

Diabetes Knowledge, Self-care Behaviours, Acculturation, and Health Outcomes in Arabic-speaking Adults with Type 2 Diabetes in Edmonton, Canada

By

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ABSTRACT

The number of Arabic-speaking immigrants in Canada is growing, as is the prevalence of type 2 diabetes (T2D) in this population. Understanding of T2D knowledge, self-care management, and diabetes-related outcomes in this population is lacking. Our objective was to examine the level of diabetes knowledge, self-care behaviours, acculturation, and health outcomes in Arabic-speaking adults with T2D in Canada, and explore whether women and men in this population have different health behaviours, as well as sociodemographic, psychosocial, and clinical characteristics.

We conducted a cross-sectional study in Edmonton, AB between July 2017 and January 2018 on 115 consenting individuals recruited from primary care clinics and community centers. Data collection involved face-to-face or phone interviews in completing a survey administered via Research Electronic Data Capture (REDCap). The interviews were conducted in the Arabic language by Arabic-speaking research team. The survey included measures of diabetes knowledge (Michigan Diabetes Knowledge Test), self-care behaviours (Summary of Diabetes Self-Care Activates, SDSCA), medication adherence (Morisky Medication Adherence Scale, MMAS8), and depressive symptoms (Patient Health Questionnaire 2, PHQ-2). In addition to the survey, we conducted a review of patients' medical charts (N=110 complete chart reviews). The mean age of participants was 57.6 (SD=10.7) years, and the majority were male (61.4%). Overall, 59.7% of participants were low-income Canadians of Arabic descent. The mean diabetes duration was 23.9 (SD 17.5) years. The majority (87.0%) had a body mass index (BMI) \geq 25kg/m², and 71.9% had a family history of diabetes. More than half of respondents reported having hypertension (58.8%) or dyslipidemia (54.4%). Only 47.2 % of the subjects met the glycated hemoglobin target of < 7%, and just more than the half 53.5% had an average score on diabetes knowledge, and 25.4 % scored poorly. The most impoverished domain of self-care behaviour was physical activity, followed by self-monitoring of blood glucose, and diet. Participants had high levels of foot care self-care management. Overall, 26.2% had poor medication adherence. One in five participants (19.3%) screened positive for depressive symptoms. Also, Arabic-speaking women with

T2D had higher BMI (mean 34.7 kg/m², SD 5.7) compared to men (mean 31.6 kg/m², SD 7.1), and were less likely to exercise as part of diabetes management.

Overall, in this first study of its kind, we found significant gaps in knowledge and self-care behaviour in the Arabic-speaking population affected by T2D, and the results suggest that gender may influence these gaps. Therefore, culturally and gender-tailored interventions are required to enhance diabetes knowledge, self-care behaviours, and health outcomes in Arabic-speaking individuals with T2D in Edmonton.

PREFACE

The study presented in this thesis is the original work conducted by Aida Belag under the supervisory committee that included Dr. Rose Yeung, Dr. Padma Kaul, and Dr. Fatima Al Sayah. Chapter two in this thesis is prepared as an independent manuscript that will be submitted for publication. Aida Belag is the first author of this work.

The research project was approved by the University of Alberta Research Ethics Board:
(Protocol number: 00069585)

DEDICATION

In the name of Allah, the Most Gracious, the Most Merciful.

All praise is due to Allah with whose grace all good work comes to completion.

My father's soul and my mother.

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LIST OF ABBREVIATIONS

ABCD	Alberta's Caring for Diabetes Project
ACR	Urine Albumin: Creatinine Ratio
BMI	Body Mass Index
BP	Blood pressure
CVD	Cardiovascular disease
DKT	The Michigan Diabetes Knowledge Test
FGM	Flash glucose monitoring
GDM	Gestational diabetes mellitus
HbA1c	Glycated hemoglobin
HDL	High-Density Lipoprotein
IDF	International Diabetes Federation
LDL	Low-Density Lipoprotein
PHQ2	The 2-item Patient Health Questionnaire screen for depressive symptoms
REDCap	Research Electronic Data Capture
SDSCA	The Summary of Diabetes Self-Care Activities Test
SMBG	Self-monitoring of blood glucose
T1D	Type one diabetes
T2D	Type two diabetes
TG	Triglycerides
UAE	United Arab Emirates

Chapter 1 : INTRODUCTION

1.1 Burden of Diabetes

The prevalence of diabetes is increasing all over the world. According to Diabetes Canada, diabetes mellitus is a metabolic disorder characterized by a deficiency in insulin secretion or insulin action, leading to hyperglycemia. Prolonged hyperglycemia is associated with long-term microvascular and macrovascular complications that affect multiple organ systems including the kidneys, eyes, nerves, and cardiovascular system.¹ Diabetes is classified as type one diabetes (T1D), type two diabetes (T2D), gestational diabetes (GDM), and other less common types of diabetes. The most common subtype of diabetes mellitus is T2D, which accounts for more than 90% of the cases. T2D is associated with insulin resistance and lack of or insufficient insulin secretion. There are historical, environmental, physical, and biomedical factors associated with T2D¹ which include:

- Older age
- Having a first-degree relative with T2D
- Excess adiposity
- Non-white ethnicity
- Social deprivation
- History of prediabetes or GDM
- Giving birth to a macrosomic infant
- Vascular risk factors e.g., smoking, hypertension, obesity, or hyperlipidemia

- Other medical conditions associated with diabetes such as a history of pancreatitis or polycystic ovary syndrome
- Medications promoting hyperglycemia such as glucocorticoids or atypical antipsychotic medications.

Diabetes adversely impacts quality of life because of its associated end-organ complications including stroke, heart disease, vision loss, and amputation. According to the International Diabetes Federation (IDF), there are an estimated 425 million adults who have diabetes globally, and forecasters anticipate that by 2045 this number will rise to 629 million.² In Canada, the prevalence of diabetes and prediabetes was estimated at 10.8 million (28%) in 2018, with 3.5 million cases of T2D.³ In 2018, diabetes was estimated to cost the Canadian health care system \$3.6 billion, and this number is projected to increase to \$4.7 billion in 2028.³ The prevalence of diabetes in Alberta was estimated at 7% and has been estimated to rise by 50% by 2028.³

Diabetes is associated with several acute and chronic complications that increase health care utilization, morbidity, and mortality in this population. Canadians with diabetes are 20 times more likely to be hospitalized for lower limb problems and amputation than those without diabetes.³ Moreover, patients with diabetes are 12 times more likely to be hospitalized for renal disease, over three times more likely to be hospitalized for cardiovascular disease, and more likely to have prolonged hospitalizations.³ Each year, diabetes leads to serious complications and contributes to 30% of strokes, 40% of heart attacks, 50% of kidney failures requiring dialysis, and 70% of non-traumatic lower-limb amputations.³ Diabetes increases the risk of blindness 25-fold and is the leading cause of blindness in Canadians under 50 years old.⁴ Diabetes has been found to reduce life expectancy by 5.8 years in women and 5.3 years in men.⁴

Fortunately, many diabetes-related complications are preventable through healthy lifestyle behaviours and pharmacotherapies.⁵ The first line of management of T2D is to adopt healthy behaviours including physical activity and healthy diet.⁶ If the blood sugar target is not achieved with lifestyle modifications alone, pharmacological treatment is recommended.⁶

1.2 Arabic-speaking Population

1.2.1 Arabic-speaking population in Canada

Canada is a multicultural country with diverse cultural and ethnic populations⁷. In 2011, immigrants of more than 200 different ethnic origins lived in Canada, making up 19.1% of the Canadian population.⁸ The largest minority groups in Canada are the South Asians, Chinese, Blacks, Filipinos, Hispanics, and Arabs.⁸ Given that culture greatly influences the perceptions of health and wellness, and that health is also influenced by the ability to navigate the healthcare system effectively, this great cultural diversity might make providing healthcare more challenging and might contribute to differing levels of health quality and health outcomes.⁹

The word “Arabs” refers to a group of people originating mainly from the Arabian Peninsula, North Africa, and their surroundings, which include a range of ethnicities and religious beliefs.¹² According to Statistics Canada, only 69% of Canadians that spoke Arabic reported being Arab as their ethnicity in 2011.¹⁰ Most Arabic-speaking people trace their origins back to one of the 22 Arabic-speaking countries in North Africa and the Middle East, including Algeria, Egypt, Libya, Morocco, Somalia, Sudan, Tunisia, Djibouti, Mauritania, Iraq, Jordan, Lebanon, Syria, Palestine, Bahrain, Oman, Qatar, Saudi Arabia, the United Arab Emirates, Kuwait, and Yemen (**Figure 1**).¹¹ These

can be further divided geographically and culturally into the Gulf, the Levant, the Maghreb countries and the Northern and Eastern African countries.^{11 12} At the center, the Gulf Arab countries include the 7 oil producing countries (Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) located along the Persian Gulf and Yemen.¹¹ North of the Arabian Peninsula are the 4 Levant Arab countries (Syria, Jordan, Lebanon, and Palestine) that share historical lands.^{11, 12} In Africa we find the Maghreb Arab countries in the west (Algeria, Libya, Morocco, Mauritania and Tunisia), two northern African countries (Egypt and Sudan) and two eastern Africa countries (Somalia and Djibouti).¹² Politically these twenty-two countries share a council called the Arab League established to drive their geopolitical influence.¹¹

Family plays the centrepiece in Arabic culture where loyalty to the family is revered. Multiple generations often share one house, and Arabs are taught to value group wellbeing above individual wellbeing.¹² Sharing food and acts of generosity are cornerstones of Arabic culture, where hosts expect their guests to eat, and refusing food is considered impolite. In 2001, 52% of Arabs reported a strong sense of belonging to their culture.¹⁰

Immigrants who speak Arabic as their mother tongue increased by 30% from 2011 to 2016, and approximately 486,525 native Arabic-speaking people were living in Canada in 2016.¹³ Arabic as a native language is one of the five top languages in Canada among immigrants with variable prevalence across the country; 18% in Montreal, 19% in Ottawa, and 6% in Edmonton.¹³ The largest subgroup of Arabs in Canada (~40%) are of Lebanese origin.¹⁰ In 2016 Approximately 40,540 Albertans spoke Arabic as their first language with 17,520 Arabic-speaking people living in Edmonton.¹³ In 2001, 30% of

Canadian-Arab adults had postgraduate education compared to 15% of the general adult population; however, they had a lower employment rate of 56% compared to 62% of the general Canadian population.¹⁰

Arabic-speaking immigrants face many challenges adapting to the Western culture, which may present barriers to maintaining and improving overall health. Kalich et al. have found that immigrants to Canada find language, finances, access to information, and cultural differences challenging when navigating the health care system.¹⁴ At present, there is a paucity of knowledge regarding Arabic-speaking people with diabetes in Canada. Given the increasing immigration from these countries,¹⁵ along with the disproportionate rise in diabetes prevalence in the Arab countries, it is essential that a better understanding of the medical needs of this group are studied to ensure appropriate diabetes prevention and treatment strategies to improve health outcomes for Arabic-speaking Canadians with T2D.

1.2.2 Diabetes in Arabic-speaking countries

The prevalence of diabetes in the Middle East and North Africa has been growing fast. There are several risk factors associated with the epidemic of T2D in Arabic-speaking countries including ageing, increasing population size, obesity, lack of physical activity, consumption of processed and fast foods, and a number of other socioeconomic factors strongly associated with urbanization and Westernization.¹⁶ According to the IDF 2017 Atlas, the estimated prevalence of T2D in Arabic-speaking countries ranged from 14% in Qatar to 18% in Saudi Arabia, with all Gulf Countries exceeding the 8% prevalence in Canada. Concerning diabetes, Sudan, Egypt, and Saudi Arabia are among the top five countries in North Africa and the Middle East with the highest absolute

numbers of adults with diabetes.² The most reported diabetes complications in Arabic-speaking countries are retinopathy, neuropathy, nephropathy, and cardiovascular disease.¹⁶

1.2.3 Arabic-speaking immigrants and diabetes

In addition to language and cultural differences when moving to North America, Arabic-speaking immigrants face similar health challenges to their counterparts in the countries of origin. Studies on Arabic-speaking immigrants in the United States of America (USA) and Australia have found a higher prevalence of diabetes¹⁷ and diabetes risk factors such as smoking¹⁸, hypertension, obesity, strong family history of diabetes, and lack of physical activity in comparison to the general populations in these countries.¹⁹ Research on Arabic-speaking immigrants with diabetes in various western countries suggests that these individuals face barriers in accessing the appropriate care for their diabetes, and have worse health outcomes than the general population. For instance, a study in Sweden reported that female Arab immigrants had a lower level of seeking advice and support from their health care providers compared to that of Swedes and Yugoslavians.²⁰ In Australia, Arabic-speaking immigrants with T2D face difficulties in navigating the health resources.²¹

Diabetes and Gender

The prevalence of diabetes among Arab immigrants in Australia was reported to be 3.6 and 2.4 times higher in males and females respectively, compared to their Australian counterparts.¹⁷ Biological and psychosocial factors may impact the prevalence and management of diabetes between genders. Eric et al. found that hormone levels are implicated in the differing risk of T2D between women and men.²² In addition to

biological differences, there are psychosocial factors that impact the management of diabetes between men and women. For example, a Canadian study showed that females who have diabetes have a strong family history of diabetes, more education about diabetes, more depressive symptoms, and higher BMI²³ compared to men with diabetes. A review done on gender differences in diabetes showed that gender has a significant influence on diabetes prevalence, management, and complications.²⁴ Although more men are diagnosed with diabetes, women with diabetes are at higher risk than men with diabetes for hypertension, CVD, obesity, dyslipidemia, and sudden death from acute CVD.^{25, 24, 26,27}

1.3 Diabetes Knowledge

Diabetes knowledge is the foundation for self-care management. Diabetes education is an essential part of diabetes management, as the treatment of diabetes requires significant behavioural changes including complex lifestyle and medication instructions.^{28 29} Certified diabetes educators and diabetes education classes provide much of the diabetes knowledge to Canadians with diabetes, however, providing quality diabetes education is challenging given the geography and cultural diversity in Canada. Little is known about diabetes knowledge among the Arabic-speaking population in Canada. Beeney and Dunn found that improving diabetes knowledge leads to improvement in self-care behaviours mainly in women, but improvement in diabetes knowledge was not associated with improvement in glycemic control.³⁰

1.4 Diabetes Self-care Management

Self-management education and support play a huge role in enhancing diabetes outcomes by improving glycemic control, self-care, reducing diabetes distress, and

reducing complications.⁵ Before starting pharmacological treatment, Canadian guidelines recommend lifestyle modification by adopting healthy behaviours to manage diabetes.⁶ Lifestyle management includes diabetes self-management education, diabetes self-management support, medical nutrition therapy, smoking cessation, physical activity, and psychosocial care.³¹ Diabetes self-care management is influenced by gender, level of education, duration of diabetes,^{32,33} in addition to having the requisite knowledge, physical skills, and self-efficacy.²⁹ No studies have yet documented the level of adherence to self-care management in the Arabic speaking population with T2D in Canada.

1.4.1 Physical Activity

Physical activity plays a critical role in T2D management. It improves cardiorespiratory fitness, glycemic control, and decreases the risk of diabetes complications.³⁴ According to Diabetes Canada, it is recommended that people who have T2D engage in at least 150 minutes of moderate to vigorous physical activity per week to improve cardiovascular risk factors and reduce morbidity and mortality.³⁴ Regular physical activity has been shown in many studies to be an important element in diabetes management primarily due to its impact on insulin sensitivity and weight reduction.³⁵ Furthermore, people with T2D who exercise have better glycemic control³⁶, lower levels of low-density lipoprotein cholesterol (LDL-C) and triglycerides than those who do not exercise.³⁷ Further, being physically active has been associated with decreased risk of CVD-related and overall mortality in patients with diabetes.³⁸ Previous studies have found that Arabic speaking populations with T2D in Arabic countries¹⁶ and in

Australia³⁹ have low levels of physical activity. There is a lack of evidence on physical activity in Arabic-speaking Canadians with T2D.

1.4.2 Nutrition therapy

Combined with physical activity, nutrition therapy is a vital part of diabetes self-care management and can reduce HbA1c by 1 to 2%.⁴⁰ Dietary patterns in the Arabic countries have rapidly transformed in the past three decades.¹⁶ The traditional Arabic diet has been changing from one that includes high fiber, fresh fruits, vegetables, and whole grains to a processed high fat, high carbohydrate, low fiber diet.^{16,41} Additionally, consuming many sweets during family and social events have become the norm. Larger portion sizes have been implicated in the diabetes epidemic in Arabic countries.¹⁶ Social life plays a major role in being less adherent to a healthy diet since people mainly eat meat, rice, and sweets at gatherings.⁴² To our knowledge, dietary behaviour in the Arabic speaking population with diabetes in Canada has not been reported.

1.4.3 Foot Care

Peripheral neuropathy is a common diabetes complication that is defined by decreased or abnormal lower limb sensation.⁴³ Association of neuropathy and peripheral arterial disease increases the risk of foot ulcer and infection that may lead to lower limb amputation, which is 20 times more likely to occur in people with diabetes than in those without diabetes in Canada.⁴³ Specific foot care education and early detection of foot problems are the keys to preventing amputation.⁴³ Diabetes Canada recommends that foot care education be incorporated in diabetes management to prevent and promptly treat complications.⁴³ There are no reported studies in the literature examining foot care management in the Arabic speaking diabetes population in Canada.

1.4.4 Medication adherence

Adhering to medications is a major modifiable risk factor for diabetes control and is cost-saving to the medical system.^{44,45} Poor medication adherence and uncontrolled T2D have been documented in many Arabic countries, including the UAE and Palestine.^{46,47} Low levels of knowledge and health awareness, poor medication adherence, concerning increased diabetes complications have been reported in many Arabic speaking countries.⁴² In a survey of Arab Americans, just under one third (29.2%) of participants reported high adherence to antihypertensive medications, and those who were most adherent had the best blood pressure control.⁴⁸ In the same study, authors linked higher acculturation with more adherence to medications.⁴⁸ However, there is no evidence of the level of medication adherence in Arabic speaking adults with diabetes in Canada.

1.4.5 Blood glucose monitoring

Self-monitoring of blood glucose levels provides an accurate assessment and monitoring of hypoglycemia and hyperglycemia.⁴⁹ Monitoring allows an individual to observe and understand the impact of food, physical activity, and medications on blood glucose fluctuations and enables the individual to make better decisions by tailoring activities to reduce glucose level.⁴⁹ More frequent self-monitoring is especially important for patients who are taking oral medications or insulin that can cause hypoglycemia.⁴⁹ The frequency of blood glucose monitoring is dependent on the severity of T2D, access and cost of supplies, as well as patient capacity to self-monitor. There are many types of devices to monitor blood glucose levels, which include self-monitoring of blood glucose (SMBG) and flash glucose monitoring (FGM).⁴⁹ There is evidence to show that SMBG is

associated with significant reductions in body weight and HbA1C level compared to those who did not use SMBG.⁴⁹ Evidence on self-monitoring of blood glucose in Arabic-speaking adults with T2D is also lacking.

1.5 Diabetes and depression

People who have diabetes are at greater risk for depression than those without diabetes.⁵⁰ One-third of people with diabetes have clinically significant depressive symptoms.⁵¹ Based on the recommendations from Diabetes Canada, people with diabetes should regularly be screened for psychological distress and psychiatric disorders including diabetes distress, fear of hypoglycemia, depression, and anxiety.⁵¹ It is important to address depressive symptoms in T2D because depression is linked to lower adherence to self-care activities^{51,52} and follow-up with care providers.⁵³ Also, major depression is associated with a poor level of self-care behaviours.⁵² Such evidence is not available for Arabic-speaking adults with T2D.

1.6 Acculturation, gender, and diabetes

Redfield states, “Acculturation comprehends those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact with subsequent changes in the original culture patterns of either or both groups”.⁵⁴ Level of acculturation can be reflected by duration of time in a new country, retention of mother tongues/language proficiency, and retention of traditional practices.⁵⁵ Lack of acculturation was reported to be a risk factor for diabetes among Arab Americans.²⁵ Consuming Arabic food, short duration in the USA, speaking Arabic with friends, and being less engaged in American culture were associated with increased risk for diabetes in Arab American men.²⁵ A Canadian study on acculturation and diet in Arab immigrants

reported decreasing consumption of Arabic food after immigration.⁵⁶ This decrease was linked to the unavailability of traditional ingredients, the increased time required to cook and prepare traditional foods, and children's preferences.⁵⁶ However, in the same study, Arab participants reported eating healthier compared to their country of origin because of increased nutritional knowledge and decreased sweets, carbohydrates, and fat consumption.⁵⁶

Gender may play a role in acculturation and diabetes care in Canada. A study on female Arabic immigrants in Edmonton showed that women maintain traditional roles as in their native countries, and are largely responsible for food shopping and cooking.⁵⁷ Women mentioned that they prefer shopping at ethnic grocery stores but reported finding it challenging to adhere to their traditional foods due to unavailability or inconvenient access to Arabic grocery shops in Edmonton.⁵⁷ We do not have data on how acculturation and gender impact diabetes care in Arab-speaking Canadians with T2D.

1.7 Diabetes-specific health outcomes

Several clinical measures have been established as standardized benchmarks of diabetes care to help clinicians guide treatment based on substantial evidence, and have served as the basis of many clinical practice guidelines.^{58,59} These measures include BMI, HbA1c, blood pressure, lipid levels, and urinary albumin-creatinine ratio.

According to the World Health Organization (WHO), BMI is calculated by weight in kilograms divided by the square of height in meters (kg/m^2).⁶⁰ The healthy BMI range falls between BMI of $18.5 \text{ kg}/\text{m}^2$ and $24.9 \text{ kg}/\text{m}^2$, overweight refers to BMI of more than $25 \text{ kg}/\text{m}^2$, while obesity is defined as BMI of more than $30 \text{ kg}/\text{m}^2$.⁶⁰ The American Diabetes Association recommends to measure BMI in patients with diabetes in

each routine visit and document it in patient records. Obesity is strongly linked to the increased risk of co-morbidities especially CVD,⁶¹ and weight loss is significantly associated with reductions in HbA1c in overweight and obese adults with T2D.⁶²

HbA1C is a standardized benchmark indicator of glycemic control, which is used for diabetes screening, measuring treatment effectiveness, and predicting the risk of future diabetes complications.⁴⁹ HbA1c reflects the mean blood glucose level over the last two to three months⁶³. In Canada, HbA1c is reported via the National Glycohemoglobin Standardization Program (NGSP) units (%) ⁴⁹ where the goal for diabetes control is generally less than 7%.

Dyslipidemia is associated with an increased risk of cardiovascular disease in people with T2D.⁶⁴ Diabetes Canada recommends that people with T2D should screen routinely for hyperlipidemia.⁶⁴ The recommended levels of LDL cholesterol in T2D are less than 2.0 mmol/L.⁶⁴

The UKPDS38 trial found that aggressive management of hypertension in individuals with diabetes helps to achieve a target level of blood pressure and reduce the risk of stroke by 40%, diabetes-related mortality by 32%, and microvascular complications by 37%.⁶⁵ For these reasons, the early detection of high blood pressure and extensive hypertensive treatment in people with diabetes is essential.⁶⁶ Diabetes Canada recommends measuring blood pressure frequently in individuals with T2D and targeting a level below 130/80 mmHg.⁶⁷

Diabetes is the most common cause of kidney disease in Canad.⁶⁸ A urine test known as the Albumin Creatinine Ratio (ACR, normal levels of ACR \leq 2mg/mmol) is a

marker for kidney damage and is an important predictor of morbidity and mortality in individuals with T2D.⁶⁸ An early sign of CKD in diabetes is proteinuria as defined by a high ACR. Diabetes Canada recommends that individuals diagnosed with T2D should be screened for proteinuria at the time of diagnosis and subsequent annual basis.⁶⁸ Proactive screening allows for early detection of kidney damage and permits early treatment that can slow the progression of CKD.⁶⁸

We wanted to assess and compare these benchmark indicators in the Arabic-speaking patients to other diabetes patients in Canada and other Arabic-speaking patients to get a better understanding of their clinical status while also taking their diabetes knowledge, self-care behaviours, depressive symptoms, adherence, and acculturation into context.

1.8 Conclusion

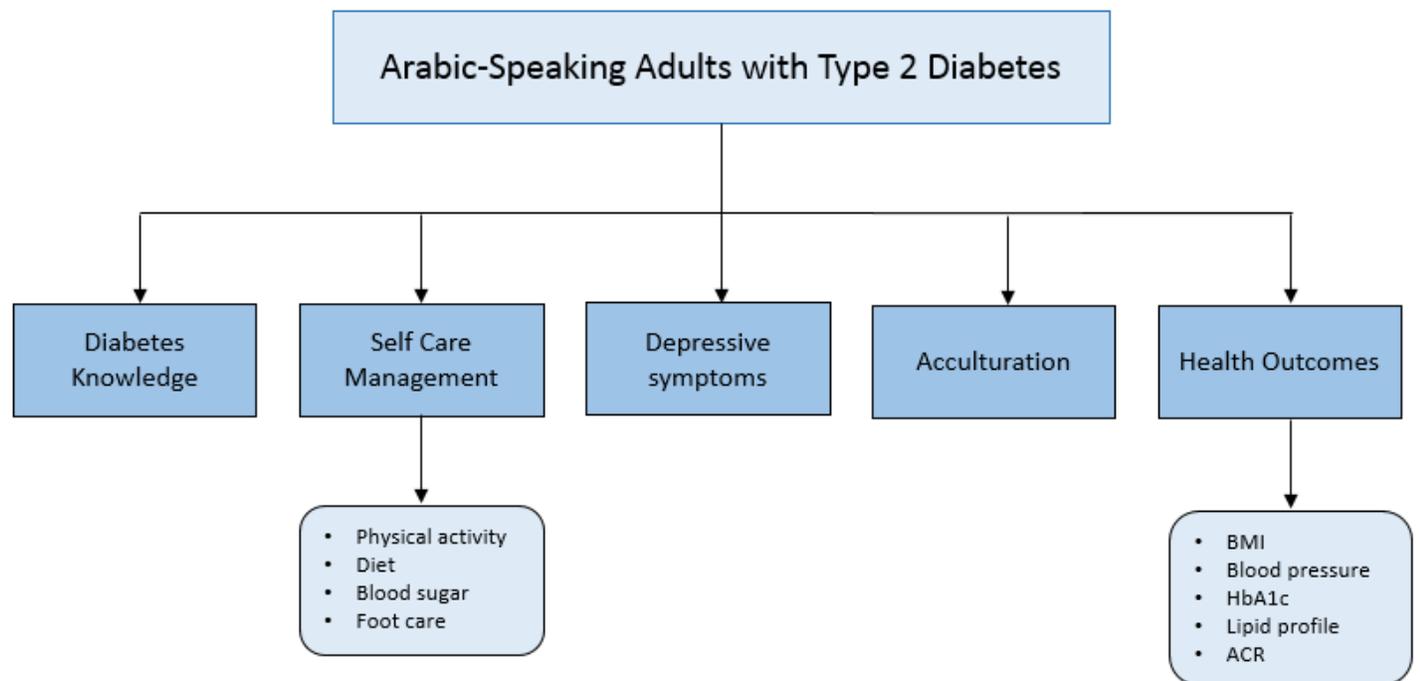
As immigrants face many challenges adapting to the Western culture, they may face barriers to improving health. Together with the increased immigration from Arabic countries,¹⁵ along with the disproportionate rise in diabetes prevalence in Arab countries, there is an urgent need to understand the care of diabetes in the Arabic-speaking people with diabetes in Canada. We hope that with a better understanding of the medical needs of this group, we can build improved diabetes prevention and treatment strategies to improve health outcomes for Arabic-speaking Canadians with T2D.

1.8.1 Objectives

In this thesis, our objectives were to:

1. Examine diabetes knowledge, self-care behaviours, medication adherence, and depressive symptoms in Arabic-speaking adults with T2D in Edmonton (**Figure 1-2**).
2. Examine whether Arabic-speaking women and men with T2D in Edmonton have different sociodemographic, behavioral, psychosocial, clinical, and health outcomes.

Figure 1-2: Thesis concept map



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**Chapter 2 : DIABETES KNOWLEDGE, SELF-CARE BEHAVIOURS,
ACCULTURATION, AND METABOLIC CONTROL IN ARABIC- SPEAKING
ADULTS WITH TYPE 2 DIABETES IN EDMONTON, ALBERTA, CANADA**

2.1 INTRODUCTION

The prevalence of diabetes has been growing all over the world with about 425 million living with diabetes globally.² Over ten million Canadians are affected by diabetes, while one Canadian is diagnosed with diabetes every three minutes.³ The prevalence of diabetes in Alberta was estimated to be 7% in 2018.³ The most common type of diabetes is T2D, which accounts for about 90% of all diabetes cases.² Diabetes leads to severe complications and contributes to causing 30% of strokes, 40% of heart attacks, 50% of kidney failures requiring dialysis, and 70% of non-traumatic lower-limb amputations yearly³, and is considered the leading cause of blindness in Canadians under 50 years old.⁴ Diabetes reduces health-adjusted life expectancy by 5.8 years in women and 5.3 years in men⁴, and currently costs the Canadian health care system \$3.6 billion per year and is projected to increase to \$4.7 billion per year in 2028.³

Fortunately, diabetes and many of its complications are now preventable with proper management, which includes lifestyle modifications (diet, physical activity), self-monitoring of blood glucose, and medications.⁶⁹ Diabetes education is a critical part of diabetes management, as the treatment requires significant behavioural changes.²⁸ In Canada, providing quality diabetes education is challenging given the diverse languages and cultures.

Canada is a multicultural country with diverse cultural and ethnic populations. This diversity may contribute to different levels of health quality and health outcomes among Canadians living

with chronic disease.⁹ The number of Arabic-speaking people has been growing fast during the last few decades. For the purpose of this thesis, we define an Arabic-speaking person as someone who was born in one of these 22 Arabic-speaking countries: Algeria, Egypt, Libya, Morocco, Somalia, Sudan, Tunisia, Djibouti, Mauritania, Iraq, Jordan, Lebanon, Syria, Palestine, Bahrain, Oman, Qatar, Saudi Arabia, the United Arab Emirates, Kuwait, and Yemen. Arabic is one of the five top non-official languages spoken in Canada with rates varying across the country: 18% in Montreal, 18.6 % in Ottawa, and 6% in Edmonton. In Alberta, 56,700 people (1.4 %), and 25,505 identified as Arabs in 2016 in Edmonton.¹³

Of concern, diabetes prevalence in several Arabic-speaking countries has exceeded epidemic proportions.² For instance, the 2017 prevalence of T2D was estimated to be 18.2% in Saudi Arabia.¹³ Sudan, Egypt and Saudi Arabia are among the top five countries in North Africa and the Middle East of having the highest number of adults with diabetes in 2017.¹³ The impact of diabetes on the increasing Arabic-speaking diaspora in Canada has not been well investigated. It has been reported that Arabic-speaking immigrants from North Africa and the Middle East are at higher risk for diabetes than the general Canadian population.⁷⁰ For instance, among ethnic groups in Ontario, male Arabs are at a higher risk of developing diabetes early in their immigration compared to other immigrants from the UK.⁷¹ A review of Arab-American health showed that Arab Americans have a higher prevalence of diabetes compared to other ethnic groups in the USA and also have a higher prevalence of metabolic syndrome.¹⁹

Arabic-speaking immigrants face many challenges in adapting to a Western culture, which might create barriers to improving health outcomes. Kalich et al. have found that immigrants to Canada find language, finances, access to information, and cultural differences challenging when navigating the health care system.¹⁴ At present, there is a paucity of knowledge

regarding Arabic-speaking people with diabetes in Canada. Given the increasing immigration from these countries ¹⁵ along with the disproportionate rise in diabetes prevalence in the Arab countries, it is essential that a better understanding of the medical needs of this group be studied to ensure appropriate diabetes prevention and treatment strategies to improve health outcomes for Arabic-speaking Canadians with T2D. For this reason, we conducted this study which aims to examine diabetes knowledge, self-care behaviours, medication adherence, and depressive symptoms in Arabic-speaking adults with T2D in Edmonton. Furthermore, there are distinctive gender roles in Arabic culture, which may also contribute to differences in health outcomes, so we also examined the role of gender in the outcomes in this population.

2.2 METHODS

2.2.1 Study design, eligibility, and recruitment

We conducted a cross-sectional study in Edmonton, Alberta between July 2017 and January 2018. Data collection was conducted using both face-to-face and phone interviews that involved completing an online survey via Research Electronic Data Capture (REDCap), and medical chart reviews. Research posters were distributed at family medicine clinics, endocrinology clinics, pharmacies, Arabic/Middle Eastern shops, and Arabic community centers throughout Edmonton area. Eligible participants from primary care networks and community centers in Edmonton were recruited via convenience and snowball sampling.

We included adults with T2D who spoke Arabic as their first language, were born in one of 22 Arabic-speaking countries, residing in Edmonton. Exclusion criteria included patients with T1D, gestational diabetes, or were not able to understand the scope of the study or communicate to answer the survey (e.g. those with dementia, cognitive issues, speech disorders). Individuals who agreed to participate provided written consent to take part in the study and to release the relevant medical information from their health care providers. Each participant received a \$10 gift card as compensation, even if they decided to withdraw from the study later on.

To enhance recruitment, we held four public seminars in Edmonton where we invited the participants who had been interviewed and other community members to attend. In these seminars, we emphasized general knowledge regarding lifestyle management, available health resources, and the Canadian guideline recommendations for individuals with T2D.

This study was approved by the health research ethics board at the University of Alberta (Pro00069585).

2.2.2 Interview and data collection

The interviews were conducted in Arabic by trained bilingual research assistants. The 25-minute survey had 66 questions addressing the following seven domains (appendix A&B)

- Sociodemographic data included a date of birth, sex, marital status, education level, employment status, and total annual household income. These questions were derived from the survey used in the Alberta's Caring for Diabetes Study (ABCD study).⁷²
- Self-reported health was assessed using one item asking participants how they feel about their overall health with the responses of excellent, very good, good, fair, and poor.⁷²
- Health and lifestyle information including questions on diabetes duration, history of hypoglycemia, diabetes self-management, self-reported of diabetes-related complications, and family history of diabetes. These questions were derived from the ABCD study.⁷²
- Diabetes knowledge assessment was done using the Arabic-version of the 14-item Michigan Diabetes Knowledge Test (DKT) to assess the level of participants' diabetes-related knowledge. A total score < 7 indicates a poor level of knowledge, scores between 7 and 11 indicate an average (acceptable) level of knowledge, and scores > 11 indicate a good level of knowledge.⁷³ After we finished the interview, we provided the right answers of this questionnaire to participants, and discussed the answers with them and why they gave the wrong answer.
- For self-care management, we used 18 items from the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. This questionnaire assesses diet, diabetes monitoring, physical activity, medication adherence, smoking, and foot care. In this study, we only used the diet (five items), diabetes monitoring (two items), physical activity (two items),

and foot care (five items) sub-scales. We used both the Lebanese and Saudi versions of this questionnaire for cultural and language adaptation.^{74,75} Individuals reported how many days in the past seven days they engaged in a particular activity. The scoring system of self-care activities was reported as adherent or non-adherent based on the mean of days of the activity in the prior week.

- Medication adherence was assessed using the Arabic-version of the 8-item Morisky Medication Adherence Scale, (MMAS8). The total score is based on the summation of the scores for the eight questions. Adherence was classified as high (score= 8), medium (score 6 - 7), and low (score ≤ 5).⁴⁷
- The Arabic-version of the 2-item patient health questionnaire (PHQ2) was used for depressive symptoms screening. A score of less than three indicates negative, depressive symptoms and greater than three positive symptoms.^{76,77}
- Acculturation-related questions about country of origin, duration of stay in Canada, the preferred language of communication (only English, only Arabic, mostly English, mostly Arabic, English and Arabic equally, another language), and eating habits/nutrition (always-Arabic food, mostly Arabic food, equal Arabic and Canadian food, mostly Canadian food, and always-Canadian food). These questions were adapted from a questionnaire used in a study that measured Arab acculturation in the USA.⁷⁸
- Clinical outcomes were obtained from participants' medical charts through their health care providers including the last reading of HbA1c, blood pressure (BP), height, weight, lipid profile (High Density Lipoprotein cholesterol levels (HDL), Low Density Lipoprotein cholesterol (LDL) levels, triglyceride (TG) levels, and urine albumin-creatinine ratio (ACR)). We excluded tests done before 2016. Based on the

recommendations of Diabetes Canada, we categorized BP, HbA1c, and LDL-C to calculate the proportion of our population meeting the recommendation for blood pressure level below 130/80mmHg⁶⁷, HbA1c less than 7%⁷⁹, and LDL-C less than or equal to 2mmol/L. For ACR, we divided this into three categories of less than 2.0 mg/mmol as normal, from 2.0 to 20.0 mg/mmol as microalbuminuria and more than 20.0 mg/mmol as over nephropathy.⁶⁸

2.2.3 Data management and analysis

The survey data were exported directly from REDcap to STATA statistical analysis software. Chart review data was entered into REDCap and checked by two members of the research team. All questionnaires were scored as per the guidelines for each^{73,80-82}, although some adaptations were made:

- **SDSCA:** We made an adaptation to the SDSCA where a response choice of “not-applicable [N/A]” to the second question in the general diet section, “On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?”, given that some patients may not have a specified eating plan. The smallest score for this question is zero days, which meant the responders had a specific diet plan but did not follow it. We also used the answer from the first SDSCA question of the diet question “How many of the last SEVEN DAYS have you followed a healthful eating plan?”, and imputed its value to the second question regarding following an eating plan, as we assumed a healthful diet was equivalent to following an eating plan.
- **Michigan Diabetes Knowledge Test (DKT):** we also adapted the DKT by adding an extra response of “I don’t know” to all questions to identify those without knowledge

instead of forcing them to indicate an answer that might be correct by chance. This adaptation provides a better estimation of the level of knowledge in this population.

Statistical Analysis

We performed descriptive and simple correlation analysis. We stratified analysis by gender, HbA1c, and acculturation. Acculturation was based on each of three separate variables: duration in Canada, language spoken at home, and type of food eaten at home. Continuous variables were examined for normality; descriptive statistics for continuous variables were expressed as mean (standard deviation, SD), median (interquartile range, IQR) and frequency (proportion) as appropriate. Student t-test was used to compare continuous variables across stratified groups for normally distributed data, respectively. Chi-square test and one-way ANOVA were used to compare categorical variables. A two-tailed $\alpha= 0.05$ was used to determine statistical significance. Stata 14 software was used for analysis. Missing data ranged from 6.5 % in blood pressure measurement data to 32.5% in height and weight measurement data and were excluded from analysis.

2.3 RESULTS

One hundred and twenty-seven participants were approached, and 115 (91.3%) were interviewed in Edmonton, primarily from the north of the city where most Arabic-speaking immigrants reside (Figure 2-1). One participant withdrew early from the study and was excluded from the data analysis. 114 participants completed the survey, and 110 had complete data from medical chart reviews. Sixty-five respondents (57.0%) were recruited from snowball sampling and advertising, with the remaining 49 respondents (43.0%) recruited from primary care clinics. Half of the participants (51.9%) were interviewed in community centers, 39.5% were interviewed in clinics, and 5.3% were interviewed over the phone.

2.3.1 Socio-demographic characteristics of participants

The mean age of participants was 57.6 years (SD=10.7). The majority (61%) of participants were male and 86.0 % were married (Table 2-2). Patients with a Lebanese background were the largest subgroup (37.7%) in this sample while 18.4 % were from Syria, which included 14 Syrian newcomers who came to Canada as refugees. The mean duration of time spent living in Canada was 23.9 years (SD=17.5). Sixty percent reported a total household income below CAD\$45,000, and 40 (35.1%) were employed either part or full-time. Sixty-eight percent of respondents primarily spoke Arabic at home. The majority (91.2%) cooked Arabic food at home either most or all of the time.

Female participants were younger (mean age of 54.6, SD=11.4) than males (mean age of 59.5, SD=9.9 years, $p=0.019$). Marital status also greatly varied with gender in this population; the proportion of unmarried women, which included single, widowed and divorced women, was

higher (27.3 %) compared to men (5.7 %, $p=0.001$). 27.3% of females had postsecondary education compared with 42.9 % of men. The same pattern was seen with employment, where 25.0 % of women were employed either part or full-time compared to 41.4% of men. Acculturation variables did not differ by gender (Table 2-2).

2.3.2 Diabetes history and management

The mean diabetes duration was 11.1 years (SD = 8.6) (Table 2-3). Most of the participants (71.9%) reported having a family history of diabetes. More than half reported hypertension (58.8%) and high cholesterol levels (54.4%). Small proportion reported diabetes complications; 14.9% reported heart problems, 20.2% reported eye problems and 12.4 % reported severe hypoglycemia that required outside help to address during last year. Regarding self-care management, 36.0% reported following a diabetes-specific diet. About half were aware of the Canada Food Guide, but only 44.1% participants used it. Just over a quarter of our sample identified physical activity as a means to manage their diabetes. The majority of participants were taking oral hypoglycemic drugs (81.6%), with 29.0% taking insulin injections, and 22.3% on a combination of oral hypoglycemic drugs and insulin. No one reported taking non-insulin injectable medications (e.g. Glucagon-like peptide 1-agonists) to manage diabetes.

The only self-management behaviour that differed by gender was the rate of self-reported physical activity as part of diabetes management where 41.4% of men reported exercising compared to 22.7% of women ($p=0.04$) (Table 2-3).

2.3.3 Diabetes monitoring and education from health care providers

The vast majority of participants (96.5%) reported that their family doctor checked their BP during their last visit (Table 2-3). A minority (17.5%) of respondents saw a diabetes educator, and 26.3% saw a dietitian within the last year. Approximately three-quarters of participants had retinopathy screening during the last two years. There were no significant differences in diabetes monitoring by gender.

2.3.4 Diabetes knowledge, self-care behaviours, medication adherence, and depressive symptoms

When assessing medication adherence, we excluded 11 participants from the data analysis because they were not taking diabetes medications. More than the half of the participants taking medications (53.5%) had an average score (7 to 11 points) on the diabetes knowledge test, 21.1% had a reasonable level of knowledge, and 25.4% had a reduced or inadequate level of knowledge (Table 2-4). The participants were more likely to answer questions incorrectly on questions asking about the levels of carbohydrate in specific foods, the effect of infection on blood sugar level, and on HbA1c. One out of five respondents in our study were unfamiliar with the HbA1c.

Despite knowledge levels, most self-care behaviours as reported by the SDSCA were poor or fair. Out of the last seven days before the survey, participants reported self-monitoring of blood glucose of 2.5 days/week on average, exercising 2.1 days/week, following a generally healthful diet for 3.1 days/week, and following a specific diabetes diet for 3.6 days/week. The best self-care behaviour was foot care management where participants reported checking their feet 4.8 days/week (Table 2-4). for physical activity, only 26.3% of participants met the physical

activity recommendation of 150 minutes per week. About one-fifth of respondents reported being current smokers. Just under one-third of participants reported high medication adherence. One-fifth of respondents screened positive for depressive symptoms.

There was a clear gender difference in smoking rates; most women (70.5%) were lifelong nonsmokers compared to 42.9% of men in our study. Differences in self-care behaviors by gender were statistically not significant, but results suggest more men were more adherent to general diet and self-monitoring of blood glucose. However, foot care and medication adherence levels were similar in both genders. Adherence to specific diet is the only self-care management behaviour that was higher in women compared to men. The prevalence of positive depressive symptoms was higher in women (25.0%) than men (15.7%), though not statistically significant.

2.3.5 Clinical and Physiologic Measures

Upon medical chart review, we were unable to obtain blood pressure data for 7 (6.5%) participants, HbA1c for 9 (7.0%) participants, LDL for 18 (15.8%) participants, HDL for 15 (13.2%) participants, triglyceride for 15 (13.2%) participants, ACR for 23 (20.2%) participants and height and weight data for 41 (32.5%) participants (Table 2-3). Among the 77 participants for whom weight and height measurements were available from the chart review (67.5% of the sample), 59.7 % were obese (≥ 30 kg/m²), and 27.3 % were overweight (25 to 29.9 kg/m²), with only 12.0% who had a BMI within the normal range. The mean HbA1C was 7.5% (SD = 1.6) with almost half meeting the recommended level of HbA1c less than 7.0%. The mean systolic and diastolic blood pressures (BP) were 125 mmHg (SD = 14) and 75 mmHg (SD = 9), respectively. About 60% had BP less than 130/80mmHg. The mean LDL-C was 2.2 mmol/L (SD = 0.8) with 49.0% have LDL-C of ≤ 2.0 mmol/L, and the mean triglyceride level was 2.0 (SD=

1.4) mmol/L. Based on ACR levels, 35.2% had microalbuminuria and 7.7 % had overt nephropathy (ACR> 20 mg/mmoL).

When stratified by gender, the only statistically significant difference in these outcomes was in BMI. Women had higher BMI (mean 34.7 kg/m² SD= 7.1) compared to men (mean 31.6 kg/m² SD = 5.7).

2.3.6 Impact of acculturation on diabetes self-management and clinical characteristics

In this study based on unadjusted analysis, participants who spent less than ten years in Canada were less affluent and less likely to be employed despite being more educated compared to those who had been in Canada for ten years or longer. These participants also reported speaking only/mostly Arabic and were more likely to eat more traditional Arabic food at home. They also had a shorter duration of diabetes, lower BMI, and lower LDL-C levels compared to those have been in Canada for ten years or longer. Additionally, they were less familiar with the Canada Food Guide and were less adherent to a specific diabetes diet (Appendices C, D, & E).

When examining this population with regards to the type of food eaten at home based on unadjusted analysis, similar findings to those with the shortest duration in Canada were seen in those who reported always eating Arabic food at home. Participants who always ate Arabic food at home were less affluent and less likely to be employed compared to those who mostly ate Arabic or non-Arabic food at home. Notably, education levels did not differ between those who always ate Arabic food compared to those who ate less Arabic food at home. People who always ate Arabic food at home were the least likely to use physical activity as part of their diabetes management strategy and were the least familiar with the Canada Food Guide compared to those who either ate mostly Arabic or other types of food at home. No statistically significant

differences were seen in rates of diabetes complications or clinical characteristics across participants according to the types of food eaten at home, although BMI was lower in the group that reported always eating Arabic food. (Appendices I, J, &K)

Regarding language spoken at home, based on unadjusted analysis, those who only speak Arabic at home were older, less affluent, less likely to be employed, and less educated than those who speak other languages at home. People who only spoke Arabic at home reported having a shorter duration of residence in Canada, more often ate Arabic food exclusively at home, and were less likely to report diet as part of their diabetes management. We also found that those always speaking Arabic at home reported having more heart problems, though other complications did not differ based on language spoken at home. (Appendices F, G, &H)

2.4 DISCUSSION

To the best of our knowledge, this is the first study to examine diabetes knowledge, self-care behaviours, depressive symptoms, and health outcomes in Arabic-speaking adults with T2D in Canada at the same time. Our results show that the majority of participants have acceptable to good levels of diabetes knowledge. Regarding self-management behaviours, participants in this study had lower levels of adherence to diet, blood glucose monitoring, and physical activity compared to their levels of medication adherence and foot care management. We also found that one fifth of participants screened positive for depressive symptoms. Moreover, we found notable gender differences in sociodemographic, behavioural, and clinical measures.

The Alberta's Caring for Diabetes (ABCD) Study is the most relevant study we found representing general Albertans with T2D to compare our population to because it used a number of the same measurement tools.⁷² The ABCD Study surveyed a cohort of 2040 adults with T2D across Alberta.⁷² Our Arabic-speaking study population was younger than the ABCD cohort population by a mean of 7 years and had a longer duration of diabetes. Fewer females participated in our study (38.6%) than in the ABCD cohort (45.0%). Our study findings 36.8% of our study population had post-secondary education compared to 46.0% of the general Albertan population with T2D⁷².

Diabetes-related knowledge

In this study, 74.6 % of participants had acceptable to good levels of knowledge. The figure is lower than that of a Canadian study in Cambridge, Ontario using the same measurement tool which reported 87.5 % of participants had an adequate level of knowledge.⁸³ In comparison

with studies from Arabic countries, our findings are consistent with a cross-sectional study in UAE of random sample of 575 participants where despite the fact that 89% saw a diabetes educator, 31% and 36% of people had a poor and fair level of knowledge about diabetes, respectively.⁸⁴ In Egypt, only 30% of people with T2D could identify the normal level of the fasting blood sugar, and only 24.1% could identify causes of hypoglycemia.⁸⁵ Given the wide variation in the health system resources across various Arabic countries, it is not surprising that knowledge of diabetes would be poorer among participants in less resourced environments.

Self-care management

Physical activity

Even though we used a different tool to measure physical activity, most participants in both our study and the ABCD study were physically inactive; in our study, only 26.3% met the recommendations by Diabetes Canada for physical activity in diabetes (150 minutes of physical activity per week) compared to 21% of the ABCD cohort. Our results are also consistent with a study of 649 Jordanian adults with T1D and T2D in Jordan which showed that 39% of participants met the recommendations for 30 minutes of daily physical activity.⁸⁶ Furthermore, a study from Qatar found low levels of physical activity where 40% and 64% of study participants did not do any moderate or vigorous physical activity, respectively⁸⁷ and among 223 individuals with T2D in Jordan, they reported adequate physical activity on 1.8 days/week.⁸⁸ Our findings are also consistent with previous studies on Arabic-speaking diaspora with T2D. In an Australian multi-centre cross-sectional study that compared 309 Arabic-speaking and 392 Caucasian English-speaking participants with T2D, the Arabic-speaking immigrants using SDSCA scored significantly lower in physical activity than Caucasian Australian participants.³⁹

We are particularly concerned about the gender gap; women in our study participated in less physical activity (1.8 days/week) compared to men (2.4 days/week). Our results are consistent with a cross-sectional study of 293 participants with T2D in Jordan that showed women reported being less active (1.7 day/week) compared to men (2.2 day/week).⁸⁹ These findings are consistent with Canadian data which found that Canadian women with diabetes reported less activity than men with diabetes (31.6% and 41.1% respectively).⁹⁰

Physical inactivity is one of the major problems in people with T2D across all ethnicities and cultures due to the common barriers of having no desire, limited time, comorbidities, car-dependence, bad weather, and lack of walkable places^{42,91}, the Arabic culture provides additional specific barriers, most notably regarding gender expectations. There is the expectation to having many children, leading to multiple pregnancies with short time between pregnancies, as well as the expectation to put family and home before physical activity or exercise.⁴² It should be noted that our study recruitment and data collection were done over the fall and winter, which may have also impacted the reporting of physical activity because of the weather.

Our results emphasize the importance of future studies to address the barriers specific to Arabic-speaking individuals with T2D to enhance the levels of fitness in this population, with an emphasis on gender-specific approaches. We anticipate that many different culturally and language appropriate interventions will be required to help women improve self-care management in T2D. Arab women prefer exercising at flexible times, indoor, in group-based environments with other women.⁹² Getting health care providers to encourage women to do physical activities based on their cultural preferences is a powerful tool to promote physical activity in Arabic speaking women with diabetes.⁹³ Alahmed et al. suggest that physician-based

physical activity counselling using the 5A strategies (ask, assess, advise, agree, assist) is an practical and realistic intervention for promoting physical activity.⁹³

Healthy nutrition

The Arabic-speaking population with T2D in Edmonton had a lower level of adherence to diet compared to the ABCD cohort.⁷² Our findings are consistent with a previous study which found that Arabic-speaking immigrants scored significantly lower on diet than Caucasian Australian participants using the same dietary measure (SDSCA) that we used.³⁹ Our study results are also consistent with those from a study that included a random sample of 649 Jordanian adults with T1D and T2D that showed similarly low rates of adherence to healthy diet behaviours where 65% did not follow diet recommendations by the dietitian,⁸⁶ similar to the majority of participants in Qatar who did not follow a healthy diet.⁸⁷ Compared to diabetes studies in Arabic countries, our findings of Arabic-speaking adults with T2D in Edmonton revealed less adherence to diet behaviours compared to those living in Arabic-speaking countries, perhaps related to factors such as greater availability of processed foods, less availability of fresh fruits and vegetables.

In this study, there were no differences in reported general dietary behaviours between women and men, but women in our study reported more adherence to specific diabetes diet compared to men, consistent with T2D studies done in both the USA and Pakistan.^{94,95} One-fifth of Canadian women with diabetes reported they did not meet the recommendation of fruit and vegetable consumption compared to one-tenth of men with diabetes.⁹⁶ A review of nutritional interventions showed that educational and behavioral interventions targeting women in home and community settings led to improvements in the level of nutritional knowledge, adherence to healthy diet, and increased physical activity in reproductive age.⁹⁷ Given that women in Arabic

culture play an important role in family life and are generally in charge of cooking, future nutritional interventions for diabetes may require targeting women or families together.⁹⁸

Self-monitoring of blood sugar

The Arabic-speaking population with T2D in Edmonton had a lower level of adherence to self-monitoring of blood sugar compared to those in the ABCD study.⁷² This was also found in the Arabic-speaking diaspora with T2D in an Australian multi-centre cross-sectional study.³⁹ Our study results are also consistent with those from a Jordanian study which showed that more than 60% of participants with diabetes did not self-monitor their blood sugar.⁸⁶ Low levels of self-monitoring of blood glucose level may also relate to the high cost of SMBG, which was likely an issue for our study participants since the total annual household income for many was less than CAD\$45,000 in the context of no public coverage for SMBG supplies. This highlights the importance of public health support to access SMBG equipment, given its established importance in diabetes management.⁹⁹

Foot care

In contrast to physical activity, nutrition, and SMBG, our results showed that Arabic-speaking individuals with T2D had better foot care management (4.8 days/week) than the ABCD participants (3.9 days/week) (70). Furthermore, our results contrast with results of the 2005 and 2007 Canadian Community Health Surveys results, which showed that Canadian immigrants with T2D in both years performed less foot care compared to Canadian-born individuals with T2D.¹⁰⁰ One possible explanation for the higher level of foot-care in our study may be related to that the majority of our study participants are Muslims. It is known that practicing Muslims wash their feet five times a day before praying. This is supported by a study conducted in Jordan showing high adherence to foot care in a Muslim population with diabetes.³⁷ So far, no study has

explored the link between the risk and prevalence of diabetic foot complications in practicing Muslim individuals with T2D who wash their feet for prayer compared to those who do not.⁸⁸

Our study results are also inconsistent with the study of 649 Jordanian adults with T1D and T2D that showed low levels of foot self-care⁸⁶ as well as the study on Arabic-speaking diaspora with T2D in Australia where the Arabic-speaking immigrants scored significantly lower in foot care than Caucasian Australian participants.³⁹

Medication adherence

The majority (73.8%) of our study population had a moderate to high level of adherence to medication but was likely lower than the ABCD study population who were adherent to medications 6.3 days/week, although the latter used a different measure of medication adherence. In contrast, our results are consistent with the results from a Canadian study of 56 T2D participants using the same measure (MMAS8) that revealed 73% had good medication adherence.⁸³ In some Arabic studies, levels of medication adherence were higher than that in our study population; only 16% of 132 individuals with T2D in UAE were found to be non-adherent to their diabetes medication¹⁰¹; 26% of T2D patients were non-adherent to their medication in Kuwait.¹⁰² However, other studies show poorer adherence in the UAE,⁴⁶ Libya¹⁰³ and Palestine.⁴⁷ A review on patient management of diabetes in the Middle East indicated that medication adherence in Arabic-speaking countries differ from country to another. The main reasons are lack of education regarding benefit of adherence and forgetting to take their medication.⁴² We found no difference in medication adherence between genders, consistent with previous studies in non-Arabic countries such as Germany, Uganda, and Ethiopia.¹⁰⁴⁻¹⁰⁶ However, a few studies from Arabic countries have shown females to be less adherent. A cross-sectional study interviewing 353 Saudis with T2D found that being less adherent to diabetes medication was

associated with being female, having low level of education, doing less exercise, and using insulin.¹⁰⁷ Both Montague and Sajith et. al found that males with T2D have higher adherence level of medication than females, which might be related to observations that women with T2D had more comorbidities, negative attitudes toward diabetes, and higher prevalence of psychological problems.^{108,109}

Smoking

There are cultural differences in substance use, whereby 21.9% of participants in this study were active smokers, higher than the prevalence of smoking in the ABCD cohort (10.4 %) and slightly higher than that of the general Alberta population (18.8%).¹¹⁰ Notably, our results are not consistent with the results of the Canadian Community Health Surveys in 2005 and 2007 for immigrants and non-immigrants with T2D, where smoking rates in immigrants were significantly lower than non-immigrants.¹⁰⁰ Our findings were, however, similar to those in an Arabic-speaking immigrant cohort with T2D in Australia where 26.7% were smokers.³⁹ It has also been observed that Arab Americans have a higher rate of smoking than the general American population¹⁹ because smoking is considered a common practice in Arabic culture and is generally not thought of as a risk factor for common chronic diseases.¹¹¹

Among genders in our sample, 24.3% of men were active smokers compared to 18.2% of women, which has been seen in both people with and without diabetes from the results of the Canadian Community Health Survey (2007-2008).⁹⁰ The same trend is seen in the general population but at higher rates. In Eastern Mediterranean countries, national smoking rates vary considerably across Arabic speaking countries. In these countries, smoking rates range from 29.7% in men and 1.4% in women in Morocco to 59.0% in men and 47.3% in women in Lebanon.¹¹² Sociocultural factors in some Arabic countries may contribute to increasing rate of

smoking, particularly in females. For example, the high rate of smoking in Lebanese women has been linked to the fact that Lebanon is one of the most urbanized and Westernized Arabic countries, where smoking is associated with freedom.¹¹²

Arabic-speaking adults with T2D had a meager rate of alcohol consumption of just 2.6% compared to 69.5% in ABCD cohort. The majority of participants in our study are Muslims, and the use of alcohol is prohibited in Islam. Little evidence has examined the use of alcohol in Arabs with diabetes.

Depressive symptoms

Regarding mental health, 19.3% of our population screened positive for depressive symptoms, close to 18% of the ABCD cohort who reported having moderate to severe depressive symptoms.⁷² Our results are in contrast to a study on multiethnic groups living with diabetes in the Netherlands, which reported 27.3% of Moroccan participants had significant depressive symptoms versus 9.4% of native Dutch people, however little is known about the reasons behind this particular discrepancy.¹¹³

A review on depression and diabetes in the Levant and Gulf countries found that the prevalence of depression in individuals with diabetes has increased and became a clear concern in Arabic speaking countries.¹¹⁴ Another review of depression in women with diabetes in Arabic countries highlighted the limited mental health support team as mental health specialists and mental health providers, which are the main reasons behind the gap in mental health in diabetes in Arabic speaking countries.¹¹⁵

Our study results found that depressive symptoms were not significantly associated with gender, but we noticed that more women screened positive for depressive symptoms than men

(25.0% vs 15.0 %), which is consistent with previous studies among Canadians and Americans with T2D.^{86,90,95} In a study in Jordan, 23.4% of women with T2D reported depressive symptoms compared to only 14.9% of men; very similar to the absolute numbers seen in our study⁸⁶, suggesting that with a larger sample size, our findings might be significant. A meta-analysis study of depression in women with T2D in Arabic speaking countries found that 34.1% of Arabic women with T2D have depression.¹¹⁵ Furthermore, they mentioned that no clear reasons had been identified to explain the higher risk of depression and diabetes in Arab women. However, high prevalence of diabetes, low levels of vitamin D, high family responsibility, stigma, and lack of access to health care resources for screening and treatment of depression were found to be associated with higher rates of depression in Arab women, which may also explain the findings in our population.¹¹⁵

Diabetes monitoring and clinical monitoring:

The majority of our study sample (65.9%) were overweight or obese (BMI \geq 25kg/m²), which is in line with the obesity trends observed in Arabic-speaking immigrants with T2D in Canada, the US, and Arabic-speaking countries.^{87,116-119} In our study, 27.3% of respondents did not have measurements of height or weight recorded in their chart from 2016/2017, and only 2.7% had a measurement recorded from 2014/2015. The lack of measurement may reflect the difficulty primary care providers have in addressing this complex issue. Research in Alberta has shown that many primary care providers do not feel equipped to address obesity management¹²⁰; such evidence in Arabic-speaking population is lacking.

Our findings show that Arabic-speaking women with T2D in Edmonton have higher BMI compared to men, which is similar to the results of the ABCD cohort which reported that women

have higher BMI (31.9 kg/m²) compared to men (30.7 kg/m²).¹²¹ The same result is accurate for the general Canadian population with diabetes where 42.8% of women are obese compared to 37.9% of men.⁹⁰ Moreover, the same trend was shown among 1619 American participants with T2D from the Health and Retirement Study (HRS)⁹⁵ and Italian participants in the Thiazolidinedione's or Sulfonylureas and Cardiovascular Accidents Intervention Trial (TOSCA.IT).¹²² Being overweight or obese has dramatically risen in North Africa and the Middle East regions with a prevalence rate of up to 55% of adult women and 37% of adult men.¹²³ The fact that women in our study were more likely to be less educated, less employed, have lower income and be more depressed may have played a role in the lower adherence to physical activity, and dietary recommendations and are likely contributing to higher BMI than men. Furthermore, people in some Arabic countries did not find obesity and physical inactivity as strong risk factors for comorbidities.⁴⁸

Clinical benchmarks in T2D Management

In this study, about 60% of participants met the recommendation of BP target of less than 130/80mmHg. This is higher than what is reported from target achievement in the Canadian primary care setting from the DM-SCAN and the DRIVE studies, where BP target achievement was 36% and 54% respectively.^{116,124} HbA1c target attainment was only slightly worse than that in similar primary care studies (47.2% vs 53 %). 49.0% of our study population achieved the target HbA1c target of $\leq 7.0\%$ which is slightly lower than the result from (DM-SCAN) survey that 50% had the result of A1c $\leq 7.0\%$ and 53 % of T2D in (DRIVE) study results.^{116,124} Only 49.0% of our study population had LDL-C of the recommended ≤ 2.0 mmol/L compared to 64% in (DM-SCAN) survey and 64 % in DRIVE study population.^{116,124} These findings suggest many care gaps in the Arabic-speaking population with T2D for glycemic and lipid control,

though it is reassuring that BP management in this population was better than previously reported.

Interestingly, other process measures of diabetes care were better in this study compared to other Canadian populations with diabetes. Only 15% of participants did not have retinopathy screening within the last two years compared to 24.7% of Canadians with diabetes in the Canadian Community Health Survey (2007–2008).⁹⁰ According to Diabetes Canada guidelines, retinopathy screening should be done every one to two years in T2D¹²⁵, and 68.4% of our subjects met this criterion. Our results are much better than a large database linked cohort in Ontario which showed only 37.5% of recent immigrants with diabetes and 50.5% of long-term immigrants with diabetes had appropriate retinopathy screening.¹²⁶

Regarding acculturation, our results were partially consistent with the sociodemographic results of the Arabic-speaking population with diabetes in the US where being less acculturated was associated with older age at immigration, shorter stay in the US, and lower education level.²⁵ However, we did not see any consistent trends across all domains of acculturation (duration of time in Canada, type of food eaten at home, language spoken at home) in self-care behaviors, depressive symptoms, adherence, or health outcomes apart from being less familiar with the Canada Food Guide, which is an unsurprising difference. A reason for the lack of difference might be the homogeneity of our population, as most of our participants either spoke Arabic most or all of the time and ate Arabic food most or all of the time.

Strengths and Limitations

This study is the first to explore various aspects of T2D in Arabic-speaking immigrants in Canada. We recruited participants from both community and healthcare settings and collected

data through interviewing the participants and using their health care charts to provide a more holistic view of our participants' health status. We also used validated measurement tools, which allowed better comparisons to other populations with T2D. Nonetheless, these results should be interpreted in light of a few limitations. First, this was a cross-sectional survey that only allowed examining associations between the studied factors, and therefore, we cannot infer causation. Second, unmarried men were underrepresented in this sample, limiting its generalizability. Third, survey data was based on self-reported measures that inherently introduce bias, and which is influenced by recall bias¹²⁷ and social desirability bias. Finally, given the small sample in the sub-group analyses, we were unable to analyze with adjustment for potential confounders to examine the independent relationships between the studied variables. In the data analysis, we were also limited from further exploration of data because of smaller sample size in some categories, and limited variability in participant's responses, particularly in questions relating to acculturation where the majority of our population was very adherent to Arabic culture and language.

2.5 CONCLUSION

We found that despite the majority of Arabic-speaking adults with T2D in Edmonton having an acceptable level of diabetes-related knowledge, there are significant gaps in self-care behaviours and diabetes clinical benchmarks. Moreover, women and men in this study differ in self-care behaviours and clinical characteristics. These findings suggest the need for developing culturally-tailored interventions to enhance self-care behaviours and clinical outcomes in the Arabic-speaking population in Canada. Arabic-speaking individuals in Edmonton are quite adherent to their culture, so creating a specific intervention for this population should be based

on Arabic culture, language, values and attitude, and include gender-specific education and supports to promote healthy living.⁹⁸

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Table 2-1: Summary of survey domains, measured variables and source of tools

Domain	Measured variables	Measurement tools
Diabetes history	Duration of diabetes, history of hypoglycemia, diabetes management, self-reported presence or absence of diabetes-related complications, and family history of diabetes	Derived from the survey used in the ABCD study ⁷²
Health and lifestyle information	Life style management. Medication, follow with dietitian, retinopathy screening, diabetes educator follow up history of hypoglycemia	Derived from the survey used in the ABCD study ⁷²
Diabetes knowledge	-	The short version of the Michigan Diabetes Knowledge Test (DKT) ⁷³
Self-care behaviours	Diet, physical activity, foot care, blood sugar monitoring	Summary of Diabetes Self-Care Activities (SDSCA) ^{74,75}
Medication adherence	-	Morisky medication adherence scale, (MMAS8) ¹²⁸
Depressive symptoms	-	Patient Health Questionnaire 8-items (PHQ-2) ^{76,77}
Acculturation related question	Country of origin, duration of stay in Canada, preferred language of communication, and eating habits/nutrition	Derived from the PHAC-SL CDC survey Parent Demographic Questionnaire Q3,5,13 ⁷⁸
Sociodemographic data	Age, sex, marital status, educational level, employment, country of origin, total household income	Derived from the survey used in the ABCD study ⁷²
Clinical out come	HbA1c, blood pressure, height, weight, cholesterol (HDL, LDL) levels, triglyceride (TG) levels, and urine albumin: creatinine ratios (ACR)	Derived from the survey used in the ABCD study ⁷²

Table 2-2: Sociodemographic characteristics of participants stratified by gender

Characteristic	Total	Male	Female	P-value
Mean ± SD or n (%)	N= 114	N= 70 (61.4)	N= 44 (38.6)	
Health status				
Excellent/Very Good	28 (24.6)	19 (27.1)	9 (20.5)	0.713
Good	50 (43.9)	30 (42.9)	20 (45.5)	
Fair /Poor	36 (31.6)	21 (30.0)	15 (34.1)	
Age, years				
20 – 44	10 (8.8)	2 (2.8)	8 (18.2)	0.013*
45 – 64	72 (63.2)	45 (64.3)	27 (61.4)	
≥65	32 (28.1)	23 (32.9)	9 (20.5)	
Marital status,				
Married	98 (86.0)	66 (94.3)	32 (72.3)	0.001*
Other **	16 (14.0)	4 (5.7)	12 (27.3)	
Annual household income				
<45,000	68(59.7)	38 (54.3)	30 (68.2)	0.141
Other ***	46 (40.4)	32 (45.7)	14 (31.8)	
Employed	40 (35.1)	29 (41.4)	11 (25.0)	0.074
Level of Education				
Less than high school	43 (37.7)	21(30.0)	22 (50.0)	0.088
Completed high school	29 (25.4)	19 (27.1)	10 (22.73)	

Post-secondary education	42 (36.8)	30 (42.9)	12 (27.3)	
Type of Food Cooked at Home				
Always Arabic	56 (49.1)	32 (45.7)	24 (45.6)	0.623
Mostly Arabic	48 (42.1)	31 (44.3)	17 (38.6)	
Other	10 (8.8)	7 (10.0)	3 (6.8)	
Spoken language at Home				
Only Arabic	45 (39.5)	27 (38.6)	18 (40.9)	0.249
Mostly Arabic	38 (33.3)	27 (38.6)	11 (25.0)	
Other	31 (27.2)	16 (22.9)	15 (34.1)	
Duration in Canada (years)	23.9 ± 17.5	24.5 ± 17.2	23.1 ± 18.0	0.675

* P value < 0.05 is considered significant, **include: Single/Divorced/Widowed, ***include: > \$ 45.000/Prefer not to answer/I don't know

Table 2-3: Healthy behavior and clinical characteristics of participants stratified by gender

Characteristic Mean ± SD or n (%)	Total N= 114	Male N= 70 (61.4)	Female N= 44 (38.6)	P-value
Family history of diabetes	82 (71.9)	50 (71.4)	32 (72.7)	0.881
Duration of diabetes by years	11.1± 8.6			
<5	29 (25.4)	18 (25.71)	11 (25.00)	0.670
5-10	36 (31.6)	24 (34.29)	12 (27.27)	
>10	49 (44.0)	28 (40.00)	21 (47.73)	
Self-reported Diabetes Management strategies				
Diet	50 (43.9)	32 (45.7)	18 (40.9)	0.615
Exercise	39 (34.2)	29 (41.4)	10 (22.7)	0.040*
Oral hypoglycemic medication	93 (81.6)	59 (84.3)	34 (77.3)	0.347
Insulin injection	33 (29.0)	21 (30.0)	12 (27.3)	0.755
Self-reported history of Hypoglycemia during last year	14 (12.4)	6 (8.7)	8(18.2)	0.186
Self-reported Comorbidities				
Hypertension	67 (58.8)	41 (58.6)	26(59.09)	0.956
Stroke	3 (2.6)	0 (0.0)	5 (11.4)	0.004*
DVT	6 (5.3)	6 (8.6)	0 (0.0)	0.046*

Characteristic	Total	Male	Female	P-value
Mean ± SD or n (%)	N= 114	N= 70 (61.4)	N= 44 (38.6)	
Kidney Problem	14 (12.3)	6 (8.6)	6 (13.6)	0.391
Eye problem	23(20.2)	13 (18.6)	10 (22.7)	0.590
Heart problem	20 (17.5)	12 (17.1)	8 (18.2)	0.887
High cholesterol	62 (54.4)	39 (55.7)	23 (52.3)	0.719
Amputation	2 (1.8)	1 (1.4)	1 (2.3)	0.738
Self-care clinical monitor				
Retinopathy screening				
Never	18 (15.8)	12 (17.14)	6 (13.6)	0.881
Less than a year ago	78 (68.4)	47 (67.14)	31 (70.5)	
More than a year ago	18 (15.8)	11 (15.71)	7 (15.9)	
Familiar with Canada Food Guide	59(51.8)	34 (48.6)	25 (56.8)	0.391
Follow up with a dietitian	30 (26.3)	19 (27.1)	11 (25.0)	0.697
Following Canada Food Guide	26 (44.1)	16 (47.1)	10 (40.0)	0.589
Follow up with diabetes educator	20 (17.5)	13 (18.6)	7 (15.9)	0.716
HgbA1C (n=105)	7.5 ± 1.6	7.4 ± 1.5	7.7 ± 1.9	0.348
Systolic blood pressure (n=107)	124.5±14.2	125.4 ± 15.2	122.9 ± 12.6	0.384

Characteristic	Total	Male	Female	P-value
Mean ± SD or n (%)	N= 114	N= 70 (61.4)	N= 44 (38.6)	
Diastolic blood pressure (n=107)	74.8 ± 9.3	75.6 ± 9.6	73.4 ± 8.7	0.232
Body Mass Index (n=77)	32.7 ± 6.3	31.6 ± 5.7	34.7 ± 7.1	0.043
Low-Density Lipoprotein (n=96)	2.2 ± 0.8	2.2 ± 0.9	2.2 ± 0.9	0.923
High-Density Lipoprotein (n=99)	1.2 ± 0.4	1.1 ± 0.4	1.3 ± 0.4	0.116
Triglyceride (n=99)	1.98 ± 1.4	1.9 ± 1.2	2.1 ± 1.7	0.683
Albumin-Creatinine Ratio (n=91)				
<2 Normal level	52 (57.1)	28 (51.9)	24 (64.7)	0.172
2-20 Microalbuminuria	32 (35.2)	23 (42.6)	9 (24.3)	
>20 over nephropathy	7 (7.7)	3 (5.6)	4 (10.8)	

* P value less than 0.05 is considered significant

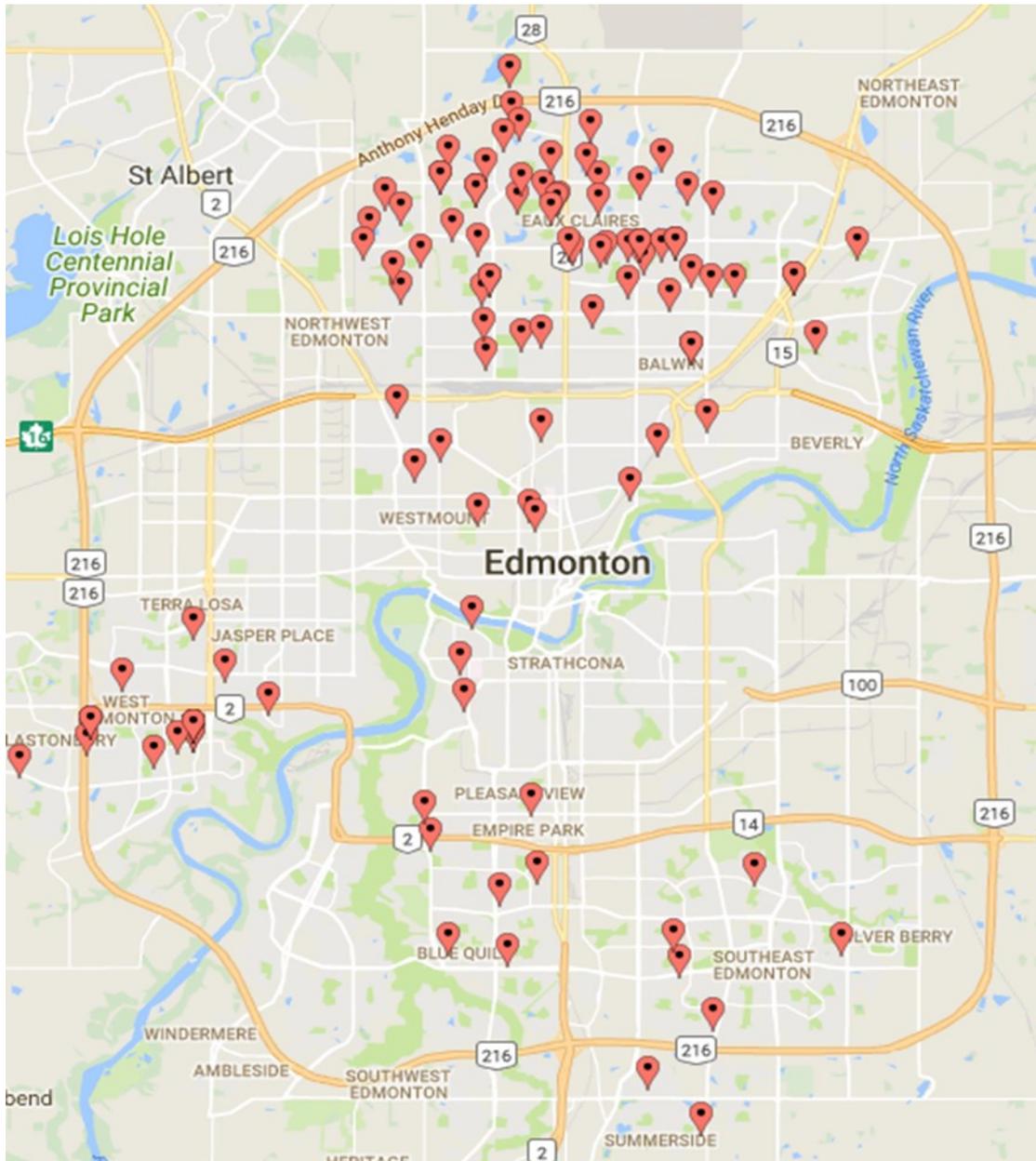
Table 2-4: Behavioral and psychosocial characteristics of participants stratified by gender

Characteristic	Total	Male	Female	P-value
Mean ± SD or n (%)	N= 114	70 (61.4)	44 (38.6)	
Diabetes knowledge Test (0 -14)				
Poor (< 7)	29 (25.4)	21 (30.0)	8 (18.2)	0.313
Average (7 to 11)	61 (53.5)	34 (48.6)	27 (61.4)	
Good (> 11)	24 (21.1)	15 (21.4)	9 (20.5)	
Self-care management				
General diet (0 to 7 days)	3.1 ± 2.7	3.3 ± 2.6	2.9 ± 2.9	0.462
Specific diet (0 to 7 days)	3.6 ± 2.0	3.4 ± 1.9	4.0 ± 2.1	0.095
Self-monitoring of blood glucose (0-7 days)	2.5 ± 2.4	2.7 ± 2.5	2.3 ± 2.2	0.413
Foot care (0 to 7 days)	4.8 ± 1.5	4.8 ± 1.6	4.9 ± 1.5	0.850
Exercise (0 to 7 days)	2.1 ± 2.6	2.4 ± 2.7	1.8 ± 2.4	0.248
Medication Adherence score (0 to 8)				
N=103**				
Low (≤ 5)	27 (26.2)	15 (23.4)	12 (30.8)	0.682
Medium (6 to 7)	44 (42.7)	29 (45.3)	15 (38.5)	
High (8)	32 (31.1)	20 (31.3)	12 (30.8)	

Smoking Status				
Never smoke	61 (53.5)	30 (42.9)	31 (70.5)	0.009*
Smoking now	25 (21.9)	17 (24.3)	8 (18.2)	
Quit Smoking	28 (24.6)	23 (32.9)	5 (11.4)	
Depressive symptoms score (0-6)				
Positive (3-6)	22 (19.3)	11 (15.7)	11 (25.0)	0.221
Negative(<3)	92 (80.7)	59 (84.3)	33 (75.0)	

* P value less than 0.05 is considered significant, **11 missing because they are only on life style management and they excluded from analysis

Figure 2-1: Map of Participants' Locations



Chapter 3 : GENERAL DISCUSSION AND CONCLUSION

3.1. SUMMARY OF FINDINGS

The purpose of this thesis was to examine T2D in Arabic-speaking communities in Edmonton. The aspects of T2D being studied include diabetes knowledge, self-care management, depressive symptoms, acculturation, and metabolic control. The results of this thesis indicate despite of having good level of knowledge and medication adherence, there are major gaps in self-care management associated with a substantial level of depressive symptoms, where fewer than half of the study population met important diabetes clinical benchmarks. Moreover, Arabic-speaking women with T2D were more prone to obesity and less physically active than their male counterparts.

3.2 IMPLICATION OF RESEARCH

To the best of our knowledge, this is the first study exploring T2D in the Arabic-speaking population in Canada using both interview and clinical data. We found that Arabic-speaking adults with T2D have a higher rate of smoking, obesity, hypertension, dyslipidemia, in addition to lower self-care behaviors, all negatively contributing to future diabetes-related complications. For this reason, health care providers need to focus more on healthy lifestyle behaviours in T2D in this population. Furthermore, we need future exploration of the barriers and challenges of low self-care behaviors in T2D management in this population. We also need better information on mental health issues and cultural context in this population, given the bidirectional relationship with T2D⁵⁰ and the evidence showing considerably poorer outcomes in those with both diabetes and mental health problems.

Gender, which has significant cultural significance given the traditional gender roles in Arab societies, requires tailored approaches with particular focus on women, given their higher risk of obesity and physical inactivity and their leading role in family life. Interventions focusing on improving self-care management (diet, physical activity, self-monitoring of blood glucose level and smoking) will help Arabic speaking population to have better diabetes control and prevent early microvascular and macrovascular diabetes complications, and improve health outcomes.

3.3. STRENGTHS AND LIMITATIONS

This study has several strengths. First, it is the first study to describe clinical, behavioural, and psychosocial outcomes of T2D in Arabic-speaking individuals in Canada. Second, the response rate in this study was high, minimizing the non-response bias that may influence the generalizability of results ¹²⁷. We also had a team of 7 bilingual research team members to help recruit from the Arabic-speaking community in Edmonton. It has been shown that it is difficult to recruit people from the Arabic-speaking community to participate in a study¹²⁹, so we feel our sample of 114 participants to be quite a reasonable number given the scope of a Master's thesis. Arabic-speaking immigrants could be from 22 different countries, however, the majority of participants in this study (37.7%) were from Lebanon, which is very close to 40 % of Arabs in Canada being Lebanese origin.¹⁰

Limitations include study design, where we recognize that a cross-sectional study design only allows exploring associations. Notably, the generalizability of our study is also limited in a number of ways. Firstly, unmarried men were under-represented in this study; this group might be at higher risk of cardiovascular outcomes. Furthermore, our data is self-reported, which is subject to recall bias, especially in reporting negative behaviours, as well as social desirability

bias when participants reported behaviour and attitude information ¹²⁷. Studies show that voluntary participants may differ from the general public in terms of behavior, attitude, sociodemographic and level of health status such as being more educated, having higher income, and being more sociable ^{127,130}.

3.4. CONCLUSION

We conducted the first cross-sectional study examining diabetes-related knowledge, self-care management, acculturation and clinical outcomes in Arabic-speaking population with T2D in Canada. Our study results show that despite good levels of knowledge and medication adherence, Arabic-speaking individuals who have T2D had lower levels of self-care behaviours in terms of adherence to diet, physical activity, self-monitoring of blood sugar, and higher smoking rates. Furthermore, Arabic-speaking women with T2D have lower levels of physical activity higher rates of obesity, and depressive symptoms whereas males have higher rates of smoking. Our findings highlight the need for developing culturally-tailored interventions to enhance diabetes knowledge, self-care behaviours, and health outcomes in Arabic-speaking individuals with T2D in Edmonton.

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APPENDICES

Appendix A Arabic version of the study survey

الآن سوف نقوم بتعنة نموذج الدراسة والذي يتكون من خمسة اجزاء:
سوف نبدأ بالجزء الاول من هذه الاستمارة والذي يتضمن أسئلة حول تاريخك
الطبي وكيفية تعاملك مع مرض السكري
ليس عليك الاجابة علي اي سؤال تشعر بعدم الراحة لاجابته

بصفة عامة كيف ترى حالتك الصحية؟

* must provide value

ممتازة

جيدة جداً

جيدة

لا بأس بها

سيئة

participant does not prefer to answer this question

reset

في أي سنة تم تشخيصك بمرض السكري؟

كيف تتعامل مع مرض السكري ؟
(Check all that apply to you)

* must provide value

نظام غذائي

تمارين رياضية

أدوية خفض السكر(حبوب)

حقن الأنسولين

ادوية الحقن التي لا يوجد بها انسولين (eg. liraglutide, exenatide)

participant does not prefer to answer this question

خلال السنة الماضية، هل أحسست بأي عوارض قوية لانخفاض السكري واحتجت شخص آخر لمساعدتك خلالها مثل(الاعماء/ فقدان الوعي او نوبات صرع)؟

نعم

لا

غير متأكد

participant does not prefer to answer this question

هل سبق وقيل لك من قبل طاقمك الطبي أن لديك إحدى هذه المشاكل الصحية؟

- ارتفاع ضغط الدم
- مشاكل بالكلية
- مشاكل بالعجزين
- نوبات بالقلب
- جلطات دماغية
- إنسداد الشرايين بالكاحل أو القدم
- ارتفاع مستوى الكولسترول أو الدهون في الدم
- بئر
- غير هذه المشاكل
- ليس لديك إحدى هذه المشاكل
- participant does not prefer to answer this question

إذا كانت الاجابة غير هذه المشاكل، ما هي هذه المشاكل؟

خلال السنة الماضية، كم مرة ذهبت إلى غرفة الطوارئ؟

خلال السنة الماضية، كم مرة دخلت للمستشفى وبقيت أكثر من ليلة؟

هل لديك أي معلومات عن كتيب النظام الغذائي في كندا؟

show the participant food guideline copy if said no and ask them if wants a copy

- نعم
- لا
-

participant does not prefer to answer this question

[reset](#)

هل تدخن حالياً

* must provide value

- لم ادخن مطلقاً
- حالياً مدخن
- توقفت عن التدخين منذ
- participant does not prefer to answer this question

[reset](#)

هل تشرب الكحول

* must provide value

- نعم
- لا
- participant does not prefer to answer this question

re

هل أحد أفراد عائلتك مصاب بالسكري؟

* must provide value

- لا يوجد أحد
- الأب
- الأم
- الاخوة/الاخوات
- الجد/الجدة
- لا أعرف
- participant does not prefer to answer this question

متي آخر مرة قمت بفحص شبكية العينين

where your eyes were dilated (this

would have made you temporarily sensitive to light) or you had a picture of back of your eye?

* must provide value

- مطلقا
- خلال السنة الماضية
- من مدة عام الي عامين
- منذ اكثر من عامين
- لا اعلم/ غير متأكد
- participant does not prefer to answer this question

re

اذا قمت بفحص الشبكية من قبل

- هذه اول مرة
- كل سنة مرة بانتظام
- مرة واحدة من قبل

re

هل يقوم طاقمك الطبي يقحص ضغط دمك في أغلب مواعيد فحصك المتعلقة بالسكري؟

* must provide value

- نعم
- لا
- لا اعلم
- participant does not prefer to answer this question

reset

هل تتابع مع أخصائي تغذية (dietitian)؟

* must provide value

- نعم
- لا
- غير متأكد/لا اعلم
- participant does not prefer to answer this question

reset

هل تتابع مع اخصائي توعية مرض السكري؟**
this means diabetes educator/diabetes nurse

* must provide value

- نعم
- لا
- غير متأكد/لا اعلم
- participant does not prefer to answer this question

reset

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Save & Return Later

الآن سوف تنتقل إلى الجزء الثاني من هذه الاستمارة
في هذا الجزء سوف تقوم بسؤالك بعض الأسئلة حول مرض السكري لتختبر مستواك المعرفي حول هذا المرض، سوف تقوم بتزويدك بالإجابة الصحيحة بعد الانتهاء من هذه
الاستمارة إذا تريد ذلك

النظام الغذائي لمرض السكري هو

* must provide value

- الطريقة التي يأكل بها معظم العرب
- النظام الغذائي الصحي لمعظم الناس
- النظام الذي يحتوي على نسبة عالية من الكربوهيدرات لمعظم الأشخاص
- النظام الذي يحتوي على نسبة عالية من البروتين لمعظم الأشخاص
- the participant does not have any knowledge about the question
- participant does not prefer to answer this question

reset

أي من الأغذية التالية يحتوي على نسبة عالية من الكربوهيدرات؟

* must provide value

- الدجاج المشوي
- جبن شيدر
- بطاطس مشوية
- زبدة الفول السوداني (Peanut butter)
- the participant does not have any knowledge about the question
- participant does not prefer to answer this question

reset

أي من الأطعمة التالية يحتوي على نسبة عالية من الدهون؟

* must provide value

- حليب قليل الدسم (2%)
- عصير برتقال
- ذرة (corn)
- عسل
- the participant does not have any knowledge about the question
- participant does not prefer to answer this question

reset

أي من الأطعمة التالية يعتبر خالي من الكربوهيدرات؟

* must provide value

- الأطعمة الغير محللة
- أي طعام عليه علامة خالي الدهون
- أي طعام عليه علامة خالي من السكر
- أي طعام يحتوي على أقل من 20 سعر حراري
- the participant does not have any knowledge about the question
- participant does not prefer to answer this question

reset

اختبار مخزون السكر/السكر التراكمي هو أحد الاختبارات التي تقيس متوسط مستوى السكر في الدم قيل

HbA1C

- يوم
- أسبوع
- من 6 إلى 12 أسابيع
- أشهر 6
- the participant does not have any knowledge about the question
- participant does not prefer to answer this question

reset

ماهي افضل الطرق التالية لفحص سكر الدم في المنزل؟

* must provide value

- فحص البول
- فحص الدم
- كلاهما جيد
- participant does not prefer to answer this question
- the participant does not have any knowledge about the questio

reset

ما هو تأثير عصير الفاكهة الغير محللة على مستوى السكر في الدم؟

- يخفض منه
- يساهم في ارتفاعه
- ليس له تأثير
- participant does not prefer to answer this question
- the participant does not have any knowledge about the questio

أي من التالي لا يجب استخدامه لعلاج سكر الدم المنخفض ؟

- ثلاث حبات من التمر
- نصف كوب عصير برتقال
- كوب مشروب غازي خالي من السكر
- كوب حليب قليل الدسم
- participant does not prefer to answer this question
- the participant does not have any knowledge about the question

reset

بالتنسبة للشخص المتحكم بمعدل جيد للسكري، ما هو تأثير التمارين الرياضية على مستوى سكر الدم ؟

- تقلل منه
- تساهم في زيادته
- ليس لها تأثير
- participant does not prefer to answer this question
- the participant does not have any knowledge about the question

reset

ما هو تأثير العدوى (الالتهابات البكتيرية والفيروسية) الأكثر احتمالاً على سكر الدم:

* must provide value

- ارتفاع في سكر الدم
- انخفاض في سكر الدم
- لا تؤثر عليه
- the participant does not have any knowledge about the question
- participant does not prefer to answer this question

reset

أفضل وسيلة لرعاية قدميك

* must provide value

- الاهتمام بها و غسلها يوميا
- التدليك بالكحول يوميا
- نقعها لمدة ساعة يوميا
- شراء حذاء بمقاس أكبر من المعتاد
- participant does not prefer to answer this question
- the participant does not have any knowledge about the question

reset

تناول أطعمة ذات دهون أقل تقلل من خطورة الإصابة بـ :

* must provide value

- امراض الاعصاب
- أمراض الكلى
- أمراض القلب
- أمراض العين
- participant does not prefer to answer this question
- the participant does not have any knowledge about the questio

re

الشعور بالوخز و التتميل ربما يكون أعراض لـ :

* must provide value

- أمراض الكلى
- أمراض الأعصاب
- أمراض العين
- أمراض بالكبد
- participant does not prefer to answer this question
- the participant does not have any knowledge about the questio

re

أي مما يلي عادةً لا يرتبط بمرض السكري :

* must provide value

- مشاكل بالرؤية
- مشاكل بالكلى
- المشاكل العصبية
- مشاكل بالرئة
- the participant does not have any knowledge about the question
- participant does not prefer to answer this question

re

الآن سوف تنتقل الى الجزء الثالث
في هذا الجزء نود سؤالك بعض
الاسئلة حول الانشطة المتعلقة بعنايتك الشخصية لمرض السكري خلال السبعة الايام الماضية. اذا كنت مريضا خلال السبعة الايام الماضية . يرجى اعادة التفكير الى السبعة الايام
الاخيرة التي لم تكن فيها مريض

اولا: قسم التغذية

خلال السبعة ايام الماضية، كم عدد الايام التي اتبعت فيها نظام غذاء صحي؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

reset

على مدى الشهر الماضي وبمعدل كم يوم في الاسبوع، اتبعت نظاما غذائيا صحيا خاصا بك؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- not applicable/لا توجد خطة غذائية
- participant does not prefer to answer this question

reset

كم من الايام السبعة الماضية تناولت خمس حصص او أكثر من الفاكهة او الخضار؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

reset

كم من الايام السبعة الماضية تناولت الاطعمة ذات الدهون العالية مثل اللحوم الحمراء او منتجات الالبان الكاملة الدسم؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

reset

خلال السبعة ايام الماضية، كم عدد الايام التي تناولت فيها كمية النشاط اليومية خلال اليوم بالتساوي (كمية متساوية من النشاط في الفطور والغداء والعشاء او باقي وجباتك الغذائية

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6

كم من الايام السبعة الماضية مارست تمرينا رياضيا معنا (مثل السباحة، المشي، ركوب الدراجة) غير الذي تغطه في المنزل او كجزء من عملك؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

reset

خلال السبعة ايام الماضية، كم عدد الايام التي مارست فيها في أنشطة بدنية بصفة عامة لمدة 30 دقيقة على الاقل (مجموع الدقائق الكلية للأنشطة بما فيها المشي

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

reset

ثالثاً: اختيار نسبة السكر في الدم

خلال السبعة ايام الماضية، كم عدد الايام التي قحصت فيها سكر الدم حسب العدد المذكور في تعليمات طبيبك؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

خلال السبعة ايام الماضية، كم عدد الايام التي قحصت فيها نسبة السكر في الدم؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

خلال السبعة ايام الماضية، كم عدد الايام التي فحصت فيها قدميك؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

reset

خلال السبعة ايام الماضية، كم عدد الايام التي فحصت فيها حذائك من الداخل (للتأكد من عدم وجود اشياء تسبب الجروح مثل قطع في الحذاء او نتوءات)؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

reset

خلال السبعة ايام الماضية، كم عدد الايام التي غسلت فيها قدميك؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5

- 5
- 6
- 7
- participant does not prefer to answer this question

res

خلال السبعة ايام الماضية، كم عدد الايام التي نعتت فيها قدميك بالماء؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

res

خلال السبعة ايام الماضية، كم عدد الايام التي جفقت فيها بين اصابع قدميك بعد القسيل؟

* must provide value

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- participant does not prefer to answer this question

res

:الان سوف ننتقل الى الجزء الرابع من هذه الاستمارة

- بقي هذا الجزء تود سؤالك بعض الأسئلة حول مزاجك خلال الأسبوعين الماضيين

:خلال الأسبوعين الماضيين، كم مرة عانيت من أي من المشاكل التالية

:قلة الاهتمام أو قلة الاستمتاع عند القيام بأي عمل

* must provide value

- ولا مرة
- عدة أيام
- أكثر من نصف الأيام
- تقريبا كل يوم
- participant does not prefer to answer this question

reset

الشعور بالحزن أو ضيق الصدر أو اليأس

* must provide value

- ولا مرة
- عدة أيام
- أكثر من نصف الأيام
- تقريبا كل يوم
- participant does not prefer to answer this question

reset

الآن سوف تنتقل للجزء الخامس وقيل الأخير
في هذا الجزء، نريد ان نسألك بعض الأسئلة حول الادوية التي تتناولها

هل تنسى أحيانا أن تتناول الدواء الخاص بالسكري؟

* must provide value

- نعم
- لا
- participant does not prefer to answer this question
- Participant does not take medication
- Participant stop medication without by her / himself

reset

أحيانا الناس لا تتناول الأدوية الخاصة بهم لأسباب أخرى غير
النسيان. هل كان هناك أية أيام على مدى الأسبوعين الماضيين لم تتناول فيها الدواء (الخاص بالسكري)؟

* must provide value

- نعم
- لا
- participant does not prefer to answer this question
- Participant does not take medication
- Participant stop medication without by her / himself

reset

هل سبق لك أن خفضت أو توقفت عن تناول علاج السكر دون أن تخبر طبيبك وذلك لأنك شعرت بأن حالتك الصحية أصبحت أسوأ عندما تناولت الدواء؟

* must provide value

- نعم
- لا
- participant does not prefer to answer this question
- participant does not take any medication for diabetes
- Participant stop medication without by her / himself

reset

عندما تسافر أو تغادر المنزل ، هل تتسي أحياتا إصطحاب الدواء (الخاص بالسكري) ؟

* must provide value

- نعم
- لا
- participant does not prefer to answer this question
- participant does not take any medication for diabetes
- Participant stop medication without by her / himself

res

هل تناولت الدواء الخاص بعلاج مرض السكري بالأمس؟

* must provide value

- نعم
- لا
- participant does not prefer to answer this question
- participant does not take any medication for diabetes
- Participant stop medication without by her / himself

res

عندما تشعر بأن مستوي السكر تحت السيطرة، هل تلجأ أحياتا الى التوقف عن إستعمال الدواء؟

* must provide value

- نعم
- لا
- participant does not prefer to answer this question
- participant does not take any medication for diabetes
- Participant stop medication without by her / himself

res

تناول العلاج بشكل يومي قد لا يروق لبعض الناس. هل تشعر بعدم رضا أو إمتعاض أو تشويش بسبب التزامك اليومي بالدواء؟

* must provide value

- نعم
- لا
- participant does not prefer to answer this question
- participant does not take any medication for diabetes
- Participant stop medication without by her / himself

كم من المرات تواجه صعوبة في تذكر تناول جميع أدويةك؟

* must provide value

- أبدا / نادرا
- من حين الى حين
- أحيانا
- عادة
- دائما
- participant does not prefer to answer this question
- participant does not take any medication for diabetes
- Participant stop medication without by her / himself

reset

والآن سوف ننتقل للجزء الاخير الذي يتضمن بعض بعض المعلومات حولك لكي نتعرفك عليك اكثر

هل أنت؟

fill it with out asking participant

* must provide value

- ذكر
- أنثى
- أفضل عدم الاجابة

reset

في أي بلد ولدت

إذا كانت الاجابة غيرها، في أي بلد ولدت

في أي عام انتقلت الى كندا؟

Are you Syrian refugee?

- Yes
- No

reset

ماهي نوعية الطعام الذي تقوم بإعداده عند الطبخ/ او تناوله بالمنزل؟

ask direct

* must provide value

- دائما أكل عربي
- غالبا أكل عربي
- بالتساوي ما بين الاكل العربي والكندي
- غالبا الأكل الكندي
- دائما الأكل الكندي
- participant does not prefer to answer this question

reset

ماهي اللغة التي تتحدث بها في البيت؟

ask direct

* must provide value

- فقط بالانجليزي
- فقط بالعربي
- غالبا بالانجليزي
- غالبا بالعربي
- كلتا اللغتين بالتساوي
- لغة اخرى
- participant does not prefer to answer this question

ماهي حالتك الاجتماعية؟

* must provide value

- أعزب
- متزوج/ة
- مطلق/ة
- ارمل/ة
- أفضل عدم الإجابة

ما هي تحصيلك العلمي؟

ask if they had education or not
if they have ask specific

* must provide value

- لا يوجد تحصيل علمي رسمي
- اقل من المستوى الثانوي/يكالوريا
- اكملت المستوى الثانوي/يكالوريا
- بعض المستوى الجامعي (college-university)
- اكملت الشهادة الجامعية (college-university)
- دراسات عليا ماجستير/ دكتوراه
- participant does not prefer to answer this question

هل لديك وظيفة حالياً؟

* must provide value

- رب/ة منزل
- موظف بدوام كامل
- موظف بدوام جزئي
- عاجز عن العمل بسبب إعاقة
- متقاعد
- عاطل عن العمل
- غيرها
- participant does not prefer to answer this question

re:

ما هو دخل العائلة السنوي قبل الضرائب؟

total annual household income before taxes

- أقل من \$45,000
- \$45,000 - \$90,000
- \$90,000 - 142,000
- أكثر من \$142,000
- أفضل عدم الإجابة
- لا اعرف

re:

هل ترغب في حضور دورات تثقيفية بخصوص مرض السكري؟

- Yes
- No

re:

Appendix B English version of the study survey

All answers are optional.

Diabetes History Questionnaire

In general, how do you feel about your health?

- Excellent Very Good Good Fair Poor

In what year were you first diagnosed with diabetes? _ _ _ _

How do you manage your diabetes? (Check all that apply to you)

- Diet
- Exercise
- Hypoglycemic pills
- Insulin
- Injectable non-insulin medicine (eg. liraglutide, exenatide)

During the past year, did you experience any severe symptoms of low blood sugar requiring someone else to help you (e.g. fainting, loss of consciousness, or seizure)?

- Yes No Not sure

Have you ever been told by a healthcare professional that you have any of these medical problems?

(Choose all that apply to you)

- High blood pressure Kidney problem Eye Problem
- Heart attack
legs or foot ulcer Stroke Blocked arteries in
- High cholesterol or triglycerides None of the above Other

If other, please specify: -

In the last year, how many times have you been to the emergency room?

In the last year, how many times have you been admitted in hospital overnight?.....

Are you familiar with Canada's food guide?

- Yes No

If yes, do you follow Canada's food guide?

- Yes No

If yes, which language version of Canada's food guide do you use?

- English Arabic

What is your current smoking status?

- I am currently smoker
 I quit smoking
 Never smoked

If you I quit smoking, how many years ago did you quit?

Do you drink alcohol?

- Yes No

If yes, what is the average number of drinks per week? _____

Do any of the following of your family members have diabetes? (Check all that apply to you)

- Father
 - Mother
 - Brother/Sister
 - Grandparents
 - I don't know
 - None
-

When was the last time you had a dilated eye exam (when you had drops put in your eyes) or had pictures taken of the back of your eye?

- Never
 - Less than 1 year ago
 - 1 to 2 years ago
 - More than 2 years ago
 - I don't know
-

Does your health care professional check your blood pressure at most of your diabetes-related appointments?

- Yes
- No
- I don't know

Do you see a dietician?

- Yes
- No
- I don't know

If yes, how often do you see the dietician?

- Only seen my dietician once
- 1-2 times per year

3 or more times per year

Do you see a diabetes educator?

Yes

No

I don't know

If yes, how often do you see the diabetes educator?

Only seen my diabetes educator once

1-2 times per year

3 or more times per year

Diabetes Knowledge

<p>(1) The diabetes diet is:</p> <ul style="list-style-type: none"> (a) The way most Canadian people eat (b) A healthy diet for most people (c) Too high in carbohydrate for most people (d) Too high in protein for most people 	<p>(2) Which of the following is highest in carbohydrate</p> <ul style="list-style-type: none"> (a) Baked chicken (b) Swiss cheese (c) Baked potato (d) Peanut butter
<p>(3) Which of the following is highest in fat?</p> <ul style="list-style-type: none"> (a) Low fat (2%) milk (b) Orange juice (c) Corn (d) Honey 	<p>(4) Which of the following is a “free food”?</p> <ul style="list-style-type: none"> (a) Any unsweetened food (b) Any food that has “fat free” on the label (c) Corn (d) Any food that has less than 20 calories per serving
<p>(5) HbA1c is a measure of your average blood glucose level for the past</p> <ul style="list-style-type: none"> (a) Day (b) Week (c) 6-12 weeks (d) 6 months 	<p>(6) Which is the best method for home glucose testing?</p> <ul style="list-style-type: none"> (a) Urine testing (b) Blood testing (c) Both are equally good
<p>(7) What effect does unsweetened fruit juice have on blood glucose?</p> <ul style="list-style-type: none"> (a) Lowers it (b) Raises it (c) Has no effect 	<p>(8) Which should not be used to treat low blood glucose?</p> <ul style="list-style-type: none"> (a) 3 hard candies (b) 1/2 cup orange juice (c) 1 cup diet soda pop drink (d) 1 cup skim milk
<p>(9) For a person in good control, what effect does exercise have on blood glucose?</p> <ul style="list-style-type: none"> (a) Lowers it (b) Raises it (c) Has no effect 	<p>(10) What effect will an infection most likely have on blood glucose?</p> <ul style="list-style-type: none"> (a) Lowers it (b) Raises it (c) Has no effect

<p>(11) The best way to take care of your feet is to:</p> <ul style="list-style-type: none"> (a) Look at and wash them each day (b) Massage them with alcohol each day (c) Soak them for one hour each day (d) Buy shoes a size larger than usual 	<p>(12) Eating foods lower in fat decreases your risk for:</p> <ul style="list-style-type: none"> (a) Nerve disease (b) Kidney disease (c) Heart disease (d) Eye disease
<p>13) Numbness and tingling may be symptoms of:</p> <ul style="list-style-type: none"> (a) Kidney disease (b) Nerve disease (c) Eye disease (d) Liver disease 	<p>14) Which of the following is usually not associated with diabetes:</p> <ul style="list-style-type: none"> (a) Vision problems (b) Kidney problems (c) Nerve problems (d) Lung problems

Please answer the following questions on diabetes knowledge. We are happy to give you the answers after you finish the survey. This is for your reflection only.

Diabetes Self Care

We would like to know about your diabetes self-care activities during the last seven days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

Diet

How many of the **last SEVEN DAYS** have you followed a healthful eating plan?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On average, over the past month, how many **DAYS PER WEEK** have you followed your eating plan?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On how many of the **last SEVEN DAYS** did you eat five or more servings of fruits and vegetables?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On how many of the **last SEVEN DAYS** did you eat high fat foods such as red meat or full-fat dairy products?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On how many of the **last SEVEN DAYS** did you space carbohydrates evenly through the day?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Physical activity:

On how many of the **last SEVEN DAYS** did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking).

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On how many of the **last SEVEN DAYS** did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Blood Sugar Testing

On how many of the **last SEVEN DAYS** did you test your blood sugar?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On

how many of the **last SEVEN DAYS** did you test your blood sugar the number of times recommended by your health care provider?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Foot Care:

On how many of the **last SEVEN DAYS** did you check your feet?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On how many of the **last SEVEN DAYS** did you inspect the inside of your shoes?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On

how many of the **last SEVEN DAYS** did you wash your feet?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On how many of the **last SEVEN DAYS** did you soak your feet?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

On how many of the **last SEVEN DAYS** did you dry between your toes after washing?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Mood

Over the last two weeks, how often have you been bothered by the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	0	1	2	3
Feeling down, depressed, or hopeless	0	1	2	3

Taking Medication

	Yes	No
Do you sometimes forget to take your diabetes medications?	<input type="checkbox"/>	<input type="checkbox"/>
In the last two weeks, was any day when you did not take your diabetes medication?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever stopped taking your medications or decrease the dose without first warning your doctor because you felt worse when you took them?	<input type="checkbox"/>	<input type="checkbox"/>
When you travel or leave the house, do you sometimes forget to take your medication?	<input type="checkbox"/>	<input type="checkbox"/>
Did you take your diabetes medication yesterday?	<input type="checkbox"/>	<input type="checkbox"/>
When you feel your blood sugar is controlled, do you sometimes stop taking your medication?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever felt distressed for strictly following your diabetes treatment?	<input type="checkbox"/>	<input type="checkbox"/>

How often do you have difficulty to remember taking all your diabetes medication?

- Never
- Almost
- Sometimes
- Frequently
- Always

Sociodemographic data

We would like to ask more questions to better know you:

Are you?

- Male Female Prefer not to answer

What country were you born in? _____

What year did you move to Canada?

What kind of food do you cook at home?

- Always-Arabic food
 Mostly Arabic but sometimes mixed
 Equal Arabic and Canadian
 Mostly Canadian
 Always-Canadian food

At home, do you speak?

- Only English
 Only Arabic
 Mostly English
 Mostly Arabic
 English and Arabic about equally
 Another language: _____

If other language, what is it?

What is your current marital status?

- Never married
 Married / common-law
 Separated/ Divorced

- Widowed
 - Prefer not to answer
-

What is the highest level of education you have completed?

- No formal schooling
 - Completed grade school (grades 1-9)
 - Completed high school
 - Completed College or University
 - Completed Graduate education (Master or PhD)
-

What is your current employment status?

- Homemaker
 - Full-time employee
 - Part-time employee
 - On disability
 - Retired
 - Unemployed
 - Others; please specify: _____
-

What is your annual total household income?

- \$<60,000
- \$60,000 – \$90,000
- > \$90,000
- Prefer not to answer

Are you interested in attending seminars on diabetes education?

- Yes
 - No
-

What language would you like these seminars to be in?

- English Language
- Arabic Language
- Both

Are you interested to participate in future research?

Yes

No

Appendix C Sociodemographic characteristics of participants stratified by type of food eaten at home

Characteristic	Total	Always Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	56 (49.1)	48 (42.1)	10 (8.8)	
Health status					
Excellent/Very Good	28 (24.6)	11 (19.6)	13 (27.1)	4 (40.0)	0.467
Good	50 (43.9)	25 (44.6)	20 (41.7)	5 (50.0)	
Fair /Poor	36 (31.6)	20 (35.7)	15 (31.3)	1 (10.0)	
Gender Female	44 (38.6)	24 (42.9)	17 (35.4)	3 (30.0)	0.623
Age, years					
	57.6 ± 10.7	57.5 ± 11.0	58.2 ± 10.4	55.7 ± 11.2	
20 – 44	10 (8.8)	6(10.7)	3 (6.3)	1 (10.0)	0.798
45 – 64	72 (63.2)	32(57.1)	33 (68.8)	7 (70.0)	0.743
≥65	32 (28.1)	18 (32.1)	12 (25.00)	2(20.0)	
Marital status,					
Married	98 (86.0)	48 (85.7)	41 (85.4)	9 (90.0)	0.928
Other***	16 (14.0)	8 (14.3)	7 (14.6)	1 (10.0)	
Annual household income					
<45,000	68(59.7)	42 (75.00)	20 (41.7)	6 (60.0)	0.003*

Other****	46 (40.4)	14 (25.00)	28 (58.3)	4 (40.0)	
Employed	40 (35.1)	12 (21.4)	23 (47.9)	5 (50.0)	0.011*
Level of Education					
Less than high school	43 (37.7)	27 (48.2)	13 (27.1)	3 (30.0)	
Completed high school	29 (25.4)	10 (17.9)	15 (31.3)	4 (40.0)	0.163
Postsecondary education	42 (36.8)	19 (33.9)	20 (41.7)	3 (30.0)	
Duration in Canada (years)	23.9 ± 17.5	18.1 ± 16.8	29.7 ± 15.6	28.0 ± 20.3	0.002*
The language spoken at home					
Only Arabic				2 (20.0)	
Mostly Arabic/Other	45 (39.5)	32 (57.1)	11 (22.9)	3 (30.0)	
Only English/Mostly English/Both Language Equal	38 (33.3)	17 (30.4)	18 (37.5)	5 (50.0)	0.001*
	31 (27.2)	7 (12.5)	19 (39.6)		

* P value less than 0.05 is considered significant, **include: Single/Divorced/Widowed, ***include: > \$ 45.000/Prefer not to answer/I don't know

Appendix D Healthy behavior and clinical characteristics of participants stratified by type of food eaten at home

Characteristic	Total	Always Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	56 (49.1)	48 (42.1)	10 (8.8)	
Family history of diabetes	82 (71.9)	39 (69.64)	35 (72.92)	8 (80.0)	0.782
Duration of diabetes by years	11.1± 8.6	10.3 ± 8.4	12.6 ± 9.2	8.1 ± 5.3	0.193
<5	29 (25.4)	17 (30.4)	9 (18.8)	3 (30.0)	0.289
5-10	36 (31.6)	17 (30.4)	14 (29.2)	5 (50.0)	
>10	49 (43.0)	22 (39.3)	25 (52.1)	2 (20.0)	
Self-reported Diabetes Management strategies					
Diet	50 (43.9)	21 (37.5)	22 (45.8)	7 (70.0)	0.152
Exercise	39 (34.2)	13 (23.2)	20 (41.7)	6 (60.0)	0.028*
Oral hypoglycemic medication	93 (81.6)	45 (80.4)	40 (83.3)	8 (80.0)	0.918
Insulin injection	33 (29.0)	20 (35.7)	11 (22.9)	2 (20.0)	0.289
Self-reported history of Hypoglycemia during last year	14 (12.4)	8 (14.3)	6 (12.5)	0 (0.0)	0.150
Self-reported Comorbidities					
Hypertension	67 (58.8)	35 (62.5)	27 (56.3)	5 (50.0)	0.682

Characteristic	Total	Always Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	56 (49.1)	48 (42.1)	10 (8.8)	
Stroke	3 (2.6)	1 (1.8)	2 (4.2)	0 (0.0)	0.648
DVT	6 (5.3)	3 (5.4)	3 (6.3)	0 (0.0)	0.722
Kidney Problem	14 (12.3)	8 (14.3)	4 (8.3)	2 (20.0)	0.483
Eye problem	23(20.2)	13 (23.2)	7 (14.6)	3 (30.0)	0.396
Heart problem	20 (17.5)	13 (23.2)	6 (12.5)	1 (10.0)	0.289
High cholesterol	62 (54.4)	34 (60.7)	25 (52.1)	3 (30.0)	0.182
Amputation	2 (1.8)	1 (1.8)	1 (2.1)	0 (0.0)	0.901
Familiar with Canada Food Guide	59(51.8)	21 (37.5)	30 (62.5)	7 (80.0)	0.017*
Following Canada Food Guide	26 (44.1)	11 (52.4)	11 (36.7)	4 (50.0)	0.504
Self-care clinical monitor					
Retinopathy screening					
Never	18 (15.8)	7 (12.5)	8 (16.7)	3 (20.0)	0.147
Less than a year ago	78 (68.4)	44 (78.6)	29 (60.4)	5 (50.0)	
More than a year ago	18 (15.8)	5 (8.9)	11 (22.9)	2 (20.0)	
Blood Pressure check in the clinic	110 (96.5)	53 (94.6)	47 (97.9)	10 (100.0)	0.812
Follow up with diabete educator	20 (17.5)	9 (16.1)	7 (14.6)	4 (40.0)	0.145
Follow up with a dietitian	30 (26.3)	12 (21.4)	14 (29.2)	4 (40.0)	0.504
Chart review data (n=110)					

Characteristic	Total	Always Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	56 (49.1)	48 (42.1)	10 (8.8)	
HgbA1C (n=105)	7.5 ± 1.6	7.6 ± 1.8	7.5 ± 1.5	7.0 ± 1.5	0.612
Systolic blood pressure (n=107)	124.5±14.2	124.5 ± 13.8	124.3 ± 15.6	125.5 ± 9.9	0.972
Diastolic blood pressure (n=107)	74.8 ± 9.3	75.3 ± 8.9	73.4 ± 10.0	78.9 ± 6.1	0.212
Body Mass Index (n=77)	32.7 ± 6.3	31.0 ± 6.9	34.6 ±4.99	33.8 ± 6.7	0.055*
Low-Density Lipoprotein (n=96)	2.2 ± 0.8	2.1 ± 0.8	2.2 ± 0.8	2.1 ± 1.0	0.916
High-Density Lipoprotein (n=99)	1.2 ± 0.4	1.2 ± 0.4	1.2 ± 0.4	1.1 ± 0.3	0.673
Triglyceride (n=99)	2.1 ± 1.4	2.1 ± 1.6	1.9 ± 1.3	1.9 ± 1.0	0.846
Albumin-Creatinine Ratio (n=91)					
<2 Normal level	52 (57.1)	28 (63.6)	22 (55.0)	2 (28.6)	0.522
2-20 Microalbuminuria	32 (35.2)	13 (29.6)	15 (37.5)	4 (57.1)	
>20 over nephropathy	7 (7.7)	3 (6.8)	3 (7.5)	1 (14.3)	

Appendix E Behavioral and psychosocial characteristics of participants stratified by type of food eaten at home

Characteristic	Total	Always Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	56 (49.1)	48 (42.1)	10 (8.8)	
Diabetes knowledge Test (0 -14)					
Poor (< 7)	29 (25.4)	16 (28.6)	10 (20.8)	3 (30.0)	0.649
Average (7 to 11)	61 (53.5)	31 (55.4)	26 (54.2)	4 (40.0)	
Good (> 11)	24 (21.1)	9 (16.1)	12 (25.0)	3 (30.0)	
Self-care management					
General diet (0 to 7 days)	3.1 ± 2.7	3.1 ± 3.0	3.1 ± 2.4	4.0 ± 2.8	0.581
Specific diet (0 to 7 days)	3.6 ± 2.0	3.5 ± 2.1	3.9 ± 1.9	3.1 ± 2.1	0.463
Self-monitoring of blood glucose (0-7 days)	2.5 ± 2.4	3.0 ± 2.4	2.2 ± 2.3	1.9 ± 2.2	0.128
Foot care (0 to 7 days)	4.8 ± 1.5	4.9 ± 1.6	4.8 ± 1.5	4.7 ± 1.1	0.950
Exercise (0 to 7 days)	2.1 ± 2.6	2.0 ± 2.7	2.2 ± 2.6	3.0 ± 2.4	0.519
Medication Adherence score (0 to 8) N=103*					
Low (≤ 5)	27 (26.2)	17 (31.5)	7 (17.1)	3 (37.5)	0.445
Medium (6 to 7)	44 (42.7)	23 (42.6)	18 (43.9)	3 (37.5)	
High (8)	32 (31.1)	14 (25.9)	16 (39.0)	2 (25.0)	
Smoking Status					

Never smoked	61 (53.5)	31 (55.4)	23 (47.9)	7 (70.0)	0.701
Current Smoker	25 (21.9)	12 (21.4)	11 (22.9)	2 (20.0)	
Quit Smoking	28 (24.6)	13 (23.2)	14 (29.2)	1 (10.0)	
Depressive symptoms score (0-6)					
Positive (3-6)	22 (19.3)	14 (25.0)	7 (14.6)	1 (10.0)	0.300
Negative(<3)	92 (80.7)	42 (75.0)	41 (85.4)	9 (90.0)	

* P value less than 0.05 is considered significant, **11 missing because they are only on life style management and they excluded from analysis

Appendix F Sociodemographic characteristics of participants stratified by language spoken at home

Characteristic	Total	Only Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	45 (39.5)	38 (33.3)	31 (27.2)	
Health status					
Excellent/Very Good	28 (24.6)	8 (17.8)	12 (31.6)	8 (25.8)	0.467
Good	50 (43.9)	24 (53.3)	13 (34.2)	13 (41.9)	
Fair /Poor	36 (31.6)	13 (28.9)	13 (34.2)	10 (32.3)	
Gender Female	44 (38.6)	18 (40.0)	11 (29.0)	15 (48.4)	0.249
Age, years	57.6 ± 10.7	60.3± 11.4	56.3 ± 9.4	55.2 ± 10.6	0.079
20 – 44	10 (8.8)	2 (4.4)	4 (10.5)	4 (12.9)	
45 – 64	72 (63.2)	23 (51.1)	27 (71.1)	22 (71.0)	0.032*
≥65	32 (28.1)	20 (44.4)	7 (18.2)	5 (16.1)	
Marital status,					
Married	98 (86.0)	38 (84.4)	33 (86.8)	27 (87.1)	0.931
Other***	16 (14.0)	7 (15.6)	5 (13.2)	4 (12.9)	
Annual household income					
<45,000	68(59.7)	33 (73.3)	18 (47.4)	17 (54.8)	0.045*
Other****	46 (40.4)	12 (26.7)	20 (52.6)	14 (45.2)	

Employed	40 (35.1)	7 (15.6)	17 (44.7)	16 (51.6)	0.002*
Level of Education					
Less than high school	43 (37.7)	20 (44.4)	12 (31.6)	11 (35.5)	0.499
Completed high school	29 (25.4)	12 (26.7)	8 (21.1)	9 (29.1)	
Postsecondary education	42 (36.8)	13 (28.9)	18 (47.4)	11 (35.5)	
Duration in Canada (years)	23.9 ± 17.5	20.2 ± 18.2	21.5 ± 15.0	32.4 ± 16.9	0.005*
Food type cooked at home					
Always Arabic	56 (49.1)	32 (71.1)	17 (44.7)	7 (22.6)	
Mostly Arabic	48 (42.1)	11 (24.4)	18 (47.4)	19 (61.3)	0.001*
Equall Arabic/Canadian- Mostly Canadian	10 (8.8)	2 (4.4)	3 (7.9)	5 (16.1)	

* P value less than 0.05 is considered significant, **include: Single/Divorced/Widowed, ***include: > \$ 45,000/Prefer not to answer/I don't know

Appendix G Healthy behavior and clinical characteristics of participants stratified by language spoken at home

Characteristic	Total	Only Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	45 (39.5)	38 (33.3)	31 (27.2)	
Family history of diabetes	82 (71.9)	29 (64.4)	30 (79.0)	23 (74.2)	0.324
Duration of diabetes by years	11.1 ± 8.6	11.7 ± 9.2	10.5 ± 8.2	10.9 ± 8.4	0.825
<5	29 (25.4)	10 (22.2)	9 (23.7)	10 (32.3)	0.711
5-10	36 (31.6)	15 (33.3)	14 (36.8)	7 (22.6)	
>10	49 (43.0)	20 (44.4)	15 (39.5)	14 (45.2)	
Self-reported Diabetes Management strategies					
Diet	50 (43.9)	14 (31.1)	22 (57.9)	14 (45.2)	0.049*
Exercise	39(34.2)	13 (28.9)	15 (39.5)	11 (35.5)	0.590
Oral hypoglycemic medication	93 (81.6)	38 (84.4)	30 (79.0)	25 (80.7)	0.803
Insulin injection	33 (28.95)	12 (26.7)	12 (31.6)	9 (29.0)	0.886
Self-reported history of Hypoglycemia during last year	14(12.4)	6 (13.3)	4 (10.8)	4 (12.9)	0.923
Self-reported Comorbidities					
Hypertension	67 (58.8)	31 (68.9)	17 (44.7)	19 (61.3)	0.079
Stroke	3 (2.6)	1 (2.2)	1 (2.6)	1 (3.2)	0.965

Characteristic	Total	Only Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	45 (39.5)	38 (33.3)	31 (27.2)	
DVT	6 (5.3)	4 (8.9)	1 (2.6)	1 (3.2)	0.373
Kidney Problem	14 (12.3)	3 (6.7)	5 (13.2)	6 (19.4)	0.249
Eye problem	23(20.2)	8 (17.8)	7 (18.4)	8 (25.8)	0.656
Heart problem	20 (17.5)	13 (29.0)	2 (5.3)	5 (16.1)	0.018*
High cholesterol	62 (54.4)	23 (51.1)	20 (52.6)	19 (61.3)	0.658
Amputation	2 (1.8)	0 (0.00)	0 (0.00)	2 (6.5)	0.066
Retinopathy screening					
Never	18 (15.8)	8 (17.8)	5 (13.2)	5 (16.1)	0.541
Less than a year ago	78 (68.4)	33 (73.3)	26 (68.4)	19 (61.3)	
More than a year ago	18 (15.8)	4 (8.9)	7 (18.4)	7 (22.6)	
Blood Pressure check in the clinic	110 (96.5)	44 (97.8)	37 (97.4)	29 (93.6)	0.310
Familiar with Canada Food Guide	59 (51.8)	21 (46.7)	17 (44.7)	21 (67.7)	0.111
Following Canada Food Guide	26 (44.1)	10 (47.6)	9 (52.9)	7 (33.3)	0.442
Follow up with diabetes educator	20 (17.5)	5 (11.1)	6 (15.8)	9 (29.0)	0.123
Follow up with a dietitian	30 (26.3)	11 (24.4)	8 (21.1)	11 (35.5)	0.294
Chart review data (n=110)					
HgbA1C (n=105)	7.5 ± 1.6	7.5 ± 1.5	7.7 ± 2.0	7.3 ± 1.3	0.528
Systolic blood pressure (n=107)	124.5±14.2	127.8 ± 13.7	121.8 ± 14.7	123.2 ± 14.1	0.153

Characteristic	Total	Only Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	45 (39.5)	38 (33.3)	31 (27.2)	
Diastolic blood pressure (n=107)	74.8 ± 9.3	74.6 ± 9.8	75.2 ± 8.2	74.6 ± 10.1	0.953
Body Mass Index (n=77)	32.7 ± 6.3	33.3 ± 7.0	31.8 ± 5.8	33.3 ± 6.3	0.597
Low-Density Lipoprotein (n=96)	2.2 ± 0.8	1.9 ± 0.7	2.3 ± 0.9	2.1 ± 1.0	0.158
High-Density Lipoprotein (n=99)	1.2 ± 0.4	1.2 ± 0.4	1.1 ± 0.4	1.2 ± 0.5	0.739
Triglyceride (n=99)	2.0 ± 1.4	2.1 ± 1.9	1.7 ± 0.8	2.2 ± 1.5	0.355
Albumin-Creatinine Ratio (n=91)					
<2 (Normal level)	52 (57.1)	20 (55.6)	19 (63.3)	13 (52.0)	0.794
2-20 (Microalbuminuria)	32 (35.2)	14 (38.9)	8 (26.7)	10 (40.0)	
>20 (over nephropathy)	7 (7.7)	2 (5.6)	3 (10.0)	2 (8.0)	

* P value less than 0.05 is considered significant

Appendix H Behavioral and psychosocial characteristics of participants stratified by language spoken at home

Characteristic	Total	Only Arabic	Mostly Arabic	Other**	P-value
Mean ± SD or n (%)	(n= 114)	45 (39.5)	38 (33.3)	31 (27.2)	
Diabetes knowledge Test (0 to 14)					
Poor (< 7)	29 (25.4)	11 (24.4)	14 (36.8)	4 (12.9)	0.144
Average (7 to 11)	61 (53.5)	27 (60.0)	16 (42.1)	18 (58.1)	
Good (> 11)	24 (21.1)	7 (15.6)	8 (21.1)	9 (29.0)	
Self-care management					
General diet (0 to 7 days)	3.1 ± 2.7	2.5 ± 2.8	3.7 ± 2.6	3.4 ± 2.7	0.122
Specific diet (0 to 7 days)	3.6 ± 2.0	3.3 ± 1.7	3.7 ± 2.1	4.0 ± 2.3	0.392
Self-monitoring of blood glucose (0-7 days)	2.5 ± 2.4	2.5 ± 2.3	2.7 ± 2.5	2.3 ± 2.5	0.773
Foot care (0 to 7 days)	4.8 ± 1.5	4.8 ± 1.6	4.9 ± 1.5	4.8 ± 1.5	0.887
Exercise (0 to 7 days)	2.1 ± 2.6	1.9 ± 2.5	2.2 ± 2.6	2.4 ± 2.9	0.665
Medication Adherence score (0 to 8) N=103*					
Low (≤ 5)	27 (26.2)	11 (26.2)	7 (23.3)	5 (23.8)	0.851
Medium (6 to 7)	44 (42.7)	20 (47.6)	10 (33.3)	10 (47.6)	
High (8)	32 (31.1)	11 (26.2)	13 (43.3)	6 (28.6)	

Smoking Status					
Never smoked	61 (53.5)	23 (51.1)	18 (47.4)	20 (64.5)	0.377
Current Smoker	25 (21.9)	12(26.7)	7 (18.4)	6 (19.4)	
Quit smoking	28 (24.6)	10(22.2)	13 (34.2)	5 (16.1)	
Depressive symptoms score (0-6)					
Positive (3-6)	22 (19.3)	10 (22.2)	5 (13.2)	7 (22.6)	0.501
Negative(<3)	92 (80.7)	35(77.8)	29 (87.9)	20 (80.0)	

* P value less than 0.05 is considered significant, **11 missing because they are only on life style management and they excluded from analysis

Appendix I Sociodemographic characteristics of participants stratified by duration in Canada

Characteristic	Total	<10 years	10-19 Years	>20 years	P-value
Mean ± SD or n (%)	(n= 114)	31 (27.09)	23 (20.18)	60 (52.63)	
Health status					
Excellent/Very Good	28 (24.6)	6 (19.4)	9 (39.1)	13 (21.7)	0.319
Good	50 (43.9)	15 (48.4)	10 (43.5)	25 (41.7)	
Fair /Poor	36 (31.6)	10 (32.3)	4 (17.4)	22 (36.7)	
Gender Female	44 (38.6)	13 (41.9)	10 (43.5)	21 (35.00)	0.703
Age, years	57.6±10.7	54.4 ± 10.8	51.1 ± 7.6	61.8 ± 9.97	0.000*
20 – 44	10 (8.8)	3 (9.7)	6 (26.1)	1 (6.7)	0.000*
45 – 64	72 (63.2)	22 (70.97)	16 (69.6)	34 (56.7)	
≥65	32 (28.1)	6 (19.4)	1 (4.4)	25 (41.7)	
Marital status,					
Married	98 (86.0)	27 (87.1)	18 (78.3)	53 (88.3)	0.486
Other **	16 (14.0)	4 (12.9)	5 (21.7)	7 (11.7)	
Annual household income					
< \$ 45,000	68(59.7)	24 (77.4)	11 (47.8)	33 (55.00)	0.051*
Other ***	46 (40.4)	7 (22.6)	12 (52.2)	27 (45.00)	
Employed	40 (35.1)	8 (25.8)	13 (56.5)	19 (31.7)	0.047*
Level of Education					
Less than high school	43 (37.7)	13 (41.9)	3 (13.0)	27 (45.00)	0.010*
Completed high school	29 (25.4)	3 (9.7)	9 (39.1)	17 (28.3)	

Post-secondary education	42 (36.8)	15 (48.4)	11 (47.8)	16 (26.7)	
The language spoken at home					
Only Arabic	45 (39.5)	18 (58.1)	7 (30.4)	20 (33.3)	0.038*
Mostly Arabic/Other****	38 (33.3)	9 (29.0)	11 (47.8)	18 (30.0)	
Only English/Other*****	31 (27.2)	4 (12.9)	5 (21.7)	22 (36.7)	
Food type cooked at home					
Always Arabic	56 (49.1)	24 (77.4)	10 (43.5)	22(36.7)	
Mostly Arabic	48 (42.1)	5 (16.1)	10 (43.5)	33(55.0)	0.004*
Equall Arabic/Canadian- Mostly Canadian	10 (8.8)	2 (6.5)	3 (13.0)	5 (8.3)	

* P value less than 0.05 is considered significant, **include: Single/Divorced/Widowed, ***include: > \$ 45.000/Prefer not to answer/I don't know

Appendix J Healthy behavior and clinical characteristics of participants stratified by duration in Canada

Characteristic	Total	<10 years	10-19 years	>20 years	p-value
Mean ± SD or n (%)	(n= 114)				
Family history of diabetes	82 (71.9)	23 (74.3)	18 (78.3)	41 (68.3)	0.631
Duration of diabetes by years	11.1± 8.6	6.8 ± 4.4	8.2 ± 5.6	14.4 ± 9.8	0.000*
<5	29 (25.4)	12 (38.7)	7 (30.4)	10 (16.7)	0.001*
5-10	36 (31.6)	13 (41.9)	10 (43.5)	13(21.7)	
>10	49 (43.0)	6 (19.4)	6 (26.1)	37 (61.7)	
Self-reported Diabetes Management strategies					
Diet	50 (43.9)	14(45.2)	11(47.8)	25 (41.7)	0.867
Exercise	39 (34.2)	11 (35.5)	11 (47.8)	17 (28.3)	0.242
Oral hypoglycemic medication	93 (81.6)	25 (80.7)	19 (82.6)	49 (81.7)	0.983
Insulin injection	33 (29.0)	10 (32.3)	6 (26.1)	17 (28.3)	0.875
Self-reported history of Hypoglycemia during last year	14 (12.4)	3 (9.7)	3(13.0)	8 (13.6)	0.776
Self-reported Comorbidities					
Hypertension	67 (58.8)	18 (58.1)	12 (52.2)	37 (61.7)	0.731

Characteristic	Total	<10 years	10-19 years	>20 years	p-value
Mean ± SD or n (%)	(n= 114)				
Cerebrovascular disease	3 (2.6)	0 (0.0)	0 (0.0)	3 (5.0)	0.250
DVT	6 (5.3)	2 (6.5)	0 (0.0)	4 (6.7)	0.449
Kidney Problem	14 (12.3)	3 (9.7)	2 (8.7)	9 (15.0)	0.644
Eye problem	23(20.2)	8 (25.8)	3 (13.0)	12 (20.0)	0.512
Heart problem	20 (17.5)	6 (19.4)	3 (13.0)	11 (18.3)	0.811
Hyperlipidemia	62 (54.4)	17 (54.8)	10 (43.5)	35 (58.3)	0.477
Amputation	2 (1.8)	0 (0.0)	0 (0.00)	2 (3.3)	0.400
Familiar with Canada Food Guide	59(51.8)	10 (32.3)	13(56.5)	36 (60.0)	0.038*
Following Canada Food Guide	26 (44.1)	5 (50.0)	5 (38.5)	16 (44.4)	0.856
Self-care clinical monitor					
Blood Pressure check in the clinic	110 (96.5)	28 (90.3)	23 (100.0)	59 (98.3)	0.250
Retinopathy screening					
Never	18 (15.8)	8 (25.8)	4 (17.4)	6 (10.0)	0.343
Less than a year ago	78 (68.4)	20 (64.5)	15 (65.2)	43 (71.7)	
More than a year ago	18 (15.8)	3 (9.7)	4 (17.4)	11 (18.3)	
Follow up with diabete educator	20 (17.5)	3 (9.7)	3 (13.0)	14 (23.3)	0.219
Follow up with a dietitian	30 (26.3)	8 (25.8)	8 (34.8)	14 (23.3)	0.743

Characteristic	Total	<10 years	10-19 years	>20 years	p-value
Mean ± SD or n (%)	(n= 114)				
Chart review data (n=110)					
HgbA1C (n=105)	7.5 ± 1.6	7.9 ± 2.0	7.6 ± 1.8	7.3 ± 1.3	0.394
Systolic blood pressure (n=107)	124.5±14.2	125.8 ± 17.8	123.1 ± 12.2	124.4 ± 13.1	0.804
Diastolic blood pressure (n=107)	74.8 ± 9.3	74.6 ± 8.4	76.8 ± 9.3	74.1 ± 9.8	0.526
Body Mass Index (n=77)	32.7 ± 6.3	34.1 ± 6.9	29.1 ± 6.3	33.5 ± 5.7	0.026*
Low-Density Lipoprotein (n=96)	2.2 ± 0.8	2.4 ± 0.9	2.4 ± 0.8	1.9 ± 0.8	0.037*
High-Density Lipoprotein (n=99)	1.2 ± 0.4	1.1 ± 0.4	1.2 ± 0.3	1.2 ± 0.4	0.468
Albumin-Creatinine Ratio (n=91)					
<2 Normal level	52 (57.1)	18 (75.0)	10 (55.6)	24 (49.0)	0.139
2-20 Microalbuminuria	32 (35.2)	4 (16.7)	8 (44.4)	20 (40.8)	
>20 over nephropathy	7 (7.7)	2 (8.3)	0 (0.0)	5 (10.2)	

* P value less than 0.05 is considered significant

Appendix K Behavioral and psychosocial characteristics of participants stratified by duration in Canada

Characteristic	Total	<10 years	10-19 Years	>20 years	P-value
Mean ± SD or n (%)	(n= 114)	22 (27.09)	23 (20.18)	60 (52.63)	
Diabetes knowledge Test (0 - 14)					
Poor (< 7)	29 (25.4)	8 (25.8)	9 (39.1)	12 (20.0)	0.316
Average (7 to 11)	61 (53.5)	15 (48.4)	9 (39.1)	37 (61.7)	
Good (> 11)	24 (21.1)	8 (25.8)	5 (21.7)	11 (18.3)	
Self-care management					
General diet (0 to 7 days)	3.1 ± 2.7	2.9 ± 3.1	2.9 ± 2.6	3.4 ± 2.6	0.681
Specific diet (0 to 7 days)	3.6 ± 2.0	2.8 ± 1.7	4.5 ± 1.9	3.7 ± 2.1	0.011*
Self-monitoring of blood glucose (0-7 days)	2.5 ± 2.4	2.6 ± 2.3	1.9 ± 2.2	2.8 ± 2.4	0.301
Foot care (0 to 7 days)	4.8 ± 1.5	4.4 ± 1.6	4.9 ± 1.5	5.1 ± 1.5	0.102
Exercise (0 to 7 days)	2.1 ± 2.6	1.7 ± 2.5	2.4 ± 2.6	2.3 ± 2.7	0.539
Medication Adherence score (0 to 8) N=103*					
Low (≤ 5)	27 (26.2)	11 (37.9)	5 (25.0)	11 (20.4)	0.175
Medium (6 to 7)	44 (42.7)	13 (44.8)	10 (50.0)	21(38.9)	
High (8)	32 (31.1)	5 (17.2)	5 (25.0)	22 (40.7)	

Smoking Status

Never smoke	61 (53.5)	18 (58.1)	13 (56.5)	30 (50.0)	0.344
Current Smoker	25 (21.9)	8 (25.8)	2 (8.7)	15 (25.0)	
Quit Smoking	28 (24.6)	5 (16.1)	8 (34.8)	15 (25.0)	

Depressive symptoms score (0-6)

Positive (3-6)	22 (19.3)	6 (19.4)	5 (21.7)	11 (18.3)	0.940
Negative(<3)	92 (80.7)	25 (80.7)	18 (78.3)	49 (81.7)	

* P value less than 0.05 is considered significant, **11 missing because they are only on life style management and they excluded from analysis

Appendix L Recruitment Posters (Arabic and English versions)

- English Version

We are looking for Arabic speaking diabetes patients to participate in a research study!

Title: Diabetes knowledge, self-care behaviors and metabolic control in the Arabic speaking population with type 2 diabetes in Edmonton.

To participate you must:

- Be an Edmonton resident
- Have diabetes (type 2)
- Speak Arabic as a first language
- Be at least 18 years of age

Our study will involve:

- Completing a survey in a 20 minute in-person or phone interview

if you are interested, please contact Dr. Aida

Arabic Type 2 Diabetes Study
Aida:
Phone: 587-937-6398
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- Arabic Version

دراسة حول مرض السكري في الجالية العربية الناطقة باللغة العربية في مدينة أدمنتون

عنوان الدراسة: المستوى المعرفي لمرضى السكري
والعناية الذاتية وعوامل التحكم بالمرض ومضاعفاته لدى
مرضى السكري الناطقين باللغة العربية في مدينة أدمنتون

لتشارك بهذه الدراسة يجب أن تكون:

- مقيم بمدينة أدمنتون

- اللغة العربية هي لغتك الأم

- لديك مرض السكري

- عمرك 18 سنة أو أكثر

هذه الدراسة تتضمن:

تعبئة استمارة خلال مقابلة شخصية او مكالمة هاتفية لمدة عشرين دقيقة

إذا كنت مهتما أو ترغب بالمشاركة بهذه الدراسة أرجوك التواصل مع الدكتورة عائدة بليق المسؤولة عن الدراسة



دراسة حول مرض السكري في الجالية العربية

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دراسة حول مرض السكري في الجالية العربية

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Appendix M Information Letter (Arabic and English versions)

- English Version



Dr. Roseanne Yeung, MD, FRCPC, MPH
DIVISION OF ENDOCRINOLOGY
University of Alberta
9th Fl. CSB 11350 83 Ave NW
Edmonton AB T8G 2G3
Phone: 780-482-5159
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Diabetes knowledge, self-care behaviors, and metabolic control in the Arabic speaking population with type 2 diabetes in Edmonton

Information letter

Research/Study Coordinator:

Principal Investigator:

Why am I being asked to take part in this research study?

You have been diagnosed with type 2 diabetes (T2D) and are a member of the Arabic speaking community living in Edmonton. Before you decide to participate in this study, one of the researchers will go over this form with you. You are encouraged to ask questions if you feel anything needs to be made clearer. You will be given a copy of your signed consent and this letter for your records.

The reason for doing the study:

Type 2 diabetes is a lifelong disease that affects the way your body handles sugar in your blood. Type 2 diabetes is more common in Arabic countries, but little is known about type 2 diabetes in Arab-speaking population. Our research team at the University of Alberta is seeking your help to learn more about type 2 diabetes in your community. We are comparing the Arabic speaking to the general diabetes population in Alberta regarding diabetes management. In addition, we will use data collected from your medical records and link this with your responses in the interview.

This study is a part of Dr. Aida Belag's Master degree in Medicine in the Department of Medicine at University of Alberta. We will provide you with our research results or send you a report if you wish.

What will I be asked to do?

We ask that you participate in around-20 minutes face-to-face or phone interview as you prefer. The interview includes 5 sections on:

1. Diabetes history
2. Diabetes knowledge
3. Mood
4. Self-care and lifestyle
5. Medications

Version: August 15, 2017

We also ask you to provide written consent that will allow us to access your medical records for review where we will collect information on your blood pressure, hemoglobin H_{A1c}, weight, height, LDL/ HDL cholesterol, triglycerides, and urine protein levels.

The benefits and the risks and discomforts:

By participating in this study, you may learn more about your diabetes and we will work with your doctor to improve care to other Arabic speaking with type 2 diabetes. Each participant will receive a \$10 CAD gift card for participating in this study. Participants who enroll in the study but chose to withdraw before completing the face-to-face or phone interview will not receive the gift card incentive. By participating in this study and completing an interview, participants will be directly helping researchers understand the knowledge of diabetes amongst Arabic speaking people in Edmonton

It is not possible to know all the risks that may happen in a study, but we have taken all reasonable safeguards to minimize any known risks. Your participation is completely your choice and you do not have to answer any questions that you feel uncomfortable answering. We ask that you try to complete as much of the interview questions as you can.

Do I have to take part in the study?

You will be able to withdraw from the study at any time, if you decide that you do not want to be part of this study and have changed your mind, please contact us. In addition, your care will not be affected by participating in this study. We will ask if you would also like to have the information you provided to us removed as well, in which case we will destroy it.

Confidentiality:

During the study, we will be collecting data about you including your personal information and your health information. We will do everything we can to make sure that this data is kept private. No data relating to this study that includes your name will be released outside of the researcher's office or published by the researchers. All information collected will be stored in a secure location at the University of Alberta and only the researchers on the study team will have access to this information. In the unlikely event of a breach of privacy, we will contact you immediately. *The data will be held a minimum of 5 years prior to destruction. By signing this consent form you are saying it is okay for the study team to collect, use and disclose information about you from your personal health records as described above.*

If you have questions:

If you have any questions or concern about the research now or later, please contact



If you have any questions regarding your rights as a research participant, you may contact the Health Research Ethics Board at 780-492-2615.
This office has no affiliation with the study investigators

CONFIDENTIALITY WARNING: This communication is intended for the use of the recipient to which it is addressed, and may contain confidential, personal, and/or privileged information. Please contact me immediately if you are not the intended recipient of this communication, and do not copy, distribute, or take action relying on it. Any communication received in error, or subsequent reply, should be deleted or destroyed (20120217) Version No.: 08152017.01

- Arabic Version



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المستوى المعرفي لمرضى السكري والعناية الذاتية وعوامل التحكم بالمرض ومضاعفاته لدى مرضى السكري الناطقين باللغة العربية في مدينة أدمنتون

معلومات حول هذه الدراسة

رقم الهاتف:	منسق البحث:
رقم الهاتف:	الباحث الرئيسي:

لماذا تم اختيارك للمشاركة في هذه الدراسة؟

لقد تم اختيارك للمشاركة في هذه الدراسة لأنك أحد الأشخاص الذين يتحدثون باللغة العربية كاللغة الام ولديك مرض السكري ومقيم في مدينة أدمنتون. قبل اتخاذ قرارك بخصوص المشاركة بهذه الدراسة، أحد أفراد البحث سوف يقوم بتوضيح الدراسة بعمق ونحن نتمنى ان تقوم بطرح أي أسئلة لديك. ونريدك ان تكون على دراية لماذا قمنا بدعوتك للمشاركة في هذه الدراسة. سوف نقوم بتزويدك بنسخة من هذه الاستمارة للاحتفاظ بها.

ما هو الهدف من هذه الدراسة؟

مرض السكري هو أحد الأمراض المزمنة التي تؤثر على كل أعضاء الجسم ويعتمد ذلك بشكل كبير على مستوى السكر بالدم. مرض السكري يعتبر من الأمراض الشائعة جدا في الدول العربية. لكن بالنسبة للعرب الموجودين في كندا ولديهم مرض السكري لا توجد أي أبحاث من قبل لدراسة مرض السكري عند الجالية العربية المقيمة في كندا.

ولهذا الغرض الباحثين بجامعة ألبرتا يودون القيام بهذه الدراسة لمساعدتك ومساعدة الجالية العربية في كندا لفهم هذا المرض واحداثياته لتقديم المساعدة المستقبلية. يهدف هذا البحث أيضا لدراسة الفروقات بين العرب الناطقين باللغة العربية والكنديين المقيمين في مقاطعة ألبرتا من حيث التعامل مع مرض السكري. كذلك بهذه الدراسة سوف نقوم بجمع معلومات حول فحوصات طبية من ملفك الطبي وربطها بالمعلومات التي سنتحصل عليها خلال المقابلة.

هذه الدراسة هي جزء من رسالة الماجستير للطالبة عائدة بلق بقمم الباطنة بكلية الطب بجامعة ألبرتا. إذا كنت ترغب في معرفة نتائج هذه الدراسة نحن سوف نقوم بتزويدك بنسخة من النتائج.

ما هو دورك وماذا مطلوب منك إذا قررت المشاركة في هذا البحث؟

نحن نود سؤالك لتشارك بهذه الدراسة التي تحتاج الى 20 دقيقة عن طريق مقابلة شخصية او مكالمة هاتفية كما انت تفضل، هذه الاستمارة تحتوي على خمسة اجزاء وهي تتضمن:

- تاريخك الصحي
- مستوياتك المعرفية حول مرض السكري

- مزاجك/ الصحة النفسية
 - العناية الشخصية بالسكري ونمط الحياة الذي نتبعه
 - الأدوية التي نتناولها
- وكذلك سوف نقوم بسؤالك لتزويدنا بموافقة خطية مع هذه الرسالة للسماح للباحثين بهذه الدراسة التحصل على معلومات من ملفك الطبي. المعلومات التي سوف تأخذ من ملفك هي طولك ووزنك وآخر قياس لضغط دمك ومعدل السكر التراكمي (مخزون السكر) (HbA1c) ومستوى الدهون والكوليسترول ونسبة البروتين والكرياتين بالدم.

ماهي الفوائد والسليبيات المتوقعة من مشاركتك بهذه الدراسة؟

بمشاركتك بهذه الدراسة سوف تتعلم الكثير حول مرض السكري وتساعد الباحثين بجامعة البرتا والطبيب على تحسين مستوى الرعاية الطبية للجالية العربية مستقبلا. كل المشاركين سوف يتحصلون على هدية بقيمة عشرة دولار كندي عند انتهاء المشاركة. وكذلك الأشخاص الذين غادروا الدراسة قبل انتهائها سوف تمنح لهم نفس الهدية. مشاركتك سوف تقوم بمساعدتنا مباشرة لفهم مرض السكري في الجالية العربية الناطقة بالغة العربية لا يمكننا الجزم بتاتا لمعرفةنا التامة لجميع السليبيات بهذه الدراسة ولكن نحن قمنا بأخذ جميع الاحتياطات لتقليل نسبة حدوث أي خطر.

هل يجب عليك أن تشارك بهذه الدراسة؟

مشاركتك بهذه الدراسة هي عمل تطوعي منك ولديك كامل الحرية في الانسحاب من هذه الدراسة عندما تريد ذلك ولذلك يمكنك عدم الإجابة على أي سؤال تشعر بعدم الراحة لإجابته. نتمنى ان تحاول الإجابة على أكبر قدر من الأسئلة. يجب ان تعلم ان لديك الحرية المطلقة في الانسحاب من الدراسة عند أي وقت دون إعطاء الأسباب وكذلك دون التأثير على رعايتك الطبية المستقبلية. إذا غيرت رأيك بالمشاركة، أرجوك ان تتصل بنا. إذا قررت الانسحاب من المشاركة، سوف نقوم بسؤالك حول المعلومات التي قمت بتزويدنا بها إذا كنت تريد الغائها وما هي الطريقة التي سوف نتبعها لتلف معلوماتك.

السرية والخصوصية بهذه الدراسة:

خلال هذه الدراسة سوف نقوم بجمع معلوماتك الشخصية والصحية ولذلك سوف نقوم بجميع الاحتياطات اللازمة حتى نقوم بحماية جميع المعلومات بخصوصية تامة. لن نُنشر أي معلومات تحتوي على اسمك خارج نطاق مكتب الدراسة او سوف ننشر بأي نتائج لهذا البحث. جميع المعلومات التي سوف نقوم بجمعها في هذه الدراسة سوف تخزن بمان آمن في جامعة البرتا. فقط أفراد البحث سوف يقومون بالإطلاع عليها. في حالة حدوث أي شيء يتعلق بحمايه معلوماتك الشخصية سوف نقوم بالاتصال بك فوراً. المعلومات التي قمنا بجمعها خلال هذه الدراسة سوف تبقى موجودة لمدة أظها خمس سنوات قبل ان يتم إتلافها. بتوقيعك لنموذج الموافقة، أنت تمنح الموافقة للباحثين بهذه الدراسة بجمع واستعمال معلومات من ملفك الطبي كما تم شرح ذلك مسبقاً. **إذا كان لديك أي سؤال:**

إذا كان لديك أي استفسار حول هذا البحث، الرجاء الاتصال بالباحثين المسؤولين عن هذه الدراسة:

وإذا كان لديك أي استفسار حول المشاركة بهذه الدراسة يمكنك التواصل مع مكتب

Health Research Ethics Board

في جامعة البرتا على الرقم 780-492-2615

هذا المكتب مستقل تماماً وليس له أي علاقة بالأشخاص العاملين في هذه الدراسة

CONFIDENTIALITY WARNING: This communication is intended for the use of the recipient to which it is addressed, and may contain confidential, personal, and/or privileged information. Please contact me immediately if you are not the intended recipient of this communication, and do not copy, distribute, or take action relying on it. Any communication received in error, or subsequent reply, should be deleted or destroyed (2012017) Version No.: 03012017.01

Appendix N Consent Form

- English version



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 Fax: 780-492-6444

CONSENT

Study Title: Diabetes knowledge, self-care behaviors, and metabolic control in the Arabic speaking population with type 2 diabetes in Edmonton

Study Coordinator: D Phone Number:
 Principal Investigator: Phone Number:

	Yes	No
Do you understand that you have been asked to be in a research study?	<input type="checkbox"/>	<input type="checkbox"/>
Have you read and received a copy of the attached Information Sheet?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand the benefits and risks involved in taking part in this research study?	<input type="checkbox"/>	<input type="checkbox"/>
Have you had an opportunity to ask questions and discuss this study?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand that you are free to leave the study at any time, without having to give a reason and without affecting your future medical care?	<input type="checkbox"/>	<input type="checkbox"/>
Has the issue of confidentiality been explained to you?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand who will have access to your study records including your personal and medical records?	<input type="checkbox"/>	<input type="checkbox"/>
Do you want the investigators to inform your family doctor that you are participating in this research study? If so, give his/her name	<input type="checkbox"/>	<input type="checkbox"/>
For safety reasons, we will inform you and your family doctor if you require medical attention even if you have checked that you do not want us to inform your family doctor that you are participating in this research study		
Who explained this study to you?		
<i><u>By signing this consent form you are saying it is okay for the study team to collect, use and disclose information about you from your personal health records as described above</u></i>		
I agree to take part in this study:		
Signature of Research Participant		
Printed Name	Date	
Signature of Witness		
I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.		
Signature of Investigator or Designee		Date
[For office use only] Interview format preference: Face-to-face <input type="checkbox"/> Phone <input type="checkbox"/>		
THE INFORMATION SHEET MUST BE ATTACHED TO THIS CONSENT FORM AND A COPY GIVEN TO THE RESEARCH PARTIC		

• Arabic version



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عنوان الدراسة: المستوى المعرفي لمرضى السكري والعناية الذاتية وعوامل التحكم بالمرض ومضاعفاته لدى مرضى السكري الناطقين باللغة العربية في مدينة أدمونتون

	رقم الهاتف:		منسق البحث:
	رقم الهاتف:		الباحث الرئيسي:

لا	نعم	
<input type="checkbox"/>	<input type="checkbox"/>	هل فهمت إننا ندعوك للمشاركة في هذه الدراسة؟
<input type="checkbox"/>	<input type="checkbox"/>	هل قرأت واستلمت نسخة من هذه المعلومات ؟
<input type="checkbox"/>	<input type="checkbox"/>	هل أنت على دراية بفوائد وسليبات مشاركتك في هذه الدراسة؟
<input type="checkbox"/>	<input type="checkbox"/>	هل كانت لديك الفرصة لطرح اسئلة حول هذه الدراسة ؟
<input type="checkbox"/>	<input type="checkbox"/>	هل انت على دراية ان لديك الحرية المطلقة لمخادرة هذه الدراسة عند أي وقت ، دون إعطاء الأسباب وكذلك دون التأثير على رعايتك الطبية المستقبلية ؟
<input type="checkbox"/>	<input type="checkbox"/>	هل تم التوضيح حول مسألة الخصوصية بهذه الدراسة ؟
<input type="checkbox"/>	<input type="checkbox"/>	هل أنت على دراية من هم الأشخاص الذين لديهم المقدرة على الوصول الى ملفات الدراسة والتي ضمنها معلوماتك الشخصية والصحية ؟
<input type="checkbox"/>	<input type="checkbox"/>	هل تريد من الباحث الرئيسي اخبار طبيبك بأنك مشارك بهذه الدراسة؟
		إذا نعم، ما هو اسم طبيبك.....
		في حالة وجود أي مشاكل طبية بخصوصك سوف نقوم بإخبارك انت وطبيبك الخاص وذلك لدواعي امنية وصحية وسيتم ذلك (حتى في حالة عدم موافقتك على اخبار طبيبك بمشاركتك بهذه الدراسة).
		من هو الشخص الذي قام بشرح هذه الدراسة لك؟.....
		بتوقيعك لنموذج الموافقة، أنت تمنح الموافقة للباحثين بهذه الدراسة بتجميع واستعمال معلومات من ملفك الطبي كما تم شرح ذلك بتوقيعي هنا أنا موافق على أن أشرك في هذه الدراسة: -
		توقيع المشارك.....الاسم.....التاريخ..... توقيع الشاهد.....
		أنا اعتقد أن الشخص الذي يقوم بالتوقيع على هذه الاستمارة على علم بتفاصيل هذه الدراسة ويوافق طوعيا على المشاركة
		توقيع الباحث او مساعد الباحث.....التاريخ.....
[For office use only] Interview format preference: Face-to-face <input type="checkbox"/> Phone <input type="checkbox"/>		

Appendix O Consent for Release of Contact Information (Arabic and English versions)

- English version



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DIVISION OF ENDOCRINOLOGY
University of Alberta
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Edmonton AB T6G 2G3
Phone: 780-492-5159
Fax: 780-492-6444

Consent for Release of Contact Information

Study Title: Diabetes knowledge, self-care behaviors, and metabolic control in the Arabic speaking population with type 2 diabetes in Edmonton

Investigators:
Dr. Phone Number:
Dr. Phone Number:

Study Summary:

We are researchers from the Department of Medicine, University of Alberta conducting clinical research on type 2 diabetes in the Arabic speaking population to assess diabetes knowledge and self-care behaviors, and the relationship to metabolic control. In this study, we are going to ask you questions about your medical history and diabetes knowledge and management. One of our research assistants will interview you face-to-face, this interview will take 20 minutes to complete the survey

Completing this form is voluntary and only allows the research team to contact you.

CONSENT:

By signing this consent, I give permission to my health care provider (family physician, etc.) to release my contact information to the study team listed above for the purposes of providing me with more information about participating in the study.

Consent can be withdrawn at any time by contacting the health care provider obtaining this consent.

Patient Name:

Phone number: _____

Patient Signature:

Date:

Person obtaining consent:

Name:

Signature:

Date: _____

- Arabic version



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الموافقة على تزويدنا بمعلوماتك للتواصل معك

عنوان الدراسة:

المستوى المعرفي لمرضى السكري والعناية الذاتية وعوامل التحكم بالمرض ومضاعفاته لدى مرضى السكري الناطقين باللغة العربية في مدينة أدمنتون

منسق البحث:
الباحث الرئيسي:
رقم الهاتف:
رقم الهاتف:

ملخص البحث:

نحن مجموعة من الباحثين في كلية الطب في جامعة ألبرتا نقوم بدراسة مرض السكري لدى الجالية العربية المقيمة في مدينة أدمنتون لدراسة مستوى المعرفة حول مرض السكري، ومستوى العناية الذاتية وتأثيرهما على عوامل التحكم بمرض السكري ومضاعفاته. هذه الدراسة تتضمن إجراء مقابلة لتحجئة استمارة تحتوي على مجموعة أسئلة حول مرض السكري وكيفية تعاملك مع مرض السكري. أحد الباحثين بهذه الدراسة سوف يقوم بإجراء مقابلة معك. وهذه المقابلة سوف تأخذ عشرين دقيقة من وقتك لتحجئة الاستمارة الخاصة بهذه الدراسة.

تحياتك لهذا النموذج تطوعية وهي فقط لتزويدنا بمعلوماتك الشخصية للتواصل معك.

إعطاء الموافقة:

بتوقيعي لهذا النموذج، أنا أعطى الإذن لطاقتي الصحية (طبيب الأسرة،...) لإعطاء معلوماتي لفريق البحث الخاص بهذه الدراسة للتواصل معي لغرض تزويدي بمعلومات أكثر حول هذه الدراسة وسؤالي إذا كنت أريد المشاركة.

اسم المريض:
توقيع المريض:
رقم الهاتف:
التاريخ:

الشخص الذي حصل على هذه الموافقة:

الاسم
التاريخ
التوقيع

Appendix P Chart review form



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Chart Review form

Diabetes knowledge, self-care behaviors, and metabolic control in the Arabic speaking population with type 2 diabetes in Edmonton

Survey ID: _____

Date: (Month/day) _____ 2017

Please record most recent values:

Measure	Result	Please record date if measured before 2017 (month/day/year)
Blood pressure (mmHg)		
Body weight	<input type="checkbox"/> lbs <input type="checkbox"/> kgs	
Height	<input type="checkbox"/> Feet/inches <input type="checkbox"/> cm	
HbA1c (%)		
LDL (mmol/L)		
Triglyceride (mmol/L)		
HDL (mmol/L)		
Urine albumin: creatinine (mg/mmol)		

Study Contact: Dr. Aida Belag

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