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Association between Provided Lifestyle Health Advice and Changes on Behavior of Diabetic Patients in Ramallah Governorate driven by Socioeconomic Factors

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ABSTRACT

Diabetes is responsible for about (25%) of deaths in adults aged 35 to 64 years across the Middle East region. Recent studies indicated that the prevalence of diabetes among Palestinians aged 20 to79 is approximately (20.6%), which is high in range compared to a worldwide prevalence of 6%, underscoring the urgent need for prevention and management through providing effective education programs. The study aims to assess the relationship between the provided lifestyle health advice in Ramallah government primary health clinics and the changes in diabetes health-related behaviors, driven by socioeconomic demographic factors. In accordance to the provided health advice, the study found that (3.3%) received always and often advice in terms of smoking, (0.8%) of consuming healthy diet, (1.6%) of practicing physical activity similarly to adherence to medication. A statistically significant association was reported only between the diet advice provided by healthcare providers and eating healthy diet (p=.000; p=.000 respectively). On the other hand, age of participants showed a statistically significant difference across the level of delivered health advice respecting to smoking(p=.001), while gender & income affect the ability to receive health advice respecting to diet (p=.048; p=.03 respectively). Educational level & income affect the ability to receive health advice concerning physical activity (p=0.036; p=0.019 respectively). Level of education and the occupation of diabetic participants influenced the level of inquiring health advice regards medication (p=0.025; p=0.032). Health education at the primary level is considered essential for promoting health of diabetic patients by modifying risk factors concerning diet, physical activity, medication, smoking and alcohol consumption. Sociodemographic factors are integral part in understanding and improving these lifestyle behaviors. Initiating training programs for healthcare providers is significant to address the patients' needs in the primary healthcare clinics, while launching a web-based educational platform, being accessible for patients could be helpful for enrichment of information.

Keywords: Education, health advice, diabetes, Healthy behavior patterns, socioeconomic, Primary health clinic.

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1.1 Introduction

Depending on the International Diabetes Federation (IDF) Atlas in 2021 report, it estimated that 537 million people (10.5%) of the adult population (20-79 years) has diabetes, with almost half unaware that they are living with the condition. Such number is expected to reach 643 million by 2030 and 783 million by 2045 with a rate of (46%). Noteworthy that 3 in 4 adults with diabetes live in low- and middle-income countries (Migdalis,2024). Diabetes is responsible for about (25%) of deaths in adults aged 35 to 64 across the Middle East region and the 4th leading cause of death in Palestine. It continues to pose a significant public health challenge in the West Bank particularly due to the political instability that induced high unemployment rates, which in turn increase food insecurity and poverty rate to be as high as 31.5% among the Palestinian households (Palestinian Central Bureau of Statistics [PCBS], 2024). Recent studies indicated that the prevalence of diabetes among Palestinians aged 20 to 79 is approximately (20.6%), aligning with regional trends observed in the Arab world, but high in range compared to a worldwide prevalence of 6% (World Bank Group,2025). Anecdotal information derived from several sources predicted the rate could be much higher in 2030. This high prevalence underscores the urgent need for effective prevention and management strategies through providing effective education programs that shed the light on the importance of modifying the patients' lifestyle behaviors involving diet, exercise, and everyday habits toward healthier one, to mitigate the impact of this disease on individuals and the healthcare system in the West Bank (Ong et al.,2023). The economic implications of diabetes in the West Bank are substantial, where the direct costs associated with diabetes and its complications are considerable, emphasizing the urgency for preventive measures to mitigate future healthcare expenditures. Reviews indicates that a significant proportion of individuals with diabetes in the West Bank experience microvascular complications, including chronic kidney disease and retinopathy. A study found that 23.6% of diabetic patients exhibited chronic renal illness, with higher prevalence among older adults, smokers, and individuals with hypertension (Dweib& El Sharif, 2023).

A look into Diabetes in Palestine, a few epidemiological studies have focused on the fruitful of the educational programs afforded by healthcare professional to diabetic patients at the primary level. Furthermore, the estimated reports by the WHO about the effectiveness of the applicability of the educational program incorporated into the PEN-2 intervention for diabetic patients, do not reflect actually the Palestinian situation due to absence of close monitoring and supervision by focal points. Thus, this paper aims to assess the relationship between the provided lifestyle health advice in the government primary health clinics and the changes in diabetes-related health behaviors which is driven by socioeconomic demographic factors in Ramallah governorate.

1.2 Specific Objectives

The main three objectives for the study were; to assess the effectiveness level of education afforded by health care providers to diabetic patients; to determine the

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relationship between the life style related -behavior modification and the educational sessions provided at the primary health clinics among diabetic patients; &to identify the relationship between the level of perceived health education and the socioeconomic demographic factors of the patients.

1. 3 Research Questions

1. *How frequent do diabetic patients change their daily habit behaviors regards smoking, alcohol consumption, dieting, physical activity, and medication handling when receive health education advice?*

2. *To what extent the cultural, social, and economic factors influence the effectiveness of the lifestyle advice provided by healthcare providers for diabetic patients in Palestine?*

1.4 Research Hypothesis

1. *Tobacco smoke habit, compliance with appropriate medication and healthy diet, and change in physical activity level will differ after receiving health advice sessions afforded by healthcare providers.*

2. *Demographic data of the diabetic participants affects the comprehension of the information given in terms of health education, consequently make differences in their behaviors.*

2.Methedology

2.1 Study Design

To study the effectiveness of education on the alteration of diabetes health behavior which is driven by sociodemographic factors, a cross-sectional correlation descriptive case study quantitative approach was used. This approach allows for quantitative data to be gathered, providing a comprehensive understanding of the association between the provided health education and the change on diabetes health behaviors, while also considering how sociodemographic factors drive the outcomes of such educational session afforded by healthcare providers at the primary healthcare facilities without introducing any manipulation or intervention by the researcher (Creswell& Clark,2017).

2.2 Study Setting

The study took place in Ramallah district in 45 primary health clinics (PHC) out of 50 PHC, run by the Palestinian Authority. Ramallah is one of the 11 governorates of the West-bank in Palestine, serves as the dynamic administrative capital of the State of Palestine, includes numerous hospitals, in addition to several diverse primary health centers belonged to the governmental primary health care clinics, Military Medical Services clinics; UNRWA primary Health clinics, and NGOs facilities. Further, the Health Information System is located at Ramallah. In addition, Ramallah primary health directorate contains the second largest number of primary health clinics

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compared to other governorates in the West Bank that forms 57 clinics distributed in almost all rural and urban areas of Ramallah district, serving 85 communities with about 329,000 inhabitants. A religious diversity of Christians and Muslims besides people with a variety of socioeconomic status present in Ramallah (Palestinian Central Bureau of Statistics (PCBS),2024).

2.3 Study population

Based on Palestinian Health Annual Report in 2024, there are 2,689,400 adult population live in Palestine state by the end of 2023, with183,000 diabetic cases out of the total population, with 71 000 patients living with diabetes in Gaza. of whom 5% (9,150 patient) with DM type (1) and 95% (173,850 patient) with T2DM (WHO,2025). However, there are 4,700 new diabetic cases reported in PHC/MOH Clinics In 2021 in the West Bank, with an incidence rate of 166.9 per 100,000 population compared to 149.4 /100,000 population in Gaza strip. 2,079 cases out of 4,700 in West Bank are males with an incidence rate of 144.8 per 100,000 male population, and 2,621 are females with an incidence rate of 189.9 per 100,000 female population (PHIS,2024).

2.4 Participants

Diabetic patients of both genders, diagnosed with 19 adults with type I (T1DM) 361 adults with type 2 diabetes (T2DM) participated in this study from different sociodemographic backgrounds (age, gender, marital status, income, education, residency place, occupation, and religion), aged from 20-70 years old, free of mental and cognitive impairment, received healthcare services in the governmental primary clinics in Ramallah district.

2.5 Sampling Strategy

Quota Sampling based on the type of diabetes, DM1:DM2 (1:19) was used, to ensure the diverse representation from both types, drove by various sociodemographic groups (age, gender, marital status, education level, religion, occupation, and income). The sample size was 380 adults selected based on Thomson equation(n =Nx/((N-1)E2+x)by using Raosoft website (http://www.raosoft.com/). Half of the sample (190) participants selected by using stratified random sampling in accordance to the duty work days of the seven diabetic specialized clinics with a proportion of 10:2:2: 2:2:1:1; whereas, the remained half data of sampling 190 cases were selected from the 38 clinics of which 5 cases out of each clinic is taken conveniently considering the palestinian national proportion of diabetes. The total sample was 380 cases of which 342 with DM-2 and 38 with DM-1 were chosen conveniently depending on attending the clinic for having the health service.

2.6 Study Tool

Self-report (structured interviewing questionnaire) by means of the STEP survey was used (WHO,2013). The WHO-STEP questionnaire is an international standard method developed by WHO to improve the quality of noncommunicable diseases and risk factor surveillance and information processes reliable and valid for the use in

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different countries and in different languages including Arabic (www.who.int/ncds/steps). It includes items related to lifestyle habits (diet, physical activity, smoking habit, alcohol consumption, medication adherence), blood sugar and cholesterol level monitoring, in addition to some of sociodemographic information including age, gender, marital status, religion, income, education level, and occupation to analyze how these factors influence the effectiveness of the provided education.

2.7 Study Variables

The dependent variable measured by the effectiveness of Education program. The Independent variables were measured by studying the diabetes health behavior (e.g., physical activity, diet, medication adherence, self-monitoring of blood glucose), in addition to the patient satisfaction with the lifestyle advise provided by healthcare providers. Sociodemographic factors (age, gender, marital status, religion, residency place, education level, occupation, income) was considered a moderating variable.

2.8 Data Collection

A study was carried out between January - March in 2025, in 45 primary health clinics of Ministry of Health in Ramallah district. A 380-representative sample of DM patients was invited to fulfill the STEP survey by structured interview that assessed the participants' health behaviors, practices, knowledge and attitudes on a variety of subjects linked to various aspects of life style including smoking and alcohol consumption, diet, exercise, medication adherence, and monitoring blood sugar levels. The data was collected from 38 general primary health clinics (PHC) and 7 primary diabetic specialized health clinics (Central Directorate -Al-balo', Beit Rima, Qibia, Na'aleen, Beit Laqia, Shuqba, Deir Ammar), in accordance with the planned weekly program designed by administrators of Al-balo' directorate are selected as shown in table (1). According to the 38 sampled clinics, a simple random sampling was done to determine them. The sample list was: (Qarawa Bani Zaid, Rantis, Betunia, Deir Abzia, Bileen, Al-janya, Deir -Qeddis, Ras Karkar, Birzeit, Deir Dibwan, Deir Sudan, Kharbatha al-misbah, Turmusayya, Saffa, Beit our Tahta, Shabtin, Medea, Kafr Ni'ma, Ramallah Al -tahta, Bettello, Deir Jarir, Kafr Malik, Bettin, Burqa, Deir Nizam, Al-Tira, AL-mazraa' al-gharbiyah, AL-mazraa' Al-shaqiyah, Cooper, Abu Falah, Beit Sira, Silwad, Attara, Aboud, Abwein, Dora Al-qare', Western Labban, and Um Safa). The total sample was 380 cases of which 342 with DM-2 and 38 with DM-1. The first half of the sample equals 190 diabetic patients out of 380 was selected from 38 primary health clinics provide general medicine services in different villages of Ramallah of which 19 out of 190 are diagnosed as DM type- 1 and 171 patients with DM type- 2. From each clinic (n = 5) was taken. Whereas, the other half of the sample equals 190 cases was taken from the remained seventh clinics that are mainly targeted the diabetic patients in Ramallah.

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Table -1: proportion of the sample in DM clinics

Clinic Name	Central Directorate - Al-balo'	Beit Rima	Qibia	Na'aleen	Beit Laqia	Shuqba	Deir Ammar
Proportion	10	2	2	2	2	1	1
Sample Size	96	19	19	19	19	9	9

All participants fulfilled the survey by interviewing them in Arabic, then answers translated to English for the purpose of data analysis.

2.9 Data Analysis

The data were analyzed numerically by using statistical software SPSS version 25. Descriptive frequencies were used to summarize the data, while inferential statistics (ANOVA) &Pearson -r tests to determine the association and the strength of relationship between lifestyle health advice about diabetes provided by health care providers (nurses and doctors) and participants' behavior towards diabetes drive by socioeconomic demographic factors.

2.10 Ethical Considerations

Approval from Excellency of the Palestinian Ministry of Health was afforded in order to carry out this study. A written consent form from each participant was obtained. Anonymity &confidentiality especially for sensitive sociodemographic and health-related information was taken into consideration during data collection, in addition to providing participants with the option to withdraw from the study at any time without consequence.

3. Results

3.1 Demographic Characteristics

According to descriptive statistics of participants, the majority were married, Muslims and females. The age of the most fell between the 51 and 70 years old with mean of 53 years. More than half (57.4%) completed high secondary class and above. The most typical living place was village (72.6%). The average monthly salary was less than 5000 NIS, and a large percentage got less than 2000 NIS as shown in table-2.

Table2: Distribution of Demographic Characteristics of Participants

Variable		N	%
Age	20-30	14	3.7%
	31-40	14	3.7%
	41-50	59	15.5%
	51-60	172	45.3%
	61-70	121	31.8%
Gender	Male	155	40.8%
	Female	225	59.2%
Religion	Muslim	368	96.8%
	Christian	12	3.2%
	Never married	24	6.3%

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Marital Status	Currently married	307	80.8%
	Divorced	2	0.5%
	Widowed	47	12.4%
Education Level	Illiterate	6	1.6%
	Less than primary school	68	17.9%
	Primary school completed	14	3.7%
	Secondary school not completed	74	19.5%
	High school completed	101	26.6%
	College/University completed	108	28.4%
	Post graduate degree	9	2.4%
Residency Area	Village	276	72.6%
	Town	49	12.9%
	City	55	14.5%
Occupation	Government employee	54	14.2%
	Non-government employee	25	6.6%
	Self-employed	67	17.6%
	Student	3	0.8%
	Homemaker	183	48.2%
	Retired	28	7.4%
	Unemployed	20	5.2%
Monthly Income NIS	< 2000 NIS	102	26.8%
	2000 to < 3500 NIS	74	19.5%
	3500 to <5000 NIS	98	25.8%
	5000 to < 6500 NIS	69	18.2%
	6500 to < 8000 NIS	17	4.5%
	More than 8000 NIS	17	4.5%
	Don't know	3	0.7%

3.2 Patterns of Diabetic Patients' Behavior

3.2.1 Smoking Behavior among Participants

For the past 12 months, 12.7% were smokers and 87.3% were not. The majority of smokers were men (95.8%). One third (31.25%) of smokers belonged to low middle class; while all smokers belonged to a level of education higher than secondary school.

In fact, no specific tobacco smoking tendency Most participants (90%) were between age 10-14 years when start smoking. A quarter of the respondents reported to be heavy smoker as they smoked more than 25 manufactured cigarettes a day. Last 12 months, about (30%) of participants claimed that sometimes they receive advise from a professional healthcare provider to stop smoking. Nearly wo thirds of respondents appeared to be often exposed to passive smoking either at home or work. Figure (1) exhibited smoking status of participants.

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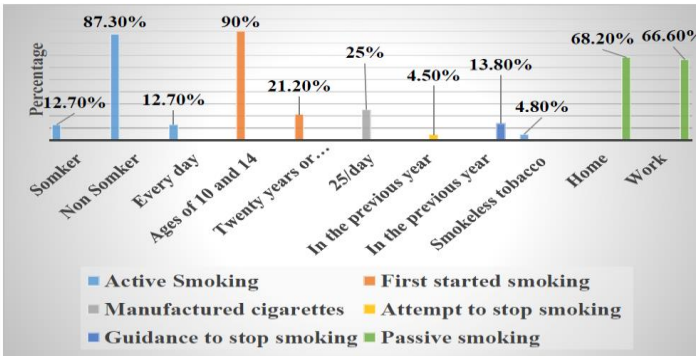

Figure (1): smoking status of participants

3.2.2 Alcohol consumption Behavior among Participants

A small fractional number (2.4%) of the participants consumed alcohol, belonged to high class and high income more than 8000 NIS monthly, and all of them were Christians. Also, (77.8%) of drinkers don't stop alcohol consumption for any health reason. A quarter of them consumed more than 6 standard drinking last month. Trivial number of them (11%) stated that they receive advise to reduce or stop drinking.

3.2.3 Dieting Behavior among Participants

About half of respondents (51.2%) consumed two servings of fruits a day which is enough for diabetic patients, but insufficient in terms of vegetables of 2 servings a day. Insignificant number (0.3%) reported eating 5 servings of vegetables and fruits per day. More than half (59.4%) of them avoid adding salt at their cooked meal. The majority (73%) reported never or rarely eat processed food high in salt, additionally (96%) agreed that consuming too much salt may be harmful to one's health. Just only 7.7% buy low salt or sodium alternatives. However, (88.3%) use spices other than salt when cooking. Over half (55.7%) of participants avoid eating foods prepared outside of a home. Figure (2) illustrated the dieting behavior of the participants.

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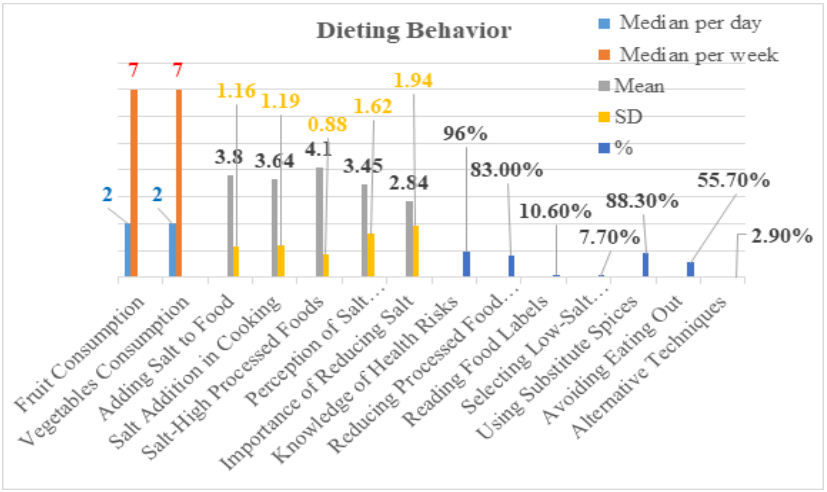

Figure(2):Diet behavior of diabetic participants

3.2.4 Physical Activity Behavior among Participants

Half of the respondents (56.5%) indicated that their work involves vigorous-intensity activity that causes large increases in breathing or heart rate, while (23.3%) of them reported performing such work more than four times a week with average daily duration of thirty minutes. Respecting to practicing a daily walk, 53.3% of patients preferred to walk, with average time of 24 minutes daily belonged to category of younger age, employed, had a satisfactory income, educated with positive background in terms of daily exercise. However, (10.6%) achieved a score of 200 minutes and above of performing activity weekly. Only 4.8% of participants participated in sports or vigorous recreational activities. On the other hand, minority of them (1.6%) lived in a sedentary lifestyle (≥ 6hours a day) of which females achieved highest score in this area more than males. An average of 117 minutes and a median of 120 minutes were spent sitting or lying down by the participants daily. Figure (3) illustrated the activity behavior of the participants.

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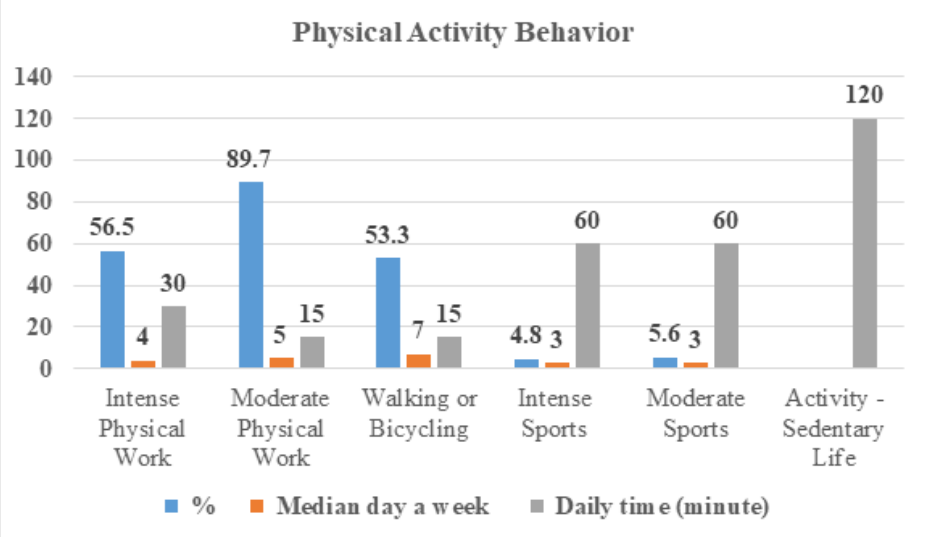

Figure (3): Physical activity behavior of participants

3.3 Glycemic Control History

Concerning blood sugar test, (54.5%) reported monitoring the level in blood by medical professional frequently. About (51.3%) indicated having elevated blood sugar since the last 12 months, while (47.4%) of them stated that their doctors did not inform them about that. Currently, (17.9%) of participants were using insulin. Also, **(**47.4%) of participants said they adhere to their diabetic medication recommended by a physician. Improvement was seen in fasting blood sugar level as (60.4%) of participants reported readings below 125 mg/dl after 12 months of adherence to medication and monitoring of lab tests compared to (31 .9%) in the first 3 months of treatment. According to glycemic control test (HgbA1c), (22.4%) of participants recorded a result below 7 after initial treatment during the first three months compared to (57.4%) after one year of receiving medical management. In relation to CVD score, it was obvious that doctors do not accommodate the scores with the updating situation of the patients. On the other hand, just 9 (2.6%) of overall participants' body mass index (BMI) fell within the normal weight range, whereas 146 women out of 225(64.88%) were obese of (BMI≥30), in comparison with 45 out of 155(29%) of men recorded obesity, inclined to increase obviously with advanced aging (≥51years).

3.4 History of Diabetic -related Complications

Respecting to high blood pressure which frequently accompanied diabetes, (85.7%) reported that their blood pressure measured by a doctor or other health worker when visiting the clinic, while (81.4%) of them declared that they were reported of having raised blood pressure during the last 12 months. Around (78.8%) stated that the doctor prescribed a drug for them to control blood pressure readings. According to dyslipidemia, (81.8%) reported measuring cholesterol level in blood after the doctor order, however (46.8%) stated that they were informed about high result of cholesterol level in their blood by a doctor or a nurse. Meanwhile, (50.1%) are on regular anti-lipidic drug without adjustment in dose since the start point and (41.3%)

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took oral medication for managing high cholesterol last two weeks. In terms of cardiac accompanied disease, (21%) reported complaining of chest pain and angina since the last 12 months. The majority of the participants (81.2%) are on regular aspirin, some for treatment and others for prevention of heart attack.

3.5 Health Advice Concerning Dietary, Smoking, Physical Activity, And Medication Behaviors among NCDs Patients

Regarding smoking advice to quit or decline the use, (85.6%) of participants reported receiving advice either rarely or never which might refer to poor communication with patients about the importance of smoking cessation. A significant indication for better nutritional counseling is requested since a substantial fractional number of patients (95.5%) reported rarely or never receiving advice regarding the heart healthy diet. Additionally, the majority of patients (91.5%) reported never or rarely receive encouragement towards practicing routine physical activity. Also, a need for regular medication counseling is reported by (84.9%) of patients who stated that they never or rarely received medicine advice. In summary, the association between the health advice provided by healthcare providers and the lifestyle behavior of diabetic patients, showed that (3.3%) received always and often advice in terms of smoking, (0.8%) in terms of consuming healthy diet, (1.6%) in terms of practicing physical activity similarly to adherence to medications, as shown in table (3).

Table -3: The provided Lifestyle Advice

Variable Key Recommendations	Always & often N (%)	Sometimes N (%)	Rarely & never N (%)
For smoker only, to stop smoking			
Strongly advise all smokers to stop smoking or don't start and support them in their efforts	7(7.8)	27(30)	56(62.2)
Assist in preparing a quitting plan	4(4.4)	8(8.9)	78(86.6%)
MEAN STOP SMOKING ADVICE	3(3.3%)	10(11.1%)	77(85.6%)
Mean Percentages ±SD:4.33 ±0.87			
Eat healthy diet			
Reduce salt to less than 5 grams (1 teaspoon) per day in your diet	9(2.4)	25(6.6)	346(91)
Reduce salt when cooking, limit processed and fast foods	13(3.5)	29(7.7)	338(88.9)

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Eat at least five servings of fruit and/or vegetables (400-500 grams) each day	15(3.9)	24(6.4)	341(89.7)
Limit fatty meat, dairy fat and cooking oil (less than two tablespoons per day) in your diet	4(1.1)	23(6.1)	353(92.8)
Replace palm and coconut oil with olive, soya, corn, rapeseed or safflower oil	3(0.8)	16(4.2)	361(95)
Replace other meat with chicken (without skin)	5(1.3)	21(5.6)	354(93.1)
Reduce sugary beverages in your diet	2(0.5)	16(4.2)	362(95.2)
MEAN DIET ADVICE	3(0.8%)	14(3.7%)	363(95.5%)
Mean Percentages ±SD:4.77 ±0.52			
Perform Regular Physical Activity			
Start or do more physical activity: Progressively increase physical activity to moderate levels (such as brisk walking); at least 150 minutes per week	7(1.9)	28(7.4)	345(90.7)
Maintain a healthy body weight or lose weight: Control body weight and avoid overweight by reducing high calorie food and taking adequate physical activity	11(3)	30(8)	339(89.1)
MEAN PHYSICAL ACTIVITY	6(1.6%)	26(6.9%)	348(91.5%)
Mean Percentages ±SD:4.71 ±0.7			
Treatment adherence			
Teach how to take medications at home	14(3.7)	97(25.7)	269(70.6)
Explain the difference between medicines for long- term control and medicines for quick relief	10(2.7)	63(16.7)	307(80.6)

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Tell the reason for prescribing the medicine/s	8(2.1)	102(27.1)	270(41.4)
Show the appropriate dose	14(3.8)	91(24.1)	275(72.1)
How many times a day to take the medicine	7(1.8)	100(26.5)	273(71.6)
The need to take the medicines regularly as advised even if there are no symptoms	2(0.5)	57(15.1)	321(84.4)
MEAN TREATMENT ADHERENCE	6(1.6%)	51(13.5%)	323(84.9%)
Mean Percentages ±SD:4.35±0.77			

3.6 Relation between the Provided Health Advice and Alteration in Participants' Behaviors

A statistically significant relationship between diet advice provided by healthcare providers and the modified behaviors concerning fruit and vegetables consumption, alike behavior related to salty intake with (p = 0.000).

Table-4: Relationship between advice on lifestyle and behaviors of participants

Independent Variables	Dependent Variables	ANOVA	
		F	P-value
Smoking Advice	Smoking Behaviors	0.479	0.848
Diet Advice	Fruit and Vegetables Behavior	2.826	0.000
	Salty Intake Behavior	3.558	0.000
Physical Activity Advice	Physical Activity Behavior	0.501	0.606

2.7 Relation between the Provided Health Advice and Sociodemographic Factors of Participants

3.7.1 Diet advice across Demographic Factors

The findings showed that the provided diet advice to diabetic patients significantly differs based on gender, for the benefit of females (P= 0.048; μ=4.818). Similarly, a significant statistical difference reported based on monthly income (P = 0.03; μ=4.889) for the benefit of higher monthly income of 5000 to < 6500 NIS as seen in table (5)**.**

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Table-5: Diet advice across sociodemographic factors

Factors		Diet advice score		F value	p-value
		Mean	SD		
Gender	Male	4.711	0.567	3.928	0.048
	Female	4.819	0.487		
Age				0.872	0.481
Level of education				1.835	0.091
Marital status				1.476	0.221
Occupation				1.213	0.294
Monthly income	< 2000 NIS	4.747	0.597	2.249	0.030
	2000 to < 3500 NIS	4.851	0.315		
	3500 to <5000 NIS	4.764	0.555		
	5000 to < 6500 NIS	4.889	0.295		
	6500 to < 8000 NIS	4.555	0.716		
	More than 8000	4.563	0.853		
	don't know	4.071	0.303		
	Refused	4.286	.		

3.7.2 Smoking Advice across Demographic Factors

Receiving smoking advice by diabetic patients statistically showed significant differences only among age groups (P= 0.001; μ=4.408), for the benefit of (51-60 years) as illustrated in table (6).

Table-6: Smoking advice across sociodemographic factors

Factors		Smoking advice score		F value	p-value
		Mean	SD		
Gender				1.201	0.276
Level of education				2.328	0.063
Marital status				0.158	0.854
Monthly income				0.391	0.883
Occupation				1.981	0.090
Age	31-40	1.00	.	5.822	0.001
	41-50	4.308	0.830		
	51-60	4.408	0.768		
	61-70	4.333	0.866		

3.7.3 Activity Advice across Demographic Factors

Concerning receiving advice about physical activity, the study found a statistically significant differences among diabetic patient based on level of education, for the benefit of primary school completed (9th class) (P= 0.036; μ=4.892), and differences based
on monthly income (P = 0.019; μ=4.835) favoring who had income of 2000 to < 3500 NIS monthly as illustrated in table (7).

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Table-7: Activity advice across sociodemographic factors

Factors		Physical activity advice score		F value	p-value
		Mean	SD		
Level of education	No formal schooling	4.667	0.817	2.281	0.036
	Less than primary school(9th not completed)	4.500	0.906		
	Primary school completed(9th class)	4.893	0.401		
	Secondary school not completed	4.811	0.541		
	Secondary school completed	4.840	0.507		
	College/University completed	4.675	0.750		
	Post graduate degree	4.444	1.333		
Age				2.251	0.134
Gender				0.617	0.650
Marital status				1.353	0.257
Occupation				1.155	0.328
Monthly income	< 2000 NIS	4.583	0.887	2.434	0.019
	2000 to < 3500 NIS	4.836	0.507		
	3500 to <5000 NIS	4.776	0.597		
	5000 to < 6500 NIS	4.821	0.527		
	6500 to < 8000 NIS	4.618	0.697		
	More than 8000	4.500	1.090		
	don't know	4.250	1.061		
	Refused	3.000	.		

3.7.4 Medication Advice across Demographic Factors

Respecting to responses to medication advice, diabetic patients showed significantly differences based on level of education, favoring less than primary school (9th not completed) (P= 0.025; μ=4.738), besides occupation (P = 0.032; μ=4.816) for the benefit of unemployed, as illustrated in table (8).

Table-8: Medication advice across sociodemographic factors

Factors		Medication advice score		F value	p-value
		Mean	SD		
Level of education	No formal schooling	3.750	0.835	2.438	0.025
	Less than primary school(9th not completed)	4.145	0.953		
	Primary school completed(9th class)	4.738	0.569		
	Secondary school not completed	4.412	0.745		
	Secondary school completed	4.398	0.769		
	College/University completed	4.349	0.652		
	Post graduate degree	4.667	0.722		
Age				1.806	0.127
Gender				1.248	0.265
Marital status				1.311	0.271
Monthly income				1.782	0.090
Occupation	Government employee	4.241	0.799	2.219	0.032
	Non-government employee	4.433	0.717		
	Self-employed	4.387	0.689		
	Student	4.444	0.962		
	Homemaker	4.366	0.784		
	Retired	4.393	0.602		
	Unemployed (able to work)	3.583	1.304		
	Unemployed (unable to work)	4.817	0.372		

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4. Discussion

Globally, the NCD rates will upsurge by 17% by 2030, because of population aging and the modern trend towards globalization, and urbanization. Females particularly is predicted to achieve the highest rate of noncommunicable diseases in the recent future. The four modifiable main NCD risk factors including; having unhealthy diets, physical inactivity, focusing on tobacco use and the harmful consumption of alcohol, if such practices eliminated or mitigated would prevent 80% of all heart disease, stroke, and diabetes and over 40% of cancer (Ong et al.,2023).

4.1 Dieting Behavior among Diabetic Participants

Overall, high consumption of sugar-sweetened beverages, processed red meat, refined grains and alcohol, as well as diets low in fruits, vegetables, fiber and wholegrain foods are linked to higher diabetes risk which supposed to be found among low socioeconomic groups as reported in numerous studies (Kyrou et al.,2020; & Allen, et al.,2017). This finding was aligned with what was reported in this study as half of respondents (51.2%) consumed two servings of fruits and two for vegetables a day, whereas the majority belongs to low monthly income. Also, it was consistent with what reported in a study conducted in Nepal as (96.6%) of participants had insufficient fruit and vegetables intake linked to one serving of vegetable a day, and to that done in Gaza strip as (15.4 %) only showed adherence in terms of eating enough servings of 5 vegetables and 2 fruits a day for diabetic patients (Dhungana, et al., 2014; & Albelbeisi al.,20121). Further high consumption of fatty and salty meals induced dyslipidemia which in turn rise the risk of exposure to hypertension and strokes among diabetic patients. The majority of participants (73%) in the current study reported avoidance of eating processed food and consumed low grams of salts which showed better results than seen in studies conducted in Nepal and Kyrgyzstan, as (42.9%) of patients in Kyrgyzstan aged 25–64 years have elevated blood pressure and (23.6%) have a raised total cholesterol level; while in the majority of patients in Nepal consumed 14.4 grams ±4.89 grams of daily salt intake. People of high education level and high monthly income reported better habits in accordance with eating healthy diet, which coincided with the finding of this study disregards the insignificance statistical differences across educational level (Dhungana, et al., 2014; &Kontsevaya and Farrington,2017).

4.2 Physical Activity Behavior among Diabetic Patients

Of note, adoption of performing a regular daily activity- as studies recommend a person to do moderate exercise for about 150 minutes or a brisk walking accompanied by low impact aerobics for 200 minutes a week-is essential to improve the glycemic control, which promote health and reduce the short-term, as well as the long-term complications of diabetes. Obesity prevalence measured by body mass index (BMI) tended to be declined with the assistance of activity (Wheeler, 2024; & Islam, 2017). One third of participants in this study (31.8%) claimed to achieve the healthy standards of physical activity, with a median frequency of walking seven days per week for about fifteen minutes daily, and two hours in terms of practicing sedentary

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life style on a typical day. The findings aligned with results found in a study done in Gaza strip and in Nepal as (as (50.1%;48.8%) of patients respectively performed physical activity on a regular basis, however they don't reach the required time and frequency of activity performance (Albelbeisi, et al., 2021; & Dhungana, et al.,2014).

The contribution of high BMI to diabetes as a risk factor is proved in several empirical studies, emphasized by high glycemic and cholesterol findings in blood of diabetic patients. According to the current study, a high percentage rate as (46.1%) of participants were overweight with BMI of 25 and more and (52.4%) of them were obese with BMI over 30 kg/m2. The mean initial BMI was 29.96±3.43. A neglected improvement in the mean of BMI is shown after receiving treatment (29.84); whereby unhealthy lifestyle behaviors of the participants contributed either directly or indirectly to overweight and obesity. Increased urbanization in addition to poor mental health, due to long-standing of Israeli -Palestine struggle might stand behind this high rate of BMI as I guess. The findings of this study were a little bit lower than a study conducted among 302 type 2 diabetes mellitus patients receiving care in resource limited settings primary healthcare clinics distributed across the different governorates in the West Bank including those in the refugee camps in Palestine. About 117 (38.7%) met the recommended amount of physical activity. Theis study alike Shawahna et al in reporting that being younger than 58 years, employed, had high income, well educated, and had positive belief enthused adherence to physical activity (Shawahna et al.,2024). In summary, unhealthy dietary habits, sedentary lifestyle and decreased physical activity are closely associated with Obesity which is recognized to be the most important modifiable risk factor for prediabetes. The study finding was aligned with a systematic review study conducted among 24 European countries about the risk factors associated with diabetes and a systematic analysis computed in 204 countries and territories, across 25 ages

groups, for males and females including Asia, Africa, Europe, and American countries over 1990-2021 (Kyrou et al.,2020; Ong et al.,2023). In addition, the current study showed that the rate of obesity was higher among women rather than men increasing with advanced age (≥51years) which aligned with a study done in Palestine in 2014 by Birzeit university showed that prevalence was higher among women compared with men with the highest prevalence observed for the ages 45–54 years in women and 55–64 years in men (Abu-Rmeileh et al.,2014).Sime findings were supported by a descriptive study conducted in European countries(Armocida et al.,2024).

4.3 Smoking and Alcohol Consumption Behavior among Diabetic Patients

Overt discrepancies are seen in terms of propensity to smoke and the income and education level. Some reviews reported increased rate of smoking among high socioeconomic status people and high-level educators, while other researchers stated the opposite (Allen, et al., 2017; & Corsi, et al., 2013). The present study result revealed that the majority of smokers belonged to low and middle income, aged 50 years and belonged to a level of education higher than secondary school. Such results matched the results of a study done among 406 cardiovascular patients of age 20 to 50

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years selected randomly in Nepal, which revealed that (28.6%) of smokers with low income and (46.3%) of them without formal schooling (Dhungana, et al.,2014). Meanwhile, the results were contradicted to a study conducted in Africa which revealed that being more educated and older than 60 years resulted in being less consuming of tobacco products (Wu et al.,2015). Additionally, the majority of smokers in this study was men (95.8%) aligned with the findings of a study conducted in India as tobacco chewing was higher in men (50.3%) compared with women (4.8%) and higher among high education group (Corsi, et al.,2013). Numerous studies pointed at the negative impact of using cigarette smoking and the risky of alcohol intake in markedly rising the risk for diabetes micro and macrovascular complications. A study conducted among Indian people reported increase blood pressure (27% increase) prevalence, high body-mass index (82% increase), and high fasting plasma glucose (58% increase) among heavy smokers and alcohol drunk (Singh& Bharti,2021).Similarly, a mixed-method study design, within a project aiming to improve diabetic outcomes across PHC in Mysore city, India, conducted in 2018 revealed that poor control increased with higher body mass index (BMI),stress ,and alcohol consumption(Dey et al.,2022).

4.4 Health Advice Concerning Dietary, Smoking, Physical Activity, And Medication Behaviors among NCDs Patients

Sociodemographic factors significantly influence the ability to receive messages which in turn affect behaviors and management of diabetic patients in the West Bank. Additionally, older ages face challenges related to cognitive comprehension, mobility to access healthcare clinics, and adhere to treatment plans. Reviews propose that diabetic women often exhibit better adherence to dietary recommendations and glucose monitoring. Higher education levels are generally associated with better diabetes knowledge, and improved self-care practices. Those with strong social support networks like married ones exhibit better diabetes self-management. Urban patients may have better access to healthcare facilities, while financial constraints can limit access to healthcare services (American Diabetes Association,2021; & Walker, et al.,2016).

In general, inefficient education provided by the healthcare professionals was noticed as reported by the mouth of participants in this study. Receiving health advice that reported in this study (>5%) was lower than seen in Filipin, Malaysia, and in Nepal, as patients receive well enough comprehensible education at the governmental primary health clinics with a percent of (12.2%;20%;23.5%) respectively (Kawi, et al.,2022; & Mazlan, et al.,2021; & Rawal, et al.,2020). A statistically significant association was detected just only between the diet advice provided by healthcare providers and its associated behavior of improvement in daily intake of fruits and vegetables in addition to reduction of salty intake (P=.000; P=.000 respectively) in spite of low mean (3.7%) of participants that they sometimes receive advice. Accordingly, the highest mean reported percentage of lifestyle advices provided by healthcare professional was adherence to medication (13.5%) in this study, but still profoundly lower than a study conducted in Gaza strip as (92.6%) of healthcare

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providers stated that they sometimes or always showed a strict commitment toward medication counseling (Albelbeisi et al.,2020). Only (1.6%) mentioned in the present study that they receive advice concerning performing regular physical activity, which seems inconsistent with what was reported in a study conducted in Gaza strip and Canada (54.5%;42%) respectively, depending on patients' reports about receiving advice from healthcare professional in primary health clinics (Albelbeisi, et al.,2022; & Sinclair et al., 2008).The present study reported that the mean percentage of receiving advice regards stop smoking was (3.3%),which was severely lower than reported in similar studies done in Gaza and USA ,reporting that healthcare providers always and often advised patients to stop smoking with a mean of (54.7% to 73.9%) (Albelbeisi et al.,2020;& Landrine et al.,2018).

4.5 Health -Related Lifestyle Advice across Demographic Factors

Respecting to receiving stop smoking advice, age showed a significant difference in the current study revealed a significant difference (*P*=.001) on the side of 51-60 years old aligned with Sánchez Urbano, et al., 2021 study findings. In terms of comprehending the diet advice, gender particularly females revealed a significant difference(*P*=.001), which was similar to Sánchez Urbano, et al.,2021 study result conducted in a central area of Argentina. Monthly income also seemed to have significant differs concerning diet (*P*=.030) for the benefit of individuals earned (5000 to < 6500 NIS) monthly contradictory to Sánchez Urbano, et al.,2021 study. According to physical activity advice, level of education make difference (*P*=.036) on the side of those who complete the 9th class, and also income (*P*=.019) on the side of those who earn 2000 to < 3500 NIS. Meanwhile, Sánchez Urbano, et al.,2021 study did not show statistical significance difference in terms of either educational level or income. On the opposite, sex and age were statistically significant linked to physical activity and weight control. Regards medication adherence advice, level of education induced a significant difference (*P*=.025) for the benefit of those completed the 9th class, and alike occupation (*P*=.032) for the benefit of the category of Unemployed patients (unable to work). Occupation status was significantly correlated to diet and physical activity advice respecting to Sánchez Urbano, et al.,2021 study.

4.6 Limitations

The study might be affected by participant recall bias in self-reported behaviors. Socioeconomic and cultural factors may affect participants' engagement with the educational program, which could influence results. Also, limited number of the sample size might restrict the generatability of the study findings.

4.7 Recommendations

Building human capacity through evolving training programs for all healthcare providers who take care of diabetic patients is significant to address the patients' needs in the primary healthcare clinics. Considering the current trends regards incorporating the influence of aging, demographic structure and socioeconomic diversity on lengthening of life expectancy of diabetic patients, is becoming increasingly essential to put into integrated holistic interventions for effective diabetes prevention and better control, including lower blood sugar levels, and fewer diabetes-

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related complications. Launching a web-based educational platform, being accessible for patients as well as healthcare providers could be helpful. Finally, experimental studies are recommended to be conducted regards both patients and providers' perspectives in terms of the quality and quantity of the afforded educational health programs at the primary level.

4.8 Conclusion

Effective health educational sessions are expected to improve self-care behaviors among diabetic patients if properly provided by professional healthcare providers in the primary healthcare facilities. Sociodemographic factors are integral part in understanding and improving the lifestyle behaviors of diabetic patients concerning their disease mainly in terms of physical activity, smoking and alcohol consumption, diet, and drug regimen. Addressing these factors through tailored interventions can lead to better disease management and outcomes.

Conflict of Interest

The author declared that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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