Non-Adherence to lifestyle Modification Recommendations of Diet & Exercise amongst Diabetic Patients

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Abstract:
Background: Diabetes is a challenging disease to be managed successfully. So, regimen adherence problems are common in individuals with diabetes, thus making glycaemic control difficult to attain. The aim of this study was to determine the occurrence of non- adherence to life style modification amongst type 2 diabetes mellitus patients.
Methods: Subjects: A purposive sample of all diabetic patients 30 years or older diagnosed with type 2 diabetes mellitus and on clinic care for two or more years who contact the Internal Medicine Clinic in Sheben El-kom Teaching Hospital were included in this study. Instruments: It consisted of self administered questionnaire: It included two constructed tools; 1) questionnaire for socio demographic data including age, educational level, employment, and marital status, ...etc. 2) Lifestyle Questionnaire consisted of yes/no and multiple-choice questions related to perceptions related to lifestyle modification recommendations of diet & exercise, adherence/non- adherence to lifestyle modification recommendations, social and environmental variables as reasons for non- adhering to life style modification of diet & exercise. Results: The study showed that the majority (84.0%) of the studied subjects were not adhering to exercise. Also, more than half (66.0%) of the studied subjects adhering to dietary recommendations. Conclusion: Non- adherence to diet and exercise recommendations amongst type 2 diabetes patients is far more prevalent and no particular single reason could be attributed to poor adherence to either diet or exercise recommendations, rather a combination of many factors. Recommendations: Health care providers should be aware of the factors related to the non- adherence of lifestyle modification and should try to intervene them.
Keywords: Diabetes, Non-adherence to lifestyle modification recommendations.

I. Introduction

Over the last 30-40 years, there have been considerable cultural and social changes and changes in people's behaviors and lifestyles, all of which have resulted in an escalating incidence of type 2 diabetes [1]. With the rising rate of diabetes in both developing and developed countries, the World Health Organization has described diabetes as a worldwide epidemic [2]. The World Health Organization [3] defines diabetes mellitus as "a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. Such a deficiency results in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves".

Type 2 diabetes is the most common form and comprises of 90% of people with diabetes around the [4].The prevalence of type 2 diabetes rates continue to increase with increasing number of patients at risk of serious diabetes-related complications. Having type 2 diabetes increase the risk of a myocardial infarction two times and the risk of suffering a stroke two to four times. It is also a leading cause of blindness, limb amputation and kidney failure [4-7]. The world prevalence of diabetes in 2010 among adults aged 20-79 years is estimated to 6.4%, affecting 285 millions adults [8].Between 2010 and 2030, there is an expected 70% increase in numbers of adults with diabetes in developing countries and a 20% increase in developed countries [8].

Type II diabetes-related mortalities account for 4.6 million deaths in 2011 for people aged 20–79 years, accounting for 8.2% of global all-cause mortality for people in this age group with an estimated rate of one death every seven seconds [9]. The number of deaths has increased by 13.3% from estimates for the year 2010 [10]. The magnitude of the estimated number of deaths due to diabetes is similar to the combined deaths from several infectious diseases like HIV/ AIDS, malaria, and tuberculosis that are ranked as top public health priorities [9]. There is increased concern about the rising tide of type II diabetes and its associated complications in the Arabic speaking countries (East Mediterranean, Arabic peninsula, and Northern Africa) as these regions have some of the highest rates of diabetes in the world [11].

II. Literature Review

The global prevalence of DM in the year 2010 among adults has been estimated to be 6.4%. The prevalence of diabetes mellitus is growing rapidly worldwide and is reaching epidemic proportions. It is estimated that there are currently 285 million people with diabetes worldwide and this number is set to increase to 438 million by the year 2030 [12]. It is estimated that by the year 2030, Egypt will have at least 8.6 million adults with is the eleventh most important cause of diabetes. Diabetes premature mortality in Egypt, and is responsible for 2.4% of all years of life lost (YLL). Similarly, diabetes is the sixth most important cause of disability burden in Egypt 2. Little data is available on the prevalence and characteristics of diabetes in Egypt. The Diabetes in Egypt study, performed between 1992 and 1994, was confined to Cairo and its surrounding villages, and reported the total prevalence of diagnosed and undiagnosed diabetes in the Egyptian population above 20 years of age to be 9.3% [8]. The recent WHO Stepwise survey of non-communicable diseases in Egypt showed the prevalence of known diabetes to be 6.0% [13].

The World Health Organization defines adherence as "the extent to which patients take medications as prescribed by their health care providers, following a diet and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider" [14&15]. Adherence is the key for favourable treatment outcome of the diseases and even the best possible treatment becomes ineffective due to poor adherence to the treatment. The long and complex treatments increase the risk of poor adherence. Non adherence can constitute in many forms including not taking medications or following diet and different lifestyle modifications as recommended by the physician. Non adherence affects the health care provider and the health care delivery system as well as the patient as the patient has to suffer from the poor quality of life and long duration of hospital stay and increased cost and burden of the disease [16].

Targeting lifestyle modifications amongst patients with type 2 diabetes mellitus is effective if the healthcare practitioner understands patients' reasons for adherence and non-adherence to diets and exercise recommendations. Certain studies indicate that adherence to prescribed diet and regular exercise are important for both prevention and control of patients with type 2 diabetes mellitus [17&18]. Several studies have shown the benefit of healthy dietary habits and regular exercise in the prevention and management of type 2 diabetes mellitus. Adherence to prescribed lifestyle changes have also been shown to improve glucose levels, to lead to decreased blood pressure and to correct lipid abnormalities which are factors associated with the micro and macro-vascular complications of diabetes [19].Few studies about patient adherence to oral hypoglycemic agents (OHAs) in Arab Countries have been published. Most of these studies were carried out in Saudi Arabia. One study was performed at Al-Manhal primary health care center, aimed at identifying determinants of compliance among diabetic patients attending that clinic [20]. Other study has been conducted in Palestine aiming to study the effect of "polypharmacy" and "frequency of drug dosing" on the rate of compliance among diabetic and hypertensive patients [21]. The third study was performed to study the rate of compliance among patients with DM and hypertension [22]. A recent study was performed to gather data on current practices in the management of patients with T2DM in Saudi Arabia and to evaluate the degree of compliance with international guidelines [23].Of the various methods available for assessing compliance, self reports and interviews with patients were the simplest and most common methods for measuring medication adherence. On the other hand, it is established that adherence rates to treatment are bad in chronic illnesses. Nevertheless, data on medication adherence among diabetics are scarce. The studies so far have generally evaluated medication adherence and its effects on metabolic control of diabetes, while factors affecting medication adherence itself have been analyzed less frequently [24]. For the previous reasons and due to the limited body of evidence regarding this important health and economic issue in the Egyptian population, we conducted this research study whose aim was to determine the occurrence of non- adherence to life style modification amongst type 2 diabetes mellitus patients.

III. Aim Of The Study

The aim of this study was to determine the occurrence of non- adherence to life style modification amongst type 2 diabetes mellitus patients.

3.1 Objectives
1. To determine prevalence of non- adherence to lifestyle modification recommendations of diet and exercise in type 2 diabetes mellitus patients.
2. To establish the reasons non- adhering patients give for not adhering to diet and exercise.
3. To establish the perceptions of patients on the role of lifestyle modification recommendations in the management of type 2 diabetes mellitus.

IV. Research Question

Why type 2 diabetes mellitus patients were not- adhering to lifestyle modification recommendations of diet and exercise?

V. Methods

5.1 Design: - A descriptive design was used.

5.2 Settings:-This study was conducted in the Internal Medicine Clinic in Shebin El-kom Teaching Hospital at Shebin El-kom city, Menoufia Governorate.

5.3 Sample:- A purposive sample of 150 diabetic patients diagnosed with type 2 diabetes mellitus and who contact the Internal Medicine Clinic in Shebin El-kom Teaching Hospital for two or more years.

5.4 Inclusion criteria:-
- Diagnosed with type 2 diabetes mellitus.
- Contact the Internal Medicine Clinic for two or more years and on clinic care.
- Aged 30 years or older.

5.5 Exclusion criteria:-
- People with type 1 diabetes mellitus.
- Age < 30 years.
- Non- clinic attendants type 2 diabetic mellitus patients.
- Less than 2 years of diagnosed with type 2 diabetes mellitus.

5.6 Sample Size:-The sample size was calculated as N>61. Based on 95% level of significance and 80% power of the study and expecting non compliance at 20-30%.

5.7 Data Collection Instruments:-
Self administered questionnaire was developed by the researcher after reviewing literature related to diabetes management. And it was utilized in this study. It included:-
a. Socio demographic data including age, educational level, employment, and marital status, …etc
b. Questions of yes/no and multiple-choice related to perceptions related to lifestyle modification recommendations of diet & exercise, adherence/non- adherence to lifestyle modification recommendations and Socio– environmental variables i.e. reasons for non- adhering to life style modification of diet & exercise.

5.8 Reliability of the tools:
Reliability was applied by the researcher for testing the internal consistency of the tool, by administration of the same tools to the same subjects under similar conditions on one or more occasions. Answers from repeated testing were compared (Test-re-test reliability = 0.7).

5.9 Validity of the tools:
They were tested for content validity by jury of four experts in the filed of Community Health Nursing and Internal Medicine Specialty to ascertain relevance and completeness.

5.10 Pilot Study was conducted to test the practicality and applicability of the questionnaire and to detect the problems that may encountered during data collection. Also to help to estimate the time needed to fill the questionnaire. The pilot study was conducted on 15 diabetic patients. Patients whom participated in the pilot study were excluded from the total sample.

5.11 Ethical Consideration
An oral consent was obtained from patient to participate in the study. During the initial interview, the purpose of the study was explained and the oral consent was obtained from the participants. The subjects were assured that all information would be confidential to assure the confidentiality of the participants. Participants were assured that their participation in the study was voluntary and that they could withdraw from the study or can refuse to participate in the study. It was explained that there were no costs to participate in the study.
Study Period: the study started from 1 December 2013 to 30 March 2014**.**

5.12 Procedure and Data Collection:
Permission was obtained from the director of Shebin El-kom Teaching Hospital at Shebin El-kom city, Menoufia Governorate. According to the diabetic patient's follow up visits' time schedule, the data were collected from the Internal Medicine Clinic in Shebin El-kom Teaching Hospital at Shebin El-kom city. The purpose of the study was explained and their consent to participate was obtained. Self administered questionnaire was filled by patients and took about 20 minutes. Also, patients with poor educational background were assisted in completing the questionnaire by the researcher. It took four months.

5.13 Statistical analysis:
The collected data were organized, tabulated and statistically analyzed using SPSS version 19 (Statistical Package for Social Studies) created by IBM, Chicago, Illinois, USA. For categorical variable the number and percentage were calculated and differences between subcategories were tested by exact tests. The level of significant was adopted at p<0.05.

VI. Results
## Table (1): Socio-demographic Characteristics of the Studied Subjects

Socio-demographic characteristics	Number (n=150)	%
Age in years:	13	8.7
30-	19	12.7
40-	61	40.7
50-	52	34.7
70+	5	3.3
Marital status:		
Single	2	1.3
Married	103	68.7
Widowed	42	28.0
Divorced	3	2.0
Residence:		
Rural	126	84.0
Urban	24	16.0
Educational level:		
Illiterate	96	64.0
Read & write	29	19.3
Primary	7	4.7
Technical	18	12.0
Employment:		
Unemployed	26	17.2
Employee	4	2.7
Housewife	100	66.7
Dealer	7	4.7
Manual worker	13	8.7

Table (1) displayed the socio-demographic characteristics of the studied subjects. As noticed in the table, 40.7% of the studied subjects were 40-49 year age group, this is closely followed by 34.7% aged 50-69 years, and the lowest proportion was noted among the studied subjects aged 30-39 year. More than half of the participants (68.7%) were married and 28.0% reported to be widowed. The highest percentage of the studied subjects (84.0%) lived in rural area. More than half of the studied subjects (64.0%) were illiterate and housewife (66.7%).

Table (2): Distribution of the Studied Subjects in relation to understanding of life style modifications

Life style modifications	Number (n=150)	%
Management of diabetes:		
Gentle aerobic exercise only	5	3.3
Healthy dietary habits only	81	54.0
Both gentle aerobic exercise and health dietary habits	64	42.7
Gentle aerobic exercise has a role in management of diabetes	134	89.3
Perceives that exercise helps to control blood sugar	133	88.7
Healthy dietary habits has a role in management of diabetes	141	94.0
Perceives that healthy dietary habits helps to control blood sugar	139	92.7

Figure (1): Distribution of the Studied Subjects by their perception of importance of exercise and dietary habits in control of diabetes
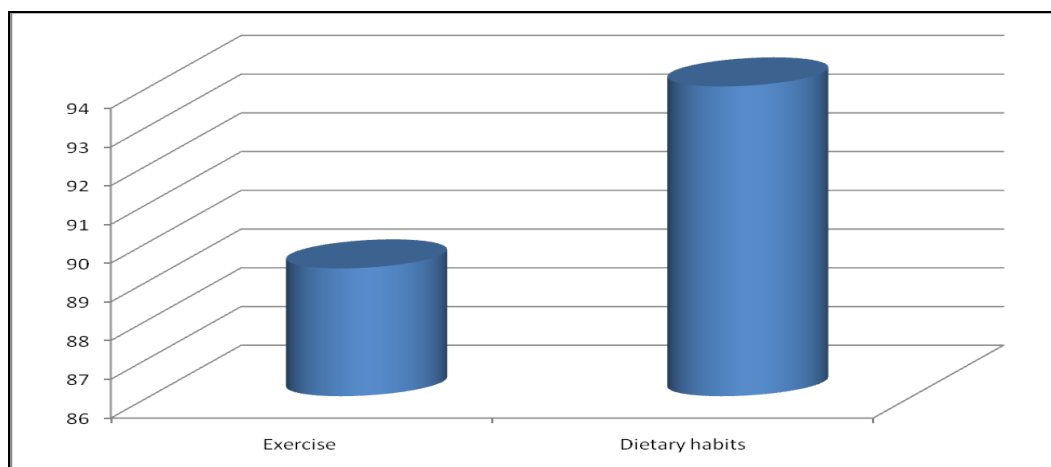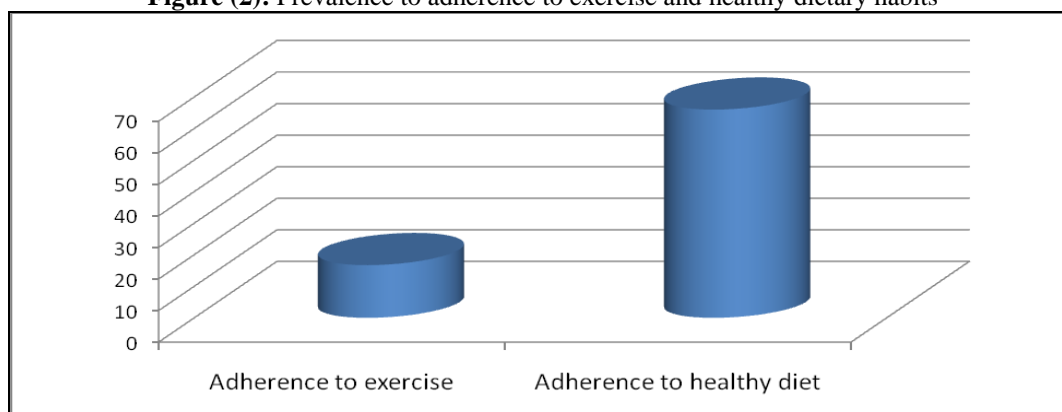

Table (2) and figure (1) showed distribution of the studied subjects in relation to understanding of life style modifications. As shown from the table and figure, the majority of the studied subjects reported that healthy dietary habits has a role in management of diabetes and perceived that healthy dietary habits helps to control blood sugar (94.0%, 92.7% respectively). The highest percentage of the studied subjects reported that gentle aerobic exercise has a role in management of diabetes and perceived that exercise helps to control blood sugar (89.3%, 88.7% respectively). More than half (54.0%) of the studied subjects reported that their understanding of lifestyle modification recommendations in the management of type 2 diabetes mellitus was healthy dietary habits only.

Table (3): Distribution of Adherence to Gentle Aerobic Exercise among the Studied Subjects

adherence to gentle aerobic exercise	Number (n=150)	%
Adhere to any form of gentle aerobic exercise	**25**	**17.0**
Type of gentle aerobic exercise practiced: (n=25)		
Brisk walking	**12**	**48.0**
Cycling	**1**	**4.0**
Sport activities	**10**	**40.0**
Slow walking	**2**	**8.0**
Frequency of adherence to gentle aerobic exercise: (n=25)		
Once daily	**5**	**20.0**
Once weekly	**6**	**24.0**
At least thrice weekly	**13**	**52.0**
Once monthly	**1**	**4.0**
Duration of gentle aerobic exercise in minutes: (n=25)		
<10	**4**	**16.0**
10-19	**16**	**64.0**
20-29	**3**	**12.0**
30-39	**1**	**4.0**
40+	**1**	**4.0**

Figure (2): Prevalence to adherence to exercise and healthy dietary habits
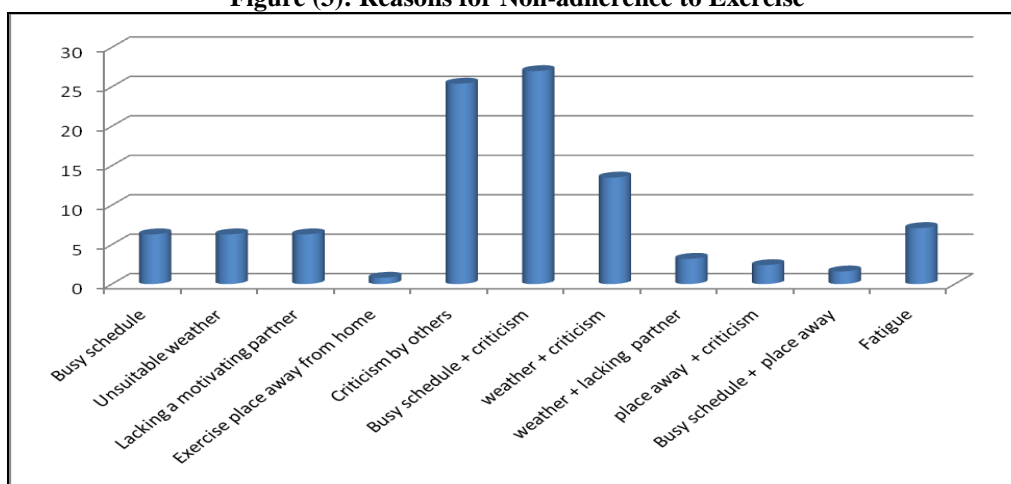
Table (3) and figure (2) illustrated distribution of adherence to gentle aerobic exercise among the studied subjects. As noticed from the table and figure, about one sixth (17.0%) of the studied subjects indicated that they exercised; brisk walking was the most frequently selected option, followed by sport activities (40.0%) and cycling as the least chosen option. More than half (52.0%) of the adherers stated that they engaged in exercise for at least 3 times per week and each session lasting for 10-19 minutes or more. While the highest percentage (83.0%) of the studied subjects were not adhering to physical exercise.

Table (4): Distribution of Adherence to Healthy Dietary Habits among the Studied Subjects

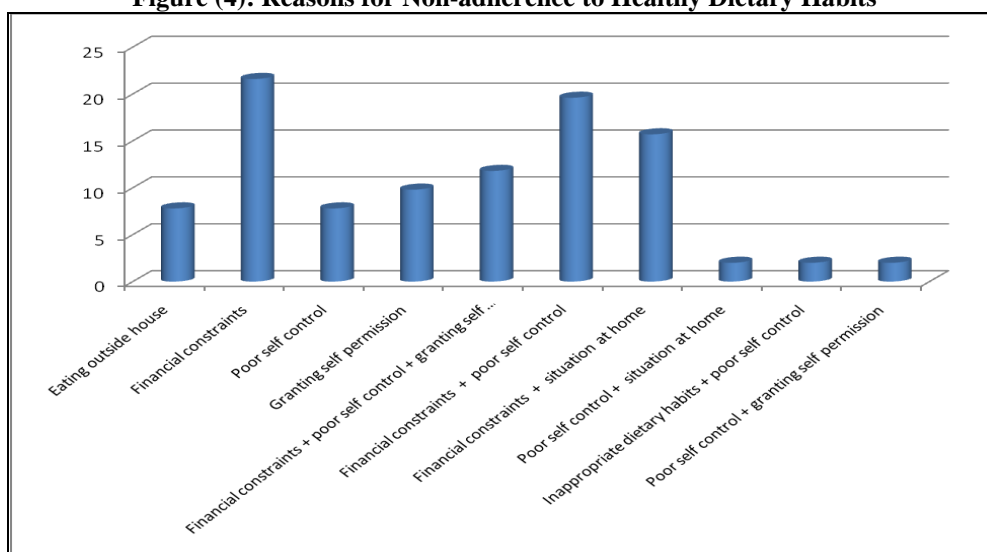| Adherence to Healthy Dietary Habits	Number (n=150)	%
Adhere to healthy dietary habits	99	66.0
Type of health dietary habit practiced: (n=99)		
High starch and fiber food	2	2.0
Low saturated fat and calories intake	2	2.0
Fruits and vegetables	1	1.0
Smoking cessation	11	11.1
Low saturate fat and calories intake + fruits and vegetables	61	61.6
High starch and fiber + smoking cessation	4	4.0
Low saturated fat and calories + fruits and vegetables + smoking cessation	12	12.1
High starch and fiver + fruits and vegetables	6	6.1
Frequency of adherence to healthy dietary habits: (n=99)		
Once daily	3	3.0
Once weekly	8	8.1
At least thrice weekly	16	16.2
Once monthly	25	25.3
Once every two months	47	47.5

Table (4) and Figure (2) showed distribution of adherence to healthy dietary habits among the studied subjects. As shown from the table and figure, more than half (66.0%) of the studied subjects adhering to dietary recommendations indicated that they engaged in Low saturate fat, calories intake, fruits and vegetables. Less than half (47.5%) of the adherers reported that their frequency of adherence to healthy dietary habits was once every two months and less than one third (25.3%) of them reported that their frequency of adherence to healthy dietary habits was once monthly. While, only more than one third of the studied subjects were not adhering to diet.

Figure (3): Reasons for Non-adherence to Exercise

Figure (3) demonstrated distribution of reasons of non-adherence to exercise among the studied subjects. As noticed from the table and figure, the majority (84.0%) of the studied subjects were not adhering to exercise and the top five reasons for having difficulty to engage in regular moderate intensity exercise include busy schedule and criticism (27.1%), criticism by others (25.4%), unsuitable weather and criticism (13.5%), fatigue (7.1%) and busy schedule (6.3%).

Figure (4): Reasons for Non-adherence to Healthy Dietary Habits

Figure (4) illustrated Distribution of reasons of non-adherence to healthy dietary habits among the studied subjects. As illustrated from the table and figure, the main perceived reasons for not adhering to diet recommendations were financial constraints (21.6%), financial constraints and poor self control (19.6%), financial constraints and situation at home (15.7%), financial constraints, poor self control and granting self permission (11.8%) and granting self permission (9.8%).

Table (5): Relationship between Adherence to Exercise and Healthy Dietary Habits and Consistently Receiving Moral or Emotional Support

Adherence of patients	Consistently receiving moral or emotional support				p
	Yes		No		
	n	%	n	%	
Adherence to healthy diet:					0.078
Yes	78	70.3	21	53.8	
No	33	29.7	18	46.2	
Adherence to exercise:					0.001*
Yes	16	38.1	9	8.3	
No	26	61.9	99	91.7	

*Significant

Table (5) showed relationship between adherence to exercise and healthy dietary habits and consistently receiving moral or emotional support. As shown from the table, there was no statistical significant difference between consistently receiving moral or emotional support and adherence to healthy dietary habits where p= (0.078). While there was statistical significant difference between consistently receiving moral or emotional support and adherence to exercise where p= (0.001).

Table (6): Relationship between Adherence to Healthy Dietary Habit Recommendations and Receiving Detailed Written Instructions regarding Healthy Dietary habits

Adherence of patients to healthy dietary habits	Receiving detailed written instruction about healthy Dietary habits				p
	Yes		No		
	n	%	n	%	
Yes	88	75.9	11	32.4	0.001*
No	28	24.1	23	67.6	

*Significant

Table (6) illustrated relationship between adherence to healthy dietary habit recommendations and receiving detailed written instructions regarding healthy habits. As noticed from the table, there was statistical significant difference between receiving detailed written instructions regarding healthy habits and adherence to healthy dietary habit recommendations where p= (0.001).

Table (7): Relationship between Adherence to Gentle Aerobic Exercise Recommendations and Receiving Detailed Written Instructions regarding Exercise Program

Adherence of patients to gentle aerobic exercise recommendations	Receiving detailed written instruction about exercise program				p
	Yes		No		
	n	%	n	%	
Yes	16	38.1	9	8.3	0.001*
No	26	61.9	99	91.7	

*Significant

Table (7) demonstrated relationship between adherence to gentle aerobic exercise recommendations and receiving detailed written instructions regarding exercise program. As demonstrated from the table, there was statistical significant difference between receiving detailed written instructions regarding exercise program and adherence to gentle aerobic exercise recommendations where p= (0.001).

VII.   Discussion

Among the chronic non-transmissible diseases which are responsible for chronic health conditions, Diabetes Mellitus (DM) stands out, because of its epidemic proportions on the national [25&26] and global scale, and the concept of adherence, for this disease, includes, as well as drug therapy, an individualized nutritional plan, regular physical exercise, and general care [27]. Non-adherence affects the health care provider and the health care delivery system as well as the patient as the patient has to suffer from the poor quality of life and long duration of hospital stay and increased cost and burden of the disease.

Concerning the studied subjects' understanding of life style modification, the finding of the present study (table 2 and figure 1) revealed that, the majority of the studied subjects reported that healthy dietary habits has a role in management of diabetes. Also, the highest percentage of studied subject reported that gentle aerobic exercise has a role in management of diabetes. This finding is similar to what was reported by [28] who assessed perceptions and practices of Indian type 2 diabetics, and reported that lifestyle interventions, namely nutrition and exercise, are the cornerstones of successful diabetes therapy. Also, the findings of this study revealed that diabetic patients rely mostly on drugs and dietary modification to control their disease condition.

Moreover, finding of the present study is supported by [29] who asses African type 2 diabetic patients' non-adherence to lifestyle modification recommendations (diet and exercise), and found that most of the participants perceived diet and exercise as indispensable lifestyle measures that would improve their diabetic control. Also, the present study finding is in consistent with the results of the study carried out by [30] who assessed knowledge and awareness of diabetic and non-diabetic population towards diabetes mellitus in Kaduna, Nigeria, and reported that both diabetic and non diabetic participants have good knowledge towards diabetes physical control by planned diet and regular exercise. In addition, the finding of the present study is supported by [31] who evaluate awareness of diabetes mellitus among diabetic patients in Gambia, and concluded that a significant proportion of these participants said diabetes mellitus can be managed by dietary modification and medication.

Regarding adherence to gentle aerobic exercise, the finding of the present study (table 3 and figure 2) revealed that one sixth of the studied subjects indicated that they exercised; brisk walking was the most frequently selected option, followed by sport activities and cycling as the least chosen option. More than half of the adheres stated that they engaged in exercise for at least three times per week and each session lasting for 10-19 minutes or more. While the highest percentage of the studied subjects were not adhered to physical exercise. This finding is similar to what was reported by [32] who examined the relationship between cultural factors and patients' adherence to lifestyle measures, and reported that there is a higher occurrence of non-adherence to physical exercise. This might be due to different patient co-morbidities such as hypertension, obesity and osteoarthritis. Also, finding of the present study is supported by [33] findings; the researcher assessed barriers to physical activity in patients with diabetes and reported that there high occurrence of non-adherence to exercise.

Moreover, this finding is similar to [34] findings; the researcher studied the effectiveness of adding cognitive behavioral therapy aimed at changing lifestyle to managed diabetes care for British patients with type 2 diabetes – design of a randomized controlled trial and demonstrated seventy percent of people with type 2 diabetes had little or no physical activity. In addition, finding of the present study is supported by [35] finding; the researcher performed a comparative study of compliance between hospital and primary care for Egyptian diabetic patients and reported that only one third of subjects exercise for 3 to 7 times per week. Where as more then half of them exercise only zero to two times per week. This study clearly showed that the rate of compliance towards exercise recommendation was still low among the patients. This can be explained by subjects' wrongly viewed exercise as potentially exacerbating illness such as body pain

Concerning adherence to healthy dietary habits, the finding of the present study (table 4) revealed more than half of the studied subjects adhering to dietary recommendations. While, only more than one third of the studied subjects were not adhering to diet. This finding is supported by [29] finding; the researcher assessed

African type 2 diabetic patients' non-adherence to lifestyle modification recommendations (diet and exercise) and reported that only more than one third were not adhering to diet. Also, finding of the present study is supported by [35] finding; the researcher performed a comparative study of compliance between hospital and primary care for Egyptian diabetic patients and reported that more than three quarters of the diabetics adhered poorly to the prescribed diet. This can be explained by higher level of perceptions noted amongst participants that diet significantly helps to achieve and maintain good glycaemic control.

Regarding reasons of non-adherence to exercise, the finding of the present study (figure 3) revealed that the majority of the studied subjects ere not adhering to exercise and reasons for having difficulty to engage in regular moderate intensity exercise include busy schedule, criticism by others, unsuitable weather and fatigue. This finding is similar to [36] finding; the researcher examined barriers to physical activity in older adults in Germany and found that barrier to physical activity were poor health, tiredness, lack of company and lack of time. Also, finding of the present study is supported by [37] findings; the researcher assessed barriers to exercise in obese Irish patients with type 2 diabetes and the reported barriers to physical activity were physical discomfort, the perceived boring nature of exercise and lack of time. Moreover, this finding is similar to what reported by [38] who examined the effect of home visit as an educational health strategy on self care in diabetes, and reported that great resistance was observed among patients. Many reasons are pointed to, such as the lack of time and space for practice, pain from comorbidities and lack of company. In addition, this finding is similar to what was reported by [39] who performed a pilot study on barriers influencing the compliance towards exercise recommendation in Egyptian patients with DM and reported that the most possible factor for exercise noncompliance is environmental factor, in the sense of lacking of time to exercise, poor health condition, busy with work, tired and having no companion or partner.

Concerning reasons of non-adherence to healthy dietary habits, the finding of the present study (figure 4) revealed that more than one third of the studied subjects were not adhering to diet and reasons were financial constraints, poor self control, situation at home and granting self permission. The finding of the present study is supported by [29] findings; the researcher assessed non-adherence to lifestyle modification recommendations (diet and exercise) amongst African type 2 diabetes mellitus patients and reported that the most frequent reasons for not adhering to dietary recommendations are granting self permission, financial constraints to buy healthy diet and poor self control. Also, the finding of the present study is consistent with that reported by [32]

Regarding relationship between consistently receiving moral or emotional support and adherence to exercise and healthy dietary habits. The finding of the present study (table 5) revealed that, there was statistical significant difference between consistently receiving moral or emotional support and adherence to exercise. This finding is similar to what was reported by [40] who examined relationship among social support, treatment adherence and metabolic control of diabetes mellitus patients and reported that family members and significant others may reinforce patients' health orientations, which could lead to higher adherence to diet and physical exercise recommendations as well as to medication.

However, the finding of the present study indicated that there was no statistical significant difference between consistently receiving moral or emotional support and adherence to healthy dietary habits. This finding is contraindicated with [41] who assessed factors influencing dietary practice among type 2 diabetes, and reported that patients' good family support possibly contributed in improving dietary practice in older age groups. This may due to adherence to diet may require stronger support from the patients' relatives, considering that all members in a family, especially in traditional societies (including African countries), usually share meals. In addition, financial constraints to buy healthy diet were the main reason for non-adherence to healthy dietary habits.

Concerning relationship between receiving detailed written instructions regarding healthy dietary habits and adherence to healthy dietary habits recommendations. The finding of the present study (table 6) indicated that there was statistical significant difference between receiving detailed written instructions regarding healthy dietary habits and adherence to healthy dietary habits recommendations. This finding is similar to what was reported by Bahrain and American Diabetes Association's guidelines for the management of diabetes mellitus [42] that all diabetic patients at time of diagnosis, must be provided with an access to a dietitian/nutritionist. Also, they need other health-care professional trained in the principles of nutrition who will offer an initial consultation with two or three follow-up sessions, either individually or in groups.

Also, finding of the present study is supported by [43] findings; the researcher examined compliance to dietary counseling provided to patients with type 2 diabetes at a tertiary care hospital. The authors indicated that this study provides valuable evidence that dietary advice given by a professional dietitian is effective in modifying dietary behavior; and thus has a great potential for influencing the outcome of treatment. In addition, the finding of the present study is consistent to what was reported by [44] who assessed factors associated with poor glycemic control among Egyptian patients with type 2 diabetes, and reported that continuous education is recommended to encourage physical activity and diet regimen adherence.

Regarding relationship between receiving detailed written instructions regarding exercise program and adherence to gentle aerobic exercise recommendations. The finding of the present study (table 7) revealed that there was statistical significant difference between receiving detailed written instructions regarding exercise program and adherence to gentle aerobic exercise recommendations. This finding is similar to what was reported by [45] who examine the impact of an education program on patient anxiety, depression, glycemic control, and adherence to self-care and medication in type 2 diabetes in Saudi Arabia, and reported that an increase in the proportion of patients who began to take adequate physical exercise (at least 30 min) after the education program. Also, finding of the present study is supported by [29] findings; the researcher indicated that lack of information (i.e. detailed written instruction) between patients and health care providers appeared to be the most frequently reported reason for diet and exercise non-adherence, when comparing with other reasons for not adhering to lifestyle modification recommendations. This finding agree with the study by [46] who assessed perspectives of type 2 diabetes patients' adherence to treatment, and concluded that the overall effects of lack of lifestyle measures information would include knowledge and skill deficits and thus, leading to poor glycaemic control. This suggests the need for diabetes educational program to improve diet and exercise adherence.

VIII.   Conclusions

Non- adherence to diet and exercise recommendations amongst type 2 diabetes patients is far more prevalent and no particular single reason could be attributed to poor adherence to either diet or exercise recommendations, rather a combination of many factors.

Recommendation

Health care providers should be aware of the factors related to the non- adherence of lifestyle modification and should try to intervene them.

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