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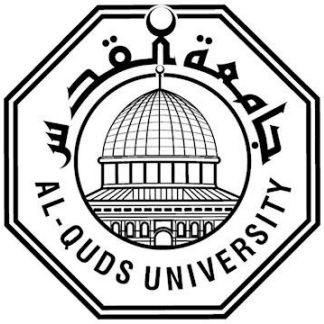

Oral Hygiene; knowledge, attitude, and practices among diabetic patients in Hebron- Palestine.

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Master Thesis

Jerusalem- Palestine

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Oral Hygiene; knowledge, attitude, and practices among diabetic patients in Hebron- Palestine.

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Dedication

I dedicate this thesis …

To the first teacher of all people, Prophet MOHAMMED (peace be upon him)

To my dear father and mother

To my beloved big and small family who supported and encouraged me at all stages.

To my friends, colleagues

To all who helped me in completing this study

With respect and love.

Areej Hassan Harahsheh

Declaration

I certify that this thesis submitted for the degree of master in health policy and management, is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same material) has not been submitted for a higher degree to any other university or institution.

Areej Hassan Harahsheh.

Signed: 

Date: 3 / 4 /2022

Acknowledgment

First, all thanks to Allah for helping me during my study and capability to complete this thesis, I would like to express my gratitude and appreciation, to all who have contributed to the success of this study.

My most profound gratitude to my supervisor Prof. Mohammad Abu Yunis, who guides me and gives his time until the accomplishment of this study, you are for me a leader, advisor, teacher, supervisor, and role model. Many thanks go to you.

I sincerely hope that this study will be beneficial and helpful to the policymakers, and strategic planners to have oral and dental programs for diabetics in Palestine.

Although it would be impossible to name individually all people and events which contribute to the success of this thesis and the accomplishment of remarkable knowledge and experience. I am very grateful to all those who have contributed to the completion of this study and helped to make this research possible.

Finally, my warm appreciation is expressed to my family, respectful parents, and brothers who have continually supported me during my entire educational journey, what a pleasure it has been. I also wish a special thanks to my friends– for their supportive role and patient attitude, it was most truly welcome.

Abstract

Background: Diabetic patients are at greater risk for several oral health complications, particularly periodontal disease. Periodontal disease has an impact on diabetes control. Good oral hygiene knowledge and practices are recommended to prevent and manage oral health problems.

Purpose: To assess the oral hygiene; knowledge, attitude, and practices levels among diabetic patients attending primary healthcare centers to synthesize current evidence base data in order to help in the effective planning of oral health services for diabetic patients in Palestine.

Methods: A descriptive, cross-sectional study was conducted using face to face questionnaire. The Study participants consist of diabetic patients attending diabetes clinics in primary healthcare centers in Hebron Health Directorate. The study included 309 participants; 309 responded to the questionnaire, with a response rate of 100%. The questionnaire is divided into four parts: Part one: consist of two parts, section A: Has questions about information on the socio-demographic of participants, section B: Information on the clinical characteristics of participants, Part two: Has questions related to knowledge of oral hygiene, Part three: Has questions related to attitude towards oral hygiene, the questions collect information on oral hygiene practices. The questionnaire has to be designed in a way that it can precisely measure the dependent and independent variables in this research. To assess the level of diabetic patients' attitude about oral hygiene, the Likert scale is used it allows the respondent to choose the degree of agreement or disagreement with each item in the questionnaire when it comes to the stimulus purpose, the different items were measured on 5-point Likert scale to check the participant's degree of convenience with the statement or not, as below: Strongly disagree (SD), disagree (D), neither agree nor disagree (NAD), agree (A), strongly agree (SA). To assess the level of diabetic patients' knowledge about Oral Hygiene a 3- point scale is used as below: Yes, no, don't know. To assess the level of diabetic patients' practice about oral hygiene, the Likert scale is used, the different items were measured on 5-point Likert scale to check the participant's degree of convenience with the statement or not, as below: Always, often, sometimes, rarely, never.

Results: The study included a total of 309 patients with diabetes mellitus both types; type

1, and type 2. It was conducted in 5 diabetes clinics in primary healthcare centers in the Hebron Health Directorate. The review found that people with diabetes have a medium level of oral health knowledge (60%), High oral health attitudes (Mean score=4.09), and medium oral hygiene practices (Mean score=3.14). They rarely receive oral health education or information about the relation between diabetes and oral health. They also rarely receive dental referrals from their care providers. A majority of people with diabetes are unaware of the bidirectional link between diabetes and periodontal disease and they have limited knowledge of their risks for oral health problems.

The study also found that (66.99%) attending primary healthcare centers in Hebron directorate are type2 diabetic patients, (57.28%) are more than 5 years diabetic patients, (61.81%) are not smoking, (56.63%) are poor HbA1c levels. The study showed a low awareness level that smoking with diabetes increases the incidence of oral problems. There is a significant relationship between control and uncontrol diabetic patients with knowledge and practice, results showed that knowledge and practice are better among patients with control diabetes. Provision of oral health education by diabetes care providers and referral to dentists can improve oral hygiene practices among patients.

Conclusion: Diabetic patients have limited knowledge about the risk of diabetes on their oral health, lack compliance with recommended oral hygiene behavior. Knowledge and oral hygiene practices levels are better among patients with controlled diabetes. It is therefore essential to educate patients about their increased risk for oral complications and motivate them for good oral hygiene practice, facilitate access to dental care, and advise them to have regular dental checkups.

Keywords: Oral hygiene, Diabetes Mellitus, Oral hygiene Knowledge, Attitude, Practices.

المعرفة والمواقف والممارسات تجاه العناية بالفم لدى مرضى السكري في الخليل-فلســطين

اسم الطالب : ريج حسن محمد حراحشه

المشرف : البروفيسور: محمد ابو يونس

الملخص

مرضى السكري معرضون بشكل أكبر للإصابة بالعديد من مضاعفات صحة الفم ، وخاصة أمراض اللثة والاسنان حيث ان لها تأثير على التحكم في تنظيم مستوى السكر في الدم كما انه يجب على مرضى السكر ي المعرفة الجيدة بشأن العناية بالفم والاسنان لتجنب المضاعفات المرتبطة بمرض السكري بشأن مشاكل صحة الفم والاسنان.

الهدف: هدفت هذه الدراسة لتقيم مستويات المعرفة والمواقف والممارسات بشأن صحة الفم والاسنان بين مرضى السكري الذين يحضرون إلى مراكز الرعاية الصحية الأولية من أجل المساعدة في التخطيط الفعال لخدمات صحة الفم لمرضى السكري في فلسطين.

المنهجية: أجريت دراسة وصفية مقطعية باستخدام استبيان. المشاركون في الدراسة من مرضى السكري الذين يترددون على عيادات السكري في مراكز الرعاية الصحية الأولية في مديرية صحة الخليل. ضمت الدراسة 309 مشارك ا . بمعدل استجابة 100٪ .

النتائج: بينت نتائج الدراسة أن الأشخاص المصابين بالسكري لديهم مستوى متوسط من المعرفة بصحة الفم(60٪) ، ومواقف عالية بشأن صحة الفم متوسط الدرجة = (.09)، وممارسات نظافة الفم المتوسطة متوسط الدرجة = (14.3). كما انه نادرا ما يتلقون تثقيف ا عن صحة الفم والأسنان أو معلومات حول العلاقة بين مرض السكري وصحة الفم. وناد را ما يتلقون تحويلات خاصة للعناية بالأسنان من مقدمي الرعاية في مختلف العيادات. غالبية مرضى السكري غير مدركين للعلاقة بين مرض السكري وأمراض اللثة والاسنان كما ا ن لديهم معرفة قليل ة بمخاطر مرض السكري على مشاكل صحة الفم والاسنان.

كما توصلت الدراسة إلى أن(99.66٪)من مرضى السكري من النوع الثاني يترددون على مراكز الرعاية الصحية الأولية في محافظة الخليل ، و(28.57٪) أكثر من 5 سنوات مرضى السكري ، و (81.61٪) غير مدخنين ، و(63.56٪) يعانون من ضعف مستويات السكر التراكمي كما أظهرت

الدراسة انخفاض مستوى الوعي بأن التدخين مع مرض السكري يزيد من حدوث مشاكل الفم. هناك علاقة ذات دلالة إحصائية بين مرضى السكري الذين لديهم تحكم جيد بمستويات السكر مع المعرفة والممارسة، وأظهرت النتائج أن المعرفة والممارسة أفضل بين مرضى السكري الذين لديهم تحكم جيد بمستويات السكر.

يمكن أن يؤدي توفير التثقيف بشأن صحة الفم والاسنان من قبل مقدمي رعاية مرضى السكري وتحويل المرضى لعيادا ت أطباء الأسنان إلى تحسين ممارسا ت العناية بالفم والأسنان بين المرضى.

الخلاصة: مرضى السكري لديهم معرفة قليلة حول مخاطر الإصابة بمرض السكري على صحة الفم والأسنان، كما ان مستويات الممارسة الصحية والنظافة قليلة. أظهرت النتائج ان مستويات المعرفة وممارسات نظافة الفم والأسنان أفضل بين المرضى الذين لديهم تحكم جيد في مستويات السكر في

الدم. توصي الدراسة بانه من الضروري تثقيف مرضى السكري حول زيادة مخاطر تعرضهم لمضاعفات الفم والأسنان المرتبطة بمرض السكري وتحفيزهم على ممارسة نظافة الفم الجيدة ، وتسهيل الوصول إلى عيادات رعاية الفم والأسنان، وتقديم المشورة لهم لإجراء فحوصات منتظمة للأسنان.

الكلمات المفتاحية: نظافة الفم والأسنان ، داء السكري ، المعرفة ، المواقف ، الممارسات.

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List of Abbreviations.

ADA American Diabetes Association.

DHF Dental Health Foundation.

DM Diabetes Mellitus**.**

IDF International Diabetes Federation,

MOH Ministry of Health.

NCD Non-Communicable Disease.

SPSS Package for Social Science.

UNRWA United Nations Relief and Works Agency for Palestine Refugees in the Near East.

WHO World Health Organization

WDF World diabetes Foundation

Chapter one:

Introduction.

1.1. Introduction

Diabetes Mellitus (DM) is a chronic, progressive, metabolic disease that is characterized by high levels of glucose in the blood. It results from an absolute or relative deficiency in insulin secretion from pancreatic beta cells or an increased cellular resistance to the action of insulin (American Diabetes Association, 2017).

According to the International Diabetes Federation, there are currently 415 million individuals worldwide with type 2 diabetes mellitus, and this number is expected to rise to 541 million adults by 2030. (IDF,2021).

In Palestine, DM is becoming an epidemic. Diabetes and its possible consequences have substantial morbidity and mortality rates, which have significant health care costs for people, families, and society (Imam, 2019).

The political and economic fragility of Palestine means that, despite the rising incidence and prevalence of diabetes, only few researches have examined the disease prevalence and management. The prevalence of type 2 diabetes (T2DM) in Palestine is underreported. The annual incidence rate of T2DM ranged from 150 to 220 per 100,000 people in the Palestinian national population-based survey (Khader, et al. 2013)). According to the Palestinian Ministry of Health, diabetes-related death was the fourth largest cause of death in 2014, accounting for 8.9% of all deaths. Diabetes has a 9.1 percent prevalence among Palestinians aged 20–79 (Imam, 2019).

The World Health Organization has classified diabetes mellitus as a pandemic disease because of its high incidence and increasing prevalence (Standl, et al., 2019). The 2013 International Diabetes Federation Diabetes Atlas estimates that 387 million people around the world have diabetes, and that figure is expected to reach 592 million by 2035. (Guariguata, et al., 2014). Systemic and oral problems are common in diabetics with uncontrolled blood

glucose levels (Zeitler, et al. 2014). Macrovascular and microvascular disorders are the most frequent chronic DM consequences. Adult patients with severe periodontitis had a higher prevalence of macrovascular and kidney issues than diabetic adults with mild periodontitis and gingivitis, suggesting that periodontitis is linked to the characteristic DM consequence (Gupta, et al, 2017). Xerostomia (dry mouth) causes an increased risk of oral fungal infections (oral candidiasis), dental caries, poor wound healing, taste impairment, burning mouth syndrome, and periodontal disease in those with diabetes (Yuen, 2016). Periodontitis may be more severe and aggressive in people with DM as a result of their weakened immune system and healing abilities. This condition may also affect glycemic control, as it has been established that DM management improves after the treatment of periodontitis (Poudel, et al., 2018). In order to prevent and treat periodontal/oral disease as well as manage DM, DM patients should be educated on the two-way relationship between oral health and DM (Albert, 2016).

Without treatment, T2DM-associated chronic hyperglycemia can cause major problems for the general health as well as the oral health (Verhulst, et al., 2019). T2DM can induce a variety of short- and long-term complications, including diabetic nephropathy, neuropathy, retinopathy, atherosclerosis, peripheral artery disease, diabetic heart disease, and cardiomyopathy, to name just a few (Wellapuli & Ekanayake, 2016). Those with T2DM and hyperglycemia also have less effective healing processes for oral mucous membrane injuries, which may be due to hyposalivation, changes in salivary chemical composition, impaired immunological function, or dietary changes (Allen, et al., 2008; Passos-Soares, et al., 2019). Oral pathology, plaque, calculi, and infections may become more common as a result of these alterations in oral hygiene (Nikbin, et al., 2014). Periodontal disease has also been linked to the poorly controlled T2DM (AzoguiLévy, et al., 2018). T2DM patients have an increased risk of tooth decay, both in terms of frequency and severity (Tavares, et al., 2014). Poorly fitted dentures, periodontal illnesses and dental cavities are primary causes of tooth loss, and this, combined with poor eating habits and limited food options, leads to nutritional imbalances and a poorer living standard (AzoguiLévy, et al., 2018). If oral health issues have a clinical effect on a person's well-being, they should also be considered in terms of their impact on the way they perceive their own physical, psychological, and social well-being (Sandberg, et al. 2003; Azogui-Lévy, et al., 2018). The World Health Organization (WHO) has revised its definition of oral health to include not only the physical impacts of dental disorders but also the

implications on psychological and social well-being (Furuta & Yamashita, 2013). Instead of only considering the effects of disease on the patient's physical and mental health, this new paradigm takes into account the individual's subjective perception of the impact of dental conditions on their overall well-being and their subjective assessment of the impact of oral health on their overall physical, mental, and social well-being (AzoguiLévy et al., 2018). Measuring oral health-related quality of life is one aspect of the paradigm shift that is taking place (Azogui et al., 2018; Locker, 1988).

Oral health and measuring oral health-related quality of life impacts of T2DM have received less research attention than medical complications. Patients with type 2 diabetes had an increased risk of developing oral pathology (Verhulst, 2021). People with Type 2 Diabetes (T2DM) are more likely to develop periodontal disease, dental caries, and dry mouth than the general population, according to numerous empirical investigations. OHRQoL has been inconsistently measured across populations due to the use of many instruments in different language versions and with varying quantities of questionnaire items (Al Shamrany, 2006; Bennadi & Reddy, 2013). The quality of life and ability to function of patients with T2DM have been shown to be negatively impacted by oral problems, according to several research (AzoguiLévy et al., 2018; Sandberg, 2003). T2DM and non-T2DM have not been found to vary in OHRQoL in other studies (Irani, et al., 2015). There is discrepancy in the empirical research addressing the link between T2DM and OHRQoL, leading in a lack of understanding of the risk and protective factors involved with this relationship. T2DM and oral diseases have repeatedly been linked to poor overall health outcomes in evidence-based studies (Verhulst, 2018).

Diabetes and Dental diseases

Many medical problems including diabetes increase the risk of periodontal disease which has become more severe and progressive (Guzman et al., 2013). As a result, the dental health of diabetes patients has been examined extensively in the recent past, there is significant evidence to show that diabetes mellitus affects the incidence and severity of periodontitis (Sogi and Bhaskar, 2015). When diabetes is poorly treated, people with diabetes are more likely to develop gum disease. Those with diabetes have a higher risk of developing

periodontitis than those without diabetes (Loe, 2014).

Periodontal disease is the sixth most prevalent consequence of diabetes mellitus, according to research (Löe, 1993). In comparison to other systemic disorders like hypertension, diabetes mellitus is the biggest risk factor for periodontal disease (Lalla and Lamster, 2012).

Glycemic control and diabetic complication severity are greatly reduced by periodontal infection with Gram-negative organisms (Nazir, et al., 2017). A self-reinforcing catabolic process that includes inflammation, tissue death, and insulin resistance occurs when diabetes and periodontal disease are concurrently present (Tsai, et al., 2016).

Public health is concerned about oral illnesses because of their high prevalence and the negative impact they have on quality of life. These oral disorders may be caused by genetic predispositions, developmental issues, poor oral hygiene, and traumatic events (Simpson, et al., 2015). According to a wide range of characteristics, patients are more likely to adhere to oral health care regimens if they are educated and encouraged. Lack of information is the main reason behind why people don't practice good dental hygiene. Also important to oral health behavior is the person attitude and ideas about oral health (Cheng, et al., 2018). The dental expert and the patient must work together to maintain a healthy mouth. The view of a population on their dentition is one of the most critical elements in determining their dental health (Martin, et al., 2017).

Analytical cross-sectional study conducted in Palestine about Oral Health Problems among Type 2 Diabetic Patients Attending UNRWA Health Centers in Gaza Governorates. included 406 patients with type 2 diabetes mellitus selected through systematic random sampling from 5 UNRWA health centers. The World Health Organization's basic methods tools were used to collect data and assess oral health. Study results Showed that 36.3% of participants never brush their teeth, only 16.5% brush their teeth twice or more a day. Only 16.4% of participants have no gingival bleeding, the mean number of teeth showing no gingival bleeding is (9.79), showing gingival bleeding (9.91), and not present for bleeding test (9.14). While 2.4% have no periodontal pockets, the mean number of teeth showing absence of pocket (7.15), showing pocket 4-5 mm (7.84), showing pocket 6 mm or more (4.96) and not present for pocket measurement (9.13). Gingival bleeding was statistically significant associated with gender, and frequency of teeth brushing, but there was no statistically

significant association between gingival bleeding and periodontal pocket, and sociodemographic, Glycated Hemoglobin (HbA1c) and diabetic duration. Type 2 diabetes mellitus patients already had chronic periodontitis worsen by diabetes. Oral and periodontal health should be promoted as integral components of diabetes management (Alqedra and Aljeesh, 2020).

Saudi Arabian researchers conducted a cross-sectional study of 612 diabetes patients in the city of Abha to examine their attitudes and practices toward maintaining excellent oral health through appropriate oral hygiene and frequent dental check-ups. Only 46.1 percent and 46.4 percent of the diabetic patients studied were aware that DM causes dental caries and affects the gingival, respectively, according to the results of the study. Diabetic individuals have a low degree of awareness and understanding about oral health. When it came to the medical consequences of diabetes, most diabetics were aware of them. When it comes to diabetes patients' attitudes and practices about oral health, overall oral hygiene measures were determined to be excellent (Ismaeil and Ali, 2013).

Al Habashneh, et al., (2010) conducted A cross-sectional study in Jordan to examine the awareness, perception, sources of information, and knowledge about diabetes mellitus and periodontal health among Jordanians. Between September 25, 2006, and February 20, 2007, a random sample of 500 diabetes patients was selected from three hospitals and three comprehensive health facilities in Jordan that reflect both urban and rural populations. 405 individuals completed and submitted questionnaires with their replies (response rate was 81 percent). More than half (48%) of diabetes patients were aware that gum disease and oral health issues are more prevalent among diabetics. Only 38 percent were aware that their oral health may impact their blood sugar levels. 50% of dentists got their information from television and the internet. Diabetic patients' knowledge of diabetes and periodontal health is limited, and many are uninformed of the oral health consequences of their illness and the importance of effective preventative treatment. Consequently, educational programs should be tailored to the requirements of the community and aimed at those people who visit their dentists and doctors seldom. Patients with diabetes should be checked for gum disease by dentists, doctors, and other health care professionals on a frequent basis, according to the findings of a recent research (Al Habashneh, et al., 2010).

To better understand how DM patients in the United Arab Emirates feel about

maintaining excellent oral health, a study was undertaken in the UAE. Diabetic patients are unaware of their elevated risk for oral illness, according to the findings. It was recommended professionals working in both the dentistry and medical areas need to take on the role of developing educational programs to raise awareness about the oral manifestations of diabetes and its implications on oral health (Eldarrat, 2011).

1.2. Statement of problem

Medical professionals are increasingly concerned about the link between diabetes and periodontal disease because of strong evidence that shows a negative two-way relationship between diabetes and periodontal disease. Diabetes mellitus (DM) increases the risk for periodontitis and the periodontal inflammation negatively impacts glycemic control (Forouhi, et al., 2014). In order to successfully treat both DM and periodontitis, the most important aspect is the patient. Periodontal health may be improved by brushing, flossing, and going to the dentist on a regular basis (Lang, et al,1995). Another factor that influences oral health behavior is a person's ideas and attitudes about oral health issues (Knecket, 2000). There is a correlation between oral health awareness and the likelihood of getting preventative dental treatment. One of the reasons why people don't practice good dental hygiene is a lack of information. Patients are more likely to adhere to health-care regimens if they are reassured and educated about them (Poudel, et al., 2018).

For health-related behavior, oral health education has long been seen as a precondition (Poudel, et al., 2018). Cross-sectional research demonstrates only a small correlation between knowledge and behavior, although studies have shown that knowledge is associated with better oral health. Despite several studies, there is still a dearth of information on this topic, particularly among rural residents, who account for more than 70 percent of the population. Furthermore, even those who live in cities and have access to dental treatment are nonetheless at risk of developing oral disease because of their poor nutrition and unhealthy lifestyles (Peker, 2014).

However, in spite of the growing recognition that oral health is an important element of overall health, it is still under-recognized and poorly-assessed in Palestine. In most diabetic individuals, dental treatment is sought only after the condition has progressed to a point where

it is difficult, if not impossible, to stop it. Providing patients with the information they need to follow appropriate oral hygiene habits in order to avoid dental caries and periodontal disease is an important step in reducing the risk of oral problems. Specifically, what is the degree of oral hygiene among diabetes patients in Hebron, Palestine?

1.3. Significance of study.

At every stage of life, oral health is critical to general health and well-being. Not only does a healthy mouth aid in nourishing the body, but it also promotes social interaction, positive self-esteem, and a positive mood (DHF, 2017). Poor dental health has been linked to a host of undesirable outcomes, including discomfort, functional limitations, and a general decline in well-being (Petersen ,2004). Prerequisites for oral health-related behaviors include appropriate conduct and attitudes (Carneiro, et al., 2011).

Researchers across the world have studied diabetics' knowledge, attitudes, and behaviors related to dental hygiene. Despite the prevalence of oral diseases and their systemic link to other illnesses, oral health is frequently overlooked and studies on the oral health care of the population, particularly diabetic patients, are scarce in Palestinian. Dentists are not providing diabetic patients with dental care instructions or education programs at primary healthcare centers in MOH, and there are no guidelines or referral pathways in place for routine dental care for diabetics. As a result, little is known regarding the oral health condition and requirements of NCD patients. This is the first study to look at how diabetic patients in Hebron, Palestine, feel about oral hygiene and what they do about it in terms of knowledge, attitude, and practice.

In Gaza, research on oral health problems in diabetics with type 2 diabetes was undertaken. Patients with type 2 diabetes mellitus who attended UNRWA Health Centers in the Gaza Governorates were selected through five UNRWA health centers. Research into oral health literacy is critical because it is linked to better oral health behaviors such as more frequent brushing, dental visits, and good oral hygiene practices (Yuen, et al., 2016). Social factors play a role in oral health behaviors, as patients who are neglected or of lower socioeconomic status are more likely to have unhealthy practices, lack of knowledge and attitudes about oral health, and low utilization of dental services (Petersen, et al., 2011). This

study may help identify the level of knowledge, attitude, and oral hygiene practices among diabetic patients in Palestine for all of the aforementioned reasons mentioned above. A baseline for effective planning for noncommunicable oral health services, including education and promotion programs as an integral part of routine care for non-communicable, may be provided by this study. The findings of the study might help dental practitioners broaden their scope of practice to include a larger range of health care services. It may also serve as a reminder of the need of training the medical team responsible for normal diabetic care, and informing them about the link between dental health and diabetes management.

1.4. General objective of study.

The main aim of this study is to assess knowledge, attitude, and practices toward oral hygiene among diabetic patients attending primary healthcare centers in Hebron health Directorate.

1.5. Specific Objectives of study

- To assess the level of knowledge among diabetic patients about oral hygiene in primary healthcare centers in Hebron Health Directorate.
- To assess oral hygiene practices of diabetic patients in maintaining good oral health.
- To assess the attitude of diabetic patients in maintaining good oral hygiene.
- To identify the relationship between socio-demographic variables with knowledge, attitude, and oral hygiene practice among diabetic patients.
- To identify the relationship between clinical characteristics of diabetic patients and knowledge, attitude, and oral hygiene practice among diabetic patients
- To compare between diabetic patients with controlled glycemic level and uncontrolled glycemic level in relation to their knowledge, attitude, and oral hygiene practices?

1.6. Research questions

- What is the level of knowledge among diabetic patients about the oral hygiene in primary healthcare centers in Hebron directorate?
- What is the level of attitude among diabetic patients toward their oral hygiene in Hebron directorate?
- What is the level of oral hygiene practices among diabetic patients in primary healthcare centers in Hebron directorate?
- What is the impact of socio-demographic variables on patients' knowledge, attitude, and
- oral hygiene practice among diabetic patients in Hebron directorate?
- What is the impact of clinical characteristics of participants on patients' knowledge, attitude, and oral hygiene practice among diabetic patients in Hebron directorate?

1.9. Null- Hypothesis.

- There is no significant relationship at level of $\alpha \leq 0.05$ between socio-demographic variables and patient's oral hygiene knowledge in Hebron Health Directorate.
- There is no significant relationship at level of $\alpha \leq 0.05$ between socio-demographic
- variables and patient's oral hygiene practices in Hebron Health Directorate.
- There is no significant relationship at level of $\alpha \leq 0.05$ between socio-demographic variables and patients' attitude toward oral hygiene practices in Hebron Health
- Directorate.
- There is no significant relationship at level of $\alpha \leq 0.05$ between 05 between clinical characteristics variables of participants and patient's oral hygiene knowledge in Hebron Health Directorate.
- There is no significant relationship at level of $\alpha \leq 0.05$ between clinical characteristics variables of participants and patient's oral hygiene attitudes in Hebron Health Directorate.
- There is no significant relationship at level of $\alpha \leq 0.05$ between clinical characteristics variables of participants and patient's oral hygiene practices in Hebron Health Directorate.

1.10 Study outcome

The outcomes of this study might be used to help diabetes patients in the Hebron Directorate improve their oral hygiene by changing their knowledge, attitudes, and behaviors around oral hygiene. Based on the findings of this study, the public health decision makers may have an evidence foundation for a new strategy for oral health services for non-communicable disease patients or a review of the excitant services. The results of this research might be used to better design and evaluate oral health services for at-risk populations. In addition, it may help the Ministry of Health to arrange oral health education programs in all of Palestine's local government regions; this will help diabetes patients get information and dental checkups. A new strategy is devised to target the most at-risk individuals and work on remedial measures in the larger community.

Chapter two:

Literature review

2.1 Diabetes mellitus

An estimated 347 million individuals over the age of 18 have diabetes, according to the World Health Organization (WHO). By 2030, this figure is expected to climb to 439 million (Diabetes, 2015). According to the Centers for Disease Control and Prevention's 2014 National Diabetes Statistics Report, diabetes cost the United States $245 billion in 2012. Direct medical expenditures total $176 billion, while indirect costs such as disability, loss of productivity, and early death total $69 billion (National Diabetes Statistics Report, 2015).

According to The International Diabetes Federation (2021) 537 million people have diabetes in the world and 73 million people in the Middle East and North Africa Region; by 2045 this will rise to 135.7 million. In Palestine Total adult population is 2,689,400, the Prevalence of diabetes in adults was 6.8% with total cases of diabetes in adults 183,000.

An unusually high quantity of sugar in the blood (glucose) impairs a person's health over a lengthy period of time with diabetes mellitus. DM is caused by hyperglycemia (or high blood sugar) as a result of impaired cellular activity or reduced insulin production as a result of metabolic syndrome, a disorder that alters the body's normal biochemical processes (Loghmani, 2005). Poor control of lipid metabolism and blood protein levels can exacerbate DM (Tan, et al., 1997). Type I and Type II diabetes are two distinct kinds of diabetes mellitus, respectively. insulin-dependent or juvenile diabetes is a kind of diabetes known as insulin-dependent diabetes. Type II diabetes, or adult-onset diabetes, is a non-insulin-dependent form

of diabetes (American Diabetes Association, 2017).

Abnormal antibodies destroy insulin-producing beta cells in the pancreatic islets of Langerhans in people with Type I diabetes (Loghmani, 2005). Absolute insulin insufficiency is the result of this disorder, which is thought to be genetically inherited (Dean & McEntyre, 2004). Type I diabetes mellitus, which generally occurs in childhood or early adulthood, accounts for 5% to 10% of all diabetes occurrences, according to the American Diabetes Association (ADA) (Hainsworth, 2004). One of the most common reasons why young people get diabetes is because they have Type I diabetes (more than 80% of cases) (Hainsworth, 2004). The older a person is, the more likely they are to acquire this kind of diabetes (Kobayashi et al., 1993). Latent autoimmune diabetes in adults (LADA) is a subset of this group (Pollak & Vasquez, 2012).

Type I diabetes with a slow and steady progression is known as LADA (Pollak & Vasquez, 2012). Type I diabetics dependent on insulin for glycemic control and for their own life (Loghmani, 2005). As autoimmune interference may be the primary cause of diabetes, it is also possible that it is idiopathic, which means there is no recognized reason for it (Umpierrez et al., 1995). However, despite genetic predisposition being the primary risk factor for the development of Type I diabetes, there appears to be an environmental effect as well (Purohit & Sharma, 2015). The pancreas' beta cells may be damaged as a result of aberrant antibody responses triggered by nutritional intake and pathogenic infections (Toeller et al., 2001; Wagenknecht et al., 1991). Diabetic ketoacidosis and significant swings in plasma glucose levels are common symptoms of Type I diabetes (Wojcik et al., 2015). In addition, the human body is able to recognize the signs and symptoms of Type I diabetes as soon as they begin to express themselves. Excessive urination, thirst, hunger, and itchiness are among the symptoms of polyuria, which is also known as polydipsia, polyphagia, or polyuria (irritating sensation). Controlling insulin injections is the best way to treat Type I diabetes and keep blood sugar levels stable. If the condition goes untreated, people may experience weariness and weakness (Morris, 2014).

Type II diabetes develops when insulin activity is impaired and insulin resistance is present, resulting in cells that do not effectively react to insulin (Loghmani, 2005). In the

absence of insulin development, non-insulin-dependent diabetes mellitus (NIDM) or generally known as adult-onset diabetes (ADA) arises. Adults with Type II diabetes are more likely to gain weight as a result of a lack of activity. When Type II diabetes is present, the pancreas secretes insulin in unusually high amounts (Loghmani, 2005). Cells in the body (especially muscle and lipid cells) are insulin insensitive, which is a fundamental feature of Type II diabetes (DeFronzo & Tripathy, 2009). Cells are aided in their recognition of insulin by the body's production of huge amounts of insulin (Cefalu, 2001).

Glucose levels rise as a result of the pancreas malfunctioning, as well as the lack of insulin sensitivity, which causes insulin resistance to grow (Ferrannini et al., 2005). Furthermore, increased glucose levels in diabetic individuals may cause the liver to continue to produce glucose, which might perpetuate the illness condition (Ferrannini et al., 1990; Stone & Van Thiel, 1985).

It is more common for Type II diabetes to be linked to obesity than Type I diabetes. Nearly all people with diabetes have type II diabetes, which accounts for 90 to 95 percent of all cases. It is possible that a person's lifestyle, such as a lack of physical activity and an unhealthy diet, might be contributing causes. It's possible that Type II diabetes might be caused by inherited risk factors (American Diabetes Association, 2010). There is an increase in the risk of developing Type II diabetes with age and a lack of physical exercise (American Diabetes Association, 2010). Furthermore, those with hypertension or dyslipidemia are more likely to suffer from it (Grossman & Messerli, 2008; Pardina et al., 2016). Egede and Dagogo-Jack (2005) and Harris et al. (1998) found that African Americans, Hispanics, and Aboriginal people may have an enhanced 90 percent hereditary risk of getting Type II diabetes (Stern & Mitchell 1993). Exercise and a healthy diet are often used to treat Type II diabetes, which is characterized by an increased risk of cardiovascular disease, blindness, and kidney failure (Tuomilehto et al., 2001). However, insulin injections are required in the most severe instances of Type II diabetes (Ohkubo et al., 1995).

During pregnancy, carbohydrate intolerance causes gestational diabetes mellitus (GDM), another subgroup of diabetes (American Diabetes Association, 2010). Women with gestational diabetes mellitus had 77.4 percent periodontitis compared to 57.5 percent of pregnant women without gestational diabetes mellitus. With regard to Type II diabetes, women with GDM are more likely to acquire the condition later in life (Kim et al. 2002).

In addition, GDM increases the risk of maternal and newborn morbidity, including as fetal macrosomia, preeclampsia, premature delivery, and the necessity of a cesarean section, all of which are more common in women who have GDM (Xiong, et al., 2009). As a young adult, the fetus of a GDM mother has an increased risk of obesity and diabetes (Catalano, 2010).

Diabetic complication can also be classified as "other special categories" (American Diabetes Association, 2010). Diabetic comorbidities, such as pancreatitis or the usage of certain medications, are often included in these studies (American Diabetes Association, 2010).

Long-term increases in blood glucose levels, or hyperglycemia, are linked to diabetic complications (Diabetes, 2015). As a result, diabetes leads to the production of advanced glycation end products (AGEs) (Brownlee, 2005). The buildup of AGEs in diabetics' blood plasma and tissues has been related to diabetes consequences (Kilpatrick et al., 2009). Nonenzymatic glycation of proteins or lipids under hyperglycemic circumstances results in the formation of AGEs. It enhances the sensitivity of endothelial cells and monocytes, allowing them to produce more pro-inflammatory mediators (Kirsten et al., 1990).

Superior vascular permeability of AGE-enriched gingival tissue increases the chance of increased degradation of collagen fibers and has been shown to promote the deterioration of bone and non-mineralized connective tissue The enlarged endothelial basement membrane also alters migration and phagocytic activity, triggering a 'infection-mediated' route of cytokine upregulation and exacerbating the concentration of pro-inflammatory cytokines (Southerland et al., 2005).

Additionally, diabetes mellitus has a pathogenesis with periodontal disease, which is characterized by the accumulation of AGEs (Matthews, 2002). Peripheral vascular disease, coronary artery disease and cerebrovascular disease are all exacerbated by diabetes mellitus's rapid progression of atherosclerosis in bigger blood arteries (Fowler, 2008). Diabetic neuropathy, nephropathy, and retinopathy are all examples of diabetes mellitus' microvascular complications (Control & Group, 1993). If you get dysesthesias or burning sensations in your limbs, you may have peripheral neuropathy, a symptom of nerve damage (American Diabetes Association, 2010). Blindness can result from the illness of the retina, retinopathy. The progressive nature of nephropathy raises the possibility of kidney failure (American Diabetes

Association, 2010).

Approximately 90-95 percent of diabetics have type 2 diabetes, which is the most prevalent kind (Ogurtsova, et al., 2017). When untreated, chronic hyperglycemia associated with type 2 diabetes (T2DM) can result in serious short- and long-term adverse events affecting both general and oral health (for example, diabetic nephropathy, neuropathy, retinopathy, atherosclerosis, peripheral artery disease/amputation, cardiomyopathy) as well as general and oral health (for example, periodontitis, dental caries, xerostomia, edentulous, soft tissue lesions) (Shrivastava, et al., 2018). Medical problems of type 2 diabetes are widely known, but the impact of the disease on dental health are less well understood (Verhulst, 2019).

"Oral health," according to the World Health Organization (WHO), is "a state of being free from mouth and facial pain, throat and oral cancer, tooth loss, tooth decay, oral infection, and sores, periodontal (gum) disease, and other disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychological well-being" (Furuta & Yamashita, 2013).

” Changing the paradigm from a narrow focus on disease to a more comprehensive view that takes into account one's self-perception of the impact of dental conditions on individual wellbeing, as well as the valuation of the impact of oral health on physical, psychological, and social quality of life, is necessary for improved oral health outcomes (de Pinho, et al., 2012).

According to multiple studies, type 2 diabetes is related with worse oral health outcomes, as seen by a greater incidence of periodontal disease, dental caries, and dry mouth in T2DM patients as compared to non-T2DM individuals (Pinho, et al., 2018; de Sousa, et al., 2019). In another study, it was discovered that persons with type 2 diabetes had a higher prevalence of oral pathology (Shrivastava, et al., 2018). In persons with type 2 diabetes, oral diseases are recognized to contribute to decreased capacity to perform as well as worse quality of life (de Pinho, et al., 2012). Other research (Sadeghi, et al., 2014; Passos-Soares, et al., 2018) have failed to discover variations in OHRQoL between those with and without type 2 diabetes.

Sustained hyperglycemia has a negative impact on nearly all tissues in the body, including those in the oral cavity. In addition to xerostomia, opportunistic infections, increased plaque accumulation, delayed wound healing, susceptibility to periodontal disease, oral

paresthesia, and changed taste, diabetics are more likely to have other oral problems (Yuen,2016). A bidirectional unfavorable association between diabetes and periodontal disease has been shown in studies; diabetes can increase periodontitis, and periodontitis can have a detrimental impact on diabetic management. In order to maintain good periodontal health in diabetes patients, preventative habits such as brushing, flossing, and regular dental visits, which have a positive link with better periodontal health, become essential (Albert,2016).

A variety of factors influence oral hygiene habits and the likelihood of obtaining oral health treatment. Patients who are informed and positively reinforced are more likely to adhere to oral health care regimens, and there is a link between more oral health awareness and a higher chance of seeking preventative dental treatment, according to research (Poudel, et al,2018). One of the causes for noncompliance with oral hygiene procedures is a lack of knowledge about the topic. Oral health attitudes and beliefs, on the other hand, are important in determining oral health behavior (Cheng, et al,2018).

2.3 Periodontal disease

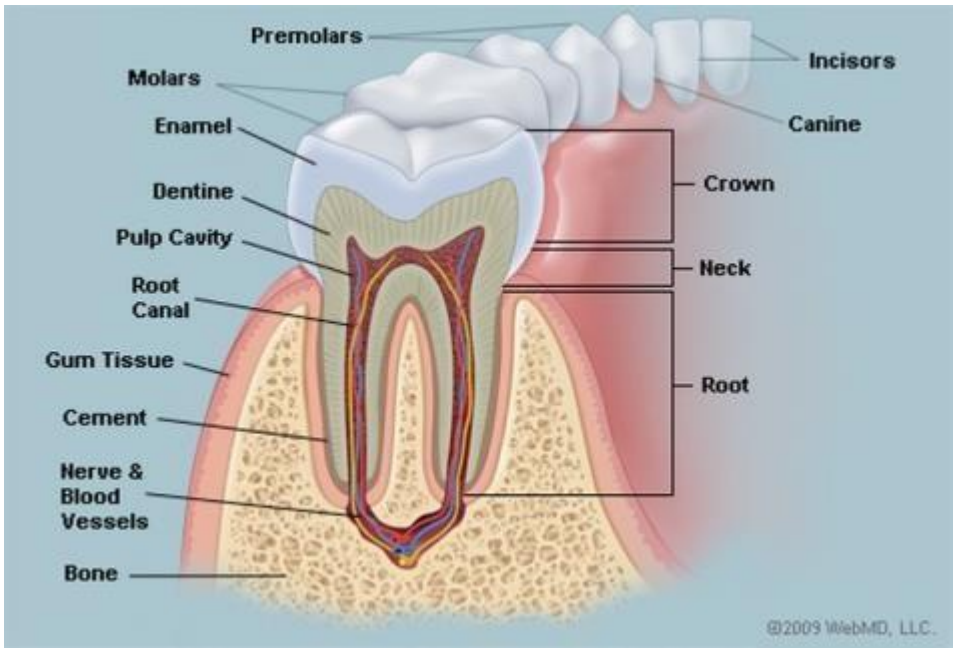
Adults worldwide are affected by gum disease, which is known as periodontitis (Petersen & Ogawa, 2005). Between 2009 and 2012, NHANES found that roughly 64.7 million adults in the United States over the age of 30 had some type of periodontitis, according to NHANES. As a result of race and socioeconomic position, the prevalence of periodontitis varied. Hispanics had the highest prevalence (63,5 percent), followed by non-Hispanic blacks (59,1 percent), and nonHispanic Asian Americans (58.8 percent) (50.0 percent). Non-Hispanic whites had the lowest percentage rating (40.8 percent). People in the lowest socioeconomic position had double the rate of Parkinson's disease as those in the greatest socioeconomic class (Eke et al., 2015). Studies have shown that poor oral hygiene is linked to a lack of dental education, funding, and access to dentists.

Periodontal disease is an infection in the mouth, but recent studies have shown that the inflammatory pathways in the mouth are linked to the overall health of the body. The high incidence of periodontal disease is a serious public health concern because of the relationship between periodontal disease and overall health (Seymour et al., 2007). The disease's

educational value extends beyond the individual's health to the well-being of society and the economy, necessitating more study.

Periodontal disease is an infection in the mouth, but recent studies have shown that the inflammatory pathways in the mouth are linked to the overall health of the body. The high incidence of periodontal disease is a serious public health concern because of the relationship between periodontal disease and overall health (Seymour et al., 2007). More study is needed because of how much of an impact the disease has on society as a whole, not simply the health of individuals.

Periodontal disease is mostly caused by poor dental hygiene on a regular basis. Gingival inflammation is a symptom of periodontal disease, which is triggered by the breakdown of the supporting components of the periodontium. There are specialized tissues in the mouth known as the periodontium, which help to support and keep teeth in the jaw and skull. The gingiva (gum), cementum, alveolar bone, and the periodontal ligament make up the periodontium. Tooth decay or loss occurs if the periodontium and its components are not preserved or restored by adequate oral care.



Prognosis is influenced by a number of factors, including the microorganism profile, the host's genetic component, and their reaction to the disease (Kim & Amar, 2006). When it comes to periodontal disease, subgingival plaque, which is a soft, adherent and white film of bacteria that accumulates often on teeth and gums, is the most prevalent indicator of its

presence (Novak & Novak, 2006). Calculus or tartar is a hardened kind of plaque. In order for plaque to form, there must first be a large amount of bacterial growth on the teeth. A brown or yellow hardened plaque known as tartar forms over a period of time, generally as a result of poor dental care, in between, behind, or along the gum line. If left untreated, dental plaque can develop to caries and other periodontal illnesses.

Perio-pathogens and virulence factors, two types of bacteria, are found in plaque and calculus, respectively (Szkaradkiewicz & Karpiski, 2013). Streptococci mutans bacteria are to blame for the emergence of caries (Koo et al., 2013). When compared to other oral microbes, these germs cling strongly to tooth surfaces and create acid from glucose in considerably higher quantities (Bowen & Koo, 2011). Plaque with high levels of S. mutans is associated with an increased risk of caries in patients (Loesche, 1986). Periodontal disease (PD) can result from the buildup of these bacteria in the periodontal tissues and the adjacent alveolar bone structure (Flemmig, 1999).

Gingivitis is a typical precursor of periodontitis, a disease that affects the tissues of the gums. Periodontal disease known as gingivitis is characterized by redness and swelling of the gingiva, the gum tissue that covers the teeth's roots (National Institute of Dental and Craniofacial Research, 2013). Poor dental hygiene is the most prevalent cause of gingivitis. Gingivitis can be prevented during the earliest stages of inflammation, when no bone loss has occurred, by practicing good dental hygiene (Goldstein, 2014). Plaque is the major cause of gingivitis in around 75% of persons in the United States (Albandar et al., 1999).

2.4 Pathogenesis of periodontal disease:

However, it's widely accepted that the bacteria in the mouth that may be responsible for PD are the same ones that are found there naturally (Papaioannou et al., 2009). People with intermediate chronic periodontitis and those with severe periodontitis shared the same bacteriological profile, according to Rescala et al (Rescala et al., 2010). Most species, including Porphyromonas gingivalis, appear to be related with probing depth, as opposed to aggressive or mild chronic periodontitis (Riep et al., 2009). P. gingivalis and T. forsythia have been shown to be linked to chronic periodontitis by other researchers, while T. denticola has also been linked to the disease (Bodet et al., 2007). As a result, there is much disagreement

over the microbiological differences between mild chronic periodontitis and severe periodontitis (Armitage, 2010).

Periodontitis-associated inflammation is mediated by the generation and release of cytokines like interleukins (IL) and tumor necrosis factor (TNF) in response to an increase in bacteria or their products such lipopolysaccharides (LPS) (Chiang et al., 1999; Baqui et al., 1998). Small soluble proteins that are produced by cells in order to influence the behavior or attributes of another cell are known as cytokines A wide range of biological processes rely on it, from proliferation to differentiation and homeostasis, regeneration to inflammation and repair (Okada & Murakami, 1998).

The pathophysiology of fever ushered in the emergence of cytokines. Periodontal tissue resident cells, such as gingival fibroblasts, produce more pro-inflammatory cytokines when exposed to LPS, according to research (Cekici et al., 2014). Liposaccharides from oral bacteria have also been shown to cause an increase in the levels of inflammation-inducing cytokines (IL1/TNF), leading to an increased recruitment of inflammatory cells (Baqui et al., 1998). In periodontitis patients' gingival fibroblasts, increased levels of apoptosis were seen when leukocytes were subsequently drawn to the diseased gingiva (Koulouri et al., 1999).

The three pro-inflammatory cytokines, IL-1, IL-6, and TNF-, are all thought to have a significant role in the breakdown of periodontal tissue (Palmqvist et al., 2008). cytokines have been found to significantly reduce cellular structure and function through inflammation by promoting apoptosis and hindering fibroblasts' capacity to repair injured tissue, it has been proven (Graves et al., 2006).

Macrophages are the primary source of this polypeptide, which is primarily responsible for its production following an infection, damage, or antigenic challenge (Dinarello, 1988;

Havemose-Poulsen & Holmstrup, 1997; Mizel, 1989; Nguyen et al., 1991; Stashenko et al., 1987; Tatakis, 1993). Normal IL-1 stimulation of keratinocyte, fibroblast, and endothelial cell proliferation has been documented. Prostaglandin E2 and type 1 procollagen production are also boosted by the supplementation of collagenase and hyaluronate (Okada & Murakami, 1998). To counteract this, unrestrained production of IL-1 causes the development of matrix-degrading enzymes known as matrix metalloproteinases (MMPs), which aid in the degradation of connective tissue and ultimately lead to loss of attachment (Birkedal-Hansen et al., 1993).

IL-1 and TNF- both promote bone loss and inhibit bone growth, which is similar to IL-1

(Nguyen et al., 1991; Tatakis, 1993). The Macaca fascicularis monkey was used to study the involvement of IL-1 and TNF in periodontal disease (Assuma et al., 1998). The monkeys' posterior teeth were laced with silk laces, which caused a rapid inflammatory reaction, resulting in periodontal bone loss (Assuma et al., 1998).

Both IL and TNF have been shown to play an important role in the control of inflammatory progressions in the body by encouraging the synthesis of secondary pro-inflammatory mediators to amplify the inflammatory reaction (Page, 1991). As a result of inflammatory cell recruitment, the gingival connective tissue in lab mice was reduced by an estimated 80%. (Delima et al., 2002).

When it comes to IL-6, the interleukin is an anti-inflammatory and pro-inflammatory interleukin at the same time. Periodontal infections are a common source of IL-6, which is a cytokine that works to boost the immune system. Aside from this, IL-6 can also boost the prevention of infections following a trauma, tissue burns, or other damages that cause an immune system inflammation.

As a result, bacterial compounds and the following inflammatory cascade increase osteoclastogenesis, which results in the breakdown of alveolar bone (Sharma et al., 2016). Researchers have also shown that gingival fibroblasts execute their local osteotropic effects by activating MAP kinases, which produce IL-6. TNF- and IL-1B increase the expression of IL-6 in gingival fibroblasts, which in turn enhances the production of IL-6 (Palmqvist et al., 2008).

Plaque is the most common cause of periodontal disease, but there are a slew of other variables that can have an impact on gum health. Other immunological illnesses such as HIV infection are also included in this list of risk factors (Imai & Ochiai, 2011; Timmerman & Van Der Weijden, 2006; Van Der Weijden & Slot, 2011). In the research of periodontal disease, diabetes mellitus has had the largest impact on disease progression (Preshaw et al., 2012).

2.5 Diabetes and periodontitis

The body's vascular homeostasis is maintained by avoiding thrombosis and leukocyte diapedesis and ensuring appropriate blood flow and nutrition delivery through blood vessels and anatomical tissue connections (Kinlay et al., 2001). The endothelial cell's production of nitric oxide (NO) is critical to maintaining this equilibrium (Moncada & Higgs, 1993). L-

guanidinenitrogen arginine's terminus is oxidized by the NO synthase (eNOS) to create NO (Moncada & Higgs, 1993). Protecting blood vessels against endogenous damage, such as atherosclerosis, is accomplished by enhancing molecular signaling that inhibits vascular smooth muscle cell proliferation and migration (Napoli et al., 2006). In addition, NO inhibits leukocyte and platelet adhesion to the vascular wall by acting as a cytokine (Kubes et al., 1991; Radomski et al., 1987).

NF-kB is activated by endothelium-derived NO deficiency, resulting in the production of chemokines and cytokines and the activation of leukocyte adhesion molecules in response to endothelial dysfunction (Zeiher et al., 1995). Vascular smooth muscle cell degeneration is induced by the migration of macrophage foam cells into the intima by these actions (Grover &

Luthra., 2013). Atherosclerosis's earliest morphological alterations begin here (Collins et al., 2001; Libby, 2000).

One of the most important indicators of cardiovascular health is the bioavailability of nitric oxide (NO), which is primarily produced by oxygen-derived free radicals in the NOS (Arnal et al., 1999). Numerous diabetes-related metabolic imbalances such as hyperglycemia, insulin resistance, and excess free fatty acid release have been linked to abnormalities in endothelial cell function. (King, \sDiabetes Periodontitis, the most severe form of periodontal disease, has been linked to diabetes (Casanova et al., 2014). Diabetes patients with periodontitis have a greater risk of poor glycemic control and diabetes-related complications. Diabetes has been linked to an increased risk of periodontitis in people. There is an estimated 2-3 times increased risk of periodontitis in diabetics than in the general population (Casanova et al., 2014).

According to the American Academy of Periodontology, periodontal disease is a

"Inflammatory illness that affects the soft and hard tissues that support teeth" (AAP, 2019, para. 2). During the early stages of periodontal disease, the gums become inflamed and swollen as a result of the presence of dangerous bacteria. gums recede from teeth when they are ravaged by periodontitis, a disease that affects the tissues of the gums (AAP, 2019).

In the United States, periodontal disease is widespread. Periodontal disease affects 47.2 percent of persons in the United States who are 30 years of age or older, according to data from the 2009 and 2010 National Health and Nutrition Examination Survey (CDC, 2015). By raising the likelihood of poor glycemic control and increasing the risk of diabetes-related

health problems, periodontitis has been demonstrated to negatively influence diabetes. Blood glucose bound hemoglobin (HbA1c) levels are a good indicator of how effectively the diabetes is being controlled (Casanova et al., 2014). According to the American Diabetes Association, anyone with a HbA1c level more than or equal to 6.5 percent are considered to have diabetes (American Diabetes Association, 2016). Studies of the Gila River Indian Community provided the first indication that periodontitis can impair glycemic control (Preshaw et al., 2011).

There was a higher chance of poor glycemic control (HbA1c >9.0 percent) among diabetics with severe periodontitis at the beginning of the trial, according to these studies. Periodontitis may raise a person's chance of developing diabetes, according to a five-year study of non-diabetic people (Preshaw et al., 2011).

There is a link between periodontitis and other diabetes-related health issues, including kidney disease. Gila River Indian Community research discovered a link between periodontitis and microalbuminuria in persons with Type II Diabetes (Preshaw et al., 2011). There are several risk factors for diabetes-related kidney failure, and detecting albumin in the urine may be an early indicator of kidney damage (Fraser & Haldeman-Englert, 2019). People with intermediate periodontitis had twice as much albumin in their urine as people without teeth, while those with severe periodontitis had 2.6 times as much albumin in their urine as people without teeth (Preshaw et al., 2011). Those with intermediate periodontitis, those with severe periodontitis, and those who were edentulous were all more likely to have end-stage renal disease than those with no or mild periodontitis (Preshaw et al., 2011).

Glycemic control in diabetics has been the subject of a number of research on periodontal therapy. The results are consistent in that treating periodontitis reduces HbA1c by 0.4 percent (Casanova et al., 2014). Patients with type 2 diabetes who had periodontal therapy had lower medical expenses and fewer hospitalizations than those who did not receive periodontal treatment, according to research published in the American Journal of Preventative Medicine (Jeffcoat et al., 2014).

2.6 Oral hygiene knowledge

Study participants were assessed on their degree of awareness of the dangers of oral

health problems related to diabetes, the necessity of effective diabetic management, and preventative oral health habits (brushing, flossing and frequent dental visits) that can minimize the risk of oral health problems. Studies show that more than half of diabetics are not aware of the connection between their condition and their dental health, particularly the higher risk of developing periodontal disease (Yuen, et al., 2009; Orlando, et al., 2010; Arunkumar, et al., 2015; Sahril, et al., 2014). According to a few research, individuals with type 1 and type 2 diabetes were aware of the relationship between dental health and diabetes and obtained this information mostly through dentists, doctors, and the media (Al Amassi, & Al Dakheel, 2017; Ummadisetty, et al., 2016).

At least two times daily brushing, once daily flossing, and twice-yearly dental appointments were all linked to good oral health knowledge in a study performed in the United States by Yuen et al., 2009 ($p = 0.01$). Similarly, a high level of education ($p = 0.05$) and having received oral health information ($p = 0.008$) were also substantially linked with appropriate oral health knowledge (Al Amassi, & Al Dakheel, 2017).

2.7 Oral hygiene attitudes

Relevant attitudes included perceptions of oral health's importance, self-rating of oral health status, agreement/disagreement on the relationship between diabetes and oral health, and reasons for delaying or denying dental referrals. Patients with diabetes were less likely than those without diabetes to assess their overall dental health as bad (Kejriwal, et al., 2014). Study participants from high-income countries rated their oral health status higher than those from low-income countries (Poudel, et al., 2018). When it comes to dental health, over half of participants (49 percent) said it's just as essential as maintaining a healthy body, but just a third (33 percent) thought plaque or tartar buildup was an issue (Orlando, et al., 2010). A few of the interviewees were also skeptical that there was a relationship between diabetes and dental health (Bangash, et al., 2011).

More than half (51 percent) of diabetics in Malaysia refused a dental referral because they felt their tooth problems were not significant, according to a survey (Sahril, et al., 2014). Some of the most common reasons cited by participants for not going to the dentist on a regular basis were dental costs, a lack of dental issues, uncomfortable dental visits, and the

difficulty of organizing an appointment (Poudel, et al., 2018). In high-income nations, the expense of dental treatment was the primary cause for reduced dental visits, but in low-income countries, the perceived lack of necessity, pain, and fear of oral health care were the primary reasons (Aggarwal & Panat, 2012). Participants from low-income nations were more likely to visit the dentist if they needed immediate care (Aggarwal & Panat, 2012). Additionally, research in Ireland found that 32% of participants would rather preserve a painful posterior tooth than have it extracted (Allen, et al., 2008).

2.8 Oral hygiene practices

Patients' brushing, flossing, and dental appointments were all considered as part of oral health care procedures. Fewer than half of those with diabetes (mean 49.3%, 95 percent CI 35.70–62.90) reported brushing twice daily in the trials (n = 18). (Poudel, et al., 2018). Low- and middle-income nations like India, Malaysia and Jordan had a very low uptake of dental services (mean 34.6 %, range 10%–75.60 %), compared to high income countries (mean 60.6

%, range 12.6–95.4 %), which included the United States, UK and Sweden (Poudel, et al., 2018).

Participants' oral health behaviors improved significantly after they were exposed to oral health information (Yuen, et al., 2009).

Theoretical framework

Andersen Behavioral Model ABM is one of the most well-known conceptual models used in the analysis of health services and key health outcomes (Figure 1.1) (Babitsch, et al., 2012). It provides a framework for the analysis of factors that influence utilization of health services and key health outcomes. The model was originally developed in 1968 and revised in 1995 by Andersen to analyze social, individual, and contextual factors that influence health services use (Andersen, 1995).

The model analyzes the difference in use of health services between individuals, and

explains used of services by five factors: (i) predisposing, (ii) enabling resources, (iii) need, (iv) personal health practices and use of services, (v) health outcomes (Babitsch, et al., 2012). Predisposing factors include demographic characteristics (e.g., age, sex, race/ethnicity) that exist prior "health outcomes." Enabling resources are financial and organizational factors that enable services utilization (e.g., health insurance, education, cost of care). Need factors are perceived and clinician-evaluated need for health care treatment (Andersen, 1995). Some individuals may be more predisposed to seek healthcare services, and there are enabling resources that allow them to do so (Baker, 2009). However, even when predisposing and enabling factors present, health services use will only occur if an individual perceives a need for treatment or the individual is evaluated by a clinical for treatment need (Baker, 2009). The interrelationship between these three contextual factor categories will, in turn, determine the likelihood of personal health practices (e.g., smoking) and use of services (e.g., frequency of annual dental prophylaxis, reason of dental visit, dental visit frequency) (Baker, 2009). In addition, the ABM and the Baker et al., (2009) study suggest that personal health practices and use of services will influence health outcomes (both perceived and evaluated health status) and personal satisfaction with care.

Figure 1.1. Andersen's Behavioral Model of Health Care Utilization

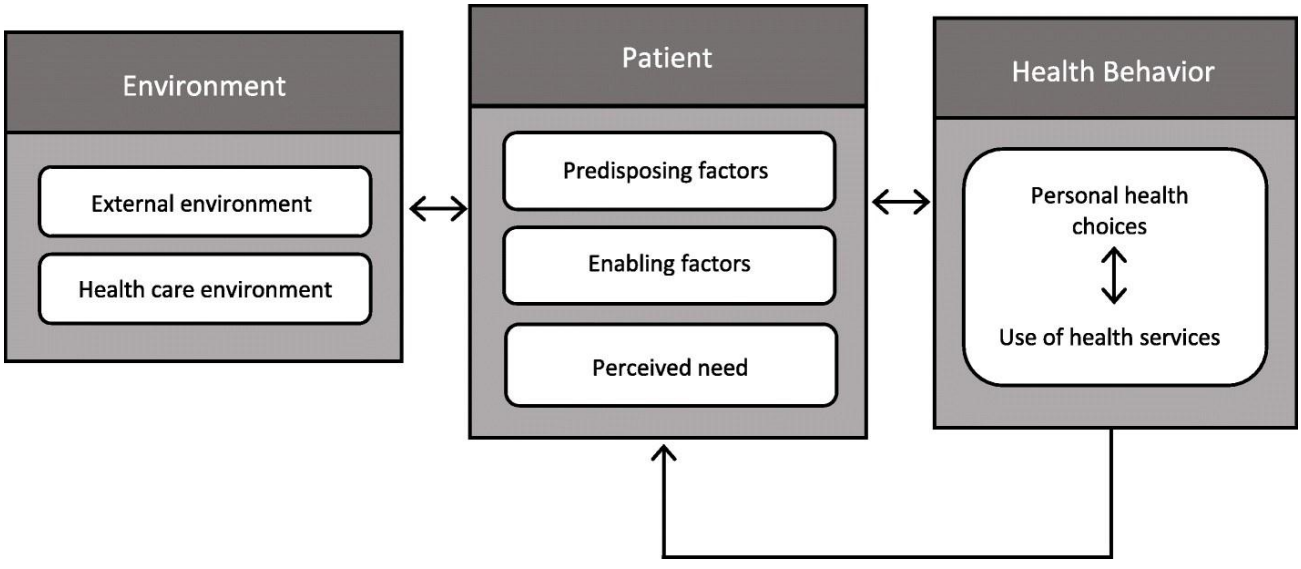
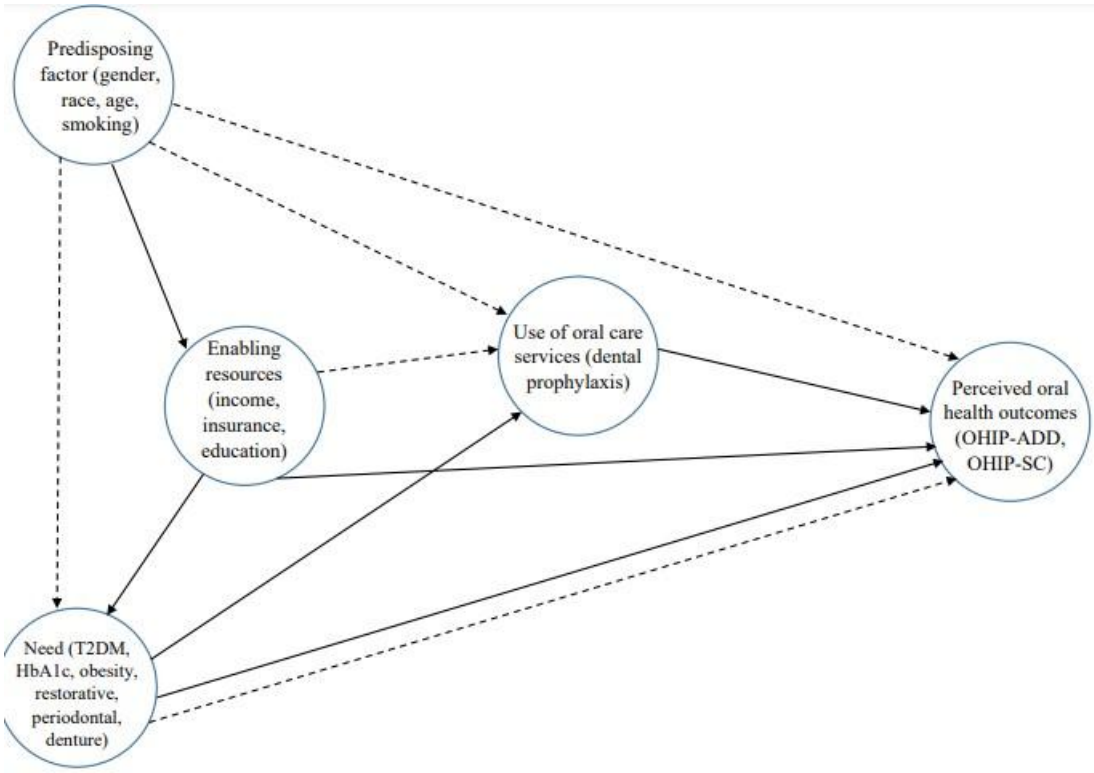


Figure 1.2. Pathways of factors in Andersen model



Chapter Three:

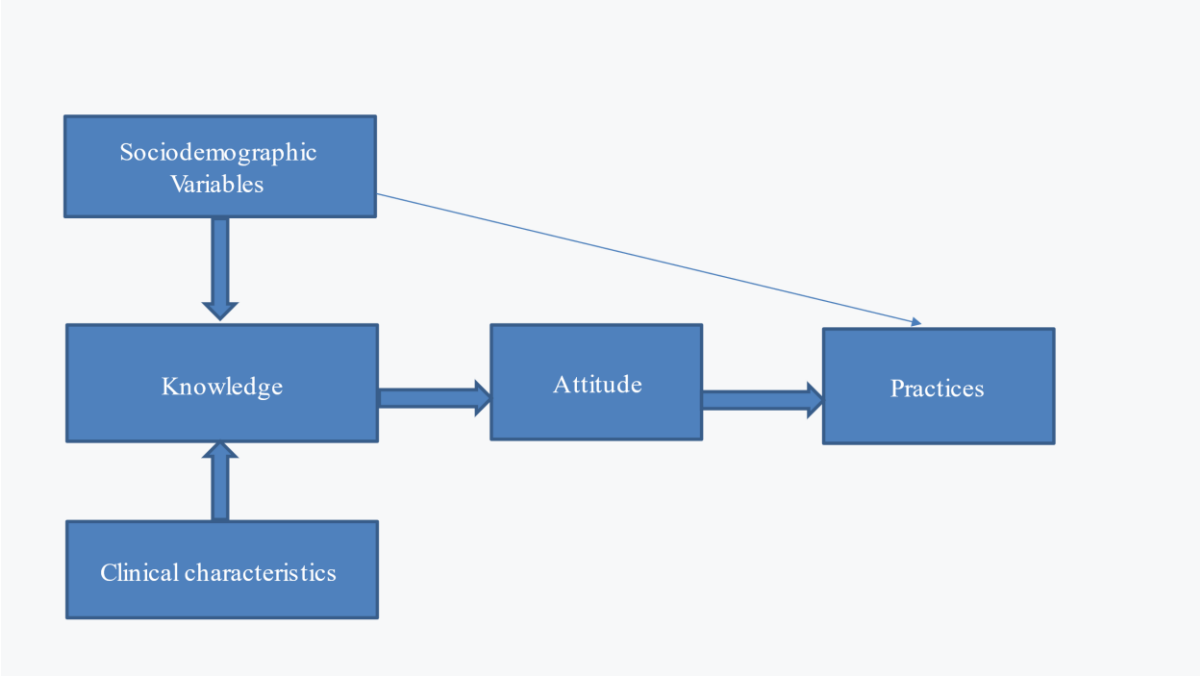
Conceptual Framework

3.1. Introduction

This chapter includes conceptual and operational definitions of dependent and independent variables, also definition of terms in addition to figure that conceptualize relationship between dependent and independent variables. The conceptual framework model was constructed and adopted after reviewing the related literature about the oral hygiene:

knowledge, attitude, and practices among diabetic patients (Poudel, et al., 2018). (Al Habashneh, et al., 2010). (Ismaeil and Ali, 2013).

The study consists of as shown in figure 3.1.



Study variables:

- **Independent variables**: The independent factors are summarized as follows: 1- Socio-demographic variables (age, gender, residency(rural/urban), occupation, educational level, and income).

  2- Clinical characteristic of participants (DM duration, DM type, HBa1c last reading and when it was, and smoking)

- **Dependent variables**: It is included:

- Knowledge.

- Attitude of diabetic patients toward oral hygiene.

- Oral hygiene practices.

Conceptual definition:

Oral hygiene: This is the practice of keeping the mouth clean to prevent oral diseases and other problems such as bad breath by regular program of teeth brushing, dental flossing, and periodic examination by a dentist. (Darby, and Walsh, 2010).

Knowledge: This is the expertise and skills acquired by a person through experience or education with the capability to use it regarding a particular purpose (Sharda, & Shetty, 2008).

Attitude.: This is defined as a relatively permanent organization of belief around subject, an object, or concept, which predisposes one to respond in some preferential way (Shardra, &

Shetty, 2008).

Oral practice: an activity that undertaken by people to protect, maintain oral health, and prevent dental diseases. The practices include brushing and sugar consumption practice among others (Taiwo, et al, 2012).

Diabetes Mellitus (DM) is a chronic, progressive, metabolic disease that is characterized by high levels of glucose in the blood. It results from the deficiency in insulin secretion from pancreatic beta cells or an increased cellular resistance to the actions of insulin (American Diabetes Association, 2017). It has two types:

Type 1 DM results from the pancreas's failure to produce enough insulin. It was previously referred to as "insulin-dependent diabetes mellitus" or "juvenile diabetes". The cause is unknown. Type 2 DM starts with insulin resistance, a condition in which cells fail to respond to insulin properly (WHO, 2016).

Socio-demographic Factors: are socioeconomic characteristics of a population expressed statistically, such as age, sex, education level, marital status, occupation, religion, birth & death rate, average size of a family, average age at marriage (Business Dictionary, 2015).

3.2. Operational definitions.

In this study, the operational definitions are as follows:

- Oral hygiene: This is the practice of keeping the mouth clean to prevent oral diseases and other problems. In this study it refers to the level of response of the participants regarding oral hygiene knowledge, attitude, and practice elicited through the structured questionnaire.
- **Knowledge**: In this study it refers to the level of knowledge and education of the participants regarding oral health and the impact of diabetes mellitus elicited through structured questionnaire. In this study participants were assessed on their degree of awareness and understanding of the oral health-diabetes relationship, awareness about oral health complications and importance of diabetes control to minimize oral health risks. It is included 10 questions on part two in the questionnaire. In this section:

  Yes/No/Don’t know answer type questions were selected

- **Attitude**: In this study It is used to report perception and beliefs of the people with diabetes regarding the relevant attitude items related to perceived need and importance of oral health, regular brushing, dental visits reasons, and education about oral healthdiabetic link. That

included in Part three of questionnaire (6 item) response to it in 5point Likert scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree).

- **Practice:** In this study it refers to the activity undertaken by a person in order to protect, promote, or maintain oral health and prevent oral diseases. The practices include tooth brushing and the tools used to clean teeth (Taiwo, et al, 2012). That included in Part four of questionnaire (8 items) response to it in 5-point Likert scale (Always, Often, Sometimes, Rarely, Never).
- **Socio-demographic Factors:** the independent variables are included in part1, section

1. **Gender is a nominal variable: The choices were** related to statement1 in questionnaire. The members of the sample were both sexes.

2. **Age variables** is an interval: The intervals were related to statement 2 in questionnaire.

3. **Residency** is a nominal variable**:** The choices were related statement 3 to in questionnaire.

4. **Marital status** is a nominal variable: The choices related to statement 4 in questionnaire.

5. **Educational level** is an ordinal variable: The levels were related to statement 5 in questionnaire.

6. **Occupation** is a nominal variable**:** The choices were related to statement 6 in questionnaire.

7. **Family Income** is an interval variable: The intervals were related to statement 7 in questionnaire. (According to minimum wage in Palestine 1450 shekel).

- **Clinical characteristics of participants**: the independent variables are included in part1, section B:

1. **Diabetes Type:** It was included both types. Type 1, Type 2 DM.

(Related statement in questionnaire number 1in part 1, section B)

2. **Duration of diabetes**: in this study "time" is an important factor for the development of the disease (Selwitzet al., 2007). Duration of DM might play an important role when the relation between DM and oral diseases is investigated, like other complications of diabetes, the risk of oral and periodontal disease tends to increases over time.

Related statement in questionnaire number 2 were categorized as the sub-group (duration of T2DM: (≤5 years, shorter). (>5 years, longer).

(Afroz, et al.,2019).

3. **HbA1c last reading**: A hemoglobin A1c (HbA1c) test measures the amount of blood sugar (glucose) attached to hemoglobin. An HbA1c test shows what the average amount of glucose attached to hemoglobin has been over the past three months. The HbA1c test is an important blood test that gives a good indication of how well diabetes is being controlled.

(Related statement in questionnaire number 3).

The patient's latest readings of glycemic status were categorized as follows (Afroz, et al.,2019):

- Good glycemic control=HbA1c<7%
- Fair glycemic control=HbA1c 7–7.9% • Poor glycemic control =HbA1c≥8.0%.

The reading was recorded from the patient s file so that the HbA1c last reading was within period of 6 months.

4. **Smoking** is a nominal variable**:** The choices were related to statement 4 in questionnaire.

Chapter Four:

Methodology.

4.1 Introduction.

This chapter is discussed the research methodology, which consists of the study design, study setting, inclusion criteria, exclusion criteria, and period of the study. Moreover, the population and sampling, study tool, validity and reliability of the study tool and data collection method, pilot study, ethical consideration, and data analyses will be explained too.

4..2 Study Design.

The design of this study is a descriptive, Cross-sectional approach to achieve the aim of the study, to assess the level of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending diabetes clinics in primary healthcare centers in Hebron Directorate, crosssectionally design reflect the facts which is existing at the same point of time of data collection. It is less expensive and consumes less time than other longitudinal studies. Quantitative studies are structured and are used to determine the extent of the problem and describe a phenomenon. The source of data was from the primary sources, using a self-administered questionnaire.

4.3. Setting.

The study was carried out in five diabetes clinics at five primary healthcare centers at the Hebron Directorate, which is governed by the Palestinian Ministry of Health. These five health centers are Al-Salam, Um-Aldalia, Ithna, Almanshar, Al-Karantina primary healthcare centers, they were chosen for the presence of a diabetes specialist who treats

diabetic patients both types; type 1and type2, the controlled and uncontrolled patients unlike the rest of the centers where the general practitioner follows the controlled diabetic patients.

4.4. Population and sampling

The study population is the diabetic patients above 18 years of age, attending diabetes clinics at Al-Salam, Um-Aldalia, Ithna, Almanshar, Al-Karantina primary healthcare centers. The total number equals (1583) distributed on the primary healthcare centers at these five primary centers at Hebron Directorate with active DM file during the period between May and October 2021 when these centers returned to regular work during the Corona pandemic as they were closed since the start of the pandemic in Palestine in March 2020. This statistic was taken from the monthly reports of Hebron Health Directorate through the Statistics Department.

The sample size was calculated using the Robert Mason equation.

$$n = \frac{N}{\left[\left(S^2 \times (N-1)\right) \div p(1-p)\right] + 1}$$

N: Population size.

S: 1.96 /standard error=0.05

P: percentage of picking a choice expressed as decimal=0.5.

Convenience, nonprobability (purposive) sampling method will be used for this study. The sample consists of (309) diabetic patients above 18 years of age distributed at five primary healthcare centers at Hebron directorate with active DM files during 2021, who met the inclusion criteria were included in this study, the sample will be divided according to the

percentage of diabetic patients attending at Al-Salam, Um-Aldalia, Ithna, Almanshar, Al-Karantina primary healthcare centers in Hebron Directorate:

Table (4.1) The calculation of sample size and the number of participants from each center: n=309.

Primary healthcare center	Patients attending PHC	The percentage of Patients attending PHC	Percent*n	Number of participants from each PHC
Um-Aldalia	255	)255/1583) *100%= 16.18%	16.18%*309	50
Al-Salam	883	(883/1583) *100= 55,66%	55.66%*309	172
Ithna	145	)145/1583) *100%= 9.06%	9.06%*309	28
Almanshar	194	(194/1583) *100%= 12.30%	12.30%*309	38
Al-Karantina	106	(106/1583) *100%= 6.80%	6.80%*309	21
Total	1583	100%	309	309

4.5. Eligibility

4.5.1. Inclusion criteria

1. All confirmed diabetic patients attending Al-Salam, Um-Aldalia, Ithna, Almanshar, AlKarantina primary healthcare centers primary healthcare at Hebron Directorate at the time of data collection.
2. All diabetes patients who have given informed consent.
3. Participants included in the study were 18 years or older and diagnosed as having had type 1 or 2 diabetes.

4- Patients who have HbA1c test within a period of 6 months.

4.5.2. Exclusion criteria

1. Patients with an unconfirmed diagnosis of DM.
2. Patients who refused to give informed consent.
4. Patients with communication difficulties (hearing, talking, and visual difficulties).
5. Diabetic patients with mental illnesses.

4.6. Period of Study.

The study was started in February 2021until January 2022. The study was conducted in two semesters as planned. The first semester from February to May 2021 was for preparing the proposal. The second semester period lasted from September2021 to Jnuary2022 for developing the questionnaire, data collection, data analysis, and writing thesis.

4.7. Study tool.

To collect data the researcher will use face to face questionnaire that will be developed according to previous studies (Poudel, et al., 2018). (Al Habashneh, et al., 2010) (Ismaeil and Ali, 2013) (Omale,2014) to assess oral hygiene; knowledge, attitude, and practices among diabetic patients attending Al-Salam, Um-Aldalia, Ithna, Almanshar, Al-Karantina primary healthcare centers at Hebron Directorate, then distributed it to the participants which included and met inclusion criteria (Annex 1) shows the questionnaire in the Arabic language, in contrast (Annex 2) shows it in the English language The questionnaire is divided into four parts:

Part one: consist of two sections:

Section A: Has questions about information on socio-demographic of participants.

Section B: Information on the clinical characteristics of participants.

Part two: Has questions related to knowledge towards oral hygiene.

Part three: Has questions related to attitude towards oral hygiene.

Part four: Has questions to collect information on oral hygiene practices.

The questionnaire has to be designed in a way that it can precisely measure the dependent and independent variables in this research.

To assess the level of diabetic patients' attitude about oral hygiene, the Likert scale is used it allows the respondent to choose the degree of agreement or disagreement with each item in the questionnaire when it comes to the stimulus purpose, the different items were measured on 5- point Likert scale to check the participant’s degree of convenience with the statement or not, as below:

1- Strongly disagree (SD)

2- Disagree (D)

3-Neither Agree nor Disagree (NAD)

4- Agree (A)

5-Strongly Agree (SA)

To assess the level of diabetic patients' knowledge about Oral Hygiene a 3- point scale is used as below:

1- Yes

2- No

3- Don’t Know.

To assess the level of diabetic patients' practice about oral hygiene, the Likert scale is used, the different items were measured on 5- point Likert scale to check the participant’s degree of convenience with the statement or not, as below:

1-Always.

2-Often.

3-Sometimes.

4-Rarely.

5-Never.

4.8. Tool Correction:

For getting the question's purpose, means, standard deviations (SD), percentages, and response degree for each item were operated. The following scales are used to consider the level impact mean scores degree to assess the level of diabetic patients' oral hygiene; knowledge, attitude, and practices, this scale depends on interval length=range/number of intervals, interval length= (5-1)/3=1.33. According to the level of diabetic patients' oral hygiene attitude and practice, the following scale represents the result: 1- less than 2.33 is low; 2.33- less than 3.66 is medium and 3.66-5 is high. According to the level of diabetic patients' oral hygiene knowledge, we will find the percentage of the correct answer according to every statement and overall, the total average. The following scale represents the result: less than 60% is low, between 60% and less than 70% is medium, 70% and more is high.

3.10 Tool Validity

3.10.1 Virtual Validity

Validity is “the accuracy of an assessment” in other words it means, do the used instruments measure what is supposed to measure? A Letter was sent to 6 experts working in the academic field (annex6) to validate the constructed tool and to ensure its relevance, clarity, and compliance. The letter includes also the designed questionnaire in Arabic and English, the study title, and the objectives of the study. The purpose of consulting experts is to get their expert opinion. They contributed to changes and modifications to the tool and all were incorporated in the final version.

3.10.2 Exploratory Data Analysis (Construct Validity):

Exploratory data analysis is the set of steps that quantitative researcher follows in exploring a new area of social or psychological life, which they do by collecting ended questions from which to generate new concepts and generalizations about that area. The most efficacious exploratory data analysis leaves these investigators as much scope as possible for the discovery of new concepts and generalizations.

In order to examine the construct validity, the tool was applied to an exploratory sample of (19) diabetic patients above 18 years of age attending at Al-Salam, Um-Aldalia, Ithna, Almanshar, Al-Karantina primary healthcare centers at Hebron Directorate. It was distributed among participants from the study population but outside the sample. The purpose of the exploratory sample **is** to make the questionnaire achieve the greatest degree of accuracy, to identify the extent to which the respondents understand the paragraphs of the questionnaire, and detect any problems that appear during the conduct of the study, also, to examine the possibility of its application to obtain information related to the validity of the tool, through the exploratory sample, a Pearson correlation coefficient of the items and the total score of the related dimension was calculated, it was compared with the standard approved for accepting the item according to what was stated in Garcia & Gonzalez, 2006) if greater than (.40), the items are statistically acceptable, in order to confirm the consistency of the items.

Table (4.2) shows the result.

(4.2) Pearson correlation coefficient between the items and the total score of the related dimension

Item	Knowledge of Dental Health	Item	Attitudes toward dental health	Item	Practice of Oral hygiene
1	0.63**	1	0.81**	1	0.81**
2	0.13	2	0.80**	2	0.80**
3	0.56**	3	0.85**	3	0.81**
4	0.23	4	0.77**	4	0.77**
5	0.50**	5	0.71**	5	0.71**
6	0.79**	6	0.75**	6	0.75**
7	0.53**			7	0.79**
8	0.22			8	0.79**
9	0.49**				
10	0.29				

** Statistically significant ($p<0.01$)

It is noted from table (3.2) that the values of Pearson correlation coefficients ranged between (0.13-0.85), and they all were acceptable and statistically significant, with the exception of the four knowledge of dental health items: (2, 4, 8, 10), the correlation coefficients were unacceptable and not statistically significant, so these four items will be edited to be clearer before the distribution of the questionnaire on the selected sample.

3.11 Reliability.

To find out the reliability degree of the questionnaire, the reliability coefficient (Cronbach alpha) is calculated as an indicator of the homogeneity to the level of the instrument. An accepted level would be more than (70%). Table (4.3) was summarized the Cronbach's alpha values of the exploratory sample.

Table (4.3) Cronbach's Alpha values for the exploratory sample of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients'

Dimension	Number of items	Cronbach's Alpha
Knowledge of dental health	**10**	**0.72**
Attitudes toward dental health	**6**	**0.81**
Practice of oral hygiene	**8**	**0.85**
Total	**24**	**0.87**

It was found from the above Table (4.3) that Cronbach's Alpha for all dimensions of diabetic patients' oral hygiene was more than 0.70, specifically, the range of reliability located between (0.72) and (0.85). The reliability for the whole instrument equals 0.87.

3.12 Data collection technique.

After getting ethical approval from the Ethical Committee at Al-Quds University in Palestine. An approval letter was requested from MOH to get their permission to conduct this study in their primary healthcare centers in Hebron Health Directorate.

- The participant handed the consent form and the researcher was used face to face questionnaire to fill it.
- The questionnaire was distributed to each center as they calculated according to the percentage of patients attending these centers.
- The researcher personally distributed and collected the documents at the selected primary health care centers.
- Completed questionnaires were collected in the same day.

- Data collection of this study took 6 weeks from 1/11/2021 – 20/12/2021.
- The data entered to SPSS 25 for statistical analysis

3.13 Statistical analysis.

- Data analyzed by a statistical software statistical package for social sciences (SPSS).
- Cronbach's alpha was used to test reliability of the questionnaire.
- Pearson correlation was used to test validity of the questionnaire.
- Descriptive statistics (means, frequencies, standard deviation, and percentage).
- Inferential statistics (Independent sample (t) test, One-Way ANOVA), for comparison between variables, and
- $P \leq 0.05$ will be rejected as statistically significant**.**

3.14. Ethical Considerations.

In order to lunch this study, an official letter of approval was obtained from Al Quds University-School of public health after discussing the proposal with the ethical committee (annex 4). Also, an official letter of approval was obtained from PMOH to conduct the study at MOH primary healthcare centers in Hebron Health Directorate (Annex 5).

Informed consent in Arabic with straightforward and simple language attached to the questionnaire to clarify the study's purpose and to confirm confidentiality. (Annex 3)**.**

Chapter Five:

Results and data analysis

4.1 Results

The overall purpose of this research is to assess the level of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate; also to examine the significant mean differences of level of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron directorate according to the independent variables (gender, age, residency, marital status, education level, work). We used the following scale to consider the level impact mean scores degree to assess the level of diabetic patients' oral hygiene; attitude, and practices, this scale depends on interval length=range/number of intervals, interval length= (5-1)/3=1.33. The following scale represents the result: 1-less than 2.33 is low; 2.33- less than 3.66 is medium and 3.66-5 is high. According to the level of diabetic patients' oral hygiene; knowledge, we will find the percentage of the correct answer according to every statement and overall, the total average. The following scale represents the result: less than 60% is low, between 60% and less than 70% is medium, 70% and more is high.

Table (5.1) Socio-Demographic characteristics of diabetic patients (n=309)

Variable	levels	Frequency	Percent (%)
Primary healthcare center	AlSalam	172	55.66%
	Um Al-Dalia	50	16.18%
	Ithna	28	9.06%
	Almanshar	38	12.30%
	Al-Karantina	21	6.80%
	Total	**309**	**100%**
Gender	Male	154	49.84%
	Female	155	50.16%
	Total	**309**	**100%**
Age	Less than 25 years	37	11.97%
	Between 25 and less than 40 years	45	14.56%
	Between 40 and less than 55 years	81	26.21%
	55 years and more	146	47.26%
	Total	**309**	**100%**
Place of residence	City	205	66.34%
	Village	104	33.66%
	Total	**309**	**100%**
Marital status	Single	34	11.00%
	Married	230	74.44%
	Divorced	11	3.56%
	Widowed	34	11.00%
	Total	**309**	**100%**
Education level	Illiteracy	31	10.04%
	Primary	53	17.15%
	Preparatory	74	23.95%
	Secondary	84	27.18%

	University	67	21.68%
	Total	**309**	**100%**
Work	employed	79	25.57%
	unemployed	201	65.05%
	irregular employed	29	9.38%
	Total	**309**	**100%**
Family income	less than 1500 NIS	102	33.01%
	between 1500 and 2500 NIS	73	23.62%
	between 2501 and 3500 NIS	66	21.36%
	3501 NIS and more	68	22.01%
	Total	**309**	**100%**

Table (5.1) shows that 55.66% of primary healthcare participants are from Al-salam primary health center, 50.16% are females, 66.34% from city, 47.26% are 55 years and more, 74.44% are married, 48.86% got secondary and more education level, 65.05% unemployed,

33.01% have less than 1500 NIS income.

Table (5.2) Clinical characteristics of diabetic patients. (n=309)

Variable	levels	Frequency	Percent (%)
Diabetes type	Type1	102	33.01%
	Type 2	207	66.99%
	Total	**309**	**100%**
Duration of diabetes	Less than 2 years	47	15.21%
	Between 2 and 5 years	85	27.51%
	More than 5 years	177	57.28%
	Total	**309**	**100%**
Smoking status	Yes	86	27.83%
	No	191	61.81%
	Sometimes	22	7.12%
	Ex-smoker	10	3.24%
	Total	**309**	**100%**
HbA1c level	Good glycemic control	52	16.83%
	Fair glycemic control	82	26.54%
	Poor glycemic control	175	56.63%
	Total	**309**	**100%**

Table (5.2) shows that 66.99% attending primary healthcare centers in Hebron directorate are type2 diabetic patients, 57.28% are more than 5 years diabetic patients, 61.81% are not smoking, 56.63% are poor glycemic control.

The result related to the main question:

First main question: What is the level impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate?

Out of the above question, the following sub-questions are derived.

1-What is the level impact of diabetic patients' oral hygiene knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate?

2-What is the level impact of diabetic patients' oral hygiene attitude among diabetic patients attending primary healthcare centers in Hebron Directorate?

3-What is the level impact of diabetic patients' oral hygiene practices among diabetic patients attending primary healthcare centers in Hebron Directorate?

The first question: What is the level impact of diabetic patients' oral hygiene knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate?

To answer the first question Table (5.3) shows the percentage of correct answers according to every statement and overall, the total average.

Table (5.3) The percentage of correct answers according to every knowledge statement and the overall, the total average:

Statement	Correct answer %	Standard deviation	Level
People with diabetes mellitus are more prone to oral diseases?	76%	0.43	High
The treatment of periodontitis doesn't affect the regulation of the level of glucose in the blood	27%	0.44	Low
People with diabetes mellitus suffer from Halitosis.	45%	0.50	Low
People with diabetes mellitus are	89%	0.31	High

more prone to xerostomia.			
People with diabetes mellitus are more prone to Candidiasis	54%	0.50	Low
People with Diabetes mellitus who suffer from dry mouth are more likely to develop tooth decay.	51%	0.50	Low
People with diabetes mellitus at higher risk to lose their teeth.	77%	0.42	High
Regulating the level of blood glucose may reduce the incidence of oral diseases.	84%	0.36	High
Smoking can exacerbate oral diseases in patients with diabetes more than those of nondiabetic.	58%	0.49	Low
The medical team supervising diabetic patients provides information about diabetic complications on oral health during a routine visit to the diabetes clinic.	33%	0.47	Low
Total average	**60%**	**0.22**	**Medium**

we will find the percentage of the correct answer according to every statement and overall, the total average. The following scale represents the result: less than 60% is low, between 60% and less than 70% is medium, 70% and more is high.

It appears from Table (5.3) after analyzing data using the SPSS, that the percentage of the total average correct score of diabetic patients' oral hygiene knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate equals (60%), standard deviation (0.22), with a medium level, the highest

percentage mean score (89%) related to the statement “people with diabetes mellitus are more prone to xerostomia” and standard deviation equals (0.31) with a high level, followed by the percentage mean score (84%) related to the statement “regulating the level of blood glucose may reduce the incidence of oral diseases” and standard deviation equals (0.36) with a high level, the lowest percentage mean score equals (27%) related to the statement “The treatment of periodontitis doesn’t affect the regulation of the level of glucose in the blood” with a low-level knowledge, and standard deviation equals (0.44). **Second question**- What is the level impact of diabetic patients' oral hygiene; attitude among diabetic patients attending primary healthcare centers in Hebron Directorate?

To answer the second question, the mean and standard deviations are calculated for all statements to know the level impact of diabetic patients' oral hygiene; attitude among diabetic patients attending primary healthcare centers in Hebron Directorate. Table (4.4) shows the

results.

Table (5.4) Means and standard deviations of the level impact of diabetic patients' oral hygiene attitude among diabetic patients attending primary healthcare centers in Hebron Directorate

Statement	Mean	Standard Deviation	Level
Caring for your mouth is significant as caring for other body parts.	4.47	0.63	High
It is important to brush your teeth in the morning and last thing before you sleep.	4.33	0.28	High
I think that it is necessary to maintain a regular visit to the dentist at least once a year for aperiodic examination.	4.00	0.59	High
The main reason for my visit to the dentist is the pain /for treatment.	4.09	0.78	High
I consult a dentist if there is an oral problem.	3.80	0.37	High
I would like to have more information about the effect of diabetes on oral health.	3.87	0.14	High
Total average	**4.09**	**0.62**	**High**

Referring to table (5.4), It was noticed that the level impact of diabetic patients' oral hygiene; attitude among diabetic patients attending primary healthcare centers in Hebron Directorate is high, the mean score equals (4.09), the highest mean equals (4.47) related to "caring for your mouth is significant as caring for other body parts" with a

high effect, followed by “It is important to brush the teeth in the morning and last thing before you sleep” with the mean score (4.37). The lowest mean score related to the statements “I consult a dentist if there is an oral problem” with a mean score (3.80) and a high-level impact.

Question three: What is the level impact of diabetic patients' oral hygiene practice among diabetic patients attending primary healthcare centers in Hebron Directorate?

To answer question three, the mean and standard deviations are calculated for all statements to know the level impact of diabetic patients' oral hygiene; practice among diabetic patients attending primary healthcare centers in Hebron Directorate. Table (5.5) shows the results.

Table (5.5) Means and standard deviations of the level impact of diabetic patients' oral hygiene practice among patients attending primary healthcare centers in Hebron Directorate

Statement	Mean	Standard Deviation	Level
I brush my teeth at least twice a day with a toothbrush.	3.50	0.16	Medium
I rinse my mouth with water after every meal	4.19	0.93	High
I use the toothpaste that contains fluoride to clean my teeth	3.73	0.18	High
The duration of the tooth brushing process is at least two minutes.	3.48	0.21	Medium
The technique that I use in brushing my teeth is to place the brush on the teeth at a 45-degree angle so that the bristles of the brush touch the tip of the gums and teeth.	3.03	0.30	Medium
I use the dental floss to clean	2.23	0.22	Low

between my teeth at least once			
I clean my teeth using auxiliary aids such as toothpicks.	2.15	0.18	Low
I use the mouthwash (rinsing) as directed by the dentist.	2.78	0.32	Medium
Total average	3.14	0.76	**Medium**

Referring to table (5.5), it was noticed that the level impact of diabetic patients' oral hygiene practice among diabetic patients attending primary healthcare centers in Hebron Directorate is medium, the mean score equals (3.14), the highest mean equals (4.19) related to "I rinse my mouth with water after every meal" with a high impact, followed by "I use the toothpaste that contains fluoride to clean my teeth" with the mean score (3.73). "I use the dental floss to clean between my teeth at least once" with a mean score(2.23) with a low-level impact. "I clean my teeth using auxiliary aids such as toothpick**"** with a mean score (2.15) with the lowest-level impact.

The Second main question: Are there significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by the sociodemographic variables (gender, age, residency, educational level, occupation, family income)? To answer this question, we need to test the following hypothesis.

Hypothesis 1: There are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by gender. To test this hypothesis, we use the significant differences means for independent samples as it is mentioned in Table (5.6).

Table (5.6): Significant differences means for independent samples among the participants according to gender

Gender* diabetic patients' oral hygiene; knowledge, attitudes, and practices	Male		Female		T-Value	P-Value
	Mean	Standard Deviation	Mean	Standard Deviation		
Gender -> knowledge	0.61	0.22	0.58	0.21	1.14	0.26
Gender -> attitudes	4.10	0.67	4.09	0.57	0.15	0.88
Gender -> practices	3.04	0.75	3.24	0.75	-2.37	0.02

Through the results from Table (5.6), the null hypothesis for knowledge, and attitudes was accepted, which means there are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene; knowledge, attitude, among diabetic patients attending primary healthcare centers in Hebron Directorate by gender.

On the other hand, the null hypothesis according to the practice of oral hygiene was rejected, which means, there are statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene, practice among diabetic patients attending primary healthcare centers in Hebron Directorate by gender to the favor of females.

Hypothesis 2: There are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by age.

To test the significance of this hypothesis, mean scores of the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by age

Table (5.7) Means of the level impact of diabetic patients' oral hygiene; knowledge, attitude, and practices distributed by age

diabetic patients' oral hygiene	Age			
	less than 25 years	between 25 and less than 40 years	between 40 and less than 55 years	55 years and more
knowledge	0.46	0.66	0.62	0.60
attitudes	4.02	4.07	4.00	4.17
practices	2.88	3.32	3.17	3.13

(One Way ANOVA) is used to find out the significant mean difference due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by age. Table (5.8) shows that:

Table (5.8) Significant differences means for independent samples among the participants according to age

diabetic patients' oral hygiene	Source of variation	Sum of Squares	d.f	Mean Square	F	Sig.(P)
Knowledge	Between Groups	0.90	3	0.30	6.85	0.00
	Within Groups	13.36	305	0.04		
	Total	14.27	308			
Attitudes	Between Groups	1.70	3	0.57	1.47	0.22
	Within Groups	117.75	305	0.39		
	Total	119.45	308			
Practices	Between Groups	4.08	3	1.36	2.42	0.07
	Within Groups	171.70	305	0.56		
	Total	175.79	308			

Through the results from Table (5.8), the null hypothesis for attitudes and practices are accepted, which means, there are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene; attitudes, and practices, among diabetic patients attending primary healthcare centers in Hebron Directorate by age.

On the other hand, the null hypothesis according to the knowledge of oral hygiene was rejected, which means, there are statistically significant mean differences at the level of

(α<=0.05) due to the impact of diabetic patients' oral hygiene, knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by age.

To know the significant mean differences at the level of (α<=0.05) due to the impact of knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by age, (LSD) least square differences in SPSS- a test is used. Table (5.9) tabulates the results.

Table (5.9): LSD significant differences means due to of knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by age

knowledge	less than 25 years	between 25 and less than 40 years	-.19610*
		between 40 and less than 55 years	-.16153*
		55 years and more	-.13849*

Referring to Table (5.9) it was conclude the significant mean differences due to the impact of knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by age to the favor of (between 25 and less than 40 years, between 40 and less than 55 years, and 55 years and more).

Hypothesis 3: There are no statistically significant mean differences at the level of (α<=0.05) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by residency. To test this hypothesis, we use the significant differences means for independent samples as it is mentioned in table (5.10).

Table (5.10): Significant differences means for independent samples among the participants according to residency

Gender* diabetic patients' oral hygiene	City		Village		T Value	P-Value
	Mean	Standard Deviation	Mean	Standard Deviation		
Residency> knowledge	0.58	0.22	0.63	0.21	-2.22	0.03
Residency-> attitudes	4.10	0.65	4.07	0.57	0.47	0.64
Residency -> practices	3.14	0.74	3.12	0.79	0.23	0.82

Through the results from Table (5.10), the null hypothesis for attitudes and practice are accepted, which means, there are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene attitudes and practice, among diabetic patients attending primary healthcare centers in Hebron Directorate by residency.

On the other hand, the null hypothesis according to the knowledge of oral hygiene was rejected, which means, there are statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene, knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by residency to the favor of village residents.

Hypothesis 4: There are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by educational level.

To test the significance of this hypothesis, mean scores of the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by educational level

Table (5.11) Means of the level impact of diabetic patients' oral hygiene; knowledge, attitude, and practices distributed by educational level

diabetic patients' oral hygiene	Educational level				
	illiteracy	primary	preparatory	secondary	university
knowledge	0.65	0.53	0.61	0.57	0.64
attitudes	4.39	3.87	4.08	4.18	4.02
practices	3.16	2.83	3.07	3.09	3.51

(One Way ANOVA) is used to find out the significant mean difference due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by educational level. Table (5.12) shows that:

Table (5.12) Significant differences means for independent samples among the participants according to educational level

diabetic patients' oral hygiene	**Source of Variation**	**Sum of Squares**	**d.f**	**Mean Square**	**F**	**Sig.(P)**
Knowledge	Between Groups	0.53	4	0.13	2.96	0.02
	Within Groups	13.73	304	0.05		
	Total	14.27	308			
Attitudes	Between Groups	6.36	4	1.59	4.27	0.00
	Within Groups	113.09	304	0.37		
	Total	119.45	308			

Practices	Between Groups	14.92	4	3.73	7.05	0.00
	Within Groups	160.87	304	0.53		
	Total	175.79	308			

Through the results from Table (5.12), the null hypothesis for knowledge, attitudes, and practices are rejected, which means, there are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene; knowledge, attitudes, and practices, among diabetic patients attending primary healthcare centers in Hebron Directorate by education level.

To know the significant mean differences at the level of ($\alpha<=0.05$) due to the impact of knowledge, attitudes, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by education level, (LSD) least square differences in SPSS- a test is used. Table (5.13) tabulates the results.

Table (5.13): LSD significant differences means due to of knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by age

Knowledge	primary	illiteracy	-.12520*
		preparatory	-.08034*
		university	-.11388*
Attitude	illiteracy	primary	.51797*
		preparatory	.31085*
		university	.37044*
Practices	university	illiteracy	.35017*
		primary	.68136*
		preparatory	.44377*
		secondary	.41830*

Referring to Table (5.13) it was concluded that the significant mean differences due to the impact of:

-knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by education level to the favor of (illiteracy, preparatory, university).

-attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by education level to the favor of (illiteracy).

-practices among diabetic patients attending primary healthcare centers in Hebron Directorate by education level to the favor of (university).

Hypothesis 5: There are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by occupation.

To test the significance of this hypothesis, mean scores of the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by occupation

Table (5.14) Means of the level impact of diabetic patients' oral hygiene; knowledge, attitude, and practices distributed by occupation

diabetic patients' oral hygiene	occupation		
	employed	unemployed	irregular employed
knowledge	0.65	0.58	0.57
attitudes	4.08	4.12	3.90
practices	3.39	3.08	2.86

(One Way ANOVA) is used to find out the significant mean difference due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by occupation. Table (5.15) shows that:

Table (5.15) Significant differences means for independent samples among the participants according to occupation

diabetic patients' oral hygiene	Source of Variation	Sum of Squares	d.f	Mean Square	F	Sig.(P)
Knowledge	Between Groups	0.29	2	0.147	3.21	0.04
	Within Groups	13.97	306	0.046		
	Total	14.27	308			
Attitudes	Between Groups	1.28	2	0.641	1.66	0.19
	Within Groups	118.17	306	0.386		
	Total	119.45	308			
Practices	Between Groups	7.92	2	3.958	7.21	***0.00**
	Within Groups	167.87	306	0.549		
	Total	175.79	308			

Through the results from Table (5.15), the null hypothesis for attitudes was accepted, which mean there are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by occupation.

On the other hand, the null hypothesis according to the knowledge, and practices of oral hygiene are rejected, the level of significance is less than 0.05, which means that there are statistically significant mean differences at the level of (α<=0.05) due to diabetic patients' oral hygiene knowledge, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by occupation.

To know the significant mean differences at the level of (α<=0.05) due to the impact of knowledge, and practices among diabetic patients attending primary healthcare centers in

Hebron Directorate by occupation, (LSD) least square differences in SPSS- a test used. Table (5.16) tabulates the results.

Table (5.16): LSD significant differences means due to the knowledge and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by occupation

Knowledge	employed	unemployed	.06900*
Practices	employed	unemployed	.31192*
		irregular employed	.52599*

Referring to Table (5.16) it was concluded that the significant mean differences due to the impact of:

- knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by occupation to the favor of (employed).
- practices among diabetic patients attending primary healthcare centers in Hebron Directorate by occupation to the favor of (employed).

Hypothesis 6: There are no statistically significant mean differences at the level of (α<=0.05) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by family income. To test the significance of this hypothesis, mean

scores of the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by family income.

Table (5.17) Means of the level impact of diabetic patients' oral hygiene; knowledge, attitude, and practices distributed by family income

Diabetic patients' oral hygiene	family income			
	less than 1500 NIS	between 1500 and 2500 NIS	between 2501 and 3500 NIS	3501 NIS and more
knowledge	0.59	0.60	0.57	0.63
attitudes	4.12	4.17	3.93	4.11
practices	3.10	3.14	2.89	3.44

(One Way ANOVA) is used to find out the significant mean difference due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by family income. Table (5.18) shows that:

Table (5.18) Significant differences means for independent samples among the participants according to family income

diabetic patients' oral hygiene	Source of Variation	Sum of Squares	d.f	Mean Square	F	Sig. (P)
Knowledge	Between Groups	0.10	3	0.03	0.72	0.54
	Within Groups	14.16	305	0.05		
	Total	14.27	308			
Attitudes	Between Groups	2.28	3	0.76	1.98	0.12
	Within Groups	117.17	305	0.38		
	Total	119.45	308			
Practices	Between Groups	10.31	3	3.44	6.34	0.00
	Within Groups	165.47	305	0.54		
	Total	175.79	308			

Through the results from Table (5.18), the null hypothesis for knowledge, and attitudes are accepted, which means there are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene knowledge and attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by family income. On the other hand, the null hypothesis according to the practices of oral hygiene was rejected, which means, there are statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene, practices among diabetic patients attending primary healthcare centers in Hebron Directorate by family income.

To know the significant mean differences at the level of ($\alpha<=0.05$) due to the impact of practices among diabetic patients attending primary healthcare centers in Hebron Directorate by family income, (LSD) least square differences in SPSS- test is used. Table (5.19) tabulates the results.

Table (5.19): LSD significant differences means due to the practices among diabetic patients attending primary healthcare centers in Hebron Directorate by family income

Practices	3501 NIS and more	less than 1500 NIS	.33892*
		between 1500 and 2500 NIS	.30178*
		between 2501 and 3500 NIS	.54734*

Referring to Table (5.19) it was concluded that the significant mean differences were due to the impact of practices among diabetic patients attending primary healthcare centers in Hebron Directorate by family income to the favor of (3501 NIS and more).

Hypothesis 7: There are no statistically significant mean differences at the level of (α<=0.05) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by smoking status. To test the significance of this hypothesis, mean scores of the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by smoking status.

Table (5.20) Means of the level impact of diabetic patients' oral hygiene; knowledge, attitude, and practices distributed by smoking status

Diabetic patients' oral hygiene	smoking status			
	yes	no	sometimes	ex-smoker
knowledge	0.64	0.59	0.55	0.54
Attitudes	4.13	4.11	4.13	3.45
Practices	3.25	3.13	2.93	2.70

(One Way ANOVA) is used to find out the significant mean difference due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by smoking status. Table (5.21) shows that:

.21) Significant differences means for independent samples among the participants according to smoking status

diabetic patients' oral hygiene	Source of variation	Sum of Squares	d.f	Mean Square	F	Sig.(P)
Knowledge	Between Groups	0.23	3	0.08	1.66	0.18
	Within Groups	14.04	305	0.05		
	Total	14.27	308			
Attitudes	Between Groups	4.29	3	1.43	3.79	0.01
	Within Groups	115.16	305	0.38		
	Total	119.45	308			
Practices	Between Groups	3.89	3	1.30	2.30	0.08
	Within Groups	171.89	305	0.56		
	Total	175.79	308			

Through the results from Table (5.21), the null hypothesis for knowledge and practices are accepted, which means, there are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene knowledge and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by smoking status. On the other hand, the null hypothesis according to the attitudes towards oral hygiene was rejected, which means, there are statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene, attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by smoking status.

To know the significant mean differences at the level of ($\alpha<=0.05$) due to the impact of attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by smoking status, (LSD) least square differences in SPSS- a test is used. Table (5.22) tabulates the results.

Table (5.22): LSD significant differences means due to the attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by smoking status

Attitudes	Ex-smoker	yes	-.67744*
		no	-.65508*
		sometimes	-.67864*

Referring to Table (5.22) it was concluded that the significant mean differences due to the impact of attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by smoking status to the favor of (yes, no, sometimes).

Hypothesis 8: There are no statistically significant mean differences at the level of (α<=0.05) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by DM duration. To test the significance of this hypothesis, mean scores of the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients

Table (5.23) Means of the level impact of diabetic patients' oral hygiene; knowledge, attitude, and practices distributed by DM duration

diabetic patients' oral hygiene	DM duration		
	less than 2 years	between 2 and 5 years	more than 5 years
knowledge	0.64	0.53	0.61
Attitudes	4.16	4.03	4.10
Practices	3.35	3.06	3.12

(One Way ANOVA) is used to find out the significant mean difference due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by DM duration. Table (5.24) shows that:

Table (5.24) Significant differences means for independent samples among the participants according to DM duration

diabetic patients' oral hygiene	Source of variation	Sum of Squares	d.f	Mean Square	F	Sig.(P)
Knowledge	Between Groups	0.49	2	0.24	5.43	0.01
	Within Groups	13.78	306	0.05		
	Total	14.27	308			
Attitudes	Between Groups	0.56	2	0.28	0.72	0.49
	Within Groups	118.89	306	0.39		
	Total	119.45	308			
Practices	Between Groups	2.63	2	1.32	2.33	0.10
	Within Groups	173.15	306	0.57		
	Total	175.79	308			

Through the results from Table (5.24), the null hypothesis for attitudes and practices are accepted, which means, there are no statistically significant mean differences at the level of

($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene attitudes and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by DM duration. On the other hand, the null hypothesis according to the knowledge towards oral hygiene was rejected, which means, there are statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene, attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by DM duration.

To know the significant mean differences at the level of ($\alpha<=0.05$) due to the impact of knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by DM duration, (LSD) least square differences in SPSS- test is used. Table (5.25) tabulates the results.

Table (5.25): LSD significant differences means due to the knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by DM duration

Knowledge	between 2 and 5 years	less than 2 years	-.10748*
		more than 5 years	-.08118*

Referring to Table (5.25) it was concluded that the significant mean differences due to the impact of knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate by DM duration to the favor of (less than 2 years, and more than 5 years).

Hypothesis 9: There are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by HbA1c last reading.

To test the significance of this hypothesis, mean scores of the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by HbA1c last reading.

Table (5.26) Means of the level impact of diabetic patients' oral hygiene; knowledge, attitude, and practices distributed by HbA1c last reading:

diabetic patients' oral hygiene	HbA1c last reading		
	Good control	Fair control	Poor control
knowledge	0.64	0.61	0.57
Attitudes	4.22	4.13	4.03
Practices	3.37	3.24	3.02

(One Way ANOVA) is used to find out the significant mean difference due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by HbA1c last reading. Table (5.27) shows that:

Table (5.27) Significant differences means for independent samples among the participants according to HbA1c last reading:

diabetic patients' oral hygiene	Source of variation	Sum of Squares	d.f	Mean Square	F	Sig. (P)
Knowledge	Between Groups	0.23	2	0.12	2.50	0.08
	Within Groups	14.04	306	0.05		
	Total	14.27	308			
Attitudes	Between Groups	1.66	2	0.83	2.15	0.12
	Within Groups	117.80	306	0.39		
	Total	119.45	308			
Practices	Between Groups	5.77	2	2.89	5.19	0.01
	Within Groups	170.02	306	0.56		
	Total	175.79	308			

Through the results from Table (5.28), the null hypothesis for knowledge, and attitudes are accepted which means, there are no statistically significant mean differences at the level of

($\alpha<=0.05$) due to the impact of diabetic patients' oral hygiene knowledge, and attitudes among diabetic patients attending primary healthcare centers in Hebron Directorate by HbA1c last reading.

On the other hand, the null hypothesis according to the practices towards oral hygiene are rejected, which means, there are statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene practices among diabetic patients attending primary healthcare centers in Hebron Directorate by HbA1c last reading.

To know the significant mean differences at the level of (α<=0.05) due to the impact of practices among diabetic patients attending primary healthcare centers in Hebron Directorate by HbA1c last reading, (LSD) least square differences in SPSS-a test used. Table (5.28) tabulates the results.

Table (5.28): LSD significant differences means due to the practices among diabetic patients attending primary healthcare centers in Hebron Directorate by HbA1c last reading

Practices	Good control	Poor	0.34136*
	Fair control	Poor	0.21324*

Referring to Table (5.29) it was concluded that the significant mean differences due to the impact of practices among diabetic patients attending primary healthcare centers in Hebron Directorate by HbA1c last reading to the favor of (good, and fair control).

Hypothesis 10: There are no statistically significant mean differences at the level of (α<=0.05) due to the impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by diabetes type.

To test this hypothesis, we use the significant differences means for independent samples as it is mentioned in table (5.29).

Table (5.29): Significant differences means for independent samples among the participants according to the diabetes type:

Diabetes type * diabetic patients' oral hygiene	Type1		Type2		T Value	P Value
	Mean	Standard Deviation	Mean	Standard Deviation		
Knowledge	0.60	0.22	0.59	0.21	0.47	0.64
Attitudes	4.05	0.53	4.11	0.67	-0.82	0.41
Practices	3.13	0.81	3.14	0.73	-0.05	0.96

Through the results from Table (5.29), the null hypothesis for knowledge attitudes, and practices are accepted which mean, there are no statistically significant mean differences at the level of ($\alpha<=0.05$) due to diabetic patients' oral hygiene knowledge attitudes, and practices among diabetic patients attending primary healthcare centers in Hebron Directorate by diabetes type.

Chapter six: Discussion.

This chapter includes a discussion of the study findings in relation to the previous studies on oral hygiene; knowledge, attitude, and practices among diabetic patients. The chapter ends with a conclusion and recommendations. This study was carried out to assess knowledge, attitude, and practices toward oral hygiene among diabetic patients attending primary healthcare centers among a sample of Palestinians. The design of this study was cross-sectional and therefore the results obtained in this study do not indicate causality.

The study showed a lower proportion of controlled glycemic level cut point, (HbA1c < 7%) as controlled glycemic level, several similar studies carried out in the Middle Eastern region came with a similar conclusion where a large proportion of studied patients had poor glycemic control such as in Palestine (Samara, et al., 2017). A study in Jordan found that approximately 65% of diabetic patients had HbA1c values above 7 (Khattab, et al., 2010). Another study in Jordan came up with a lower percentage of people with poor glycemic control but the results are still considered high (Al Omari, et al., 2009). The HbA1c values in some Arab Gulf countries are higher than those reported in Jordan and closer to the results presented in our study (Al-Rasheedi, 2015; Baded, et al., 2016). The poor glycemic control among Palestinian diabetic patients in this study could be attributed to poor medication or dietary adherence (Samara, et al., 2017).

It appeared that the percentage of the total average correct score of diabetic patients' oral hygiene; knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate with a medium level, this consistent with many studies conducted worldwide in which a majority of people with diabetes are unaware of the bidirectional link between diabetes and periodontal disease and they have limited knowledge of their risks for oral health problems (Orlando, et al., 2010; Arunkumar, et al., 2015; Aggarwal, et al., 2011; Al Habashneh, et al., 2010; Bahammam, et al., 2016). However, a majority of people with diabetes did not receive information on oral health risks in relation to their diabetes or advice on oral health care from diabetes care providers this consistent with studies of Al Amass, et al., 2017 in Saudi Arabia in which the main source of information was the media (31%), followed by dentists and dental hygienists (23%), physicians (21%) and the Internet (16%). Also, Results in the present study regarding smoking participants showed low awareness level

that smoking with diabetes increase the incidence of prodromal diseases this contradict the study of Alhuwais, et al., (2021) in Kuwait in that that 71% of the participants recognized that diabetic smokers were more prone to gingival disease.

The results showed that the level impact of diabetic patients' oral hygiene; attitude and practice among diabetic patients was high in all questions, this consistent with the study of the overall oral hygiene measures in diabetic patients were found to be good in this study. Most of the included patients consult the dentist, brush their teeth at least once daily and regularly visit the dentist at least once a year for checkups. And these findings are in agreement with the study of Awartani, (2009). On the other hand, these findings are in disagreement with the Kamran study in Pakistan (2007) which found that overall oral hygiene measures in diabetic patients were deficient, this may be due to a lack of health education about oral hygiene. and these study results are higher than the study of Alhuwais, et al., (2021) in Kuwait Regarding the attitudes towards oral health, more than 50% of the participants visit the dentist when in pain, the majority brush their teeth at least once a day, and most of them do not floss nor use mouthwash.

6.1. Knowledge about oral health.

The percentage of the total average correct score of diabetic patients' oral hygiene; knowledge among diabetic patients attending primary healthcare centers in Hebron Directorate equals (60%), standard deviation (0.22), with a medium level,

The knowledge items included the level of information of the patients on the risk of oral health problems in relation to diabetes, the importance of good diabetic control, and preventive oral health behaviors (brushing, flossing, and regular dental visits) to reduce the risk for oral health problems. The majority of the participants reported low or moderate knowledge of the link between diabetes and oral health and their increased risk for various oral health complications including periodontal disease this consistent with many studies such as

(Arunkumar, et al., 2015; Bahammam, et al., 2015; Mirza, et al., 2007; Sadeghi, et al., 2014). In contrast, contrast, few studies did show that most participants had knowledge on the link and oral health risks, and this information was received mainly from dentists, physicians,

and media (Al Amassi, et al., 2017; Bangash, et al., 2011; Ummadisetty, et al., 2016). Furthermore, some studies showed that those who were better informed or had good knowledge of the link between diabetes and oral health were more likely to adopt good oral health behaviors (Bangash, et al., 2011; Ummadisetty, et al., 2016).

6.2. Oral hygiene attitudes

The attitudes of people with diabetes are high towards oral health related to perceived need and importance of oral health, self-rating of oral health status, agreement/disagreement on the link between diabetes and oral health, and reasons for refusing dental referrals/visits, the mean score equals (4.09), the highest mean equals (4.47) related to "caring for your mouth is significant as caring for other body parts" with a high effect, followed by “It is important to brush the teeth in the morning and last thing before you sleep” with the mean score (4.37). The lowest mean score related to the statements “I consult a dentist if there is an oral problem” with a mean score (3.80) and a high-level impact. This contradicts with Studies that reported that the perceived need and importance of oral health care in relation to diabetes was poor among people with diabetes (Allen, et al., 2008; Bowyer, et al., 2011). A study conducted in the USA showed that about half of the participants (49%) acknowledged that taking care of their oral health was as important as their general health, and only a third (33%) considered plaque or tartar build-up as a problem (Orlando, et al., 2010).

A survey conducted in Malaysia revealed that half (51%) of the people with diabetes believed teeth problems were not serious and this belief was one of the main reasons behind refusing a dental referral (Sahril, et al., 2014). A number of reasons were highlighted by participants for not having regular dental visits, the most notable being the cost of dental care, lack of need for oral health care, absence of dental problems, unpleasant dental visits, and difficulty in scheduling an appointment (Bowyer, et al., 2014; Aggarwal, et al., 2012; Alves, et al., 2009).

The low perceived need for dental care among participants was also attributed to their lack of oral health knowledge and information (Mirza, et al., 2007). Nearly half of the participants (45%) from a study conducted in Pakistan stated that they would engage in more

positive oral health practices if they were informed about the risks and consequences of poor oral health (Mirza, et al., 2007).

6.3. Oral hygiene practices

Oral health care practices were practiced among diabetic patients attending primary healthcare centers in Hebron Directorate is medium, the mean score equals (3.14), the highest mean equals (4.19) related to "I rinse my mouth with water after every meal" with a high impact, followed by “I use the toothpaste that contains fluoride to clean my teeth” with the mean score (3.73). The lowest mean score related to the statement “I clean my teeth using auxiliary aids such as toothpicks” with a mean score (2.15) and a low-level impact. This is consistent with many studies Overwhelmingly, regular dental visits among people with diabetes were also lower, over half of the people with diabetes had dental visits in the last 12 months (Oh, et al., 2012; Kejriwal, et al., 2014). the uptake of dental services was very low in low or middle-income countries (World Bank, 2017), such as India, Malaysia and, Jordan (Al Habashneh, et al., 2010) compared with high-income countries which included the USA, Finland, Sweden, Ireland, UAE, Saudi Arabia, and the Korea Republic. However, a study conducted in Ireland also showed lower compliance of dental visits with only 43% of the participants visiting a dentist in the last year and 34% reported not attending a dentist for more than 5 years (Tomar, et al., 2010). More than one-third (37%) of patients with diabetes included in a Finnish study did not visit a dentist despite being entitled to state-subsidized dental care (Karikoski, et al., 2012).

6.4. Socio-demographic factors.

There are no statistically significant mean differences at the level of ($\alpha<=0.05$) between gender with knowledge and attitude but it is statistically significant between gender and practice to the favor of females. This is consistent with the study of Clement, et al., (2012) in Nigeria which showed that Females in comparison to males significantly gave good attention to their oral health, use medium strength toothbrushes, brushed teeth more than once-daily, visited the dentist, and chose toothpaste following dentist recommendations. Hamarsha, et al., (2019) study indicated that females have significantly

higher positive practices of tooth brushing than males. Most studies conducted in the Middle East such as Kuwait and Jordan supported this fact (Al-Ansari and Honkala, 2007, Al-Hussaini et al., 2003, Al-Omari and Hamarsha, 2005). However, Oberoi et al. (2014) from India showed an opposite result. This could be explained by cultural differences such as social behaviors (Oberoi et al., 2014).

In relation to impact of diabetic patients' oral hygiene; knowledge, attitude, and practices among diabetic patients there is significant relationship between control and uncontrol diabetic patient with knowledge and practice, results showed that knowledge and practice better among patients with control diabetic, this consistent with study of Popoviciu, et al., (2022) in which The Sum Score of self-care activities was significantly higher in the group with optimal control.

There are statistically significant mean differences at the level of ($\alpha<=0.05$) between age with awareness with knowledge level higher in younger age, this can be explained that younger age has more access to various method of teaching such as media and internet as shown in previous studied to be the first source of information and older depend more on instructions by health care workers in which was low according to participants in this study.

There are no statistically significant mean differences at the level of ($\alpha<=0.05$) between age with attitude and practice, this can be explained that age is not a barrier for attitude and practice of oral hygiene.

There are statistically significant mean differences at the level of ($\alpha<=0.05$) between the level of education with knowledge, attitude, and practice, this can be explained that higher level of education has a higher level of knowledge that led to a higher level of attitude and practice of oral hygiene. And this is applicable also to the significance of occupation with knowledge, attitude, and practice because most employers have high educational levels. Similarly, adequate oral health knowledge was also significantly associated with a higher level of education

($p = 0.05$) (Bahammam, et al., 2015) and having received oral health information ($p = 0.008$) (Al Amassi, et al., 2017).

Income did not affect knowledge and attitude but there are statistically significant mean differences at the level of ($\alpha<=0.05$) between income with practice, this is due to fact that most supplies and dentist visits are not free in Palestine and need to be paid for it.

It was a significant mean difference due to the impact of an employment on knowledge and practices because most employers have high educational levels.

6.4. Limitations

- A study was conducted only in the Hebron district limits the generalization of the findings.
- Using a cross-sectional design to obtain some information on several issues of oral health of a population is another limitation of this study because of its inability to attribute causality.
- The use of a questionnaire was difficult to access the reliability of oral health variables in the survey because of recall bias, especially in the area of attitudes and practice of oral health.
- The issue of bias also occurred especially as the participants were not familiar with some of the terms that were presented in the given questionnaire.
- Using face to face questionnaire help with more accurate screening and in capturing the data from the source, but it contributes with social desirability bias which is the tendency to underreport socially undesirable attitudes and behaviors and to over report more desirable attributes.

6.5. Recommendations

Diabetes care providers should play a more active role in promoting oral health among their patients. They should educate patients about their increased risk for oral health complications and advise them to have regular dental checkups. Diabetes care providers may also need to improve their own knowledge in this area in order to incorporate oral health promotion into their practice. Oral health professionals should inform people with diabetes about good oral health behaviors and emphasize the importance of good diabetes control in minimizing oral health risks. In addition, policymakers need to develop and implement standardized oral health care guidelines and oral health promotional resources for diabetes care settings as well as create appropriate referral pathways to increase uptake of dental

services for this at-risk population. Decision-makers in the Ministry of Health must work on planning to increase the number of dental clinics in primary care centers and distribute them geographically to be available to all diabetic patients. Conducting more studies and research in the future regarding the oral health of diabetics and patients with chronic diseases at the national level. According to the study findings, the researcher recommends the following points regarding improving the oral health of DM patients to MOH: Oral health assessment should be performed twice yearly for all diabetic patients, Patients should be given an immediate appointment for intervention in case they required, and they should be given a priority in appointment system for oral health curative procedures. Most Oral health services for diabetic patients could be exclusively available and free or with a nominal fee. Public and private healthcare provider and insurance company must play a role in solving the financial barriers for diabetic patients. More effort to ensure that diabetes is well controlled, as uncontrolled diabetes increases the risk of developing oral disease. More studies should be conducted using a qualitative approach to identify the causes of low oral health awareness and proper ways of enhancing oral health awareness among Palestinian populations.

6.6. Conclusion

People with diabetes have inadequate oral health knowledge, a good oral hygiene attitude, and lack compliance with recommended oral hygiene behaviors and dental visits. They are also not receiving adequate oral health information and care advice from diabetes care providers. It is important that people with diabetes are educated about their increased risk of oral health complications and encouraged to seek regular dental checkups. People with uncontrolled diabetes have limited oral hygiene knowledge and poor oral hygiene behaviors. It is therefore essential to educate patients about their increased risk for oral health problems, motivate them for good oral hygiene practices, and facilitate access to dental care. People with uncontrolled diabetes are at greater risk for several oral complications, particularly periodontal (gum) disease. Periodontal disease also impacts diabetes control. A multidisciplinary approach involving oral health professionals is needed to promote oral health and encourage their patients to seek dental care along with the establishment of affordable dental referral pathways.

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Annex I: English Questionnaire

Part one:

Section A: Socio-Demographic variables.

Please answer the following questions with the suitable answer you find:

1. **Gender:** □ Male□ Female.

2. **Age**: ☐ Less than 25years. ☐ 25-40years. ☐ 40-55 years. ☐more than 55 years.

3. Residency □Rural □Urban. ☐ Other, mention……

4. Marital status: ☐Single ☐Married ☐Separated ☐ Widow

5. Educational level

☐ No formal schooling ☐ Primary school ☐Secondary school

☐ College/University degree.

6. Occupation

☐ Employed ☐ Unemployed. ☐ Irregular work

7. Family Income

☐ < 1500 skiekel. ☐ 1500-2500. ☐ 2501-3500 ☐ 3501<.

Section B: Clinical characteristics of participants:

1. Diabetes Type: ☐ **Type1** ☐ **Type 2**

2. Duration of diabetes. a) Below 2 years b) 2-5 years c) Above 5 years.

3. HbA1c last reading from patient file: _____.

4. Are you smoking?

☐ Yes ☐ NO ☐ Sometimes. ☐ Ex- smoker.

Part two: Knowledge of oral Health.

	Statement	Yes	No	Don't know
1.	People with Diabetes mellitus are more prone to oral diseases?			
2.	The treatment of periodontitis doesn't affect the regulation of the level of glucose in the blood			
3.	People with diabetes mellitus suffer from Halitosis.			
4.	People with Diabetes mellitus are more prone to Xerostomia.			
5.	People with diabetes mellitus are more prone to Candidiasis			
6.	People with Diabetes mellitus who suffer from dry mouth are more likely to develop tooth decay.			
7.	People with diabetes mellitus at higher risk to lose their teeth.			
8.	Regulating the level of blood glucose may reduce the incidence of oral			

	Statement	Yes	No	Don't know
	diseases.			
9.	Smoking can exacerbate oral diseases in patients with diabetes more than those of nondiabetic.			
10.	The medical team supervising diabetic patients provides information about diabetic complications on oral health during a routine visit to the diabetes clinic.			

Part three: Attitudes toward oral hygiene.

Number	Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Caring for your mouth is significant as caring for other body parts.					
2	It is important to brush your teeth in the morning and last thing before you sleep.					
3	I think that it is necessary to maintain a regular visit to the dentist at least once a year for aperiodic examination.					
4	The main reason for my visit to the dentist is the pain /for treatment.					
5	I consult a dentist if there is an oral problem.					
6	I would like to have more					

	information about the effect of diabetes on oral health.					

Part four: Practice of Oral hygiene

	Statement	Always	Often	Sometimes	Rarely	Never
1.	I brush my teeth at least twice a day with a toothbrush.					
2	I rinse my mouth with water after every meal					
3	I use the toothpaste that contains fluoride to clean my teeth					
4	The duration of the tooth brushing process is at least two minutes.					
5.	The technique that I use in brushing my teeth is to place the brush on the teeth at a 45-degree angle so that the bristles of the brush touch the tip of the gums and teeth.					
6.	I use the dental floss to clean between my teeth at least once					
7.	I clean my teeth using auxiliary aids such as toothpicks.					
8.	I use the mouthwash (rinsing) as directed by the dentist.					

Annex II : Arabic questionnaire.

القسم الاول: يحتوي هذا القسم على جزئين لمعلومات تعتبر مرجعية عامة

أ) البيانات الاجتماعية والديموغرافية: الرجاء وضع ✓ في المكان الذي يناسبك:

1. **الجنس:** ☐ ذكر ☐ انثى
2. **العمر الحالي :اقل من 25 سنة** ☐ **من 25 الى اقل من 40 سنة** ☐**من 40 الى اقل من 55 سنة** ☐**55 سنة فأكثر**
3. **مكان السكن:** ☐مدينة☐قرية☐غير ذلك، حدد ----------
4. **الحالة الاجتماعية:** ☐أعزب/عزباء. ☐متزوج/ة☐مطلق/ة☐أرمل/ة

مستوى التعليم: ☐غير متعلم/ة. ☐ابتدائي ☐إعدادي☐ثانوي جامعي

5. **العمل الحالي:** ☐ اعمل☐ لا اعمل☐ اعمل بشكل غير منتظم.
6. **الدخل الشهري للأسرة بالشيكل:**☐**اقل من 1500.** ☐**1500-2500.** ☐**2501-3500.** ☐ **3501 فأكثر.**

ب) البيانات المتعلقة بالتاريخ المرضي:

1.نوع السكري: ☐ النوع الأول ☐النوع الثاني .

2.مدة الإصابة بمرض السكري: ☐أقل من سنتين. ☐ 2 -5 سنوات. ☐ فوق 5 سنوات.

3.معدل السكر التراكمي (HbA1c) من ملف المريض:.....

4.**هل انت مدخن:** ☐ نعم☐ لا ☐ احيانا☐ .مدخن سابق.

القسم الثاني : مستوى المعرفة بصحة الفم والاسنان:

من فضلك أجب عن الاسئلة التالية اعتمادا على معرفتك بالعناية بصحة الفم والأسنان، ولا تقلق إذا كنت لا تعرف الاجابة:

الرقم	العبارة	نعم	لا	لا اعلم
1	الاشخاص المصابون بداء السكري هم أكثر عرضة للإصابة بأمراض اللثة والأنسجة الداعمة.			
2	علاج امراض الانسجة الداعمة للأسنان لدى مرضى السكري ليس له تأثير في تنظيم مستوى السكر في الدم لديهم			
3	يعاني الاشخاص المصابون بداء السكري من رائحة الفم الكريهة.			
4	المرضى المصابون بداء السكري يعانون من جفاف الفم			
5	ان الاشخاص المصابين بداء السكري هم أكثر عرضة للإصابة بفطريات الفم.			
6	ان الاشخاص المصابين بداء السكري الذين يعانون من جفاف الفم هم اكثر عرضة للإصابة بتسوس الاسنان.			
7	من الممكن ان تؤدي الإصابة بأمراض اللثة والأنسجة الداعمة للأسنان لدى مرضى السكري الى فقدان الاسنان.			
8	يساعد تنظيم مستوى السكر في الدم في الحد من الاصابة بأمراض الفم والاسنان			
9	يمكن ان يؤدي التدخين الى تفاقم امراض الفم والاسنان عند المرضى المصابين بداء السكري أكثر من غير المصابين به.			
10	يقوم الفريق الطبي المشرف على مرضى السكري بتقديم معلومات كافية عن مضاعفات السكري على صحة الفم والاسنان			

الجزء الثالث: المواقف تجاه صحة الفم والأسنان:

من فضلك الاجابة عن الاسئلة اعتمادا على موقفك بالنسبة للعناية بصحة الفم والأسنان ولا تقلق اذا لم يكن لديك موقف بالنسية لبعض الأمور:

الرقم	العبارة	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
1	العناية بفمك مهمة مثل العناية بأجزاء الجسم الأخرى.					
2	من المهم تفريش الأسنان في الصباح وقبل الذهاب الى النوم.					
3	اعتقد انه من الضروري المحافظة على زيارة طبيب الاسنان مرة على الاقل في السنة لإجراء الفحص الدوري.					
4	أرغب في الحصول على المزيد من المعلومات حول تأثير مرض السكري على صحة الفم والاسنان.					
5	السبب الرئيسي لزيارتي لطبيب الاسنان هو شعوري بالألم.					
6	أقوم باستشارة طبيب الاسنان في حال معاناتي من مشكلة في الفم والأسنان.					

القسم الرابع: الممارسة حول نظافة الفم والاسنان:

من فضلك أجب عن الأسئلة التالية اعتمادا على الممارسات التي تقوم بها بالنسبة للعناية بصحة الفم والأسنان:

الرقم	العبارة	دائماً	غالباً	أحياناً	نادراً	ابداً
1	اقوم بتنظيف أسناني مرتين يوميا على الاقل باستخدام فرشاة الاسنان.					
2	اقوم بغسل فمي بالماء بعد كل وجبة.					
3	استخدم معجون الأسنان الذي يحتوي على مادة الفلورايد لتنظيف اسناني.					
4	المدة التي تستغرقها عملية تفريش اسناني هي على الاقل دقيقتين.					
5	الطريقة التي استخدمها في تفريش اسناني هي وضع الفرشاة على الاسنان بزاوية 45 درجة بحيث تلامس شعيرات الفرشاة طرف اللثة والاسنان.					
6	استخدم الخيط للتنظيف ما بين أسناني مرة واحدة على الاقل.					
7	أقوم بتنظيف اسناني باستخدام وسائل مساعدة اخرى كالمسواك.					
8	استخدم غسول الفم (المضمضة) حسب تعليمات طبيب الاسنان.					

Annex III: Consent form

جامعة القدس
Al-Quds University

جامعة القدس

كلية الدراسات العليا

أنا الباحثة أريج حراحشة طبيبة اسنان- أدرس ماجيستير (السياسات والادارة الصحية مسار الجودة) في جامعة القدس.
أجري هذا البحث كشرط رئيسي للحصول على درجة الماجستير لأطروحتي التي تهدف الى تقييم المعرفة والوعي والممارسات تجاه صحة الفم والاسنان بين مرضى السكري في الخليل- فلسطين.

لقد تم اختياركم لتكونوا جزءا من عينة الدراسة، لذا نضع بين ايديكم هذه الاستبانة راجين تقديم المساعدة وذلك بالإجابة عن فقرات الاستبانة بدقة وموضوعية لما له أثر كبير في الحصول على نتائج دقيقة، مع العلم ان اجاباتكم سيكون لها موضع احترام وسوف يتم التعامل معها بسرية تامة ولن تستخدم إلا لأغراض البحث العلمي فقط، وسيتم التعامل مع البيانات بشكل جمعي والاحتفاظ بها على جهاز الكمبيوتر باستخدام كلمة مرور آمنة ولن يتمكن اي شخص من الوصول اليها باستثناء الباحث الرئيسي. وعليه فان المشاركة في هذا الاستبيان اختيارية ولا تتطلب الكشف عن اسمك او اي معلومات تشير الى هويتك ولديك الحق في المشاركة او لا.

Annex IV: Approval litter

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ:2021/6/1

حضرة الطالبة اريج حراحشة المحترمة
برنامج: ماجستير السياسات والادارة الصحية

الموضوع: موافقة لجنة اخلاقيات البحث العلمي

قامت اللجنة الفرعية لأخلاقيات البحث التابعة لكلية الصحة العامة بمراجعة مشروع الرسالة بعنوان:

(Oral Hygiene: knowledge, attitude, and practices among diabetic patients in Hebron- Palestine).

المقدم من (مشرف الرسالة/ د.محمد ابو يونس). يعتبر مشروعك مستوفيا لمتطلبات أخلاقيات البحث في جامعة القدس.

نتمنى لكم كل التوفيق في تسيير المشروع.

رئيسة لجنة اخلاقيات البحث
د. اسمى الامام

نسخة/ اعضاء لجنة البحث
نسخة/ الملف

Jerusalem Branch/Telefax 02-2799234
Gaza Branch/Telefax 08-2644220 -2644210
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فرع القدس / تلفاكس 02-2799234
فرع غزة / تلفاكس 08-264420-2644210
ص.ب. 51000 القدس

Annex V: Facilitating **litter**

Ministry of Health
General Directorate of Education in
Health and Scientific Research

الإدارة العامة للتعليم الصحي
والبحث العلمي

Ref.: ....
Date: ....

الأخ مدير عام الإدارة العامة للرعاية الصحية الأولية المحترم ---
تحية واحترام،

الموضوع: تسهيل مهمة بحث

مرفق طلب تسهيل مهمة الطالبة: أريج حراحشة– ماجستير سياسات وإدارة صحية/ جامعة القدس، وبإشراف د. محمد أبو يونس، في عمل بحث بعنوان:

"Oral hygiene: knowledge, attitude, and practices among diabetic patients

in Hebron- Palestine"

من خلال السماح للطالبة بجمع معلومات وإحصائيات حول مرضى السكري وتوزيع استبانة،

وذلك في:

- مديريات صحة: شمال ووسط وجنوب الخليل

على أن يتم الالتزام بجميع تعليمات وإجراءات الوقاية والسلامة الصادرة عن وزارة الصحة بخصوص جائحة كورونا، وتحت طائلة المسؤولية.

على أن يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر.

الباحث يستطيع تقديم طلب بعد انتهاء بحثه للمنافسة على جائزة فلسطين البحث العلمي

بإمكان الباحث تقديم طلب المشاركة ببحثه في المؤتمر الفلسطيني الدولي البحث العلمي

مع الاحترام،

د. عبد الله القواسمي
مدير التعليم الصحي والبحث العلمي

نسخة: عميدة كلية الصحة العامة المحترمة/ جامعة القدس

Annex VI: Panel of Experts

1-	Mahmoud Abu-Ta'a	BDS, Periodont., MSc (Perio EFP Board Certified Periodontist Associate Professor of Periodontology Faculty of Dentistry Head, Department of Dental Sciences Faculty of Graduate Studies Arab American University-AAUP
2-	Dr Elham Kateeb |	Associate Professor of Dental Public Health Dean Deanship of Scientific Research | Al-Quds

		University
3-	Dr Ra'ed O. Abu Hantash	Associate Professor Dean Assistant, Faculty of Dentistry- Al-Quds University Jerusalem-Palestine
4-	Dr Musab Qamheya	Ph.D. in Esthetic and restorative dentistry
5-	Dr Naji Arandi	Associate professor in AAUJ MSc, Conservative Dentistry
6-	Marwan Zuhd	Master degree in Statistics