Management of Type 2 Diabetes in Non-Western Patient Groups

Results from Pakistani and Kurdish immigrant populations in Norway and from the native population in the United Arab Emirates

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To my beloved family and friends all over the GLOBE!

Til min kjære familie og alle venner i hele VERDEN!

إلى أهلي وأصدقائي في جميع أنحاء العالم!

پوری دنیا میں میرے پیارے عزیزوں اور دوستوں!

بوكس وكار وهو رييا نم له هه موو جيهاندا!

List of Publications

Paper I:

Walaa Abuelmagd, Helle Håkonsen, Khadijah Qurrat-ul- Ain Mahmood, Najmeh Taghizadeh, Else-Lydia Toverud

Living with Diabetes: Personal Interviews with Pakistani Women in Norway

Journal of Minority and Immigrant Health. 2018; 20:848-53

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Paper II:

Walaa Abuelmagd, Bachar Afandi, Helle Håkonsen, Seham Khmidi, Else-Lydia Toverud

Challenges in the Management of Type 2 Diabetes among Native Women in the United Arab Emirates

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Paper III:

Walaa Abuelmagd, Bavi Botan Osman, Helle Håkonsen, Anne Karen Jenum, Else-Lydia Toverud

Experiences of Kurdish Immigrants Regarding the Management of Type 2 Diabetes: A Qualitative study from Norway

Scandinavian Journal of Primary Health Care. 2019; 37:345-52
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Summary

Type 2 diabetes mellitus (T2DM) is a major public health challenge. The increased prevalence of T2DM is explained, to a great extent, by societal changes inducing obesity through energy excess and sedentary behaviours, as in populations who have migrated to Western countries, in native populations in the Middle East who have experienced rapid economic growth, and as a result of general urbanization in many countries. Management of T2DM is multifactorial and is often a substantial challenge for patients. The aim of this thesis was to investigate how three adult non-Western patient groups, representing populations with high T2DM prevalence, managed the treatment of their disease. The patient groups were Pakistani immigrant women in Norway, native Emirati women in the United Arab Emirates, and Kurdish immigrants of both genders in Norway.

One hundred and twenty Pakistani women and ninety Emirati women were interviewed one by one in their native language (Urdu and Arabic) using a structured questionnaire. Additionally, clinical values for the Emirati women were extracted from medical records. Focus group interviews conducted in Norwegian were used for the study of the Kurds (nine women and nine men). The Kurdish participants had to be proficient in the Norwegian language to be eligible. The level of education that was reported by the Pakistanis and the Emiratis was low (illiteracy levels: 27% and 51%), whereas there was no illiteracy among the Kurdish participants. The mean age was 55.7 years among the Pakistanis, 57.5 years among the Emiratis, and 51.2 years among the Kurds.

One-third of the Pakistani and the Emirati women reported poor or very poor health, and 37% and 46% from respectively the Pakistanis and the Emiratis needed assistance to measure their blood glucose levels. One in four Pakistani women and three out of ten Emirati women were using anti-hyperglycaemic medications in both oral and injectable forms. The majority of both study populations (71% and 68%) had macrovascular comorbidities. Information from medical records revealed that almost all the Emirati women had achieved target systolic blood pressure, two-thirds had achieved target low-density lipoprotein cholesterol values, and 49% had achieved the HbA1c target of < 7.0%. While the Pakistanis and the Emiratis focused on their health status, the Kurdish participants, expressed their experiences with living with T2DM during focus group interviews, whereof the majority described it as stressful. It was commonly discussed how daily blood glucose measurements were important, and many of the participants reported incorporating this task into their daily routines, even

though it was painful. Only a few of the Kurdish participants reported using both oral and injectable anti-hyperglycaemic medications. Some of the Kurdish participants talked about comorbidities such as high cholesterol and hypertension for which they had received treatment. One in four of the Pakistani women and almost all the Emirati women reported that they fast during the month of Ramadan. These participants reported that they had altered/stopped their medication intake during that time due to religious fasting. None of the Kurdish participants fasted during Ramadan.

With regards to lifestyle habits, the majority of the Pakistani and the Emirati participants reported daily eating habits that reflected an unhealthy diet, with big meals and calorie-rich snacks. Only 3% of the Emiratis had a body mass index within the normal range. The Kurdish participants were, in general, aware of healthy dietary habits and talked about how hard they tried to change their habits to healthier ones. The majority in both the Pakistani and the Emirati groups reported very low levels of physical activity. The situation for the Kurdish participants was similar, and only a few seemed to be aware of the benefits of physical activity.

In all three study groups, the treating physician (the general practitioner in the Norwegian-based studies and the endocrinologist in the Emirati study) was the primary and most trusted source of information about T2DM. Poor Norwegian language proficiency among the Pakistanis made understanding the information difficult, and low literacy reduced, the capacity of the Pakistanis and the Emiratis to understand basic health information. The situation for the Kurds was different from the two other groups, since they had sufficient oral Norwegian language skills and had a degree of education which made them capable of reading and understanding medical information.

In conclusion, this thesis showed that Pakistani immigrant women in Norway and native Emirati women in the United Arab Emirates reported suboptimal self-management of T2DM in terms of lifestyle habits, blood glucose monitoring and medication adherence during Ramadan. Linguistic barriers, as observed in the Pakistanis, low literacy, as observed in the Pakistanis and the Emiratis, and religious factors, as observed in the Pakistanis and the Emiratis, made management difficult for both patient groups. On the other hand, the Kurds, who possessed good Norwegian language skills and were literate, expressed that their management of T2DM was largely successful.

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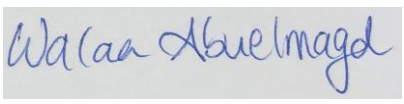

Oslo, September 2019

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Abbreviations

ADA	: American Diabetes Federation
BMI	: Body Mass Index
CKD	: Chronic Kidney Disease
CV	: Cardiovascular
DBP	: Diastolic Blood Pressure
DM	: Diabetes Mellitus
DPP-4	: Dipeptidyl Peptidase-4 Inhibitor
GLP-1RA	: Glucagon-Like Peptide-1 Receptor Agonist
GP	: General Practitioner
HbA1c	: Glycated Haemoglobin
HDL	: High Density Lipoprotein- Cholesterol
HUBRO	: The Health Survey in Oslo Region
IDF	: International Diabetes Federation
IMMIGRANT-HUBRO	: The Immigrant Health Survey in Oslo Region
LDL	: Low-Density Lipoprotein
SBP	: Systolic Blood Pressure
SGLT-2	: Sodium Glucose Co-transporter-2 inhibitor
SU	: Sulphonylurea
TGL	: Triglycerides
TZD	: Thiazolidinedione
T1DM	: Type 1 Diabetes Mellitus
T2DM	: Type 2 Diabetes Mellitus
UKPDS	: United Kingdom Prospective Diabetes Study
URI	: Upper Respiratory tract Infection
WHO	: World Health Organization
WHR	: Waist Hip Ratio

1. Introduction

1.1 Type 2 Diabetes Mellitus: a global epidemic

Diabetes mellitus (DM) is a major global health challenge of the 21st century. With its chronic nature and association with microvascular and macrovascular complications, DM often leads to reduced quality of life and premature mortality [1]. DM is ranked among the ten most common causes of death worldwide [2]. In 2017, an estimated 425 million people were living with the disease, and that number is expected to increase by roughly 50% by 2045 [1].

The burden of DM is underestimated; 38–70% of DM cases are undiagnosed [3] due to the asymptomatic nature of the disease and its progression over several years of deteriorating glucose metabolism. The United Kingdom Prospective Diabetes Study (UKPDS) found that approximately 50% of the average patient's islet β-cells were depleted at the time of diagnosis [4]. In addition, systematic or opportunistic screening of DM is not always a standard part of routine healthcare in many countries [5]. Thus, many patients live with chronic hyperglycaemia without being diagnosed and receiving anti-hyperglycaemic treatment. Late diagnosis of DM increases the risk of long-term complications of the disease. Hence, many patients have already developed microvascular and macrovascular complications before being diagnosed with DM [6, 7]. The two major forms of DM are type 1 (T1DM) and type 2 (T2DM), although DM may also develop during pregnancy and in other conditions, including genetic disorders, drug toxicity, and pancreatic exocrine disease [1].

T2DM, previously known as 'non-insulin-dependent diabetes' or 'adult-onset diabetes', accounts for 85-90% of all DM cases [1]. The rapid increase in T2DM in many parts of the world has been associated with ageing populations, as well as low physical activity levels and high access to and excess consumption of energy-dense foods [8, 9]. These unhealthy lifestyle habits are well-documented in certain populations that have experienced economic growth [8-17]. For instance, differences in T2DM prevalence have been found between urban and rural areas in China and India, whereas higher prevalence of T2DM has been found in high-income urban populations compared to low-income rural populations [18, 19].

During the past five decades, a rapid increase in T2DM has occurred in the Arabian Gulf countries [9, 10, 20]. Following the discovery of oil in these countries in the 1970s, urbanization and increased prosperity have brought extensive lifestyle changes to the native populations, leading to health issues such as obesity. It has been shown that in Gulf countries (e.g., Kuwait, Saudi Arabia, and the United Arab Emirates (UAE)), native individuals with high socioeconomic status and highest gross domestic product per capita had high daily caloric intake (> 3000 kcal), much higher than that reported from other Middle Eastern countries with less robust economies [8]. In addition, physical inactivity, particularly among native women, has been reported to be high in many of the Arabian Gulf countries [10]. The corresponding high rates of obesity are associated with a high prevalence of T2DM [21]. Prevalence rates of more than 20% for DM places most Arabian Gulf countries among the countries with the highest prevalence worldwide [1]. It is worth noting that the native populations in many of the Arabian Gulf countries represent a minority proportion of the total population. For example, in the UAE, the native population, also known as Emiratis, constitutes only 12% of the total population [22]. It is also important to mention that the high prevalence of obesity and T2DM in the native Emirati population is seen, even though they receive considerable healthcare benefits, such as almost full coverage of medication, the freedom to choose healthcare providers, either in the primary or secondary care sector with full or almost full (80%) coverage at public and private healthcare facilities. Such benefits are not offered to the majority immigrant population in the country [23].

The situation is different in Western populations in high-income countries, where high rates of obesity and T2DM are linked to individuals with low socioeconomic status [24, 25]. The high prevalence of T2DM in certain non-Western immigrants following migration to Western countries [12, 15, 16, 26, 27], has been partially explained by lifestyle changes combined with a predisposition for developing the disease [28-33]. Compared with people of European descent, South Asians living in high-income countries had a T2DM prevalence that is more than four times higher than that of the host populations of the countries to which they move [34].

1.2 Migration and T2DM in Norway

1.2.1 Migration to Norway

Migration is a dynamic phenomenon and can occur due to "pull factors" towards the host country (e.g., education, job opportunities, well-being) or as a consequence of "push factors" away from the country of origin (e.g., poverty, natural disasters, war, terrorism) [35, 36]. According to Statistics Norway, an immigrant is a person who is born abroad of two foreign-born parents and four foreign-born grandparents [37]. The term previously used to refer to this group was "first-generation immigrants". "Norwegians born of immigrant parents", formerly referred to as second-generation immigrants, are persons born in Norway of two parents born abroad and with four grandparents born abroad [37]. The number of immigrants in Norway has almost doubled during the last few decades. Immigrants are a heterogeneous group representing more than 220 different nationalities, and as of 2019, more than 900 000 inhabitants have an immigrant background, constituting almost 18% of the total population of the country [37].

Migration from non-Western countries to Norway is relatively recent and has brought substantial demographic changes over the last five decades [38]. At the start of this thesis project in 2013, Pakistanis constituted the largest non-Western immigrant group [39]. They were among the first non-Western immigrants to arrive in the country when they came as working migrants in the late 1960s and early 1970s. Later, this population kept growing in size due to family reunions and marriage [38, 40]. As of 2019, there are approximately 38 000 inhabitants of Pakistani background living in Norway [37]. The Pakistanis are currently the second largest non-Western group, after the Somali group who constitute 43 000 persons [37].

During the 1980s and 1990s, other non-Western immigrant groups started to come to Norway in relatively high numbers from different parts in the world due to "push factors". One example is the Kurds, who represent one of the largest ethnic groups in the Middle East, originating primarily from Iraq, Iran, Syria, and Turkey [41]. Because only country of origin, and not ethnicity, is recorded in Norwegian population censuses, the exact number of Kurds living in Norway is uncertain, but estimated to be between 25 000 and 30 000 persons [41].

1.2.2 The T2DM situation in Norway

In the mid-1980s, a large-scale population-based study was conducted in Nord-Trøndelag County. This almost exclusively comprised ethnic Norwegians. The prevalence of DM in adults ≥ 20 years of age was 2.9%, whereof the majority had T2DM [42]. A follow-up study was conducted in Nord-Trøndelag County a decade after, showing an increase in the prevalence to 3.2% [43], suggested to result from an increase in the mean Body Mass Index (BMI) and in the prevalence of obesity, especially among younger people [43].

In 2000/2001, the municipality of Oslo, the University of Oslo and the former National Health Institute (now part of the National Public Health Institute) conducted studies among the adult population (30–60 years old) in Oslo (The Health Survey in Oslo Region, "the HUBRO" project). This later developed further into the "Immigrant-HUBRO" project conducted among the five largest immigrant populations with the longest residence period in Oslo at that time (Iranians, Pakistanis, Sri Lankans, Turks (of whom a large proportion were Kurds), and Vietnamese) [44-46]. The aim of the project was to investigate ethnic differences in health, including prevalence of DM, obesity, and cardiovascular risk factors.

Overall, it became evident that a higher proportion of immigrants tended to assess their health as poorer than their Norwegian counterparts. Furthermore, there was a substantial difference in the proportion of Norwegians and immigrants with DM, with a higher prevalence in the latter group [44, 45]. The highest prevalence of DM was found in the capital city, Oslo, a finding attributed to the large immigrant population in the city [44, 45]. In terms of obesity (BMI ≥ 30 kg/m^2) and central obesity (waist-hip ratio (WHR) ≥ 0.85), the highest levels were found among women from Pakistan, Sri Lanka, and Turkey, and the lowest levels among women from Vietnam. Even after adjusting for sociodemographic and lifestyle factors (e.g., age, level of education, and physical activity), ethnic differences in obesity persisted [47].

At the same time, a study conducted in two districts in eastern Oslo (Furuset and Romsås) revealed the DM prevalence in 30–67 year olds to be higher among South Asian women (27.5%) compared to South Asian men (14.3%), Western men (5.9%) and Western women (2.9%) [48]. Based on results from the Immigrant HUBRO study and The Romsås in Motion Study [49], a meta-analysis examined DM susceptibility in people aged 30–60 years in four non-Western minority groups (Pakistan, Sri Lanka, Turkey, and Vietnam) compared to

ethnic Norwegians in the same age group [17]. Pakistani women had the highest prevalence of diabetes (26%), even higher than among Pakistani men (20%). The group with the next highest DM prevalence after Pakistani women were Sri Lankan women (23%) and both men and women from Turkey had a prevalence of 12% [17]. Ethnic Norwegians had the lowest rates: 3% and 6% of women and men had DM, respectively [17].

The Norwegian Institute of Public Health has estimated that 4.7% of the total Norwegian population has DM based on data collected from the Norwegian Prescription Database [50], and large population studies conducted in the country [51-53]. Due to the data source, the number is a rough estimate and must be interpreted with caution [51, 54]. In addition, it was also assumed that many were living with undiagnosed DM. A more recent study linked data from national registries with prospective data on diabetes diagnoses and anti-hyperglycaemic medication prescribed for all residents in Norway (aged 30–89 years) during 2009–2014. During the investigation period in that study, the prevalence of T2DM increased from 4.9% to 6.1% [55].

The current prevalence of DM in the Middle Eastern countries where Kurds originate is estimated to be 1.5 to 2 times higher than in Norway (9–12% vs. 6%) [1, 55]. Except for the prevalence of T2DM among people born in Turkey in Norway [17], information on the specific prevalence of T2DM in Kurdish immigrants from Iraq, Iran and Syria is scarce. Nordic studies of immigrants from countries where Kurds originate have examined the prevalence of T2DM or risk factors for the disease [14, 15, 56-61]. A 2013 Swedish study confirmed, as expected, that the prevalence of T2DM was higher among Iraqi immigrants than Swedish participants (8.4% vs. 3.3%) [61]. It has also been shown that the T2DM cases in the Iraqi immigrant population was slightly higher (12%) than for Iraqis living in rural areas in Iraq (7%), but at the same time lower than for Iraqis living in urban areas in Iraq (20%) [12]. The clear difference in the prevelance of the disease in Iraqis living in urban areas of Iraq vs. those living in rural areas of Iraq, and between those in Iraq and Sweden, respectively, indicates the influence of urbanization on diabetes development—but at the same time, shows that the migration effect is not particularly clear in this population [12]. In Finland, the prevalence of cardiovascular risk factors, such as insulin resistance, abdominal obesity, low high-density lipoprotein (HDL) cholesterol, elevated triglycerides (TGL) and hypertension, were significantly higher among Kurds than Finns [15].

1.2.3 T2DM care in Norway

All legal citizens have equal rights in terms of accessing healthcare services in Norway and are listed with a general practitioner (GP). Patients are responsible for only a small co-payment for consultations due to the state-funded reimbursement system. In other words, patients pay only about 39% of the costs for consultations, medication, and monitoring of chronic diseases (e.g., blood glucose measuring strips) until a maximum amount yearly (2085 NOK as of 2019), after which services are free of charge. The balance is covered by the Norwegian state [62].

T2DM patients in Norway are treated mainly by their GP. According to the national clinical guidelines for diabetes, most patients should have follow-up appointments at least 2–4 times a year and be referred to a diabetes specialist/endocrinologist if poor glucose control/high risk of complications persists [63]. Scheduled consultations with GPs last 15–20 minutes on average, longer than in several other countries [64]. For example, a British study showed that consultations in the UK had a mean duration of only 9 minutes [65].

According to national and international T2DM treatment guidelines, doctors are supposed to actively identify cases of undiagnosed diabetes and those with an increased risk of developing T2DM (e.g., ethnic Asians and Africans) in order to prevent or postpone the development of the disease [63, 66, 67]. The updated Norwegian guidelines from 2016 recommend yearly HbA1c testing for all individuals of Asian and African descent starting from 25 years of age [63].

1.3 Risk factors for and complications of T2DM

1.3.1 Risk factors for T2DM

Although the pathogenesis of T2DM is not fully understood, insulin resistance and an absolute or relative defect in insulin secretion are the major known factors [68]. The development of T2DM is strongly associated with genetic susceptibility combined with a variety of environmental, behavioural, and societal factors [7, 69-73]. *Figure 1* presents one model of the complex pathways of factors at different levels contributing to the development of T2DM. The figure also illustrates that different determinants interact in the development of the disease and its complications, eventually resulting in reduced quality of life for many patients [74].

Obesity plays a major role in the development of T2DM. Obesity is described as *"a disproportionate body weight for height with an excessive accumulation of adipose tissue that is usually accompanied by mild, chronic, systemic inflammation"* [75]. The prevalence of obesity and overweight has increased steadily over the past few decades [76, 77], and the WHO has declared obesity a "global epidemic" [78]. The conventional clinical thresholds for obesity were originally derived from populations of white European descent, namely BMI ≥ 30 kg/m^2 [79] or a waist circumference ≥ 88 cm in women and ≥ 102 cm in men [80]. Studies carried out in Western countries suggest that certain patient groups (e.g. South Asians) experience a higher risk of T2DM at lower levels of obesity than whites [80, 81]. For instance, in the early 2000s, the YY paradox was introduced after two researchers, Yudkin (European background) and Yajnik (Indian background), noticed that they both had a normal BMI value of 22 kg/m^2, but remarkably different adiposities, 9% and 21%, respectively [32]. "The Asian Indian phenotype" was established, referring to the tendency of South Asians to have higher adiposity [82], lower skeletal muscle mass, and a higher degree of insulin resistance and pancreatic β-cell dysfunction [83, 84] at any given BMI level than those of European descent [81, 82, 85-87]. Even at normal BMI values (22 kg/m^2), Asians have a prevalence of T2DM similar to obese (30 kg/m^2) white Europeans [81]. All of these findings suggest that rather than BMI, body fat should be measured as a risk factor for T2DM in South Asians.

As the conventional BMI cut-off points may not be appropriate and can be misleading when defining increased risk in this population group, the international guidelines for the treatment of DM recommend lowering the BMI cut-off points in South Asian populations, suggesting overweight should be defined as BMI > 23 kg/m^2 and obese as BMI > 27.5 kg/m^2 in Asian populations. [67, 88]. Another proposal, by experts in India, suggested that slightly lower cut-offs for BMI, 23 and 25 kg/m^2, for overweight and obesity respectively, should be used for Asian Indians [89].

Biological variations between South Asians and Europeans have also been found in new-borns, suggesting, at least partly, the role of intrauterine programming and epigenetics [90-92]. Studies have indicated that foetal programming in response to a nutritionally deprived environment [93, 94] and morphisms [95], may lead to a higher susceptibility for T2DM later in life. Similar to other ethnicities, low birth weight [94], family history, and eventually maternal overweight and obesity, [81, 95-97] contribute to T2DM among South Asians.

Age at T2DM onset varies across ethnicities. Early age at T2DM onset is associated with poor disease prognosis, particularly in terms of rapidly worsening glucose regulation and the development of diabetes-related complications [98]. T2DM onset in Jamaicans and Mexicans [99], and Pima Indians from the United States (US) [100] are found to occur in adolescence or early adulthood. Studies conducted in the UK and other Western countries (e.g., Australia, Canada, Denmark, France, Norway, Sweden, and the US) have shown that T2DM onset occurs much earlier among certain immigrants from non-Western populations (i.e., Black Africans, Caribbeans, Iraqis, Moroccans, Pakistanis, Sri Lankans, and Turks) compared to those with a Western background [14, 17, 28, 29, 31-33, 73, 101-106]. In Norway, immigrants from South Asian countries and the Middle East (mainly Kurds from Turkey) are diagnosed with T2DM, on average 15 and 13 years earlier than their ethnic Norwegian counterparts (45 and 47 vs. 60 years, respectively) [105].

An individual's socioeconomic status has been reported to influence obesity and consequently T2DM [14, 75]. In many populations, especially those in high-income countries, obesity is often found to be disproportionate among Western individuals; the lower the socioeconomic position, the higher the proportion of men and women who are obese [25, 107]. Moreover, studies from Western countries such as Finland, Italy, the Netherlands, Norway, Sweden, and the UK have shown that obesity prevalence increases with urbanization and migration and is more prevalent in immigrants from low-income countries than among the respective host populations [103, 108-111]. A Norwegian study found that obesity and high blood lipids were prevalent in Pakistanis in Norway and Pakistanis in Pakistan; the highest level was recorded amongst those living in Norway [112]. In many non-Western countries, obesity especially in women, is often limited to those with high socioeconomic status [9, 10, 113]. In a study conducted at hospital outpatient clinics in Al-Ain, UAE, dietary practices and barriers to a healthy diet were evaluated in 409 native Emirati patients with T2DM. The majority were overweight (36%) or obese (45%), and the women were, on average, more obese than men [114].

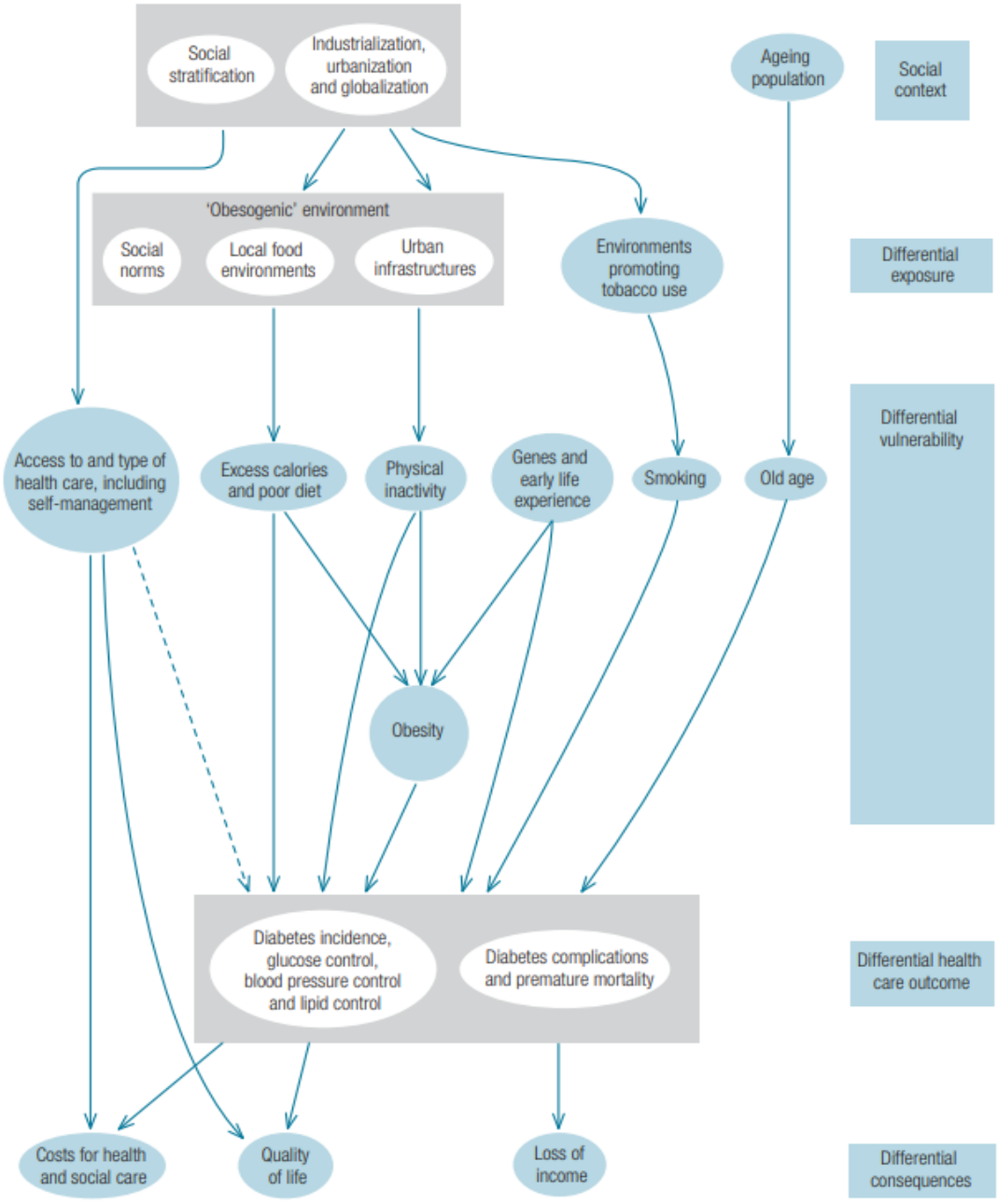

Figure 1. Overview of pathways related to T2DM - *Reprinted with permission from the World Health Organization (WHO)* [74].

1.3.2 Complications of T2DM

Vascular complications are the major cause of morbidity in patients with DM, and there is a higher risk of death among DM patients compared to individuals without the disease [115, 116]. Long-term vascular complications are broadly divided into macrovascular (myocardial infarction, stroke, and peripheral vascular diseases) and microvascular (retinopathy, nephropathy, neuropathy) complications [117]. Other long-term complications include

psychological disorders [118], dementia [119], and sexual dysfunction [120]. Acute diabetes-related complications include diabetic ketoacidosis from very high blood glucose or diabetic coma from very low blood glucose [121].

Recent research has shown that there is little or no increase in the number of mortality and the incidence of cardiovascular outcomes in patients with T2DM living in high-income countries. This is suggested to be a result of early detection of T2DM and improved management of risk factors such as hyperglycaemia, hypertension, and high cholesterol [122, 123]. However, disparities regarding cardiovascular diseases are still present in high-income countries, where the highest prevalence of T2DM and cardiovascular disease has been found in immigrants from low-income countries [61, 109, 124, 125]. In other parts of the world, the number of new cases with complications has increased, and access to effective healthcare interventions is limited; thus, the actual number of people experiencing diabetes-related complications is still increasing.

Macrovascular complications

There is a 2- to 4-fold increased risk of developing macrovascular complications in patients with T2DM than among individuals without the disease [126-129]. Myocardial infarction is the most common cause of death in patients with T2DM [130]. In addition to hyperglycaemia, macrovascular complications are strongly associated with high blood pressure and dysglycaemia (e.g., increased TGLs, low-density lipoprotein (LDL), and decreased HDL). Other risk factors include obesity, kidney disease, non-alcoholic fatty liver disease, endothelial dysfunction, and enhanced pro-inflammatory processes including plasminogen activator inhibitor-1 levels [130, 131].

Even in the absence of hypertension and coronary artery disease in patients with T2DM, diabetic cardiomyopathy may develop, characterized by diastolic dysfunction [132] which include slower filling of primarily the left ventricle during the diastole. Diastolic dysfunction is observed in up to 40–60% of subjects with heart failure [133, 134], but patients with T2DM are overrepresented [135]. The major clinical consequence is exertional dyspnoea, which limits the capacity of individuals with T2DM to perform exercise, an important aspect of diabetes management, particularly in the context of obesity.

Microvascular complications

Persistent hyperglycaemia accelerates the development of microvascular complications which often develop over many years. Chronic hyperglycaemia may cause microvascular damage to the retinal vessels through a variety of complex mechanisms and lead to diabetic retinopathy. The overall number of people affected by blindness due to diabetic retinopathy increased between 1990 and 2015, from approximately 200 000 to 400 000 people worldwide, and the population affected by vision impairment due to diabetic retinopathy increased from approximately 1.4 million to 2.6 million [136]. Diabetic neuropathy is another microvascular complication that affects both the somatic and autonomic divisions of the peripheral nervous system and, in the worst cases, leads to non-traumatic amputations [121]. Approximately 50% of people with T2DM will develop diabetic neuropathy during their lifetime, although estimates vary depending on the criteria and methods used to define neuropathy [137]. The third microvascular complication, diabetic nephropathy, is characterized by change in renal haemodynamics followed by a decline in glomerular filtration rate due to changes within glomerular epithelial cells, termed podocytes [121]. Diabetic nephropathy is mostly asymptomatic and represents a major cause of end-stage renal failure in diabetes patients [138]. The annual global mortality rates for chronic kidney diseases increased from 12 to 16 per 100 000 persons between 1990 and 2013 [139]. Decreased renal function over time often leads to an increase in cardiovascular events and deaths [140, 141].

Psychological complications

Psychological complications related to T2DM include stress, frustration, guilt, anxiety, and sadness [142-144]. A meta-analysis (n = 10 studies) of Finland, Iraq, Italy, the Netherlands, and the US, including a total of 51 331 people, estimated that one-fifth of people with T2DM had received a diagnosis of depression, a rate about four times higher than that among people without the disease [145]. The multinational Diabetes Attitudes, Wishes, and Needs (DAWN) study from 2005 investigated psychosocial experiences related to T2DM management in 13 countries in Asia, Australia, Europe, and North America from the perspective of both patients and healthcare personnel [146]. Roughly 40% of the patients with T2DM reported experiencing poor psychological well-being. The healthcare personnel (including GPs) estimated that 60–70% of T2DM patients had psychological problems, including depression, stress disorders, and burnout [146]. The study did not explore potential heterogeneity

between countries due to differences in sampling strategies and the populations from which these samples were drawn, as well as because patient and provider expectations likely differ between countries and cultures. The most important finding was that psychosocial challenges were consistently present, regardless of country [146].

1.4 Treatment of T2DM

1.4.1 Treatment goals for T2DM

The main treatment goals for T2DM are to reduce symptoms caused by high blood glucose, prevent severe hyperglycaemia and diabetic coma, and reduce, in the longer term, the risk of microvascular and macrovascular complications [63, 66, 67], as specified in the Norwegian, International Diabetes Federation (IDF) and American Diabetes Association (ADA) treatment guidelines [63, 66, 67]. Good control of blood glucose is a cornerstone. These guidelines recommend achieving Hb1Ac values < 7.0% (i.e., 53 mmol/mol), but HbA1c values of 7.0–8.0% (i.e., 53–64 mmol/mol) can be acceptable for certain patients, such as the elderly, those who experience frequent episodes of hypoglycaemia, and/or those with multiple comorbidities [63, 66, 67].

The Norwegian guidelines recommend treatment of people with diabetes and blood pressure > 140/90 mmHg with antihypertensive medications. The proposed treatment goal for people without hypertension is blood pressure < 135/85 mmHg [63]. The IDF guidelines recommend a blood pressure target of 130–140/80 mmHg for patients with T2DM and hypertension. Higher targets may be acceptable among patients > 80 years of age (145/85 mmHg) [66]. According to the ADA guidelines, most patients with diabetes and hypertension should be treated to a blood pressure target of 140/90 mmHg, similar to the recommendation in the Norwegian guidelines [67]. Lower blood pressure targets (130/80 mmHg) may be applicable for younger patients and patients with a high risk of cardiovascular disease [67].

Prophylactic treatment with lipid-lowering medication (commonly statins) is recommended for all T2DM patients between 40–80 years of age according to the Norwegian guidelines, and the treatment target for LDL-cholesterol is 2.5 mmol/1 [63]. In addition, statins are recommended for T2DM patients younger than 40 years and those without known risk factors for cardiovascular diseases if the LDL-cholesterol value exceeds 2.5 mmol/l [63]. According to the IDF guidelines, patients with T2DM and established cardiovascular disease

should be prescribed statin therapy. The targeted LDL-cholesterol value is 1.8–2.0 mmol/1. T2DM patients with and without established cardiovascular disease and ≥ 40 years of age should start treatment with statins [66]. According to the ADA guidelines, statins are recommended for T2DM patients aged 40–75 years and for patients > 75 years of age without atherosclerotic cardiovascular disease [67]. The targeted LDL-cholesterol value is < 2.6 mmol/1 [67].

1.4.2 Management of T2DM

Patient management of T2DM is necessary to achieve the treatment goals for the disease. Barlow et al. defined patient management as *"the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition"* [147]. Studies have shown that better management behaviour is associated with improved outcomes and reduced healthcare costs [148, 149]. The treatment of T2DM involves several steps that depend on the duration and the severity of the disease. Lifestyle changes, taking prescribed medications, and monitoring blood glucose are tasks that most T2DM patients are expected to perform in order to satisfactorily manage the disease and prevent or halt the development of related complications [150-152]. In addition, follow-up by healthcare personnel is important in order to support patients to achieve the treatment goals [63, 66, 67].

Both national and international guidelines (Norwegian, IDF and ADA) recommend individualized management. Most patients start with lifestyle changes alone, supplemented by one or several oral and/or injectable anti-hyperglycaemic medications as needed. The main target for doctors is usually to support patients to achieve the metabolic targets within 3–6 months from the time of diagnosis [63, 66, 67].

1.4.2.1 Lifestyle management

Lifestyle management is a fundamental part of T2DM care that is highly stressed in the national and international guidelines [63, 66, 67]. Lifestyle management primarily includes adoption of healthy diet and being physically active.

Dietary intake

All T2DM guidelines recommend restricted calorie content in the diet of obese patients. For patients with normal weight, it is recommended to check diet quality and avoid food items

that raise blood sugar. The emphasis should be on healthy eating patterns involving nutrient-dense foods with fewer energy-dense nutrients—individualised/culturally targeted—rather than an ideal percentage of calories from carbohydrate, protein, and fat that fits *all* people with the disease [63, 66, 67, 88, 153]. Several randomized controlled trials have shown the benefits of nutritional recommendations and dietary changes in reducing HbA1c values [154, 155].

Given that a high proportion of T2DM patients are overweight or obese, guidelines support modest and persistent weight loss to manage T2DM and achieve glycaemic targets [63, 66, 67]. Furthermore, making changes to the diet often leads to positive effects on several risk factors other than T2DM, and has beneficial health outcomes. National and international guidelines encourage healthcare providers to give T2DM patients advice about what food items to reduce or avoid eating and what to eat more of, as well as meal size and frequency [63, 66, 67].

Physical activity

In the national and international T2DM guidelines [63, 66, 67], physical activity in combination with a healthy diet is also presented as an important part of lifestyle management. A physical activity level of 150 minutes of moderate to vigorous aerobic exercise per week is recommended. More intense physical activity is recommended for weight loss and to avoid regaining weight [63, 66, 67].

Being adequately physically active has been shown to have several benefits. High levels of exercise intensity are associated with significant improvements in HbA1c levels [156]. A meta-analysis of 13 randomized controlled trials showed that high-intensity aerobic exercise results in a significant reduction in BMI and HbA1c levels, and is superior to low-intensity exercise in improving cardiorespiratory fitness in T2DM patients [157]. Other benefits of being physically active include improving physical form, particularly among those who are overweight or obese [158]. Several large cohort studies with 15–20 years of follow-up have shown that regular physical activity or good physical form is associated with a 39–70% reduction in cardiovascular and total mortality in people with T2DM [159-161].

1.4.2.2 Pharmacological treatment and blood glucose monitoring

Most patients with T2DM who are initially treated with diet and exercise alone will eventually be in need of pharmacotherapy to control glycaemia.

Metformin, if not contraindicated and tolerated, is the preferred initial anti-hyperglycaemic medication for the treatment of T2DM in national and international treatment guidelines [63, 66, 67] due to its effectiveness, low price, and long history of use. Until the late 1990s/early 2000s, metformin was the only available medication that improved glycaemia and had favourable effects on endothelial dysfunction, haemostasis and oxidative stress, insulin resistance, lipid profiles, and fat redistribution [6]. After 2005, new anti-hyperglycaemic medications were released on the market and provided beneficial effects for cardiovascular comorbidities and/or weight reduction/stabilization [162], including glucagon-like peptide-1 receptor agonists (GLP-1RAs), dipeptidyl peptidase-4 (DPP-4) inhibitors, and sodium glucose co-transporter 2 (SGLT-2) inhibitors [6, 153, 163, 164].

Oral anti-hyperglycaemic medications other than metformin that have different mechanisms of action can be initiated in patients with metformin contraindications or intolerance, or as add-ons. In the national and international guidelines, combination therapy is recommended when HbA1c levels are > 9% (75 mmol/mol) [63, 66, 67]. Insulin has the advantage of being effective when other agents may not be, and may be prescribed as the sole treatment or as part of combination therapy when hyperglycaemia is severe (HbA1c ≥ 10.0%; 86 mmol/mol), especially if the T2DM patient is symptomatic, β-cell function is severely limited, or if any catabolic features (weight loss, diabetic ketoacidosis) are evident [88, 117, 153]. The anti-hyperglycaemic therapy can always be simplified/reduced as the patient's glucose toxicity resolves [63, 66, 67]. *Table 1* lists information about the most common anti-hyperglycaemic medication classes prescribed worldwide.

Blood glucose monitoring

Blood glucose monitoring is a key tool in DM management. Blood glucose monitoring helps DM patients check day-to-day fluctuations and variations in blood glucose levels, allowing them to react accordingly with changes in lifestyle or medication. In addition, blood glucose monitoring provides healthcare personnel with valuable information needed to properly adjust a patient's diabetes treatment. There is an ongoing discussion about the appropriate frequency of blood glucose self-monitoring for T2DM patients [63, 66, 67].

For example, the current national and international guidelines recommend that patients using insulin perform blood glucose checks before and after meals, before and after exercise, before bedtime, prior to critical tasks, such as driving, and in situations where an abnormal glucose level is suspected, resulting typically in between 4 to 10 checks per day [63, 66, 67]. However, for patients who are not prescribed insulin or medications that influence insulin secretion or glucose absorption, less frequent monitoring may be safe due to the decreased risk of glycaemic variability [63, 66, 67].

Table 1. Overview of the most common anti-hyperglycaemic medication classes [6, 150, 164]

Anti-hyperglycaemic medication class	Mechanism of action	Main physiological action	Reduction in HbA1c (%)	Advantages	Disadvantages
Biguanides	Activates insulin receptor tyrosine kinase activity, and improves β-cell response to a glucose load through correction of glucose toxicity	↓ Hepatic glucose production ↑ Insulin sensitivity in skeletal muscle	1.0-1.5	↓ Weight cheap, long experience, no hypoglycaemic events, improves survival rates in stable heart failure patients with T2DM	GI disturbances (diarrhoea, abdominal cramping), lactic acidosis (rare) Multiple contraindications: CKD, alcoholism, acidosis, liver failure, heart failure, patients who had major surgery, or who have sepsis
Sulphonylureas (SUs)	Closure of adenosine triphosphate-dependent potassium (ATP)-sensitive K^+ channels on β-cell membrane	↑ Insulin secretion	1.0-1.5	Cheap, long experience Low microvascular risk	↑ Weight Hypoglycaemia Increased CV risk contraindicated in heart failure patients
Thiazolidinedione (TZD)	Activates the gene transcription of peroxisome proliferator-activated receptor gamma (PPARγ)	↑ Insulin sensitivity	1.0-1.5	No hypoglycaemic events, ↑ HDL-cholesterol, ↓ TGL (pioglitazone)	↑ Weight, oedema, HF, decreased haemoglobin, bone fracture, increased myocardial infarction (rosiglitazone)
Dipeptidyl peptidase-4 (DPP-4) inhibitors	Suppresses the enzymatic degradation of postprandial active incretin (GLP-1 and GIP)	↑ Insulin secretion ↓ Glucagon secretion	0.4-0.8	No hypoglycaemic events, not contraindicated in heart failure	Headaches, URI, angioedema/ urticarial, worsen heart failure prognosis (saxagliptin)
Glucagon-like peptide-1 receptor agonists (GLP-1RAs)	Activates GLP-1 receptors	↑ Insulin secretion ↓ Glucagon secretion Reduces appetite	0.5-1.5	↓ Weight, no hypoglycaemic events, ↓ Postprandial glucose excursions, not contraindicated in heart	GI disturbances (diarrhoea, nausea), pancreatitis, increases heart rate, injectable Expensive, ↑ LDL-cholesterol, ↑ Creatinine (transient)

Anti-hyperglycaemic medication class	Mechanism of action	Main physiological action	Reduction in HbA1c (%)	Advantages	Disadvantages
		Slows gastric emptying		failure, improved cardiovascular outcomes	
Sodium glucose co-transporter 2 (SGLT-2) inhibitors	Selective, potent and reversible inhibitor of SGLT-2 in the proximal nephron	Blocks glucose reabsorption by the kidney, ↑ Glycosuria	0.5-0.8	↓ Weight, no hypoglycaemic events, ↓ Blood pressure	Genitourinary infections, polyuria, dizziness/hypotension/volume depletion
α- Glucosidase inhibitors	Competitively suppresses the binding of oligosaccharides to the α-glucosidase enzyme in the small intestine.	Slow intestinal carbohydrate digestion/ absorption	0.5-0.8	No hypoglycaemia, Acarbose may reduce adverse CV events	GI disturbances (diarrhoea, flatulence), modest efficacy, frequent dosing
Meglitinides	Bind to pancreatic β-cell membranes like SUs (though at a different binding site)	↑ Insulin secretion	0.5-1.5	Useful for patients with irregular meal schedule, can be used in patients with renal impairment	↑ Weight, mild to moderate hypoglycaemia, contraindicated in heart failure patients
Insulin	Activates insulin receptors	↑ Glucose disposal ↓ Hepatic glucose production	> 1.5	↓ Microvascular risk, ↑ Efficacy	↑ Weight, injectable, hypoglycaemia, patient reluctance

CKD: chronic kidney disease; CV: cardiovascular; GI: gastrointestinal; GLP-1: glucagon-like peptide-1; URI: upper respiratory tract infection.

1.5 Challenges in T2DM treatment

1.5.1 Treatment non-adherence

As with any other chronic disease, the achievement of treatment goals in T2DM relies, to a great extent, on patients' treatment adherence. Treatment adherence refers to *"the extent to which a patient acts in accordance with the prescribed dose and interval of a dosing regimen"* [165]. The pharmacological treatment of T2DM usually involves several types of medications (i.e., anti-hyperglycaemic, antihypertensive, cholesterol-lowering medications). Lack of adherence tends to be a considerable barrier to achieving optimal glycaemic outcomes and increases diabetes-associated morbidity and mortality [166, 167].

Medication adherence among patients with T2DM and other chronic diseases decreases with time [168]. Estimates of rates of adherence to diabetes medications vary widely due to a number of factors, including methodology for measurement of adherence, patient characteristics (gender, socioeconomic status), and differences in the cut-off point used for defining adherence. In a study of electronic records among 8191 patients prescribed anti-hyperglycaemic medications, 60% were nonpersistent, i.e., did not continue their treatment after 24 months, and 4% never collected their prescription, despite 53% having HbA1c $\geq$ 7% [169]. One review found that adherence to oral anti-hyperglycaemic medications ranged from 36% to 93% across studies, and that adherence to insulin was roughly 63% [170].

There are many reasons for non-adherence, such as loss of motivation, particularly given the life-long duration of the disease, and complicated treatment strategies [168]. Table 2 presents a list of studies that show patient-related (e.g., age), medical-related (e.g., frequency of treatment), and healthcare-related (e.g., frequent visits to healthcare providers) factors and their association with T2DM medication adherence.

The form of administration for medications is also important, where adherence to oral medications is often higher than when injectable medications are used. A retrospective study in the US included more than 51 000 T2DM patients who were uncontrolled on two oral anti-hyperglycaemic medications and added either a third oral anti-hyperglycaemic medication or an injectable agent (a GLP-1RA or insulin) [171]. The percentage of patients remaining on the prescribed medication treatment without discontinuing until the end of year 1 and year 2 of follow-up was higher for patients with T2DM who initiated a third oral anti-hyperglycaemic medication (72%) than for those who initiated either insulin (57%) or a GLP-1RA (36%)

treatment [171]. As the number of injections increases in the pharmacological regimen, the risk of lower adherence to treatment increases [172]. Fear of injections, risk of encountering hypoglycaemia and/or weight gain, and difficulty in fitting injection treatment into daily life have all been reported as reasons for non-adherence to injectable anti-hyperglycaemic medications [173]. Furthermore, delays in intensifying treatment in T2DM patients by healthcare professionals despite suboptimal glycaemic control, referred to as clinical inertia, has been previously reported. Clinical inertia is most pronounced when introducing insulin [174]. The reluctance of healthcare personnel to prescribe injectable medications for patients with uncontrolled T2DM was identified to be due to fear of patient anger and non-adherence to injectable treatment, risks for patients encountering hypoglycaemic events and/or weight gain, and fears about how the initiation of injectable treatment would influence the patient's well-being [173].

Differences in medication adherence between non-Western immigrants and the host Western population have been reported in previous studies [175-178]. A previous study from the Pharma Use Research group investigated medication use among immigrants from Pakistan who had been residing in Norway 10 years or more and who were using some combination of anti-hyperglycaemic medications, and/or antihypertensive medications, and/or cholesterol-lowering medications, with emphasis on cultural influences, and sociodemographic variables [176]. It was found that Pakistani immigrants in Oslo suffering from T2DM and/or cardiovascular risk factors used on average 6.7 prescription drugs (range 1–28 drugs) and had poor medication adherence [175, 176]. The study participants, especially women, conveyed their apprehensiveness about the multi-medication use and reported poorer medication adherence compared to the results of a similar study of hypertensive patients from the general Norwegian population [175, 178].

Table 2. Overview of factors associated with T2DM medication adherence

Factors	Studies with positive association with adherence	Studies with negative or no association with adherence	Countries represented
Patient-related factors			
High education level	Håkonsen et al. [176], Kirkman et al. [179], Iqbal et al.[180], Rolnick et al. [181]	Parada et al. [182]	Norway, the US, Egypt, Pakistan
Increasing age	Tiv et al. [183], Kirkman et al.[179], Wong et al. [184], Rolnick et al. [181]	Aflakseir et al. [185], Marcum et al. [186], Ahmed et al. [187]	France, the US, China, Iran, Malaysia
Gender (female)	Shams et al. [188], Wong et al. [184], Kirkman et al. [179]	Rolnick et al. [181]	Egypt, the US, China
Overall good health	Bailey et al. [189]	Parada et al. [182]	The US
Low socio-economic status	-	Shams et al. [188], Kirkman et al. [179], Park et al. [190], Rolnick et al. [181]	Egypt, the US, South Korea
Medical -related			
Long duration of diabetes	Cohen et al. [191]	Alramadan et al. [167]	Saudi Arabia, the US
Low number of complications	Bailey et al. [189], Rolnick et al. [181]	Jamous et al. [192],	Palestine, the US
Type of medication	Haupt et al. [193]	Peyrot et al. [194]	Sweden, China, France, Japan, Germany, Spain, Turkey, the UK, the US
High number of medications used/dosage	-	Shams et al. [188], Rolnick et al. [181], Mroueh et al. [195]	Egypt, the US, Lebanon
Fewer side effects from medication	Shams et al. [188]	-	Egypt
Healthcare-related factors			
Low healthcare costs	Shams et al. [188], Bailey et al. [189], Tiv et al. [183], Mroueh et al. [195]	-	Egypt, the US, France, Lebanon
Regular visits or more frequent communication with healthcare personnel	Tiv et al. [183], Wong et al. [184]	-	France, China

1.5.2 Cultural aspects

1.5.2.1 Literacy level and health literacy

Like with other chronic diseases, T2DM patients' literacy level is considered a crucial factor affecting self-management. This is due to its role in, for example, reading food labels, understanding medication dosing, and monitoring blood glucose measurements [196, 197].

The level of literacy is associated with one's health literacy. Health literacy can be defined as *"the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions"* [198]. Appropriate health literacy includes an array of skills that are critical for patients to manage their condition and navigate the healthcare services. These skills include cultural and conceptual knowledge, aural and oral literacy (i.e., listening and speaking), print literacy (i.e., writing and reading), and numeracy (i.e., the ability to use and understand numbers) [197, 199]. Hence, health literacy skills include the ability to read labels on pill bottles and patient information leaflets, follow written or verbal instructions, and comprehend appointment information, educational brochures, and informed consent statements [200].

Low health literacy is associated with poorer health, weaker follow-up of one's own disease, and more frequent hospital admissions [197]. Low health literacy can be a major challenge in some groups, such as people who are older, have a low literacy level, or are members of ethnic minorities [196, 197, 200]. In addition, when information is sparse and/or difficult to understand, the prerequisites for being able to evaluate and use this information are important, but also challenging for vulnerable patient groups. Challenges related to health literacy persist and affect patients' adherence to management, leading to an increased risk of obesity, cardiovascular disease, and T2DM [10, 56, 108, 201, 202]. From the previously mentioned study from the Pharma Use research group, it has been shown that despite the relatively long residence period in Norway and unproblematic access to drugs and basic healthcare services, cultural aspects and low literacy levels, especially among women, seemed to obstruct access to information and were detrimental to the level of communication with healthcare professionals [176].

1.5.2.2 Language skills

It is well-established that challenges in communication and the provision of information and healthcare by GPs and other healthcare personnel arise when the patient is an immigrant and

unskilled in the language(s) of the country of residence [203-205]. Municipalities in Norway are responsible for providing authorized interpreters for patients with poor Norwegian language skills without an extra charge to the patient or the GP [206]. Still, barriers seem to persist between GPs and non-Western patients [207].

For instance, a study performed in our research group investigated how GPs working in areas of Oslo with a high proportion of inhabitants with a non-Western background experienced their contact with this patient group [204]. The GPs reported facing significant challenges when communicating with non-Western immigrant patients [204]. The GPs did not always use interpreters during emergency consultations due to short notice, because they perceived patients as having "satisfactory" oral Norwegian skills, or because the patient's family members with better Norwegian skills than the patient's were present during the consultation [204]. The majority of GPs sometimes found it difficult to know whether they had given enough information to non-Western immigrant patients, especially when patients had a poor command of the Norwegian language. The GPs explained that much of the consultation time was spent on interpretation, and that they only gave the most necessary information in these situations and hoped that the patients would be given sufficient information at the pharmacy when they collected the medication [204]. From another study performed by the researchers in this department, it was shown that non-Western patients tended to send their children to collect their medication from pharmacies[176], an aspect that Norwegian pharmacists found troubling [203]. As of 2016, it is prohibited by law to have patients' children/family members serve as translators during medical appointments [206]. A study conducted among Norwegian doctors after 2016 revealed that translation by minors and non-professionals is still happening, giving cause for concern [207]. As authorized interpreters are not offered at pharmacies, which are owned by private companies, one can assume that challenges in communication still persist.

1.5.2.3 Religion

Religious aspects are mentioned in the literature as influencing medication adherence among patients with T2DM and other chronic disorders [144, 176]. An example is fasting during the month of Ramadan. During the fasting period, Muslims are expected to abstain from food, water, and medication intake from sunrise to sunset, though people with chronic diseases are religiously exempted from this fasting rule. However, studies have shown that many chronically ill Muslim patients fast during Ramadan and may skip or reduce doses, take medications at closer intervals, or even stop taking medications altogether, often against medical advice [144,

176, 208]. Chronically ill patients have reported that they tend to fast due to a feeling of improvement in well-being, physiologically, socially, and religiously [208, 209]. However, fasting for long hours and medication non-adherence for chronic patients may have a negative impact on health conditions. Some studies have found an association between fasting during Ramadan and increased hospital admission rates [210, 211]. In a population-based study conducted in 13 countries with a Muslim majority population, 79% of T2DM patients reported fasting and poorly controlled T2DM patients who chose to fast had up to an 8-fold increase in incidence of experiencing hypoglycaemia compared to those who did not fast [212]. In the Norwegian study from our research group on Pakistani immigrants with chronic diseases including T2DM, nearly half (46%) of the Pakistani participants altered their medication use during Ramadan, often against their doctor's advice. Among the patients with T2DM, 34% fasted, and in most cases, fasting resulted in reduced daily medication doses. Women were overrepresented among those who fasted and reported that they reduced their medication use during the fasting period [176].

1.6 Why study the management of T2DM in non-Western patient groups?

It is important for healthcare personnel to understand that non-Western patients with T2DM have different needs for information about their disease, medication and the other aspects of management. These differences stem from reasons including various cultural factors, norms, values and experiences, which may influence the way these patients take their medication and the ways in which they manage their disease in the long term.

Furthermore, and as with the management and treatment of other chronic diseases, cultural differences often make communication between healthcare professionals and patients more complicated. Since the understanding of the disease among the majority population may differ substantially from the understanding among non-Western immigrants, healthcare providers may find treatment difficult without adequate knowledge of the patient's cultural background, as the UCL-Lancet Commission on Migration and Health have recently (December 2018) emphasized in a report [213].

In this thesis, three non-Western patient groups were studied regarding to how they managed their T2DM. Two of the three groups have migrated to Norway due to either pull factors (Pakistanis) or push factors (Kurds), while the third group lived in their home country (Emiratis).

The common aspect between the three groups is that they have undergone, at least partly, a lifestyle transition and represent groups with a high prevalence of T2DM in Norway (Pakistani women and Kurdish women and men) [17], and globally (Emirati women) [1]. In addition, it was of interest to examine, where possible, the similarities and differences between the three patient groups in the context of their T2DM management.

2. Aims

The overall aim of this thesis was to investigate how three non-Western patient groups, representing populations with high T2DM prevalence, manage the treatment of their disease.

The specific aims were:

1. To assess how Pakistani immigrant women in Norway live with their T2DM (**Paper I**).

2. To investigate the T2DM management of native female patients in the UAE (**Paper II**).

3. To explore the experiences of immigrant Kurdish patients in Norway related to the management of their T2DM (**Paper III**).

3. Materials and Methods

3.1 Materials: Papers I – III

The three T2DM patient groups who are the focus in the present thesis were Pakistani immigrant women (**Paper I**), native Emirati women **(Paper II**), and Kurdish immigrant women and men **(Paper III)**. The common inclusion criteria for all three patient groups were that they had to be above 18 years of age and diagnosed with T2DM. *Table 3* shows an overview of the participants' characteristics for each study.

Table 3. Summary of the participants' characteristics in **Papers I–III**

	Paper I	**Paper II**	**Paper III**
Patient group	Pakistani immigrants	Native Emiratis	Kurdish immigrants
Country of residence	Norway	UAE	Norway
Number of participants	120	90	18
Age in years: mean (range)	55.7 (29–80)	57.5 (32–86)	51.2 (40–64)
Gender	Female	Female	Female and male

3.2 Methods

3.2.1 Paper I and Paper II

The first and second papers represent cross-sectional studies in which personal face-to-face interviews were chosen as the data collection method. Such interviews, in both studies, gave the research team the possibility to ask the participants, many of whom had low level of education, follow-up questions and to ask for an explanation if their answers were unclear.

For the first study, key representatives from Pakistani female groups, senior centres and mosques in the capital city Oslo were contacted, informed about the study and asked for permission to recruit patients on their premises. These places were located in areas of Oslo with the highest density of non-Western immigrant inhabitants. After permission was given, potential participants were invited and provided with standardized information about the study in oral and written forms, both in Norwegian and in Urdu. The response rate was 95%.

Following informed consent, personal face-to-face interviews using an interviewer-administered questionnaire were conducted by three researchers (the author and two pharmacy master's students). One of the master's students, who has a Pakistani background, conducted the interviews in Urdu when necessary. Six out of ten participants were interviewed in Urdu. The interviews were mainly conducted at the participants' homes and all participants were asked to show the interviewer their medication(s), if they used any.

The questionnaire (see *Appendix 1*) used during the interviews was a modified and updated version of a previously used questionnaire among Pakistani immigrants [176]. The questionnaire consisted of four main sections:

1) Information about participants' health status, years since diagnosis with T2DM, and comorbidities;

2) Management of T2DM, including lifestyle habits, blood glucose monitoring, medication use, and medication adherence when fasting;

3) Sources of and adherence to lifestyle and medical information;

4) Sociodemographic data.

For the second study (**Paper II**), the recruitment process took place in the diabetes outpatient clinic at Tawam hospital, one of the largest hospitals in the UAE [214]. This hospital has been involved in many previous diabetes-related studies [114, 215-218]. Potential native female participants who visited the clinic for scheduled appointments were invited to take part in the study and were provided with standardized information about the study in their native language (Arabic). Participants received the information in both oral and written forms. The response rate was 90%.

A modified version of the questionnaire (see *Appendix 2*) that was used in **Paper I** was translated to Arabic and used in **Paper II**. Face-to-face interviews with the participants were conducted in Arabic in a vacant consultation room at the clinic. All interviews were interviewer-administered. In addition, medical records of the participants were reviewed, and the following information was extracted:

- Prescribed anti-hyperglycaemic medication treatment
- Comorbidities

- The most recent clinical values (within a year before study start) for BMI, HbA1c, blood pressure (SBP and DBP) and blood lipid values (LDL, HDL, TGL, and total cholesterol)

The interviews with the Pakistani women took place between November 2013 and April 2014, and those with the Emirati women were conducted between May 2015 and November 2015. As for **Papers I** and **II**, pilot studies were conducted, and it was found unnecessary to make any changes in the questionnaires after the pilot results were evaluated. The data analysis performed in **Papers I** and **II** have been described in the methods section of each paper. In general, descriptive (univariate and bivariate) analyses were conducted using SPSS statistical software v.22.0 and 24.0, respectively. A p-value < 0.05 was considered statistically significant in both studies.

3.2.2 Paper III

In the third paper, the T2DM management experiences of Kurdish immigrants living in Oslo, Norway were investigated. A qualitative study with focus group interviews was used [219]. The method is useful when investigating a population whose views on a defined topic are mostly unknown—as was the case with the immigrant Kurdish group presented here.

The participants in this study were recruited from places that the general Kurdish population in Oslo frequently visited (Kurdish mosques and cafés). Before recruitment, those in charge of these venues (imams/café owners) were asked for permission to recruit participants at their premises. After permission was given, potential participants were provided with standardized oral and written information in Norwegian and invited to take part in the study. The response rate was 60%.

After providing written informed consent, the participants were asked to fill in a brief questionnaire about their age, gender, nationality, and the number of years since they had been diagnosed with T2DM. Five focus group interviews were arranged, each including three to five participants. The focus groups were held in a meeting room at the School of Pharmacy or in a mosque.

The research group involved in this study were the present author, a pharmacy master student with an ethnic Kurdish background, and three academics with a background in pharmacy or medicine (with a GP background) who have previously performed several studies on non-

Western immigrants with T2DM. Based on the study aims and previous research on non-Western immigrants with T2DM in Norway [17, 49, 175, 176, 204], a structured guide was developed and used for the interviews (see *Appendix 3*).

The main topics in the interview guide were:

1) Experiences with being diagnosed with T2DM, including symptoms, causes, and complications;

2) Management of T2DM;

3) Need for medical information.

All focus group interviews were led by the same moderator (the student with a Kurdish background). An assistant moderator (academic in pharmacy) took notes during the interviews. The moderator gave a standardized introduction before the start of each interview. The interviews were audiotaped and lasted from 60 to 90 minutes. A pilot interview was conducted. Since no changes in the questionnaire or the interview settings were found necessary following the pilot, the information gathered during the pilot was included in the analysis. After five focus groups were conducted, data saturation was considered to have been obtained. Recruitment and all focus group interviews took place between October 2016 and January 2017.

The audio recordings were transcribed verbatim shortly after each interview and read by the research group to attain a comprehensive understanding of the data. A manual thematic content analysis with a deductive approach was conducted by the thesis author in collaboration with the research group [220]. This analysis included the identification and coding of meaning units from the data before the meaning units were categorized [220, 221]. The categories were later revised and modified through an iterative reading of the transcripts. After critical discussion within the research group, a consensus of the identified categories was reached.

3.3 Ethical considerations

The protocols of the studies performed in Norway (**Papers I** and **III**) were assessed by the Norwegian Centre for Research Data (NCRD). NCRD represents one of the most extensive archives for research data in Norway and is a resource centre assisting researchers with issues of methodology, privacy, and research ethics. Approval was granted before the start of each study (Reference number for **Paper I**: 35605/2/JSL, Reference number for **Paper III**:

49149/3/HIT). According to current regulations, ethical approval was not required from the Regional Committee for Medical and Health Research Ethics [222]. For the study conducted in the UAE (**Paper II**), ethical approval was granted by the Al-Ain medical district human research ethics committee (Protocol number: 15/12-CRD 380/15).

High standards for ethical conduct were adhered to during all three studies. All participants were provided with standardized oral and written information about the aim of the study in at least one language they understood. It was emphasized that participation was voluntary and that they had the freedom to refuse to answer any of the questions asked. All interviewees provided written informed consent before participation. None of the participants in the studies comprising this thesis withdrew during the interviews. Full anonymity was guaranteed to all participants, except for the focus group participants. In this kind of study, even though that confidentiality was granted from the researchers' side, confidentiality between group members could not be guaranteed. However, all participants were encouraged prior to each focus group discussion to refrain from sharing anything said in the group setting outside the group.

3.4 Funding

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For the Pakistani study, a grant was received from the Norwegian Pharmaceutical society to fund gift cards for the female participants.

For the Emirati study, financial support from the Pharma Use Research Group, Department of Social Pharmacy, as well as a grant received from the Norwegian PhD School of Pharmacy, were used to cover the expenses of the data collection period in the UAE.

For the Kurdish study, the Pharma Use Group of the Department of Social Pharmacy, School of Pharmacy, the University of Oslo, funded gift cards for the participants.

4. Synopsis of results from Papers I–III

Paper I

This paper aimed to study how 120 Pakistani immigrant women in Oslo manage their T2DM. All participants were "first-generation" immigrants. Nearly three out of ten (27%) were illiterate, 14% had 1–7 years of education, 33% had 8–10 years of education and the remaining 26% had > 10 years. The majority were housewives. Almost half of the participants reported that they had received a T2DM diagnosis > 10 years. Poor or very poor health was reported by one-third of the participants. Based upon the participants' medications, the majority (71%) used medications that indicated either macrovascular comorbidities or high risk thereof (e.g., antihypertensive and cholesterol-lowering medications), and 6% used medication for neuropathic pain, probably indicating microvascular complications.

Almost all (86%) reported to have been taught how to perform monitoring of blood glucose, at home. However, about one-third (32%) said they needed help from family members to measure their blood glucose, and six (5%) said they measured only at the GP's office. The majority (73%) were on one or more oral anti-hyperglycaemic medications, while 25% used a combination treatment of oral and injectable anti-hyperglycaemic medications, of whom a high proportion had a T2DM diagnosis > 10 years. One-fourth of the participants claimed medication non-adherence during the fasting month of Ramadan. A higher proportion of the non-adherent participants had claimed that they had not received information about medication treatment when fasting when compared with the adherent ones (Pearson's χ^2 test, $p = 0.036$).

The GP was reported as the participants' primary source of information about T2DM. Two-thirds (66%) said that they had received information about changing their lifestyle habits to be healthier. Regardless of this information, the majority admitted energy-dense diets (including eating big meals (78%) and calorie-rich snacks (66%)). Physical inactivity was reported by 45%, while the rest mentioned housework or low-intensity walking as their physical activity, something they perceived as sufficient. The majority of the participants (81%) reported a need for assistance to understand written medical information in Norwegian. Those > 50 years age and those who were illiterate were more likely to need assistance when compared to those ≤ 50 years of age and those > 10 years of education (Pearson's χ^2 test, $p = 0.005$, $p= 0.021$; respectively).

Paper II

This paper investigated how 90 T2DM native Emirati female patients in the UAE manage their disease. A high proportion of the participants (51%) were illiterate. Of the rest of the participants, 20% had 1–7 years of education, 4% had 8–10 years of education, and the remaining 25% had > 10 years. The majority of the Emirati women were housewives. About half of the Emirati participants reported having had T2DM for > 10 years. A third rated their health as poor or very poor. From the participants' medical records, we found that 68% had a diagnosis of high cholesterol, 62% of hypertension and 14% of cardiac disorders. One in five (21%) participants had microvascular complications. In general, the majority of participants had blood pressure (DBP: 96% and SBP: 69%) and lipid values (TGL: 76%, LDL: 65%, HDL: 35%) within the ADA's recommended target values.

The majority (87%) said that they had been shown how to perform self-measurement of blood glucose; however, only 54% reported measuring their blood glucose daily. The remaining needed help from family members or medical professionals. The mean HbA1c level for the participants was 7.7% (Median: 7.0%, n = 84). Oral anti-hyperglycaemic medications were prescribed to 96% of the participants. Additionally, 31% received injectable anti-hyperglycaemic medications. The likelihood of HbA1c levels < 7.0% was lower among women with T2DM for > 10 years, compared with those living with the disease for < 10 years (OR 0.25; 95% CI: 0.09-0.66). No association was found between HbA1c values and participants' educational levels.

The treating endocrinologist was the primary source of medical information for the majority of the participants (81%), followed by diabetes educators (28%). Personal meetings with healthcare personnel were the most preferred format for receiving oral information (57%), followed by lectures and written material (22% and 21%, respectively). About two-thirds of the participants said that they had received information about lifestyle modifications. However, the majority (78%) reported poor dietary habits that included 2–3 big meals/day and calorie-rich snacks. Almost all participants (93%) changed their dietary habits and altered/stopped their medication during Ramadan. In addition, four out of ten said they regularly fasted on Mondays and Thursdays. Only 58% reported having received information about T2DM management and fasting. Nine out of ten participants were physically inactive. Participants' BMI values were high; 30% were overweight and 67% obese.

Paper III

This paper explored experiences regarding T2DM management among immigrant Kurdish patients in Oslo. All male and female participants were literate "first-generation" immigrants. Although we did not specifically ask about the participants' employment status, more than half mentioned during the interviews that they were employed. The participants had a mean time since T2DM diagnosis of 7.3 years.

Most participants described that living with T2DM was very stressful and had led to considerable changes in their lives. Additionally, observing T2DM-related complications in family members seemed to have raised the participants' concerns about their disease. Even though daily blood glucose measurements could be painful to perform, the participants described the incorporation of such measurements into their daily routines and considered it important. The majority of participants were prescribed oral anti-hyperglycaemic medication. Only a few were on both oral and injectable treatment. In general, participants gave the impression that they were satisfied with their medication treatment and were keen to adhere to it. Moreover, none of the participants fasted during Ramadan.

In all five focus groups, participants discussed lifestyle changes, especially those related to diet. Participants highlighted that they had made changes to their diet and tried hard to stick to a healthy one in order to control the disease. Reported difficulties included eating energy-dense traditional Kurdish dishes and abstaining from eating when attending social gatherings. Some female participants said that they were responsible for preparing food for the rest of the family and were apprehensive about preparing two food types, a healthy one for themselves and a traditional one for their families. They prioritized preparing the traditional food that the family expected to be served.

The positive effect of physical activity was discussed to a much lesser extent than diet. Low-intensity walking was the most commonly described physical activity pattern among most participants. Lack of motivation and being tired were mentioned by some of the participants as reasons to why they were not more physically active. Others perceived that they were sufficiently active when taking care of their children, doing housework or when moving during religious prayers.

Different sources of medical information were mentioned, and the GP was generally described as the main and most trusted one. However, some participants commented that

they had experienced some difficulties in understanding information relayed by the GP, especially when Norwegian medical terms were complicated. To address that issue, the participants mentioned that their GP talked more slowly or used simpler terms. Pharmacists were brought up as another source of information, but only regarding information about using the glucometer.

5. Discussion

5.1 Methodological considerations

5.1.1 Study design and methods for data collection

Papers I and II

A cross-sectional design using a quantitative approach was applied in the studies described in the first and second papers.

In general, cross-sectional studies are good in providing important estimates of the prevalence of risk factors and disease, as well as enabling surveillance of trends and management of diseases by patients in a relatively timely manner. Moreover, cross-sectional studies can enable researchers to look at differences between population groups (in terms of gender, ethnicity, and age). However, an important limitation of cross-sectional studies is the difficulty in drawing conclusions about causation. To study possible causalities, prospective designs or randomized controlled trials are needed [223].

Given that cross-sectional studies require only one contact with the study population [224], many of the results depend on the identification and selection of the participants. Hence, such studies may be threatened by selection bias. However, selection bias may be limited with a high response rate (more information about response rates in the studies comprising this thesis is provided in *5.1.2*) [46]. Another important aspect in cross-sectional studies is coming in contact with and including a study sample that is large enough and that can be representative of the population of interest, and hence, reduce random bias by increasing precision [223].

Cross-sectional studies tend to provide an "overall picture" of the topic of interest, at the time of the study, and using face-to-face interviews as method is common in the research on T2DM in susceptible patient groups [105, 114, 175, 176, 217, 225]. Using essentially the same methods and questionnaire in **Papers I** and **II**, and in about the same time period, it was easy to compare findings from the two study population groups and to consider the results in light of non-Western patient groups who had been previously studied [114, 175, 176, 226, 227]. In addition, the use of a researcher-administered face-to-face interview technique in both papers was crucial, given the relatively low levels of education among

Pakistani immigrant- and native Emirati populations [114, 176], which would have made data collection using other methods challenging. Moreover, using this method in **Paper I**, made it possible to look at the participants' anti-hyperglycaemic and other medications, if they used any.

Paper III

In the third study, a cross-sectional design was used; however, unlike in the first and the second papers, a qualitative approach with focus group interviews was used. Focus group interviews enables exploration of the knowledge, feelings, attitudes, and experiences of a group of people who have had similar experiences regarding the topic of discussion, and hence, has the potential to enhance our understanding of patient behaviours [219, 224].

As this study was the first to investigate how Kurdish immigrants manage their T2DM in Norway, a qualitative approach was considered the most appropriate, as this study sought to generate new ideas and suggest directions for future quantitative studies [219]. Focus group interviews were particularly beneficial in this study of Kurdish immigrants in Norway since we did not have specific numbers on how many Kurds actually live in Norway, even though it is estimated that 25 000–30 000 Kurds are living in Norway [41]; a number similar to the Pakistani population in Norway. In addition, the total T2DM prevalence of the Kurdish population is not known (though these data were available for Kurdish Turks [17]). We chose to include both men and women in this study to gain knowledge about and increase our understanding of T2DM management in both genders.

5.1.2 Response rate

It is not an easy task to recruit and survey non-Western immigrant patients, primarily due to issues related to varying coverage and low response rates of these groups [46]. In the Health Survey conducted in the UK in 2004, response rates were lower for non-Western immigrant groups (ranging from 56% in Chinese respondents to 68% in Bangladeshi respondents) than for the general British population (72%) [228]. In the HUBRO studies in Norway, the participation rate was lower in non-Western populations (39%) than among immigrants from Western countries (42%) and Norwegians (46%) [44]. The high rates of non-participation among non-Western immigrant groups are likely due to a number of factors, including wariness of government authorities, language barriers (for some groups), reluctance to have their information written down, people's perception that the research is unimportant, or that

their contribution is not important, and a feeling that they have been over-researched [229, 230].

Low response rates may contribute to selection bias in interview-based quantitative studies. If one neglects selection bias and other confounding biases (e.g., sampling and information bias), errors in data interpretation will occur, affecting the study's validity [46]. In the present thesis, the response rates were high—95% among the Pakistani and 90% among the Emirati women. The response rate in the Kurdish study was 60%, which is considered very high for qualitative studies, especially those conducted with non-Western population groups [219, 231]. It is likely that a combination of factors explains these high response rates.

In all three studies, the information provided in the invitation letter, presented both orally and in writing, was in languages that each study's potential participants were able to understand (Urdu in the Pakistani study, Arabic in the Emirati study, and Norwegian in the Kurdish study). The information described the study aims and that the research group was interested in the participants' experiences about how they managed T2DM. Consistent with strategies suggested in the literature to increase the response rates of minority groups [228], the importance of our research was emphasized to the participants, and the value of their contribution was explained. It was made clear that this project aimed to increase the understanding of healthcare personnel regarding the patient experience when living with T2DM. In the Norwegian-based studies, the research team approached those in charge of the venues that Pakistani women (e.g., Pakistani imams/leaders of Pakistani women groups in **Paper I**) and Kurdish populations (Kurdish imams/café owners in **Paper III**) visited frequently, and asked them for permission to recruit potential participants on their premises. Through their engagement and daily contact with other immigrants, those in charge of the spaces where recruitment took place were able to facilitate researchers' access to potential participants.

"Ethnic matching", i.e., when interviewers and respondents share the same ethnicity, is another factor mentioned in the literature to help improve overall response rates among ethnic population groups. This matching most often increases the levels of trust, legitimacy and credibility, and potentially mitigates perceptions that the study is irrelevant [232]. However, it must be acknowledged that immigrant participants may be apprehensive in the presence of ethnic matching, as they are afraid that their personal information will be passed to others in the same group—possibly a competing clan etc. Of course, this should not

happen when professional researchers are collecting data, but people who are unaware of or not used to participating in research where high levels of confidentiality are set, may fear that this will happen [232]. In the present thesis, the researchers involved in this thesis paid attention to this aspect and assured all the participants in the three studies of confidentiality and anonymity. None of the participants in the studies comprising this thesis withdrew during the interviews. We therefore assume that being interviewed by someone of the same gender (as in the Pakistani and the Emirati study) and from their own home country/ethnic background (as in all three studies) might have contributed to the high response rates in the studies.

Language competence also may have played a role. As mentioned earlier (in *Methods*), most Pakistani participants either preferred to be or had to be interviewed in Urdu. It is not surprising that it is more comfortable to talk about experiences in one's native language, especially when one's educational level is low or proficiency in the host language (i.e., Norwegian) is poor. Thus, the ability to participate without poor Norwegian language skills as a barrier likely gave the Pakistani participants a sense of confidence and safety that was necessary to participate in the study; it may have resulted in more openness and freedom in explaining each participant's situation, and consequently, high levels of participation. In the study of Emirati women, all interviews were conducted in Arabic. In the qualitative study, only Kurds with Norwegian language proficiency were recruited and included; we suggest the good response rate in this study is largely because the recruitment and moderation of the focus groups were performed by a pharmacy student with a Kurdish background. The presence of a Kurdish moderator likely had a positive effect on the participants' willingness to share their thoughts on sensitive topics during the interviews, and probably also minimized moderator bias [233].

Other factors related to venue and scheduling may also have contributed. The majority of the interviews in the Pakistani study were conducted at the participants' homes, since it was the most convenient place—the difficulty of choosing other venues might have been exacerbated by low literacy or poor Norwegian language proficiency. Visiting the Pakistani participants at their homes also made it easier for the researchers to investigate what medications the participants were using. In the Kurdish study, venues were chosen for convenience, based on proximity to where the participants lived, were recruited, or spent their leisure time. In the study of Emirati women, the interviews were conducted at the clinic,

which was convenient for the author, as well as for the participants who had already set aside time to travel to and have their medical consultation at the clinic.

5.1.3 Quality of the information collected

Self-reported information (questionnaire & focus groups)

The questionnaire that was used in the quantitative studies was a modified and updated version of a questionnaire previously developed in the research group. Several of the questions have been used in previous studies performed in the research group [175, 176, 178, 203, 204]. Pilot interviews were conducted in each of the three studies presented in this work.

Though self-reported information is generally a reliable information source [224], it is prone to recall bias, since answers may over- or underestimate the participants' actual condition [224]. Moreover, answers may be affected by misclassification bias, i.e., when participants' answers are categorized in a way that can disguise some of the patients' characteristics and behaviours (e.g. level of education < / > 10 years, time since diagnosis with T2DM < / > 10 years, etc.). In particular, self-reported information related to lifestyle behaviours and medication adherence may be subjected to over- or underreporting. However, a study from the US found that patient self-report, pharmacy refill, and electronic adherence measures provided similar estimates of overall adherence, although refill and electronic measures were in highest agreement [234].

It is important to mention that the low levels of education among participants in the first and second paper discussed in this thesis might have led to participants having certain difficulties in understanding some of the study questions. However, this is considered rather unlikely, given that the interviews were conducted face-to-face in the participants' native language. This offered both the researcher and participants the chance to ask clarifying questions in order to assure questions asked were understood by the participants and the answers given were understood by the interviewing researcher.

In the Kurdish study, each participant was encouraged to participate actively, and a degree of interaction that led the discussion forward and helped in addressing the topics from different angles was achieved. We did not find differences in the discussions between focus groups with three or five members. Having dominative or particularly talkative participants is considered a frequent challenge in focus groups [219]. In the present study, none of the

groups included participants with these characteristics, and everyone participated, more or less at the same level.

Medical records

In addition to the self-reported answers provided by the Emirati participants, their medical records were reviewed and information about their prescribed anti-hyperglycaemic medication treatment, comorbidities, and their most recent clinical characteristics (within a year before the study period) was extracted. The information from medical records in the Emirati study allowed close examination of the participants' self-reported behaviours, providing the study with increased strength compared to those based solely on self-reported information. In addition, information about the medical diagnose of the Emirati participants' comorbidities from their medical records is more valid than relying on more indirect methods such as from the prescribed medications the Pakistani participants provided during personal interviews or self-reports by Kurdish participants during focus group discussions.

The latest HbA1c values, blood pressure and lipid values that were available in the Emirati participants' medical records were collected. However, not all the participants had all of their recent clinical values recorded (within a year of the study period). Missing values are often difficult to avoid when collecting routine care data, and can lead to over- or underestimation of the represented values [235].

5.1.4 External validity

External validity refers to the degree to which the results of a study can be generalized to the wider population.

The population in Oslo is multi-ethnic and one-third of the total population of the city has an immigrant background [236]. According to national statistics, most immigrant Pakistanis in Norway live in Oslo and its surroundings [237]. In the Pakistani study, recruitment took place in areas of the city with dense, non-Western immigrant populations; hence, the results in **Paper I** are likely representative of first-generation Pakistani immigrant women with T2DM in Oslo.

In the other Norwegian-based study (**Paper III**), the Kurdish participants were recruited from places in Oslo that the general Kurdish population frequently visits. However, especially given the qualitative nature of the Kurdish study, its results should not be

generalized. Of course, by selecting only participants who were fluent in Norwegian in the Kurdish study, the transferability of findings to Kurdish T2DM patients with poor Norwegian language skills is limited. Moreover, the transferability of the findings in the Kurdish study should be regarded with caution when compared with previous findings from studies, including non-Western patients (such as in the first and second paper) who were interviewed in their native languages.

Regarding the Emirati women in **Paper II**, we know that they cannot be compared to the majority (88%) immigrant population in the country. This is partly due to the fact that the immigrant population mainly comprises foreign workers, a population in constant flux, and that does not have access to the same healthcare benefits as the native Emirati population. The population of the Emirati participants were recruited and enrolled from one outpatient clinic in Al-Ain, and hence, the results cannot be generalized to other hospitals in the other Emirates in the UAE.

5.2 Discussion of main findings

5.2.1 The participants

This thesis investigated how three non-Western patient groups managed their T2DM. The two groups who migrated to Norway did that due to pull factors (Pakistani participants) or push factors (Kurdish participants). The third group were resident in their home country (Emirati participants).

A common aspect between the Pakistanis and the Emiratis is that both groups represent populations that, at least partly, have undergone a considerably rapid lifestyle transition. For the Pakistani immigrants, the lifestyle transition followed their migration (from rural areas in Pakistan to an urban city), contributing to an increased prevalence of T2DM [27]. For the native Emiratis, the wealth generated from the discovery of oil led to improved living standards, as well as accelerated urbanization, causing huge changes in nutrition, reduced physical activity, a greater reliance on migrant foreign workers and mechanization, and consequently high rates of T2DM [8, 9].

Though both groups have experienced lifestyle transition, the Pakistanis and the Emiratis live in different settings. The Pakistani immigrant women are a part of a minority population in Norway, which is geographically and culturally dissimilar to their home country. From

the present results, it was found that despite the Pakistani participants' many years of residency in Norway (mean: 28.7 years), the majority were housewives and not well-integrated into the Norwegian society. They also possessed poor oral Norwegian language skills. A high proportion of the Pakistani participants had to be interviewed in Urdu and 81% reported needing assistance to understand medical information provided in Norwegian. The presence of linguistic barriers among the Pakistani group is in line with previous findings regarding non-Western immigrants, including Pakistanis, living in Western countries [175, 176, 203, 238, 239] and may reflect poor communication with healthcare personnel and subsequent poor adherence to treatment. It is obvious that the Pakistani women included in this thesis probably had more challenges when compared with the Emirati women who did not have oral linguistic barriers when communicating with healthcare personnel, since they spoke the official language of the country.

In addition to language skills, the patient's degree of education plays a vital role in acquiring and understanding medical information about their own condition (here, T2DM), which is important when taking the daily decisions that affect the management of the disease [240]. The level of education of the participating immigrant Pakistani women was found much lower than that of their Norwegian counterparts. Nearly three out of ten (27%) Pakistani women were illiterate and almost half (47%) had under 10 years of formal education. Illiteracy and low education levels (< 10 years) are uncommon among ethnic Norwegians, especially given that ten years of education is compulsory in Norway and the fact that three out of four inhabitants have at least 13 years of formal education [241]. Hence, there is a possibility that Norwegian healthcare professionals are not fully aware of that their patients may possess low levels of education and thus do not consider providing adjusted information.

When comparing the Pakistani and Emirati women, we found a higher proportion of illiteracy in the native Emirati women (51%) than that among the Pakistani women (27%). In the UAE, it is common for healthcare personnel to expect older Emirati women to have little or no formal education. This may be due to healthcare personnel's prior knowledge of lack of educational infrastructure in the UAE in the 1960s and 70s when the participants were of school age and living as nomads. Regarding cultural norms (e.g., in terms of religious beliefs), it is undoubted that the Pakistanis differ from the majority of the Norwegian population. On the other hand, the Emiratis had no culture issues, being in a Muslim-dominant country.

As far as we are aware of, no previous information about T2DM management among Kurdish immigrants in Norway had previously been collected. The Kurdish participants we selected were literate and possessed Norwegian skills sufficient to ensure a free flow during the focus group discussions (as explained in *5.1*). Many of them reported that they were employed, indicating that they were well-integrated in the Norwegian society. Unsurprisingly, the Kurdish participants did not seem to have substantial difficulties with acquiring or understanding information provided in Norwegian. Hence, our findings show that when neither education nor language skills are a barrier, as with the Kurdish participants, the management of T2DM seems to be easier. Of course, including only Kurds who were proficient in the Norwegian language created a marked difference between this study population and the study populations of immigrant Pakistanis and Emiratis. As explained before, due to participant selection, our results from the Kurdish study are not directly transferable to the general Kurdish population who may have poorer Norwegian skills and/or low literacy levels.

5.2.2 Lifestyle management

Several studies have found that living with T2DM is often considered a physical and psychological burden for many patients regardless of country [142, 146, 242, 243]. The present thesis findings showed that the three patient groups were no exception and to have had challenges with living with T2DM in one way or another. Similar with former findings on self-perceived health [244, 245], the findings in the quantitative studies showed that one-third of the Emirati and the Pakistani women reported having "poor" or "very poor" overall health. For the Kurdish participants, who expressed their experiences with T2DM management during focus group discussions, living with T2DM was described as stressful. This is consistent with previous studies from Australia [142], Austria [144], Sweden [243], and the UK [202].

As previously mentioned, lifestyle changes, such as modifying dietary patterns and increasing levels of physical activity are cornerstones of the treatment of T2DM [63, 66, 67]. Still, many patients find this area of management extremely difficult. Most of the Pakistani and the Emirati participants were non-adherent to good dietary habits, as is clear from the contents of their reported diets. The reported unhealthy diet in Emirati women was also reflected in the unfavourably high BMI values extracted from the participants' medical records: 29% of participants were overweight, and as much as 67% were obese, a troubling

observation. The BMI values of the Emirati participants were even higher than those previously reported from the same clinic [114, 216], and neighbouring Gulf countries [246, 247]. As mentioned previously in the *Introduction*, T2DM associated with obesity is a major public health concern, and in many patient groups similar to our participants, these conditions have reached an almost epidemic order of magnitude [8, 9, 248].

Information about whether or not the Pakistani and Emirati participants perceived their dietary habits as unhealthy were not collected due to the quantitative nature of both studies. However, based on previous research, it can be anticipated that many of these patients did not consider making changes to their diet an essential part of the treatment of their T2DM, making education about diet and T2DM tough to implement and follow-up [10, 201, 248]. For the Kurdish participants, who discussed the topic freely during the focus group discussions, it seemed that they were aware of the recommended diets and had tried hard to make healthier dietary changes. They said, however, that maintaining such dietary habits was difficult. That none of the Kurdish participants brought up that they had initiated healthy changes in the diet of their family as a whole probably indicates that our participants considered eating healthy food to be only a part of T2DM treatment rather than a feature of healthy living with potential benefits for all.

It was unclear whether the reported unhealthy dietary habits of the Pakistani and the Emirati participants were due to intentional non-adherence to dietary advice, or to a lack of understanding of the information provided by treating doctor—a type of information that the majority in both patient groups had stated that they had been given. Furthermore, many (mainly elderly) Pakistani and Emirati patients were illiterate, and hence, probably would either have to memorize dietary guidelines or require the support of literate family members. The burden to adhere to dietary advice is likely even higher for the Pakistani immigrant women with poor command of the Norwegian language. Based on the Kurdish participants, our results indicate the benefits of having a degree of education and good command of the Norwegian language that gave this patient group the ability to obtain, understand and adhere to lifestyle and dietary information.

In the present thesis, it was revealed that the levels of physical activity were low in the three study populations. Among those who claimed to be physically active, the activity turned out, to a large extent, to be low-intensity walking or performing activities of daily living. Such activities are far from the recommendations in the national and international guidelines for

treatment of T2DM [63, 66, 67], recommendations that were likely unknown to our participants. These findings are consistent with results that have been reported in studies of non-Western immigrants in other Western countries (Sweden and Finland) and studies from the Middle East (Gulf countries), especially among women [10, 14, 15, 217, 248]. The barriers to physical activity were not elucidated in the Pakistani and the Emirati studies; however, the Kurdish participants mentioned reasons such as lack of motivation or family responsibilities to hinder them from exercising. The reported barriers to physical activity in the present study are very common in patients originating from these parts of the world [10, 14, 15, 49, 217]. Lack of past experience with exercise is a major problem in many non-Western countries, since physical activity was not given adequate attention when one was young [10, 217, 227]. In addition, culture physical fitness in non-Western countries is not often considered important and is rarely discussed in daily life [10, 217, 227].

5.2.3 Blood glucose monitoring and pharmacological treatment

Family assistance with blood glucose monitoring was necessary for the Pakistani and the Emirati participants. Despite having been taught how to measure/monitor their blood glucose, four out of ten Pakistani women and half of the Emirati participants reported that self-measurements were challenging to do themselves. This is consistent with results of previous studies that have shown that social support plays a vital role in the management of T2DM patients, especially for those with low levels of education [144, 242, 249-252]. To the contrary, the Kurdish participants expressed that they had reasonable control of their measurements and were capable of monitoring their blood glucose independently. The findings from the three study patient groups confirm the importance of literacy for being able to self-monitor blood glucose.

As mentioned in the *Introduction*, the national and international guidelines for treating T2DM recommend an intensive anti-hyperglycaemic treatment strategy, especially in the disease's early stages, to prevent micro- and macrovascular complications [63, 66, 67]. We found that one-fourth and one-third of the Pakistani and the Emirati women, respectively, had used both oral and injectable anti-hyperglycaemic medications, of whom a high proportion in both groups had lived with T2DM for more than 10 years. These results indicate that metabolic control was difficult, either due to poorly adherence to lifestyle and/or medication, advanced disease with little endogenous insulin production, or gradual progression of the disease over time, which was also reported by the UKPDS [253].

We did not have the HbA1c values for the Pakistani or the Kurdish participants (was not a part of the method). From previous findings from Western countries, it has been shown that patients from South Asian and Middle Eastern countries tend to have poor glycaemic control, worse than that found among their Western counterparts, even while receiving more intense anti-hyperglycaemic treatment [12, 105]. In a Norwegian study, it was found that 16.1% of the T2DM patients from South Asian countries (predominantly Pakistanis) were prescribed both oral and injectable antidiabetic drugs compared with 7.5% of Norwegian patients [105]. Despite the more intensive treatment, South Asian patients had poorer glycaemic control (HbA1c > 9.0%) than their Norwegian counterparts (20% vs. 6%) [105].

In **Paper II**, we found that nearly half of the Emirati women had achieved the HbA1c target value of < 7.0%. This finding is better than what was reported in 2006 from the same clinic, where only 31% had achieved the HbA1c target value of < 7.0% [114]. However, a more recent study from the same clinic (2015) showed that 38% had a HbA1c value < 7.0% [216]. The study findings may suggest that at least some of the Emirati women have reached the HbA1c target despite poor lifestyle habits that also were reflected by high BMI levels, and that, at least to some extent, many of the women were adhering to their anti-hyperglycaemic treatment, possibly with the assistance from literate family members (similar to our finding regarding blood glucose monitoring). The results may also, at least partly, suggest that the treating doctor likely took appropriate and timely actions in the face of participants' initial high HbA1c values and initiated an intensive medication treatment strategy in order to achieve the glycaemic target as soon as possible [67].

Several studies have found an association between achieved HbA1c values and patients' education level [218, 249]. In the Emirati study, where all participants were female and many had a remarkably low level of education, no association between HbA1c values and the participants' level of education was found, which, again, may indicate that the role of family assistance to patients' adherence to therapy and at least partly, contributed to better HbA1c values. A positive association between HbA1c and level of education has been previously reported in Emirati patients from the same clinic (included both genders), as well as from a neighbouring country, Saudi Arabia, which has the same geographical and cultural context [218, 249].

With regards to the use of antihypertensive and cholesterol-lowering medications, the Pakistani participants' medications presented during the interviews gave us an indication about whether they had hypertension and/or high cholesterol. Information about comorbidities in the Kurdish participants were collected from their discussions during the focus group interviews. It is likely that the Pakistani and the Kurdish participants who used cholesterol-lowering medications had cholesterol values that required medical treatment to prevent cardiovascular complications or after possibly new cardiovascular attacks [63]. As previously mentioned in the *Introduction*, the ADA guidelines are followed in the UAE, where cholesterol-lowering treatment is prescribed based on LDL and total cholesterol values. It was found that two-thirds of the Emirati participants had been diagnosed with hypertension and/or high cholesterol. Since two-thirds had, at the time of the study, well-controlled blood pressure and blood lipids, the results indicate that around half of the participants who were diagnosed with hypertension or high cholesterol were probably adherent to their medications.

Intermittent fasting in a religious context tends to influence different aspects of T2DM management [144, 176, 208, 254]. Not only can fasting lead to disrupted sleep and dietary patterns, dehydration and changes in blood glucose, blood pressure, lipid panel, body weight and exacerbation of psychiatric symptoms [255-258], fasting may influence medication adherence [176, 212, 259]. Among the Pakistani women, it could be anticipated that fasting would be particularly difficult in Norway during the summer months due to longer daylight hours (19–20 hours, at the time the study was conducted in 2014). However, as many as one in four of the Pakistani women admitted they did not take their medication as prescribed during the month of Ramadan.

As mentioned in *1.5.2.2*, previous results from the Pharma Use research group showed that one-third of T2DM Pakistani patients (primarily elderly women) were non-adherent to their medication during the fasting month [176]. In the UK, it has been shown that some Muslim patients avoided visiting clinicians who might disagree with their decision to fast [260]. In the present research, we found that a high proportion of the Pakistani participants who reported poor medication adherence during Ramadan had not received information about their treatment compared to those who reported good medication adherence. Unsurprisingly, it is probably challenging for Norwegian GPs to differentiate Muslim patients who may fast during Ramadan from those who choose to follow the exemption rule. Moreover, several

studies have reported that clinicians had concerns about stereotyping in general, which could cause patients discomfort, and were particularly apprehensive about discussing a Muslim's religious practice [209, 261]. In the previously mentioned study from the Pharma Use research group on the Norwegian GPs, it has been shown that GPs discovered that Muslim patients had fasted during Ramadan only by noting their fluctuating HbA1c levels after the fasting month [204].

In contrast to participants in Norway, the majority (93%) of Emirati women reported that they did not take their medication as prescribed during the month of Ramadan. Moreover, four out of ten Emirati participants reported fasting on Mondays and Thursdays throughout the year. It has earlier been identified that feeling fit enough to fast and the spiritual benefit of fasting were reasons patients choose to fast, and that not fasting was felt to be isolating and stigmatizing [208]. In a newly published prospective study from Middle Eastern countries (i.e., Egypt, Iraq, Jordan, the Kingdom of Saudi Arabia, Kuwait, Lebanon, Morocco, Pakistan, Palestine, and the UAE) involving 1749 T2DM patients, it was found that the majority fasted for more than half of the month of Ramadan, mainly based on a personal decision [262]. Being in a Muslim-majority country, and the fact that it is "expected" that all Muslims will fast, it was not surprising that almost all of the Emirati participants chose to fast, despite their T2DM and multiple medications. It is also probable that the treating doctors were aware that their patients fast, and thus adjusted patients' T2DM treatment pre-Ramadan [254]. However, we found that only six out of ten Emirati women recalled being given information on that topic. Even if the healthcare personnel in the UAE are likely aware that their patients may choose to fast, a recent prospective study in the Middle East showed that there is still an unmet need for Ramadan-focused education programs to support healthcare personnel in providing better care and to ensure the safety of people with T2DM who fast during Ramadan [262]. That study reported that over half of its participants had access to education on diabetes management during Ramadan; however, the education methods used varied [262]. Unlike the Pakistanis and the Emiratis, none of the Kurdish participants fasted during Ramadan and hence, this cultural factor did not seem to influence their medication adherence. This finding reinforces that Muslims are heterogeneous, and that differences in cultural influences may exist between patient groups sharing the same religion.

6. Conclusion

The present thesis investigated how three non-Western patient groups managed their T2DM. It has been shown that the management of the disease in the majority of the participants in two of the groups, the Pakistani immigrant women in Norway and the native Emirati women in the UAE, was suboptimal in terms of lifestyle habits, blood glucose monitoring and medication adherence during Ramadan. Linguistic barriers, as observed in the Pakistanis, low literacy, as observed in the Pakistanis and the Emiratis, and religious factors, as observed in the Pakistanis and the Emiratis, made self-management difficult. On the other hand, in the third group, the Kurdish immigrant women and men in Norway, who possessed good Norwegian language skills and were literate, expressed that even though they were not very keen about being physically active, their management of T2DM was largely successful where they had made an effort to having and adhering to a healthy diet, had incorporated blood glucose monitoring into their daily routines, and to be adherent to their medication.

In all three study groups, the treating physician (the GP in the Norwegian-based studies and the endocrinologist in the Emirati study) was the primary and most trusted source of information about T2DM. Poor Norwegian language proficiency among the Pakistanis made understanding the information difficult, and low literacy reduced, the capacity of the Pakistanis and the Emiratis to understand basic health information. The situation for the Kurds was different from the two other groups, where having had sufficient oral Norwegian language skills and a degree of education made them capable of reading and understanding medical information.

7. Study implications

In two of the non-Western groups in this thesis, it has been shown that to change dietary habits to healthier ones was difficult. In addition, basic physical activity, fell short of recommended levels among the majority of the participants in the three study groups. Therefore, advice given to T2DM patients by the treating physician regarding choosing healthier food items and being more physically active would be beneficial. Such advice should take into account the patient's education level, physical activity preference patterns, social support, time constraints, and other societal challenges. At the individual level, it is important to overcome personal and social barriers to healthy diet and/or physical activity. In line with T2DM treatment guidelines, the thesis findings underline that intensive anti-hyperglycaemic treatment of T2DM is generally important to achieve acceptable glycaemic target goals, especially when it is difficult to develop healthier lifestyle habits.

As expected, we have shown that challenges with understanding and adhering to written medical information were present, especially when the patients' level of education is limited. Therefore, emphasis on providing oral medical information seems to be needed. If increasing local language skills in non-Western immigrant patients is difficult (due to old age, low literacy level, etc.), oral information should be provided in the language used by non-Western patients (e.g., by more systematic use of interpreters during consultations). It is of increasing relevance for GPs to be aware of that cultural factors may influence the management of T2DM. The diversity in such factors in different non-Western groups, and that also tend to vary within groups, may differ substantially from the majority Western population. Hence, it can be argued that to confront cultural barriers, focus should be targeted on how to increase the cultural sensitivity among GPs.

8. References

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ORIGINAL PAPER

Living with Diabetes: Personal Interviews with Pakistani Women in Norway

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Abstract The prevalence of Type 2 diabetes (T2D) among Pakistani women in Norway is remarkably high. This study aims to assess how they live with the disease and their response to lifestyle and medical information. 120 Pakistani women living in Norway (mean age: 55.7 years) were personally interviewed about their T2D using a structured questionnaire (response rate: 95%). The participants were first-generation immigrants (mean residence time: 28.7 years) of whom 27% were illiterates. Poor health was reported by one-third, and 71% had developed macrovascular comorbidities. A majority reported physical inactivity and an unhealthy diet included religious fasting. One-third was not able to self-measure their blood glucose. There was a great variation in antidiabetic drug regimens and one-fourth had to use insulin in addition to tablets. Pakistani women in Norway showed suboptimal control of their T2D in terms of lifestyle habits, comorbidities and drug use. Low literacy and cultural factors seem to challenge adherence to lifestyle and medical information.

Keywords Adherence · Diabetes · Immigrants · Norway · Ramadan fasting

Introduction

The immigrant population in Norway has increased remarkably during the last five decades from around 100,000 people in 1970 to about 880,000 people in 2017, thus comprising 17% of the total Norwegian population [1]. The Pakistani immigrant group has long been one of the largest non-Western groups of which the majority live in the capital city, Oslo [2].

Previous research has shown that immigrant Pakistani women in Oslo (30–60 years) had a higher prevalence of diabetes (26%) compared with both Pakistani men (20%) and ethnic Norwegians (3 and 6% of Norwegian women and men respectively). Type 2 diabetes (T2D) was the most prevalent type in all groups [3]. Another Oslo-based study has shown that South Asians (~75% Pakistanis, ~25% Sri Lankans) are on average diagnosed with T2D 15 years earlier than their Norwegian counterparts (45 vs. 60 years) [4]. The situation is similar in the UK where T2D prevalence was shown to be up to six times higher in the South Asian population compared with the British general population [5]. It has also been found that South Asians (mainly Pakistanis) were diagnosed with T2D at a younger age than the British (46 vs. 57 years) [6].

The Norwegian guidelines for T2D follow the European guidelines both for diagnosis and treatment [7, 8]. In addition, the Norwegian guidelines recommend yearly HbA1c testing for all South Asians starting from 25 years of age because of this group's genetic susceptibility to develop the disease [7]. In comparison, people of European descent are recommended a risk score test from the age of 45 years [7]. The first line of T2D treatment is to develop healthy dietary habits and increase physical activity. This approach has been found specifically challenging for people from non-Western countries, such as Pakistan, who after immigration increase the intake of calorie-rich food and reduce the physical activity due to improved standard of living [9]. If glycemic control is not achieved by lifestyle modifications alone, oral antidiabetic drugs are introduced, and if a

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satisfactory treatment outcome is still not achieved, insulin and/or other injectable antidiabetic drugs are added to the regimen [7].

Drug adherence among patients with T2D and other chronic diseases decreases with time [10, 11]. There are many reasons for this such as loss of motivation, problems with complicated treatment strategies, and the lifetime disease span [10]. A previous study showed that Pakistani immigrants in Oslo suffering from T2D and/or cardiovascular risk factors used on average 6.7 prescription drugs (range 1–28 drugs) and reported poor drug adherence [12]. The study participants, especially the women, conveyed their apprehensiveness about the multiple drug use, and reported poor drug adherence when compared with the results of a similar study with hypertensive patients from the general Norwegian population [12, 13].

A few studies have investigated the experiences of general practitioners (GPs) and pharmacists when they consult or dispense drugs to non-Western immigrant patients [14–16]. It is suggested that both groups of healthcare professionals find it difficult to provide sufficient medical information to this patient group due to linguistic and other cultural barriers [14–16]. The aim of the present study was to assess how Pakistani women in Norway live with their T2D and how they respond to lifestyle and medical information.

Methods

Participants

The study population consisted of 120 Pakistani women living in areas of Oslo with the highest density of non-Western immigrants. The participants were between 29 and 80 years of age (mean 55.7 years) and had a T2D diagnosis.

Data Collection

Key representatives from Pakistani women groups, senior centers and mosques were contacted, given information about the study and asked for permission to perform recruitment on their premises. Once permission was obtained, potential participants were invited and information about the study was given orally and in writing, both in Norwegian and in Urdu. The response rate was 95.2%. A previously developed questionnaire from our department was modified for the study and used in face-to-face personal interviews [17]. The questionnaire consisted of 64 closed and 16 open-ended questions. The main topics were T2D, health status, dietary habits and physical activity, blood glucose measurement, antidiabetic treatment and need for medical information. Written informed consent was obtained from the participants. The interviews were conducted at the participants' homes and all participants were asked to show their antidiabetic medication. Pilot interviews were conducted. One of the interviewers was a Pakistani master student and conducted the interviews in Urdu when necessary. The rest of the interviews were conducted in Norwegian by non-Western postgraduate students. All interviews took place between November 2013 and April 2014.

Analysis

The data was analysed using SPSS (version 22.0). The relationship between the participants' antidiabetic treatment and years since diagnosis was studied descriptively (Table 1). Pearson's Chi square tests were carried out to investigate possible associations between drug adherence during Ramadan and if the participants had got information about drug use during Ramadan, years of residence in Norway and self-reported health (Table 2), and between the need for assistance to understand medical information in Norwegian and age, educational level and self-reported health (Table 3). A p-value below 0.05 was considered statistically significant.

Approval

The Regional Committee for Medical and Health Research Ethics was contacted about the study. Approval was

Table 1 Antidiabetic treatment of T2D Pakistani women in relation to the number of years since diagnosis (n = 118)

	Antidiabetic treatment(s) of the participants				Total
	Lifestyle intervention	Monotherapy (with peroral drug)	Polytherapy (with peroral drugs)	Combination therapy (oral + injectable antidiabetic drugs)	
≤10 years since diagnosis with diabetes *n* (%)	2 (3.1%)	38 (58.5%)	19 (29.2%)	6 (9.2%)	65
>10 years since diagnosis with diabetes *n* (%)	1(1.9%)	12 (22.6%)	17 (32.1%)	23 (43.4%)	53

Table 2 Drug adherence during Ramadan in relation to whether participants were informed about drug treatment during Ramadan, years of residence in Norway, and self-reported health

	Drug adherence during Ramadan		*p*-value
	Poor	Good	
Informed about drug treatment during Ramadan[a]			
Yes	16 (19.5)	66 (80.5)	0.036
No	11 (39.3)	17 (60.7)	
Years of residence in Norway			
0–10	2 (25.0)	6 (75.0)	0.955
>10	27(24.1)	85 (75.9)	
Self-reported health			
Poor	15 (38.5)	24 (61.5)	0.011
Good	14 (17.3)	67 (82.7)	

[a]n = 110

considered not required. The study protocol was referred to The Norwegian Social Science Data Services to be reviewed and the study was thereafter approved by them.

Results

All 120 participants were first-generation immigrants to Norway. The average residence time was 28.7 years (range 2–45 years). For 74 participants (61.7%) the interviews were conducted in Urdu and the remaining in Norwegian. Thirty-two participants (26.7%) were illiterates, 56 (46.6%) had 1–10 years of education and 32 (26.7%) had more than 10 years. Forty-five percent had suffered from T2D for more than 10 years. About 50% reported poor knowledge about their disease. Illiterates were more likely to report poor knowledge than those with the highest education (>10 years) (p = 0.001). Almost one-third of the participants (32.5%) reported poor or very poor health, of whom a higher proportion was illiterates when compared with those with more than 10 years of education (p = 0.001). There was no statistical difference between participants with short or long residence periods in Norway (≤10 and >10 years) in relation to their self-reported health (p > 0.05). Seven in ten (70.8%) reported cardiovascular risk factors/cardiac disorders such as hypertension (50.8%), high cholesterol (42.5%) and cardiac disorders (22.5%). Seven participants reported microvascular symptoms such as neuropathy and retinopathy.

It was common to eat without paying attention to the dietary recommendations. A majority of the participants (77.5%) reported that they had 1–3 big meals per day (guideline recommendation: 4–5 meals/day with balanced calorie intake) and two-thirds ate sweet snacks between the meals. About half of the participants (55.0%) claimed to be physically active, which meant for a majority to walk with low intensity or do housework (guideline recommendation: 150 min/week of moderate to intense physical activity). Seventy-nine participants (65.8%) claimed that they had been given information about developing a healthy lifestyle.

In total, 103 (85.8%) said they had been shown how to measure their blood glucose but 38 (31.7%) were not able to do it alone and six (5.0%) had it measured only at the GP's office, usually every 1 or 3 months. Three participants (2.5%) reported lifestyle modification as their only treatment. Eighty-seven (72.5%) used oral antidiabetic drugs, whereas 30 (25.0%) used a combination of oral and injectable drugs. Table 1 shows the participants' different regimens of antidiabetic treatment in relation to the number of years since they were diagnosed with T2D (≤10 and >10 years).

All participants were Muslims. One in four (24.2%) altered their drug intake due to religious fasting. Table 2

Table 3 The need for assistance to understand written medical information in Norwegian in relation to age, education level and self-reported health (n = 120)

	Need for assistance to understand written medical information in Norwegian	No need for assistance to understand written medical information in Norwegian	*p*-value
	n (%)	n (%)	
Age (year)[a]			
29–50	25 (65.8)	13 (34.2)	0.005
51–80	71 (87.7)	10 (12.3)	
Educational level (years)[b]			
No education	28 (87.5)	4 (12.5)	0.021
>10	20 (62.5%)	12 (37.5)	
Self-reported health			
Poor	37 (94.9)	2 (5.1)	0.007
Good	60 (74.1)	21 (25.9)	

[a]n = 119, [b]n = 64

shows the participants' drug adherence during Ramadan in relation to information received about drug use during Ramadan, years of residence in Norway, and self-reported health. Three in four (74.5%) said that they had got information about drug treatment during Ramadan. This was primarily from the GP. Fifty-seven participants (47.5%) were aware that drugs could contain pork gelatin. Of these, eight out of ten said they would stop intake of such drugs due to religious beliefs.

Thirty-six participants (30.0%) reported that they had not been given information about their T2D and said explicitly that they wanted information about antidiabetic drug treatment in general and side effects in particular. Three in four participants reported that they primarily consulted their GP if they had questions about their disease; 31.7% said they would also ask a family member or friend and seven (5.8%) said they would ask for information from a pharmacist. The majority of participants (80.8%) reported a need for assistance to understand written medical information in Norwegian. Table 3 shows the association between the need for assistance and the participants' age, educational level and self-reported health.

Discussion

In this study we have investigated how a group of non-Western immigrants, Pakistanis, live with T2D—a disease which in most cases has developed after lifestyle changes when settling in Norway. Due to their genetic disposition, Pakistanis are more vulnerable towards for instance obesity and inactivity than what is the case for ethnic Norwegians [18]. Especially the women seem to develop the disease in an alarming number [3]. It is, however, not easy to have non-Western immigrant patients taking part in studies [19]. The obtained response rate of 95% can probably be explained by a combination of factors. For instance, the invitation letter described that we were interested in their perspectives on the challenges they have experienced after being diagnosed with T2D in a foreign country. In addition, being interviewed by someone from their own gender and homeland, and in their own language when necessary, probably gave them the security they needed to join the study. Moreover, the participants were convenient towards conducting the interviews in their homes and it made it easier for the researchers to investigate what antidiabetic medications the participants actually were using, something which was a part of the method.

The educational level of the participants was remarkably low in all age groups, and illiteracy was highly prevalent. This is uncommon in the Norwegian society where three out of four inhabitants have at least 13 years of education [20]. Half of the participants (mainly illiterates) reported that they had poor knowledge of their T2D. This is similar with findings by Rafique et al. who found that Pakistani women with low or no education reported poor knowledge about their diabetes [21]. At the same time, the majority of the participants in the present study reported that they had been given information about developing healthy dietary habits and increasing their physical activity. Even though most of the women said they had received this information, their reported dietary habits and physical activity levels were far from the recommendations in the Norwegian guidelines for treatment of diabetes [7]. Findings from another Oslo-based study showed that 40% of Pakistani females (n = 198; age 25–63 years) had body mass index equal to or above 30 kg/m^2 [22]. The participants had a sedentary lifestyle and practiced low intensity walking which led to low energy expenditure [22]. This is a concern since poor lifestyle habits are associated with cardiovascular risk factors and disorders [23]. Owing to the early onset of diabetes among South Asian women [4], this patient group is especially vulnerable to early development of micro- and macrovascular complications [24] and at higher rates than those of non-South Asian descent [25, 26]. In the present study, cardiovascular risk factors/comorbidities were reported by participants in all age groups. Although it was not possible to find out whether such comorbidities developed prior to or after diagnosis with T2D, this is of great concern.

It was also shown in the present study that one-third of the participants could not measure their blood glucose on their own. Taking into consideration the participants' low education level, this can be due to difficulties with reading and interpreting the results of the measurements. When regards the antidiabetic treatment strategies, the recently updated national guidelines for treating T2D recommend "intensive" antidiabetic treatment, especially in the disease's early stages to prevent micro- and macrovascular complications [7]. However, it was not possible to find out in this study how long after the participants had been diagnosed with T2D they had to intensify their antidiabetic treatment. In the present study, one out of four women used antidiabetic drugs in both oral and injectable forms. By screening electronic medical records from 11 GP practices in Oslo (altogether 1653 T2D patients: 68.5% Norwegians and 31.5% ethnic minorities), Tran et al. found that 16.1% of the T2D patients from South Asian countries (predominantly Pakistanis) were prescribed both oral and injectable antidiabetic drugs compared with 7.5% of Norwegian patients [4]. Despite the more intensive treatment, Tran et al. showed that South Asian patients had poorer glycemic control (HbA1c > 9.0%) than their Norwegian counterparts (19.6 vs. 5.6% respectively) [4].

Previous research has shown that healthcare personnel are often unaware that religious factors can affect drug

adherence among Muslim patients [14, 16]. As many as 29 participants in the present study admitted they did not take their medication as prescribed during the month of Ramadan. This is similar with results by Håkonsen et al. who showed that one-third of diabetic Pakistani patients (primarily elderly women) were drug non-adherent during the fasting month [17]. As Table 2 shows, there was a high proportion of participants who reported poor drug adherence during Ramadan who had not received information about drug treatment and had poor health. However, the long period of residence in Norway did not seem to affect Pakistani women's drug adherence during the fasting month. Evidence from 13 different countries has shown that patients with poorly controlled T2D who fast during Ramadan have up to eightfold increased incidence of experiencing severe hypoglycemia compared with non-fasting diabetes patients [27].

The GP has the responsibility for counselling T2D patients in Norway. Consultation time with GPs is on average 20 minutes, publically funded and accessible to all registered citizens. In the present study, the participants told they primarily asked their GP for information and hardly asked the pharmacists. However, both Norwegian GPs and pharmacists have in former studies reported linguistic barriers as the main obstacle when they are in contact with non-Western immigrants and that they give a minimum of medical information to the patients when such barriers are present [14, 16]. Similar results are found in other European countries where healthcare personnel have reported that much of the consultation time with non-Western immigrants is often spent on interpretation [28, 29]. It is important to note that despite the participants' long residence time in Norway (mean 29 years) in the present study, almost two-thirds had to or were more comfortable to be interviewed in Urdu. This is similar to other findings that have shown that Pakistani women with more than 10 years of residence in Norway still report language problems [17]. Therefore it was not surprising to see the majority reporting need for assistance to understand written medical information in Norwegian. However, Table 3 shows that those over 50 years of age, illiterates and those reporting poor health were overrepresented. The present study is based on self-reported information from the participants which is considered a strength as it gives insight into how the participants deal with their disease as seen from their own perspective. However, the low education level of the participants might have caused difficulties when regards understanding some of the study questions.

In conclusion, this study indicates poor T2D control among first-generation Pakistani women in Norway in terms of lifestyle habits, comorbidities and drug use. Low literacy and cultural factors seem to challenge adherence to lifestyle and medical information. The participants seek information about their disease mainly from the GP.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval The Regional Committee for Medical and Health Research Ethics was contacted about the study. Approval was considered not required. The study protocol was referred to The Norwegian Social Science Data Services to be reviewed and the study was thereafter approved by them.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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International Diabetes Federation

Challenges in the management of Type 2 Diabetes among native women in the United Arab Emirates

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ABSTRACT

Aim: To investigate Type 2 Diabetes mellitus (T2DM) management in native female patients in the United Arab Emirates (UAE).
Methods: Ninety women from the outpatient diabetes clinic at Tawam Hospital, UAE, were interviewed face-to-face about how they manage their disease, using a structured questionnaire. Clinical values of the patients were extracted from medical records.
Results: The mean age of the women was 57.5 (SD: 12.7) years and half of them were illiterates. Two-third of the participants had hypertension and/or high cholesterol. A majority reported to have received information about lifestyle modification but admitted low physical activity and unhealthy diet. Mean weight and BMI were 80.0 (SD: 17.2) kg and 33.5 (SD: 6.3) kg/m^2, respectively. Although the majority were taught how to measure blood glucose, 46% considered self-measurement difficult. Oral antihyperglycemic drugs were used by 96% of participants, and 31% were also taking injections. Forty-nine percent had HbA1c values below 7% and the average was 7.7% (range: 4.9–14.1). Two-third had systolic blood pressure (SBP) and low-density lipoprotein (LDL) values within the target range.
Conclusion: Despite major challenges in T2DM management among native female patients in UAE, this study shows that one in two patients had an overall glycemic control that was acceptable.

1. Introduction

Diabetes mellitus (which mainly constitutes Type 1 diabetes mellitus (T1DM) and Type 2 Diabetes mellitus (T2DM)) is a chronic, multifaceted, and progressive disease. Global estimates show an increase in the prevalence from 425 million patients in 2017 to 629 million by the year 2045 [1]. T2DM constitutes around 90% of all cases [1].

The International Diabetes Federation's (IDF) guidelines use glycated hemoglobin (HbA1c) to screen and diagnose T2DM and also to monitor blood glucose during treatment [2]. The "**ABC**" of T2DM treatment is to achieve values of Hb**A**1c below 7.0%, systolic blood pressure (**S**BP) below 130 mmHg and low-density lipoprotein (LDL)-**C**holesterol below 2.0 mmol/l, in order to reduce the development of micro- and macrovascular complications [2]. First line treatment is

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to develop a healthy lifestyle, often followed by the introduction of oral antihyperglycemic drugs. Eventually, insulin or other injectable antihyperglycemic drugs are added if needed to reach treatment targets [2]. Use of antihypertensive drugs is recommended for T2DM patients with SBP $\geq$ 130 mmHg and cholesterol-lowering drugs as prophylactic treatment for all T2DM patients above 40 years of age, as well as all T2DM patients with a risk factor for cardiovascular disease regardless of age and initial cholesterol values [2].

The rapid increase of T2DM in many parts of the world is explained by lifestyle changes in combination with genetic susceptibility. This has been well documented in studies of certain groups of Asians who have developed T2DM in high numbers, especially after migration to a Western country [3–5]. It has been demonstrated that Asian immigrants have higher prevalence of T2DM compared with those who remained in their country of origin [4]. Studies have also found that the prevalence of T2DM in certain Asian groups after immigration is much higher than that of the general population in the new country [3–7]. In addition, Asian immigrants tend to be diagnosed with T2DM 10–15 years earlier than their western counterparts [5,8]. The increase in prevalence and early onset are found to be especially prominent in women [6,7]. Furthermore, studies have shown that high age and low education often contribute to suboptimal drug use and difficulties for patients to measure their blood glucose and interpret the results [9,10]. For instance, a study of female patients with T2DM with a Pakistani background living in Norway, found that one-third of the patients were unable to measure their blood glucose even if nine out of ten had been shown how to do it. In addition, cultural factors were described as obstacles to good adherence to lifestyle and medical information [10].

A similar development of T2DM is seen in the native population of Middle Eastern countries that have experienced substantial economic growth, such as the Arabian Gulf countries [11]. After the discovery of oil in this region in the 1970s, urbanization and a rise in prosperity brought lifestyle changes to the native population to a great extent. For instance, Meo et al. have shown that citizens of the Gulf countries with the highest gross domestic product/capita (Qatar, Kuwait, United Arab Emirates (UAE), and Saudi Arabia) had a high daily caloric intake/capita (>3000 kcal) [12]. This high energy consumption was significantly associated with the high prevalence of T2DM [12]. A survey from the UAE in 1995 showed that 27% of the native population were obese and that 6% had diabetes [13]. A study conducted in 2005/2006 found an obesity rate of 36% and a 17% prevalence of diabetes [14], and one from 2009 found a diabetes prevalence of 23% [15], placing UAE among the countries in the world with the highest prevalence of the disease [1]. A more recent study showed that the incidence of T2DM is highest in women (6.3/1000 person-years in women compared with 3.3/1000 person-years in men) [16].

Former studies from UAE have shown that the prevalence of adequate glycemic control (HbA1c < 7.0%) among patients with diabetes varied between 27% and 32% [17–20] and in two of the studies 46% and 52% were found to have SBP values within treatment targets [17,18]. Two newer studies reported that the HbA1c treatment target was met by 33% and 38% of the T2DM patients studied [21,22]. Moreover, both studies showed that the SBP target was achieved by 52% and 75% [21,22]. It has also been reported high levels of obesity, especially among women [18,21]. The high levels of obesity can be explained by the persistent sedentary lifestyle and unhealthy eating habits [18,19]. Furthermore, one of the previous studies from UAE found a significant independent association between the level of education and HbA1c values [20]. It was also shown that the majority of participants (especially women) had poor or very basic knowledge of diabetes in terms of definitions, symptoms, causes and complications [20], and that education and having a first-degree family history of diabetes had significant positive effects on the degree of patients' knowledge [20]. The aim of the present study was to investigate how native female patients in the UAE with T2DM manage their disease.

2. Material and Methods

2.1. *Study setting and participants*

The study setting was the diabetes outpatient clinic at Tawam hospital in Al-Ain city, UAE, which was also involved in the previous UAE studies [17–21]. Tawam hospital, in affiliation with Johns Hopkins Medicine, is one of the largest tertiary hospitals in the country with a capacity of 440 beds [23]. The material was 90 participants. The inclusion criteria were: to be female, >18 years of age, of UAE nationality, diagnosed with T2DM and attended the clinic at least one year prior to the study on regular follow up.

2.2. *Data collection*

One hundred potential participants were given oral and written information about the study when they visited the clinic. The response rate was 90.0%. Following informed consent, face-to-face personal interviews were conducted using an interviewer-administered structured questionnaire. This was a modified version of a previously used questionnaire [10] translated into Arabic for the present study. The questionnaire consisted of the following four sections: (1) Health status and drug use (general health status, family history of T2DM, time since diagnosis, drug use and self-monitoring of blood glucose), (2) Lifestyle (dietary habits and physical activity), (3) Information about the disease, and (4) Sociodemographic variables (age, educational level and employment status). The interviews were carried out between May and November 2015. Pilot interviews were conducted. Information about the patients' comorbidities, clinical values (BMI, HbA1c, blood pressure and blood lipids), and prescribed antihyperglycemic drugs was obtained from medical records from the clinic. The study was approved by the Al-Ain medical district human research ethics committee (Protocol No. 15/12- CRD 380/15).

2.3. *Data analysis*

Descriptive univariate and bivariate analyses (Pearson's $\chi 2$ tests) were conducted. Logistic regression was used to identify the association between the participants' age, educational

level, years since diagnosis with T2DM, and Body Mass Index (BMI) values <30 kg/m^2, and HbA1c, SBP and LDL values within the treatment targets. The treatment targets were based on the American Diabetes Association's (ADA) guidelines for T2DM, which are followed at the clinic [24]. The ADA guidelines are similar to the IDF guidelines with regard to the treatment targets of HbA1c. However, there are different targets for blood pressure (<140/90 mmHg in ADA vs. <130/80 mmHg in IDF), and some of the blood lipid values (Triglycerides (TGL) < 1.7 mmol/l, LDL < 2.6 mmol/l in ADA vs. TGL < 2.3 mmol/l and LDL < 2.0 mmol/l in IDF) [2,24]. Statistical significance was reported at a 5% level. SPSS software version 24.0 was used for conducting all analyses.

3. Results

3.1. *Self-reported information from participants*

The mean age of the 90 participants was 57.5 years with a range from 32 to 86 (Standard deviation (SD): 12.7) years. Forty-five participants (50.6%) were illiterates. Twenty-two (24.7%) had one to 10 years of education, and 22 (24.7%) had more than 10 years of education. Almost 40% were above 60 years of age, of whom 3.8% had formal education. Eighty percent reported that they were not employed. A first-degree family history of diabetes (mother and/or father and/or children) was present for 57.8% of the participants. Half of the participants (47.8%) reported having T2DM for more than 10 years, and 32.2% rated their health as poor or very poor.

Eight out of ten participants reported to have two or three big meals per day and to eat calorie rich snacks between meals when they were not fasting. During the month of Ramadan, 93% changed their dietary habits. In addition, 38.9% fasted regularly every Monday and Thursday. Two-third (63.3%) said they had received information about lifestyle modifications, and 57.8% about how to manage their disease when they fast. Nine out of ten participants (85.6%) were physically inactive.

Nine in ten participants (86.7%) told that they had been shown how to measure blood glucose. More than half of participants (54.4%) reported that they had it measured on a daily basis, while the remaining measured it at variable intervals or only during visits to the clinic. Forty-six percent admitted that they found it difficult to measure their blood glucose themselves, and needed help from household members (for instance their children) or only had it measured at the clinic.

The majority of the participants (81.1%) said that they had received medical information about their disease from the doctor and 27.8% from a diabetes educator. If the participants had questions about their disease, 73.3% said that they would ask the doctor, 18.9% a family member/friend and 7.8% a diabetes educator. Personal meetings with healthcare personnel were the preferred format for receiving information (preferred by 56.7%) compared with lectures and/or workshops (22.2%), and written material (21.1%). Two-third (65.6%) were positive to participate in educational programs arranged by the clinic. Participants with more than 10 years of education were more willing to attend such programs compared with those without any formal education (86.4% vs. 55.8%, respectively) (Pearson's $\chi 2$ test; p = 0.014).

3.2. *The participants' comorbidities, clinical values, and antihyperglycemic treatment*

Eighty-seven participants had other chronic diseases and/or risk factors in addition to T2DM. Seven out of ten (67.8%) had been diagnosed with high cholesterol, 62.2% with hypertension and 14.4% with cardiac disorders. Nineteen (21.1%) had got other complications of the disease (e.g. neuropathy). The participants' mean weight and BMI were 80.0 kg (range: 50–144; SD: 17.2) and 33.5 kg/m2 (range: 23.6–56.3; SD: 6.3), respectively (n = 87). Sixty-seven percent were obese (BMI: ≥30 kg/m2), 29.9% were overweight (BMI: 25.0–29.9 kg/m^2), and 3.4% had BMI values within the normal range (BMI: 18.5–24.9 kg/m^2). A higher proportion of women with BMI values ≥30 kg/m^2 had LDL values <2.6 mmol/l and total cholesterol values ≤5.0 mmol/l, compared with those with BMI < 30 kg/m^2 (Pearson's $\chi 2$ test; p = 0.001 and p = 0.017, respectively). No significant association between BMI and other clinical values was found. A full overview of the participants' clinical values is presented in Table 1. Of the participants whose HbA1c, SBP and LDL values were available (n = 76), 23.7% met all three treatment targets.

Oral antihyperglycemic drugs were prescribed to 95.6% of participants. Additionally, 31.1% received injections with insulin or other injectable antihyperglycemic drugs. A higher proportion of participants with HbA1c values ≥7.0% used both oral and injectable drugs compared with those on oral

Table 1 – Clinical values of the participants.

Clinical values	Number of participants	Mean (range)	Treatment target*	Participants who achieved treatment targets (%)
HbA1c (%)	84	7.7 (4.9–14.1)	<7.0	48.8
SBP (mmHg)	90	132.3 (95–176)	<140	68.9
DBP (mmHg)	90	72.9 (50–93)	<90	95.6
LDL (mmol/l)	79	2.5 (0.8–5.4)	<2.6	64.6
HDL (mmol/l)	80	1.2 (0.6–2.1)	≥1.3	35.0
TGL (mmol/l)	79	1.3 (0.3–3.6)	<1.7	75.9
Total cholesterol (mmol/l)	80	4.4 (2.3–7.8)	≤5.0	73.8

* Treatment targets based on ADA guidelines [24]. HbA1c: Glycated hemoglobin, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, LDL: Low-density lipoprotein Cholesterol, HDL: High-density lipoprotein cholesterol, TGL: Triglycerides.

therapy alone (Pearson's $\chi 2$ test; p = 0.001). Table 2 shows the likelihood of having BMI values below obesity levels (<30 kg/m^2) and having reached the treatment targets for HbA1c, SBP, and LDL in relation to participants' age, education level and years since T2DM diagnosis. As can be seen from the table, the likelihood of HbA1c levels <7.0% was higher among women who had had T2DM for 1–10 years compared with those who had had the disease for more than 10 years. The likelihood of low LDL-cholesterol values was higher among participants who had had the disease for more than 10 years compared with those who had had the disease for 1–10 years.

4. Discussion

Despite an overall acceptable level of glycemic control in the native female patients with T2DM in the present study, there are major challenges in the management of the disease. We found that the majority of the participants reported an unhealthy lifestyle including big meals, irregular food intake and high levels of physical inactivity. The information about lifestyle modifications has had minimal effect. Poor lifestyle habits is a concern since the benefits of healthy lifestyle habits are associated with less complications [25]. The self-reported unhealthy diet and sedentary lifestyle in our study coincide with the high BMI values extracted from the medical records. The proportion of participants who were obese (67%) was higher than that reported in the earlier studies from the same clinic (45% and 56%) [18,21]. It is also higher than results from other Gulf countries [26,27]. For instance, a study from Kuwait, including 312 diabetes patients (90% with T2DM) of both genders, 23% said that they exercised on a regular basis. Furthermore, 39% were reported to be overweight and 46% were obese [27]. In one of the former studies from UAE, only one-quarter of T2DM patients reported to have increased their physical activity after diagnosis; still very few met the recommendations in the guidelines [17]. Furthermore, it was found that cultural factors hindered patients, and especially women, from being physically active [19] which has also been pointed out in a review of studies from the region [28]. In a study from Kuwait, it was found that the main barriers to lifestyle modifications were the very hot climate, lack of outdoor activity, high consumption of fast food, frequent social gatherings and abundance of maids [29].

Certain challenges with T2DM management among the native Gulf population can also be seen in Asian immigrants in Western countries. Research has shown that Asians living in high-income countries change their diet after immigration [4]. In fact, obesity in certain immigrant groups from Asia is a worrying problem. It has been shown that even at normal BMI values (22 kg/m^2), Asians have a prevalence of T2DM similar to that of obese white Europeans (30 kg/m^2) [30]. Furthermore, physical inactivity is shown to be high among Asian immigrants and at levels comparable to those in the UAE and Gulf region [4,31]. For instance, the study with immigrant Pakistani women in Norway with T2DM (n = 120; mean age: 55.7 years) showed that the majority reported physical activity levels far below the recommended guidelines [10].

Table 2 – Odd ratios (OR) and 95% confidence interval (95% CI) for BMI<30kg/m^2, and HbA1c, SBP, and LDL values which met the target values in relation to age, education level and years since diagnosis with T2DM.

	BMI < 30 kg/m^2				HbA1c < 7.0%				SBP < 140 mmHg				LDL < 2.6 mmol/l			
	n	%	OR	95% CI	n	%	OR	95% CI	n	%	OR	95% CI	n	%	OR	95% CI
Age (years)																
· 32–59 (n = 55)	17	30.9	1.00		25	50.0	1.00		41	74.5	1.00		27	57.4	1.00	
· 60–86 (n = 35)	12	37.5	1.41	0.47–4.20	16	47.1	1.22	0.42–3.55	21	60.0	0.49	0.17–1.41	24	75.0	2.61	0.78–8.67
Education level (years)																
· None (n = 45)	15	35.7	1.00		21	48.8	1.00		30	66.7	1.00		30	73.2	1.00	
· 1–10 (n = 22)	5	22.7	0.58	0.17–1.95	9	47.4	0.77	0.24–2.50	16	72.7	1.22	0.38–3.88	9	50.0	0.37	0.10–1.32
· >10 (n = 22)	8	36.4	1.36	0.39–4.70	10	47.6	0.79	0.22–2.78	15	68.2	0.69	0.19–2.43	11	57.9	1.09	0.28–4.28
Years since T2DM diagnosis																
· 1–10 (n = 43)	17	39.5	1.00		25	64.1	1.00		30	69.8	1.00		21	52.5	1.00	
· >10 (n = 43)	10	25.0	0.52	0.20–1.36	13	31.7	0.25	0.09–0.66*	29	67.4	1.02	0.40–2.60	29	80.6	3.58	1.20–10.62*

* Significant at a 5% level.

Despite the abovementioned challenges, Table 1 shows that the mean HbA1c value was 7.7% and that half of participants had achieved the first component in the **"ABC"** of T2DM treatment. Hence, these findings indicate, to a certain extent, the degree of the patients' adherence to antihyperglycemic treatment. Participants who reported to have had T2DM 1–10 years prior to the study were more likely to have met the target. The percentage of participants that met the HbA1c target in our study was higher than what was reported in the earlier studies from the same clinic (ranging from 27 to 38%) [17–21]. It is also higher than results from neighboring countries. A study from Oman found that 35% of the T2DM patients met the HbA1c target (mean value: 8.2%), while it was 32% in Saudi Arabia and only 19% in Kuwait (mean value: 8.5%) [32–34]. Similar studies from other Middle Eastern countries have also shown that lower percentages of the patient populations managed to meet the target (ranging from 20 to 39%) [35–37]. With regard to the remaining components in the **"ABC"** of T2DM treatment, the present study shows that two-third met the treatment targets of **B**P and LDL-**C**holesterol. Since two-third were diagnosed with hypertension and/or high cholesterol, this indicates that the number of patients who met the targets had doubled after treatment.

All the studies we have compared with so far have reported average values for women and men who met the HbA1c target together [17–21,32–37]. However, a large multinational study (from countries in America, Asia and Europe) investigated the impact of gender on glycemic control in poorly controlled T2DM patients. The results showed that 33.0% of the male participants met the HbA1c target after treatment compared with 26.5% among the females, a difference that was statistically significant [38]. Also a recent study from Saudi Arabia have shown that the HbA1c value was significantly higher in T2DM females (10.0%) when compared to males (6.8%) [39].

Several studies have found an association between achieved HbA1c values and patients' education level [20,40]. The previous study from the same clinic (as the present one) showed that HbA1c $\geq$ 7.0 was associated with low education levels [20]. The same was shown in a Saudi Arabian study where those with the highest education had an average HbA1c of 8.1% compared with 9.2% in those with no education [40]. Another study showed, however, no association between the education level and HbA1c levels among T2DM patients [34]. In the present study, where all participants were female and many had a remarkably low education, no association between HbA1c values and the participants' education level was found (Table 2). Hence, our results indicate the role of family support to patients' adherence to therapy which is similar to that we found in the other aspect of diabetes care (blood glucose measurement). Even though nine in ten had been taught how to measure the blood glucose, almost half admitted that self-measurement was challenging and many reported to have got help from literate family members to measure and interpret the results. Local and regional studies have also shown similar results [18,36,40].

When the patients were asked from whom they would seek information about their disease, the doctor was the most frequent answer. Some of the participants, especially those with more than 10 years of education, were willing to take part in seminars about T2DM while the illiterate patients were hesitant to go to such meetings. A randomized intervention trial including 183 outpatients with T2DM, has shown that patients attending group education seminars (intervention group) had a significant improvement in Hba1c levels and better adherence to manage the disease compared with those who only had received standard education (control group) [41]. Based on the results from the present study, tailored education seminars that underlines the importance of adherence to the treatment regimen of T2DM may be therefore considered a positive measure that our participants could benefit from.

4.1. *Limitations of the study*

The interviews were conducted on the clinic's premises, which could have influenced the participants' answers in a positive direction. Furthermore, all the participants in our study were from one outpatient clinic in Al-Ain and thus the results cannot be generalized to the whole of the UAE.

5. Conclusion

The present study shows that female Emirati T2DM patients have major problems with measuring their blood glucose and to follow lifestyle recommendations both regarding dietary habits and physical activity. Despite this, the study shows that one in two patients had an overall glycemic control that was acceptable.

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Conflict of interest

None.

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Contribution of the authors

WA, HH and ELT were responsible for designing the study and developing the questionnaire. BA and SK were responsible for identifying eligible patients and WA for recruiting and conducting the interviews. BA and SK provided information about the patients' clinical data and antihyperglycemic treatment. WA performed the statistical analyses and drafted the manuscript. BA, HH and ELT made considerable contributions with their thorough and critical revision of the manuscript for important intellectual content. All authors state they approved the final manuscript before submission.

Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.diabres.2018.04.018.

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Experiences of Kurdish immigrants with the management of type 2 diabetes: a qualitative study from Norway

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Experiences of Kurdish immigrants with the management of type 2 diabetes: a qualitative study from Norway

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ABSTRACT

Objective: To explore the experiences of immigrant Kurdish patients in Oslo, Norway, related to the management of type 2 diabetes mellitus (T2DM).
Design: A qualitative study with focus group interviews.
Setting: Participants were recruited at meeting places in Oslo through Kurdish networks.
Subjects: Eighteen Kurdish immigrants (9 females and 9 males) living in Oslo, aged 40 to 64 years, diagnosed with T2DM participated in a total of five focus groups. Participants had to be proficient in the Norwegian language to be eligible.
Main outcome measures: Immigrant Kurdish patients' experiences with being diagnosed with T2DM, their disease management, and need for medical information.
Results: Participants stressed that living with T2DM was emotionally challenging, mainly because they were afraid of possible complications of the disease. They claimed to adhere satisfactorily to their medicines and blood glucose measurements. The majority of participants shared that they had made changes to their diet, even though it was difficult. To the contrary, physical activity received only minimal attention. The participants' main source of information was general practitioners and the majority of them were satisfied with the information that they had received about their disease and its management.
Conclusion: Kurdish T2DM patients in the present study from Norway reported that they adhered to the medical treatment, even if they were stressed about living with the disease. However, they were more occupied with changing their diet than to be physically active. Therefore, healthcare personnel should try to be aware of lifestyle challenges among their patients.

KEY POINTS

- Eighteen Kurdish patients in Oslo with Type 2 diabetes claimed to be adherent to medication treatment and blood glucose measurement.
- The participants shared that they had made changes to their diet, even though it was hard.
- There was generally little attention given to the need for physical activity in their daily lives.
- The participants were in need of more information and support in making healthy lifestyle changes.

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Diabetes; management; adherence; lifestyle; immigrants; Norway

Introduction

Diabetes mellitus and its complications constitute a major threat to global public health in the 21st century. An estimated 425 million people had diabetes mellitus in 2017, and this number is expected to increase to about 630 million by 2045 [1]. The corresponding figures in Europe are 58 and 67 million people, respectively [1]. Type 2 diabetes mellitus (T2DM) constitutes about 90% of the diabetes mellitus cases [1], and its prevalence varies between countries and socioeconomic groups. In Europe, it is evident that some ethnic immigrant groups are especially affected. For instance, in Norway, Sweden and the UK, the prevalence of T2DM is higher among immigrants from the Middle East and South Asian countries compared to the host populations [2–4]. This is partly explained by obesity, physical inactivity and a high intake of energy-dense food [2,3]. In addition, cultural factors may elevate the risk [5–7].

The Kurds are an example of a Middle Eastern ethnic immigrant group in Norway. Kurds constitute one of the largest ethnic groups in the Middle East, where

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they live primarily in Iraq, Iran, Syria and Turkey. Most Kurds residing in Norway have immigrated as a consequence of war and political instability in their country of origin. Because only country of origin, and not ethnicity, is recorded in Norwegian population censuses, the exact number of Kurds living in Norway is uncertain; the most recent estimate is between 25 000 and 30 000 [8]. The prevalence of T2DM in the Middle Eastern countries where most Kurds live is estimated to be around 1.5–2 times higher than in Norway (9–12% vs 6%, respectively) [1,9]. The overall prevalence of T2DM among Kurdish immigrants in Norway is unknown. However, its prevalence among the Turkish immigrants in the country, of whom a large proportion are Kurds, has been found to be around 12% [4].

The management of T2DM depends largely on patients' ability to modify lifestyle habits, adhere to anti-hyperglycaemic drug treatment and monitor blood glucose levels. In Western countries, research among South Asian and Middle Eastern immigrant T2DM patients has shown that a low level of education, lack of proficiency in the host country's language and cultural/religious traditions may result in poor management of T2DM [10–14].

In Norway, all legal inhabitants are listed with a general practitioner (GP) and patients only pay a small co-payment for consultations due to the state-funded reimbursement system. According to clinical guidelines, most T2DM patients should be followed-up at least 2–4 times a year by their GP [15]. Scheduled consultations last for 15–20 minutes on average, which is long when compared to many other countries [16]. Studies from Oslo conducted among Norwegian GPs and community pharmacists have shown that linguistic and religious factors make communication between them and non-Western immigrant patients challenging [17,18]. Thus, whether or not these patients receive sufficient information to manage their disease is questionable.

Some studies of Kurdish immigrants with or at a high risk of developing T2DM have been conducted in Nordic countries (Sweden and Finland), primarily related to prevalence, risk factors assessment or lifestyle interventions [3,5,19–23]. However, no studies on the management of the disease have been conducted, and there is a paucity of information about this patient group in Norway. Therefore, the aim of this study was to explore the experiences of immigrant Kurdish patients in Norway related to the management of T2DM.

Methods

Qualitative approach

The study was based on a qualitative design in which data was collected through focus group interviews. The method is considered appropriate to explore people's knowledge, feelings, experiences and attitudes, and is also useful when investigating a population whose views on a defined topic are largely unknown [24]. In our study, focus group interviews were used to explore how Kurdish immigrants in Oslo manage their T2DM. The research group consisted of two pharmacy students (one with an ethnic Kurdish background) and three academics (with a background in pharmacy or medicine, including one GP) who have previously performed several studies on non-Western immigrants with T2DM in Norway [4,10–12,17,25].

Study sample

The study participants consisted of 18 first-generation Kurds with T2DM from Oslo (9 females and 9 males). Thirteen participants originated from Iraq and five from Iran. Their mean age was 51.2 years (range: 40–64 years), and the mean time since diagnosis was 7.3 years (range: 0.5–16 years). Table 1 presents the compositions of the five focus groups. Although we did not ask specifically about the participants' employment status, more than half mentioned during the interviews that they were employed.

Data collection methods and instruments

Participants in this study were recruited from places in Oslo that the general Kurdish population frequently visits (Kurdish mosques and cafés). Before recruitment, those in charge of these venues (imams/café owners) were asked for permission to recruit participants at their premises. After permission was obtained, potential participants were approached and given oral and written information and invited to take part in the study. The inclusion criteria were as follows: Kurdish immigrant above 18 years of age, living in Oslo,

Table 1. Composition of the focus groups.

Focus group	Mean age in years (range)	Participant gender	Mean number of years since diagnosis with T2DM (range)
1	58.7 (55–61)	1 female, 2 male	5.3 (2–10)
2	54.3 (46–64)	2 female, 1 male	6.7 (2–12)
3	50.6 (46–51)	2 female, 3 male	11.2 (7–16)
4	46.5 (40–54)	2 female, 2 male	4.9 (2–11)
5	47.8 (42–51)	2 female, 1 male	6.5 (0.5–10)

diagnosed with T2DM and possessing oral proficiency in Norwegian. The response rate was 60%. Recruitment and all focus group interviews took place between October 2016 and January 2017.

The focus groups discussions were held in a meeting room at the School of Pharmacy or in a mosque. All focus group interviews were held in Norwegian. On arrival, the participants filled in a brief questionnaire with information about their age, gender, country of origin, and number of years since diagnosis with T2DM. The moderator then gave a standardized introduction. Based on the study aims and previous research on non-Western immigrants with T2DM [10–12,17], a structured interview guide was developed and used for the interviews. The main topics were: (1) experiences with being diagnosed with T2DM, including symptoms, causes and complications; (2) management of T2DM; and (3) need for medical information. All focus group interviews were led by the same moderator (the pharmacy student with Kurdish background). An assistant moderator (a pharmacist) took notes during the interviews. The interviews were audiotaped and lasted from 60 to 90 minutes. A pilot study was conducted; however, since no major changes were required in the interview guide or the interview setting, the pilot group was included in the study. After conducting five focus group interviews, saturation was considered to have been obtained. Each participant was compensated with a voucher of 300 NOK (30 EUR).

Data processing and analysis

Descriptive statistics were conducted on the collected data from the brief questionnaire. Audio-recordings were transcribed verbatim shortly after each interview and read by the authors to attain a comprehensive understanding of the data. A thematic content analysis with a deductive approach was conducted manually and included identification and coding of meaning units from the data before they were categorized [26,27]. The categories were later revised and modified through iterative reading of the transcripts. After critical discussion in the research group, consensus about the identified categories was reached.

Ethical considerations

The participants gave informed written consent prior to participation in the study. The study was approved by The Norwegian Center for Research Data.

Results

Experiences with being diagnosed and living with T2DM

Many of the participants were diagnosed with T2DM after presenting symptoms such as exhaustion, frequent urination, dry mouth or disturbed vision to their GP, while some were diagnosed at a routine check-up during a consultation with their GP. Participants in every focus group stated that they had family members with T2DM, many of whom were a first degree relative, e.g. mother or father, and that they knew that T2DM runs in families.

Participants in all focus groups elaborated on their experiences that being diagnosed with and living with T2DM is emotionally difficult. A range of emotions including fear, sadness and nervousness were described. Most participants described living with T2DM as very stressful and said that it had led to considerable changes in their lives. The most frequently reported stress factors were related to always having to think of their diet and remembering daily blood glucose measurements. In addition, participants in four focus groups talked about having typical comorbidities such as high cholesterol and hypertension, which they had received treatment for. Symptoms that could indicate microvascular complications, e.g. impaired eye function, numbness and pain in the extremities, were also mentioned. Some participants linked the development of the disease to everything that they had gone through during the stressful process of migrating from a war-torn country to settling in and starting a new life in Norway.

In two of the focus groups, participants spoke about complications from T2DM that their family members had suffered from. These had, in turn, increased own worries and concerns about having the disease. For example, a female participant talked about her grandmother and her father who could no longer walk and how that made her more careful about her own condition:

> *She [my grandmother] and my father have diabetes. They cannot walk anymore… I hope that does not happen to me too. So I take care because they did not. I hope I can manage.*

In general, participants perceived T2DM as a burden they will have to carry for the rest of their lives. Three participants who received a T2DM diagnosis more than 10 years ago said that the burden became easier to carry as time passed and that accepting their situation was an important step in coping with living with T2DM.

Challenges with lifestyle changes

Lifestyle changes in terms of diet were eagerly discussed in all focus groups. The majority of participants shared that they had made changes to their diet and gave the impression that they tried hard to stick to a healthy diet—mainly because they were afraid that their T2DM would worsen. They said that they had made changes to their diet, such as having less sugar in their tea, eating more fruit (instead of sweets and cakes), more of certain vegetables (such as squash, garlic and carrots) and less of the Kurdish traditional dishes.

During the focus group discussions, it became clear that participants had found it difficult to make changes to their diet. They also stressed how hard it was to maintain this healthier diet. They mainly related this to personal preferences and/or socio-cultural traditions. Eating the traditional dishes of their home country was described as an important part of their cultural identity. Kurdish dishes usually consist of large portions of rice, stews of meat and rich sauces, and are often followed by a sweet dessert. Three participants described "healthy food" as tasteless and said that it could not compare with or replace the traditional dishes. Social gatherings with other Kurds, religious festivals and travelling to their home country were also mentioned as reasons for not sticking to a healthy diet. None of our participants brought up taking any measures to make other family members eat more healthily. Female participants in three different focus groups said that they were responsible for preparing food for their families and that they were reluctant to prepare two types of food, i.e. "healthy food" for themselves and traditional food for the rest of the family. They said that they prioritized preparing the traditional food that the family expected to be served. The situation was different for some of the male participants. One of them explained:

> *My wife cares for me so much. She says, for example, 'This (food) is not good for your diabetes'. And I take care then. If it was not for her, maybe I would have had to start with taking insulin every day. God bless her.*

The participants did not talk about the positive effects of physical activity in the same way that they talked about the importance of a healthy diet. Just a few seemed to be aware of the benefits of being physically active and told that they for example, were swimming, jogging or intensive walking on a regular basis. Most participants said that they did some low intensity walking from time to time. When the topic was introduced, some mentioned a lack of motivation and being tired as reasons to why they were not more physically active, while others considered themselves sufficiently active by taking care of their children, doing housework or when doing movements in their religious prayers.

Adherence to blood glucose measurements and medication

The majority of participants described daily blood glucose measurements as an important task that they had incorporated into their daily routines—even though it could be painful to carry out. All participants were literate and seemed to have adequate knowledge of how to interpret the results. They were aware that maintaining a stable blood glucose level within the recommended range is important.

Most participants were prescribed only one oral anti-hyperglycaemic medication (mainly metformin), while a few used metformin in combination with other oral anti-hyperglycaemic medication(s) or injectable products. The latter (i.e., those with injectable medications) was the case for female participants who received T2DM diagnosis more than 10 years prior to study start. In general, the medication was not described as a source of concern for participants. They gave the impression that they had no problem administering their anti-hyperglycaemic medication before or between meals and that they had routines for remembering to take their prescribed medication. Three of the male participants said that they got reminders from their wives when it was time for the medication and/or blood glucose measurements. A couple of the female participants said they got similar help from their children. Although all the participants expressed that they were Muslims, fasting during Ramadan was not an issue and therefore not a reason for being non-adherent to their medication.

In all focus groups, participants mentioned situations in which they had forgotten to take their medication. Two participants were intentionally non-adherent due to a lack of motivation or a fear of potential side effects. Other participants talked about situations in which they were unintentionally non-adherent because they travelled abroad or took part in social gatherings. However, social gatherings did not always lead to non-adherence to medication, as they had friends who also had T2DM and used the same medication. One participant said:

> *I do not forget if I am at home, but sometimes (I forget) when I visit someone. Then, at three/four o'clock we eat dinner and I do not take the medicine that I really should take at four. But those I visit have metformin, all families have it!*

Sources and types of medical information

The GP was the main source of information for the participants. Overall, participants felt they had a good relationship with their GPs and were satisfied with the information they had received on how to manage their disease. Three participants said that they had a Kurdish GP and eight a non-Kurdish GP. The remaining participants did not specify their GPs' ethnic background. Despite the general satisfaction with their GP, some participants mentioned that they had experienced some difficulties with understanding information their GP provided, especially when complicated Norwegian medical terms were utilized. These participants said that their GP seemed to solve this by talking slowly or using simpler terms to ensure that the information was understood.

Pharmacy personnel were mentioned as the main source of information about how to use the glucometer. Other sources that were mentioned included family members, friends, television and the Internet, mainly regarding lifestyle information.

Discussion

In the present study, participants expressed that they managed their T2DM in a satisfactory way, particularly regarding regular blood glucose measurements and taking their medication as prescribed. The participants discussed the efforts they had made to change their diets to healthier ones and the sociocultural barriers that they had encountered when trying to maintain these diets. Physical activity appeared to receive less attention in their daily lives.

This study is the first to explore how immigrant Kurds in Norway manage their T2DM and adds to the sparse literature on this patient group. With the engagement of key persons with extensive Kurdish networks, we made contact with Kurds in several types of meeting places in Oslo. We chose to include only Kurdish immigrants with satisfactory Norwegian language skills in order to avoid the use of a translator, which would have interrupted the flow in the discussions and introduced a certain degree of translation bias [24]. However, by selecting only participants who were fluent in Norwegian, the transferability of findings to Kurdish T2DM patients with poor Norwegian language skills is limited. Caution should be used when comparing these results with findings from studies that included non-Western immigrants who had the possibility of being interviewed in their native languages [10,13].

About two-thirds of potential participants accepted the study invitation, which is considered a satisfactory response rate in focus group studies [28]. Having a pharmacy student with a Kurdish background responsible for recruitment and moderation of the focus groups probably contributed to the good response rate. In addition, we consider that the presence of a Kurdish moderator likely had a positive effect on the participants' willingness to share their thoughts on sensitive topics during the interviews. This factor also probably minimized moderator bias [29].

In line with the results of previous studies, our participants highlighted the difficulties in making changes in their daily life after being diagnosed with T2DM, which in turn made their situation difficult and stressful [30–33]. For instance, the 2005 multinational Diabetes Attitudes, Wishes and Needs (DAWN) study investigated psycho-social experiences related to T2DM management in 13 countries in Asia, Australia, Europe and North America, both from the patients' and healthcare personnel's perspective [31]. About 40% of patients with T2DM reported experiencing poor psychological well-being. Moreover, healthcare personnel (including GPs) estimated that around 60–70% of their T2DM patients had psychological problems, including depression, stress, and burnouts [31]. Fear of developing T2DM-related complications has been identified in previous studies [32], and in the present study, participants expressed worries about developing the same complications that some of their family members experienced. This might have had a positive impact on our participants by raising their awareness about the importance of appropriately managing T2DM.

Blood glucose measurement and medication adherence were highlighted as important across all focus groups. These results indicate that the participants had educational levels sufficient to enable them carry out and interpret glucose measurements and to take medication as prescribed. A certain level of education has earlier been reported as important for good adherence to T2DM management, and consequently, good glycaemic outcomes [34]. This may explain, at least to a certain extent, why our results differ from those of previous studies of non-Western immigrants in Western countries in which the participants had no or only minimal basic education [10,13,35]. Another contrast to the previous studies was that the participants in this study did not fast during Ramadan and therefore did not consider this religious ritual to be an obstacle to drug adherence. In previous studies of non-Western immigrant patients with T2DM, a

considerable share of patients reported that they altered their medication-taking behaviour during Ramadan [10,11,35,36].

Most of our participants discussed how they had changed their diets to be healthier. However, the overriding barriers that were mentioned, at length and across all focus groups, suggest our participants finding it difficult to maintain a healthy diet. Undoubtedly, to permanently change one's diet is a challenge that requires both intent to change and substantial modifications in behaviour [32,37,38]. Our participants mentioned that socio-cultural traditions and lack of social support (from family, friends and communities) increased the difficulty of maintaining a healthy diet. This is consistent with previous studies that have found that a lack of social support may have adverse effects on T2DM patients' lifestyle management [39,40]. At the same time, we noted that none of our participants brought up that they had initiated healthy changes in the diet of the family as a whole. Apparently, our participants considered eating healthy food to be a part of T2DM treatment rather than a feature of healthy living with potential benefits for all. This attitude further complicates their own efforts to maintain healthy dietary habits. Regardless, our results show, that participants seemed be aware of the importance of a healthy diet and were trying harder to implement healthy eating habits compared with T2DM patients in the Middle East [41,42].

In the present study, there was little focus on the benefits of being physically active and the majority of our participants mentioned activity levels that were far below the guideline recommendations [15]. These results indicate, at least partly, a lack of interest in physical activity among the participants, something that has been identified earlier among other non-Western immigrants in Nordic countries [3,5,10]. In fact, findings from a Swedish study showed that 72% of participants with an Iraqi background were physically inactive compared with 39% of native Swedes [3].

Unsurprisingly, the GP was the patients' main source of information and the participants seemed fairly satisfied with their GPs and the information they were given from her/him. From the participants' discussions, it seems that they felt that they had received enough information about blood glucose measurements, drug treatment, and the features of a healthy diet. However, our participants did not act in a way that suggested that they understood the importance of physical activity. Of course, it is not possible to know how much information they had received about that compared to information about diet. Hence, there is a possibility that an emphasis by GPs on providing more information about all aspects of treatment would be helpful in achieving the goal of improved T2DM management, better glycaemic outcomes and the prevention of future complications.

Conclusion

Kurdish T2DM patients in the present study from Norway reported that they adhered to the medical treatment, even if they were stressed about living with the disease. However, they were occupied with changing their diet than to be physically active. Therefore, healthcare personnel should try to be aware of lifestyle challenges among their patients.

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Ethical considerations

The study protocol was reviewed and approved by The Norwegian Center for Research Data. Approval from The Regional Committee for Medical and Health Research Ethics was not required. The participants provided informed written consent prior to participation in the study.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix 1. Questionnaire- Paper I

1. Deltakernes helse status, år siden T2DM diagnose, ko-morbiditet

1.1 Hvordan vurderer du din egen helse generelt?

- Meget god
- God
- Verken god eller dårlig
- Dårlig
- Meget dårlig

1.2 Vet du hvilken type diabetes du har?

- Ja
- Nei

Hvis svaret i **1.2** er «Ja», blir neste spørsmål **1.3**.

1.3 Hvilken type er det?

- Type 1
- Type 2

1.4 Er det noen andre i din familie som har diabetes? (eksempelvis: far, mor og/eller søsken)

- Ja
- Nei
- Vet ikke

Hvis svaret i **1.4** er «Ja», blir neste spørsmål **1.5**.

1.5 Hvem andre enn deg har diabetes i din familie?

1.6 a) Hvor gammel var du da du fikk vite at du har diabetes?

- Alder: _____ år
- Husker ikke

b) Hvor lenge er dette siden?

- 0-5 years år siden
- 6-10 år siden
- 11-15 år siden

- 16-20 år siden
- >21 år siden
- Husker ikke

1.7 Har du noen andre sykdommer i tillegg til diabetes?

- Ja
- Nei
- Vet ikke

Sjekk komorbiditet ut ifra medisiner som er presentert, og så fortsett med **1.8**.

1.8 Komorbiditet (er):

_____

2. T2DM omsorg (management): livsstilsvaner, blodglukose monitorering og medikamentbruk

2.1 Hvor mange måltider spiser du om dagen?

- 1
- 2
- 3
- Annet: _____

2.2.Hva består måltidene dine hovedsakelig av?

2.3.Har du en vane til å småspise mellom måltidene?

- Ja
- Nei
- Husker ikke
- Hvis ja, Eksempler:

  _____

2.4 Er du flink til å spise et variert kosthold?

- Ja
- Nei
- Vet ikke

2.5 Hvor ofte trener du i løpet av en uke?

- 1-2 ganger i uken
- 3-4 ganger i uken
- ≥ 5 ganger i uken
- Annet: _____

2.6 Når du trener, hvor lenge holder du på? (Anbefaling fra helsedirektoratet er at diabetes pasienter skal være minst 30 minutter fysisk aktive hver dag).

- 5- 10 minutter
- 11-20 minutter
- 21-30 minutter
- > 31 minutter
- Annet: _____

2.7 Når du trener, hvilken aktivitet gjør du for å trene?

2.8 Hvor ofte har du drevet med fysisk aktivitet på ulike tidspunkt i livet ditt?

	≥ 4 ganger i uken	2-3 ganger i uken	≤ 1 ganger i uken	Aldri	Husker ikke/Vet ikke
<20 år					
20-29 år					
30-39 år					
40-49 år					
50-59 år					
60-69 år					
70-79 år					
>79 år					

2.9 Da du først startet med diabetes behandling, fikk du opplæring i hvordan du skulle bruke disse legemidlene, apparatet og insulin?

- Ja
- Nei

2.10 På hvilken måte måler du blodsukkeret ditt? Gjerne vis og fortell oss hva du gjør

---

2.11 Når du skal måle blodsukkeret ditt, pleier du da å stikke deg på forskjellige fingre?

- Ja
- Nei

2.12 Hvor mange ganger om dagen måler du blodsukkeret ditt?

Antall ganger: _____

2.13 Pleier du å bruke forskjellige type måleapparater?

- Ja
- Nei

Hvis svaret i **2.13** er «Ja», blir neste spørsmål **2.14**

2.14 Hva er årsaken til at du bruker forskjellige typer måleapparater?

2.15 Hvilken type legemidler bruker du for å behandle din diabetes? Flere svar er mulige

- Diett
- Fysisk aktivitet
- Tabletter
- Insulin
- Insulin analoger
- GLP-1 agonister

Hvis svaret i **2.15** er «tabletter», be respondenten vise frem pakningene til legemidlene sine, fyll ut **2.16** og fortsett videre med **2.17**

2.16 Navn på tabletter (ene)?

- Glucophage
- Metformin ®
- Mindiab ®
- Amaryl ®
- Glimepirid ®
- Euglucon ®
- Glibenclamid ®
- Starlix ®
- NovoNorm ®
- Glucobay ®
- Actos ®
- Avandia ®
- Januvia ®
- Galvus ®
- Janumet ®
- Pioglitazone ®
- Tajenta ®
- Eucreas ®
- Forxiga ®
- Competact ®
- Avandamet ®

2.17 Hvor mange ganger daglig tar du en eller flere tabletter?

- 1-2 ganger daglig
- 3-4 ganger daglig
- > 4 ganger daglig
- Annet: _____

2.18 Når på dagen tar du tabletter? (Flere svar er mulig).

- Morgen
- Formiddag
- Ettermiddag
- Kveld

- Annet: _____

2.19 Er det noen typer tabletter du må ta med mat?

- Ja
- Nei
- Husker ikke

Hvis svaret i **2.19** er «Ja», blir neste spørsmål **2.20**.

2.20 Hvis du må ta tabletter med mat, når tar du dem i forhold til maten?

- Før mat
- Med mat
- Etter mat
- Husker ikke

2.21 Det er mange mennesker som ikke følger disse reglene nøye, hvordan er det med deg?

2.22 Synes du det er et bedre alternativ å bruke dosett for å huske å ta alle legemidlene dine til riktig tid?

- Ja
- Nei
- Vet ikke

Hvis svaret i **2.15** er «Insulin og/eller Insulin analoger og/eller GLP-1 agonister», be respondenten vise frem pakningene til legemidlene sine, fyll ut **2.23** og fortsett videre med **2.24**

2.23 Navn på injeksonbare medikamenter:

- Actarapid ®
- Insuman Rapid ®
- Apidra ®
- Humalog ®
- NovoRapid ®
- FlexPen ®
- Victoza ®
- Humulin NPH ®

- Insulatard ®
- Insuman Basal ®
- Lantus ®
- Levemir ®
- Humalog Mix 25 ®
- NovoMix 30 ®
- Byetta ®
- Byetta LAR ®

2.24 Hvor mange ganger om dagen tar du injeksjonene?

- 1-2 ganger daglig
- 3-4 ganger daglig
- > 4 ganger daglig
- Husker ikke

2.25 Tar du injeksjonene med mat?

- Ja
- Nei
- Iblant

Hvis svaret i **2.25** er «Ja», blir spørsmålet **2.26**.

2.26 Hvordan tar du insulin i forhold til mat?

- Før mat
- Med mat
- Etter mat
- Husker ikke

2.27 Når du skal ta injeksjonene, hvor på kroppen tar du det?

2.28 Husker du å injisere på forskjellige områder på kroppen?

- Ja
- Nei

2.29 Bruker du nytt nål for hver gang du skal injisere deg?

- Yes
- No

2.30 Hvis du føler at du har stabilt blodsukker, slutter du å ta dine legemidler da?

- Ja
- Nei
- Husker ikke

Hvis svaret i **2.30** er «Ja», blir spørsmålet **2.31**.

2.31 Vurderer du å ta en prat med legen din om dette? Begrunn gjerne svaret.

2.32 Kjøper du noen reseptfrie produkter fra apoteket som du bruker mot diabetes?

- Ja
- Nei
- Husker ikke

2.33 Pleier du å bruke noen produkter fra helsekostbutikk mot din diabetes? For eksempel fra Life eller Sunnkost

- Ja
- Nei
- Husker ikke

2.34 Bruker du enda noe mer, enn det vi har spurt hittil, mot din diabetes? For eksempel noe som du har hentet fra ditt hjemland, kjøpt fra utlandet, urtemedisiner og/eller homeopatmedisiner.

- Ja
- Nei
- Vet ikke

Hvis svaret i **2.32**, **2.33**, eller **2.34** er «Ja», blir spørsmålet **2.35**.

2.35 Hva heter produktet (ene) du kjøper utenom det legen skriver til deg?

2.36 Vet legen din om annet du bruker mot din diabetes, utenom det han/hun har skrevet til deg? For eksempel slikt vi nevnte i de foregående spørsmålene.

- Ja
- Nei
- Husker ikke

3. <u>Behov for legemiddelinformasjon</u>

3.1 Hvor/hos hvem fikk du informasjon når du startet på diabetesbehandling? (Flere svar er mulig)

- Legen
- Farmasøyter
- Apotekteknikker
- Sykepleir
- Familiemedlemmer
- Venner
- Brosjyrer
- Annet: _____

3.2 Mener du informasjonen du har fått om diabetes er god nok?

- Ja
- Nei
- Vet ikke

Hvis svaret i **3.2** er «Ja», blir spørsmålet **3.3.**

3.3 Hva av informasjonen synes du var bra?

Hvis svaret i **3.2** er «Nei», fortsett med **3.4** og **3.5.**

3.4 Hva skulle du ønske mer informasjon om relatert til diabetes?

3.5 Hvordan ønsker du å få denne informasjonen?

Hvis svaret i 3.1 var «Farmasøyter/ apotektekniker», blir neste spørsmål 3.6.

3.6 Er det lett å snakke med apotekpersonalet / farmasøyter hvis du har spørsmål om diabetesbehandling?

- Ja
- Nei
- Vet ikke

3.7 Hvis du lurer på noe angående behandling av diabetes, hvem spør du? (Flere svar er mulig.)

- Familiemedlemmer
- Venner
- Kollegaer
- Legen
- Apotekteknikkere / Farmasøyter
- Sykepleier
- Annet: _____

Hvis det har blitt avgitt flere svar i **3.7**, blir neste spørsmål **3.8**.

3.8 Hvis du har fått informasjon fra flere personer/steder, fikk du da samme type informasjon?

- Ja
- Nei
- Husker ikke

Hvis svaret i **3.8** er «Nei», blir neste spørsmål **3.9**.

3.9 Den informasjonen du fikk, hjalp det deg til å forstå behandling av diabetes bedre?

- Ja
- Nei
- Vet ikke

3.10 Hvor ofte trenger du hjelp til å forstå skriftlig informasjon om diabetes? (For eksempel lege, apotekpersonalet/farmasøyter, pasientforeningen, pakningsvedlegg til legemiddelet, diabetesforbundet etc.)

- Alltid
- Ofte
- Noen ganger

- En sjelden gang
- Aldri
- Husker ikke

3.11 Føler du at det er enklere å snakke med legen/apotekpersonalet (farmasøyter) dersom de snakker ditt morsmål?

- Ja
- Nei
- Vet ikke

3.12 Er det ønskelig å få/forstå informasjon skriftlig dersom det er på ditt morsmål?

- Ja
- Nei
- Vet ikke

3.13 Synes du det er nok informasjon angående medisinering under ramadan?

- Ja
- Nei
- Vet ikke

Hvis svaret i **3.13** er «Nei», blir neste spørsmål **3.14**.

3.14 Hva savner du av informasjon om ramadan og diabetes, og fra hvem?

3.15 Er du klar over at hvis du er syk så har du lov til å ta dine legemidler selv under faste og ramadan?

- Ja
- Nei
- Vet ikke

3.16 Vet du at IRN (Islamsk råd Norge) har sagt at det er greit å bruke nødvendige legemidler selv under ramadan måned?

- Ja
- Nei
- Vet ikke

3.17 Hender det at du slutter å ta dine legemidler under Ramadan?

- Ja
- Nei
- Husker ikke

Hvis svaret i **3.17** er «Ja», blir neste spørsmål **3.18**.

3.18 Er legen din klar over dette?

- Ja
- Nei
- Vet ikke

3.19 I tidligere studier har det blitt funnet ut at legene ikke tenker over at det fins gelatin i visse legemidler. Er du klar over det?

- Ja
- Nei
- Vet ikke

Hvis svaret i **3.19** er «Ja», blir neste spørsmål **3.20**.

3.20 Hender det at du slutter å ta legemiddelet (ene) dersom du finner ut at det inneholder svinegelatin?

- Ja
- Nei

Hvis svaret i 3.20 er «Ja», blir spørsmålene 3.21 til 3.22 spurt

3.21 Hva er årsaken til dette?

3.22 Tar du kontakt med legen din da?

- Ja
- Nei

4 **Demografisk data**

4.1 Hvilket år er du født i?

- Age: _____ years
- Year of birth: _____

4.2 Hvilken bydel bor du i? _____

4.3 Hvor lenge har du bodd I Norge?

- Antall år: _____

4.4 Hvilket fylke i Pakistan er du/dine foreldre fra?

_____

4.5 Hvor mange barn har du?

- Antall barn:_____

4.6 Din sivilstatus:

- Singel
- Samboer
- Gift
- Enke
- Annet: _____

Hvis svaret i **4.6** er «Gift» eller «Enke» blir neste spørsmål **4.7**.

4.7 Hvor gammel var du da du giftet deg?

- Alder: _____ år

4.8 Hva er din høyeste avsluttede utdanning?

- Grunnskole (≤ 10 år)
- Videregående (≥ 11 år)
- Høyskole / Universitet (≤ 3 år)
- Høyskole / Universitet (> 3 år)

Hvis respondenten ikke avgir et spesifikt svar i **4.8**, blir neste spørsmål **4.9**.

4.9 Hvor mange års skolegang har du alt i alt?

Antall år: _____

4.10 Din arbeidssituasjon:

- I arbeid

- Hjemmeværende
- Sykemeldt
- Arbeidsledig
- Pensjonist
- Uføretrygdet
- Annet: _____

4.11 Er fastlegen din fra samme hjemland som deg?

- Ja
- Nei
- Vet ikke

Hvis svaret i **4.11** er «Nei», blir neste spørsmål **4.12**.

4.12 Hvilket land er din lege fra?

_____

4.13 Er fastlegen din en kvinne eller en mann?

- Kvinne
- Mann

4.14 Til slutt vil jeg gjerne spørre deg om du er medlem i en forening? For eksempel diabetesforbundet, pasientforening etc.

- Ja
- Nei

Comments: _____

Tusen takk for hjlpen!

Appendix 2. Questionnaire- Paper II

1 السكري بين المرأة الإماراتية

منظورات الصحة والسكري

1.1 كيف تقيم / حالة صحتك؟

ممتازة
جيد جداً
جيدة
ضعيفة
ضعيفة جداً

1.2 هل تعرفي أي نوع من مرض السكري الذي تعانين منه؟

نعم
لا

إذا كان الجواب في 1.2 "نعم"، إنتقل إلى 1.3

1.3 ما هو النوع مرض السكري الذي تعانين منه ؟

السكري النوع الأول(1)
السكري النوع الثاني (2)

1.4 هل لديك تاريخ عائلي من مرض السكري؟ (وأعني بذلك الأب والأم و / أو الأشقاء).

نعم	لا	لا اعرف

إذا كان الجواب في 1.4 "نعم"، إنتقل إلى 1.5

1.5 من يكون و ما هي درجة القرابة ؟ _____

1.6 (a كم كان عمرك عندما علمت بأنك مصابة بمرض السكري؟

العمر ..... سنة
غير متذكرة

(b منذ متى تم تشخيصك بأنك مصابة بمرض السكري ؟

منذ 0 - 5 سنوات
منذ 6 - 10 سنوات
منذ 11 - 15 سنوات
منذ 16 - 20 سنوات
أكثر من 21 سنة

1.7 هل تعاني من أي اضطرابات أخرى بالإضافة إلى مرض السكري؟

نعم
لا
غير متذكر

Confirm comorbidity from medical records

---

2 العادات الغذائية **النشاط البدني** ,استخدام المعدات التقنية الخاصة بالسكري, والأدوية المستخدمة لعلاج مرضى السكري

2.1 كم وجبة غذائية الذي تتناولينها يومياً؟

وجبة واحدة	وجبتان	ثلاث وجبات	أخرى

2.2 ما هي المكونات الرئيسية لكل وجبة؟

2.3 هل لديك عادة ان تأكلي بين الوجبات؟

نعم	لا	لا أتذكر

2.4 كم مرة في الأسبوع تقومي بالتدريبات الرياضية؟

من 1 – 2 مرة أسبوعياً	من 3 – 4 مرات أسبوعياً	من 5 مرات لأكثر أسبوعياً	أخرى

2.5 كم طول مدة كل حصة تدريبية؟

من 5 – 10 دقائق
من 11 – 20 دقيقة
من 21 – 30 دقيقة
أكثر من 31 دقيقة .
أخرى

2.6 ما نوع التدريبات التي تقومي بها؟

2.7 هل حصلت على تدريب كافي حول كيفية استخدام جهاز قياس السكر ، والأدوية والأنسولين ؟

نعم
لا

2.8 كيف تقومي بقياس معدل السكر لديك ؟ من فضلك أوصفي وأطلعيني كيفية فعل ذلك.

2.9 عندما تقومي بقياس مستوى السكر لديك ، هل تقومي بتغيير الأصابع التي تقيسي منها ؟

نعم
لا

2.10 كم مرة يومياً تقيسي مستوى السكر في دمك ؟

2.11 هل تقومي باستخدام أكثر من جهاز واحد عند قياس السكر في الدم ؟

نعم
لا

لو كان الجواب في السؤال 2.11 "نعم" أنتقل إلى2.12

2.12 لماذا ذلك ؟

2.13 ما هو نوع العلاج الذي تستخدميه حاليا للتعامل مع مرض السكري لديك؟ ضع علامة على كل ما ينطبق.

رجيم
تدريبات/ تمارين
أقراص
أنسولين
نظائر أنسولين
منبهات جي أل بي منظمة لسكر الدم

لو كانت الأقراص مذكورة في البند2.13 وجدت في السجلات الطبية المقدمة، أنتقل إلى السؤال 2.14

2.14 أذكري الأقراص المستخدمة؟

- _____
- _____

2.15 **كم مرة يوميا تتناول الدواء الخاص بك؟**

من 1 – 2 مرة يومياً
من 3 – 4 مرات يومياً
أكثر من 4 مرات يومياً
أخرى

2.16 متى تأخذي أقراص الدواء الخاصة بك؟

صباحاً
بعد الظهيرة
مساءاً
أخرى

2.17 هل أي من الأقراص تتناوليها مع الوجبات ؟

نعم
لا
غير متذكرة

لو كان الجواب في السؤال 2.17بنعم أنتقل إلى 2.18

2.18 من فضلك حددي متى ؟

قبل الوجبات
مع الوجبات
بعد الوجبات
غير متذكرة

2.19 كثير من المرضى لا يتبعون تعليمات أخذ الأقراص مع وجبات الطعام، كيف هو الوضع بالنسبة لك؟

_____

_____

2.20 هل تشعرين أن استخدام علبة حفظ الأدوية / تذكير شأنها أن تساعدك على تذكر تناول الأدوية الخاصة بك؟

نعم	لا	لا اعرف

إذا تم ذكر "الأنسولين/ أو نظائر الأنسولين " في البند 2.13 موجودة في السجلات الطبية المقدمة، أنتقل إلى السؤال 2.21

2.21 ما هو الأنسولين / أو نظائر الأنسولين/ أو منبهات جي أل بي المستخدمة.؟

- _____
- _____

2.22 كم عدد المرات التي تأخذي فيها حقن يومياً ؟

من 1 – 2 مرة يومياً
من 3 – 4 مرات يومياً
أكثر من 4 مرات يومياً
غير متذكرة

2.23 هل تتناولين الجرعة مع الوجبات ؟

نعم
لا
ما بين

لو كان الجواب في السؤال 2.23 بنعم أنتقل إلى 2.24

2.24 من فضلك حددي متى ؟

قبل الوجبات
مع الوجبات
بعد الوجبات
غير متذكرة

2.25 أين (في الجسم) تأخذي حقن العلاج الخاصة بك؟

2.26 هل تغيري موقع الحقن ؟

نعم
لا

2.27 هل تستخدمي أبره جديدة كل مرة عند العلاج بالحقن أو قياس السكر في الدم بواسطة الجهاز ؟

نعم
لا

2.28 لو كان مستوى السكر في الدم منتظم ، هل ستتوقفين عن تناول علاجك ؟

نعم	لا	لا اعرف

لو كان الجواب في السؤال 2.28بنعم أنتقل إلى 2.29

2.29 هل ستستشيرين طبيبك قبل أن تفعلي ذلك ؟ أشرح

2.30 هل تستخدمي أي منتجات بديلة لعلاج مرض السكري الخاص بك (على سبيل المثال. منتجات خالية من وصفة طبية، وملاحق والأدوية العشبية / الأعشاب؟).

نعم	لا	لا اعرف

لو كان الجواب في السؤال 2.30بنعم أنتقل إلى 2.31

من فضلك اذكري اسم هذه المنتجات؟

2.31 هل طبيبك / مثقفي السكري أو أي شخصية صحية أخرى لديها معرفة حول استخدامك لمثل هذه العلاجات البديلة؟

نعم
لا
غير متذكر

2.32 هل تعتقدي أنك قد حصلت على معلومات كافية حول دواء السكر الخاص خلال شهر رمضان؟

نعم	لا	لا اعرف

لو كان الجواب في السؤال2.32 بنعم أنتقل إلى2.33

2.33 من من الموجودين في القائمة الذي قام بتزويدك بالمعلومات المتعلقة بدواء السكر الخاص خلال شهر رمضان ؟ ضع علامة على كل ما ينطبق.

الأطباء	الصيادلة	مساعد الصيدلي	مثقف السكري	افراد الأسرة	الأصدقاء	الممرضات	كتيبات	أخرى

لو كان الجواب في السؤال 2.32 "لا" أنتقل إلى 2.34

2.34 ما نوع المعلومات التي تفتقديها ؟

2.35 هل تقومين بصوم يوم الأثنين والخميس بشكل دائم ؟

نعم	لا	أحيانا	لا اتذكر

2.36 هل حدث وأن قمت (بتغيير / الحد / وقف العلاج) لمرضى السكري الخاص بك خلال شهر رمضان أو أيام الصيام ؟

لا	لا أصوم	أحيانا	لا اتذكر

لو كان الجواب في السؤال 2.35 أو 2.36 " نعم " أنتقل إلى 2.37

2.37 هل أبلغت طبيبك أو مثقف السكري حول ذلك؟

نعم	لا	لا اعرف

3

الحاجة للحصول على معلومات حول علاج السكري بين المرأة الإماراتية

3.1 من من الموجودين في القائمة الذي قام بتزويدك بالمعلومات المتعلقة بعلاج مرض السكري في بداية المرض؟ ضع علامة على كل ما ينطبق.

الأطباء	الصيادلة	مساعد الصيدلي	مثقف السكري	افراد الأسرة	الأصدقاء	الممرضات	كتيبات	أخرى

3.2 هل وجدت المعلومات التي استقبلتها عن علاج مرض السكري لديك مفيدة ؟

نعم	لا	لا اعرف

لو كان الجواب في السؤال 3.2 بنعم أنتقل إلى 3.3

3.3 في أي مرحلة وجدت المعلومات مفيدة ؟

لو كان الجواب في السؤال 3.2" لا " أنتقل إلى 3.4و3.5

3.4 ما نوع المعلومات التي تبحث عنها ؟

3.5 بأي معني أو وسيلة ترغب في استقبال هذه المعلومات؟

3.6 لو لديك أسئلة بشأن داء السكري الذي عندك ، من يمكن الرجوع إليه ؟ ضع علامة على كل ما ينطبق

3.7 هل غالبا ما تكوني بحاجة إلى المساعدة في فهم المعلومات المكتوبة التي تتلقيها عن مرض السكري لديك؟

دائماً
غالباً
نادراً

أبداً
لا أعرف

3.8 هل من السهل التحدث مع (الطبيب / الصيدلية/ مثقفي السكري) ، إذا كانوا يتحدثون العربية؟

نعم	لا	لا اعرف

3.9 هل ترغبي أن تكون هناك مادة مكتوبة حول علاج مرض السكري الخاص بك باللغة العربية ؟

نعم	لا	لا اعرف

3.10 في أي شكل تفضلي استقبال المعلومات (شفوية أو مكتوبة) ؟

كتيبات
محاضرات
مشاهدة فلم صحي وثائقي
شرح فردي واحد ـ لواحد
شرح جماعي من خلال الحوار و المناقشة
الانضمام الى برنامج صحي متكامل حول مرض السكري
أخرى

3.11 اذا قام موظفي التثقيف الصحي للسكري في مستشفى توام بدعوتك لحضور برنامج صحي متكامل حول مرض السكري هل ستقبلين الدعوة؟

نعم	لا	لا اعرف

لو كان الجواب في السؤال 3.11 " نعم " أنتقل إلى 3.12

3.12 متي تفضلي أن يكون وقت البرنامج الصحي المتكامل؟

صباحاً	بعد الظهيرة	مساءاً	أخرى

3.13 كيف تفضلي أن تكون مشاركتك في البرنامج الصحي المتكامل؟

مستمعة فقط
مشاركة فعالة من خلال المناقشة وطرح الأسئلة
التحدث عن خبرتي الشخصية عن المرض و مشاركة الأخرين بها
القيام بتدريبات عملية خاصة بمرض السكري
أخرى

3.14 أين تفضلي أن يكون مكان اعطاء البرنامج الصحي المتكامل؟

داخل المركز السكري

خارج مركز السكري
خارج المستشفى
أخرى

4 البيانات الديموغرافية

4.1 تاريخ الميلاد:

العمر ـــــ عام
عام الولادة :

4.2 عدد الأبناء ــــــــــ

4.3 الحالة الاجتماعية:

عزباء
متزوجة
مطلقة
أرملة
أخرى ــــــــــ

لو كان الجواب في السؤال 4.3 "متزوجة " أو " أرملة " أنتقل إلى4.4

4.4 كم كان عمرك عند الزواج ؟ العمر ــــــــــ عام.

4.5 ما هو أعلى مستوى تعليمي لك ؟

بدون
التعليم الأولي 10 أعوام أوأقل
التعليم الثانوي 11 عام وأكثر
البكالوريوس من 3 - 5 سنوات
الماجستير
الدكتوراة

لو المشارك لم يستطع إعطاء إجابة محددة أنتقل إلى4.6

4.6 كم عدد السنوات الإجمالية التي قضيتها في التعليم ؟

عدد السنوات: ـــــــ سنة

4.7 ما هي حالتك الوظيفية ؟

موظف دوام كامل
موظف دوام جزئي
بدون عمل
في إجازة مرضية
متقاعد / بالمعاش
ربة منزل
أخرى ــــــــــــ

4.8 هل أنت عضو في أية هيئة لمرضى السكر؟

نعم
لا

4.9 سؤالي الأخير بالنسبة لكي، هل تدعمي إنشاء منظمة وطنية لمرض السكري في الإمارات العربية المتحدة ، والتي يمكن أن تكون مصدراً للمعلومات التي تهم كافة مرضى السكري؟

نعم
لا

التعليقات:

شكراً كثيراً للمساعدة**!**

Clinical data:

- Weight:
- Height:
- Body Mass Index (BMI):
- Blood pressure:
- Triglycerides (TGI):
- Low-density lipoprotein (LDL):
- High-density lipoprotein (HDL):
- Total Cholesterol:
- HbA1c:

Appendix 3. Interview Guide- Paper III

1. Å leve med sykdommen diabetes

I dag skal vi snakke om diabetes og behandlingen av denne. Vi kan imidlertid starte med å snakke litt om hvordan det er å leve med denne sykdommen.

- **Kan dere si noe om hvordan dere opplever det å være diabetiker**
    - Antall år dere har hatt diabetes
    - Livet etter T2DM diagnosen
- **Kan dere si noe om hvordan dere oppdaget sykdommen. Og hva dere tror årsaken til diabetes var**
    - Som følge av en annen sykdom
    - Genetikk
    - Flere i familien som har sykdommen
    - Livsstil
- **Kan dere si om dere har fått noen senkomplikasjoner etter å ha fått diabetes.**
    - Høyt BT
    - Kolesterol
    - Nedsatt syn, nyresvikt, diabetes sår, nedsatt følelser i nervene
    - Medikamentbruk til komorbiditeter
    - Erfaringer med å ha utviklet senkomplikasjoner

2. Egenomsorg av type 2 diabetes

Da vil jeg gjerne diskutere neste tema som er kosthold og fysisk aktivitet. For mange vil det være en utfordring å legge opp et kosthold når man har diabetes. Noen vil dessuten oppleve at fysisk aktiveten har endret seg etter å ha fått diagnosen.

- **Kan dere si noe om dere har lagt om matvanene etter at dere fikk sykdommen**
    - Hvor mange måltider spises det om dagen
    - Hva slags mat spiser dere
    - Utfordringer/mulighetene ved å forandre dietten.

- **Kan dere si noe om hva slags forhold dere har til fysisk aktivitet etter dere fikk sykdommen**
    - Hvor ofte trener dere
    - Hvor lenge trener dere
    - Hva slags form for fysisk aktivitet blir utført (sykling, løping, gå tur osv.)
    - Erfaringer med å være fysisk aktiv

Da skal vi snakke litt om legemiddelene dere bruker. Tidligere studier viser at innvandrere opplever at det er vanskelig å ta medisiner riktig, mens noen synes det er vanskelig å ta medisiner i det hele tatt. Veldig fint om dere tar frem legemidlene dere står på, slik at vi kan snakke litt om dem.

For mange innebærer diabetes bruk av flere medisiner, kan dere si noe om hvordan dere opplever dette

- Medisiner mot diabetes/eller bare kost og trening
- Hvor lett å huske å ta medisinen
- Hvor ofte tar dere medisiner
- Bruker dere medisiner i form av tabletter, injeksjoner (insulin) eller begge deler
- Bytte av medisin
- Endring av dose
- Hvor lenge dere har stått på legemidlene
- Står dere på statiner (legemidler mot kolesterol)

På grunn av religion er det mange diabetikere som opplever utfordringer med tanke på fasting for eksempel under hellig måneden Ramadan.. Hva slags tanker har dere om dette

- Pleier dere å faste
- Legemiddelbehandlingen i Ramadan

Da går vi over til neste tema som blodsukkerkontroll. Noen synes det er vanskelig å huske å måleblodsukkeret ditt, eller at det er slitsomt å gjør det.

Kan dere si noe om deres erfaring med blodsukkerkontroll

- Måling av blodsukkeret: praksis og erfaringer
- Hvilket nivå bør blodsukkeret ligge

3. Informasjon gitt av helsepersonell

Diabetes er en sykdom der mange har behov for god nok informasjon for å kunne holde sykdommen under kontroll.

Kan dere fortelle om hvem dere får informasjon av når det gjelder sykdommen og legemiddelbruken deres

- Lege
- Apotek
- Gjennom bekjente
- Erfaringer med å få informasjon om diabetes

Er det vanskelig å forstå den informasjonen som blir gitt med tanke på språkvansker

- Fastlege/ lege
- Apotek
- Gjennom andre som har diabetes/bekjente
- Konkrete utfordringer med å forstå den informasjonen som blir gitt

Kan dere si om dere ønsker å få mer veiledning, oppfølgning om det er informasjon dere savner med tanke på å være diabetiker

- Om hva
- Fra hvem

Sluttspørsmål:

Har dere hørt om diabetesforbundet.

- Er dere medlem

Er det noe dere vil legge til eller diskutere som ikke har kommet frem av samtalen så langt? Eventuelt, andre kommentarer?

Tusen takk for hjelpen!