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Exercise Type and Frequency, Diet Conformity, and Medication Adherence Are Captured in Patients with Type 2 DM

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Annotation: This cross-sectional study investigates the relationships between exercise behaviors, dietary adherence, and medication use in 69 patients with type 2 diabetes mellitus (T2DM) recruited from hospitals in Iraq, where in our study Participants were primarily middle-aged adults (40-69 years), with a predominance of females (56.5%) and married individuals (78.3%) as well as Data on exercise type and weekly frequency, diet conformity, and anti-diabetic medication usage were collected through interviews and questionnaires, the finding were showed varied exercise engagement, with aerobic activities linked to higher frequency, highlighting exercise's role in glycemic control also found Dietary adherence correlated positively with the number of oral hypoglycemic drugs taken, suggesting interaction between lifestyle and pharmacotherapy so concloude from this paper polypharmacy was negatively associated with patients' self-assessed general health. These findings emphasize the importance of integrating personalized lifestyle modifications with optimized medication regimens to enhance adherence and health outcomes in T2DM management.

Keywords: Type 2 Diabetes Mellitus, Exercise Frequency, Diet Adherence, Medication Adherence, Polypharmacy, Glycemic Control.

Introduction

Non-communicable diseases are chronic conditions that typically exhibit gradual progression; diabetes mellitus (DM) is one such condition identified as a priority for preventive measures by the World Health Organization (WHO). The designation DM refers to a syndrome marked by a multifactorial metabolic disorder, which is defined by persistent hyperglycemia and disturbances in the metabolism of carbohydrates, lipids, and proteins, arising from deficiencies in insulin secretion, insulin action, or both[1,2,3,4].

Diabetes Mellitus (DM) is a perpetual disease that is not only costly but now incurable as well, and its prevalence has risen in the latter years [5]. The disease has been responsible for approximately 5 million adult mortality from 20 to 79 years of age. Diabetes Mellitus also has the propensity to engender lasting complications leading to incapacitation, and it now presents a daunting challenge to healthcare delivery systems globally [6,7,8]. Physical exercises have been mentioned as a component of an overall therapeutic regimen for the disease because various authors [12-16] advocate for the use of physical exercises in type 2 diabetes mellitus patient management [9,10,11]. The recommendation is based on the substantial beneficial outcomes of the physical exercises that the patient normally disregards without totally valuing them as components of his regimen of treatment [12,13]. The therapeutic value of physical exercises among type 2 diabetes mellitus patients is clear [14]. Many of these patients also suffer from obesity and have clinical presentations of sedentary lifestyles [15]. More

sedentary individuals tend to have elevated body mass index (BMI) levels, wider waistlines, and significant increased systolic blood increase pressures [16].

Physical inactivity (PA) contributes to a worse lipid profile, high C-reactive protein levels, and high HOMA-IR insulin resistance index. Physical inactivity also contributes to the production of an augmented triglyceride/cholesterol ratio, and high-density lipoprotein cholesterol and insulin. [17,18]

This reality requires our healthcare professionals to understand the usefulness of physical activity in these patients, which will increase their motivation to prescribe it[19] Undoubtedly, the accelerated growth of sedentary lifestyles, T2DM, and obesity (Ob) has a socioeconomic and human impact on the National Health System, justifying the development of health policies based on population-based interventions where PE plays an important role[20]

From these considerations, the subsequent paper offers an account of the beneficial effects of PE on individuals with T2DM.

Material and method

The cross-sectional study design was used in the current study to examine exercise type and exercise frequency, adherence to diet, and medication adherence of type 2 diabetes mellitus (T2DM) patients where in our Participants were enrolled according to diagnosis criteria that were confirmed mainly by the glucose tolerance test (GTT) and HbA1c, as recorded on clinical notes , according table 1 recorded Demographic information such as age, gender, and marital status were also obtained to describe the study population where The sample size comprised 69 patients who were mainly between the ages of 40 and 69 years recruited from various hospitals from Iraq with study duration between 2024 and 2025 with a greater number of females (56.5%) and the majority being married (78.3%) as well as It was addressed Duration of diabetes data also ranged substantially, from very recent diagnosis (as few as 7 days) to long-standing disease presence (up to 26 years), allowing examination of different disease stages even that Diagnoses based on age were also documented, revealing the majority of the patients were between 30 and 59 years old at the time of diagnosis in addition to Medication histories were also collected with emphasis on the history of anti-diabetic therapy, which showed that the majority of the patients (60.9%) were not on present medication, but the others were taking oral hypoglycemic drugs like glibenclamide and metformin, combinations like insulin analogs and sitagliptin, respectively.

According to Physical activity behaviours were categorized by type and number of times per week to analyse exercise behaviours, which are central to successful management of diabetes while also Adherence to dietary changes was also assessed and analyzed against the number of oral hypoglycemic agents (OHD) taken by the participant, to examine lifestyle adherence in relation to medication pill burden while in study examined the association between the number of chronic drugs taken and the general health of the patients to determine if treatment complexity has a link to self-registered health status furthermore The medication history emphasized history of past and present anti-diabetic therapy. Patients volunteered information on the use/non-use of medicines such as oral hypoglycaemic drugs and insulin treatment.

Exercise data were obtained.

- Either by interviewing patients or by questionnaire, which categorized both the exercise type (e.g., aerobic, resistance training) and the weekly exercise session frequency.
- This measure was important to quantify activity levels relevant to glycemic control.
- Figure 1 illustrates the association between exercise type and exercise frequency.

Dietary adherence was assessed by self-report of adherence to prescribed/recommended dietary modifications, i.e., adherence to "being a conformist" to dietary recommendations while that measure of dietary adherence was then mapped against the number of items of oral hypoglycemic drug product consumed, shown in Figure 2, to explore compensatory activity between lifestyle and pharmacotherapy so as The patients' self-assessment scales were utilized to gauge the general health perception, which were then cross-matched with the utilization of chronic drugs prescribed (including

those that were not diabetes medication) to establish how the treatment burden may impact overall health feel Data were analyzed utilizing descriptive statistics to summarize the demographics of the patients, disease attributes, and therapy regimens as well as Correlation tests were conducted to determine meaningful relationships between exercise regularity, dietary adherence, medication use, and overall health furthermore These variables were accurately recorded and structured within tables that provide demographic data (Table 1), diabetic history duration (Table 2), age of diagnosis and mode of diagnosis (Table 3), and pre-existing diabetes drugs (Table 4).

Results

Table 1- General demographic of the study

Age Group	Count	Percentage
<30	0	0.0%
30-39	0	0.0%
40-49	29	42.0%
50-59	17	24.6%
60-69	21	30.4%
≥70	2	2.9%
Gender	**Count**	**Percentage**
Female	39	56.5%
Male	30	43.5%
Marital Status	**Count**	**Percentage**
Married	54	78.3%
Widowed	13	18.8%
Divorced	1	1.4%
Single	1	1.4%

Table 2- Distribution by Duration of Diabetes Mellitus

Duration	Count	Percentage
5 years	15	21.7%
13 years	6	8.7%
6 years	6	8.7%
2 years	5	7.2%
1 year	3	4.3%
11 years	3	4.3%
7 years	3	4.3%
4 years	3	4.3%
12 years	3	4.3%
9 years	2	2.9%
17 years	2	2.9%
16 years	2	2.9%
8 years	2	2.9%
3 month	2	2.9%
18 years	2	2.9%
First visit	2	2.9%
6 month	2	2.9%
9 months	1	1.4%
7 days	1	1.4%
3 years	1	1.4%
3 weeks	1	1.4%
26 years	1	1.4%
15 years	1	1.4%

Table 3- Distribution by Age at Diagnosis and Diagnosis Method

Age at Diagnosis Group	Count	Percentage
<30	4	5.8%
30-39	20	29.0%
40-49	19	27.5%
50-59	16	23.2%
≥60	10	14.5%
Diagnosis Method	**Count**	**Percentage**
GTT	64	92.8%
HbA1c	5	7.2%

Table 4- Distribution by Previous Anti-Diabetes Medications

Medication	Count	Percentage
0	42	60.9%
Glibenclamide	17	24.6%
Glibenclamide, Metformin	3	4.3%
Unknown	2	2.9%
Glimepiride	2	2.9%
Metformin	1	1.4%
Insulin Glargine, Sitagliptin	1	1.4%
Glimepiride, Sitagliptin	1	1.4%

Figure 1- The relationship between the type of exercise and with frequency of exercise per week

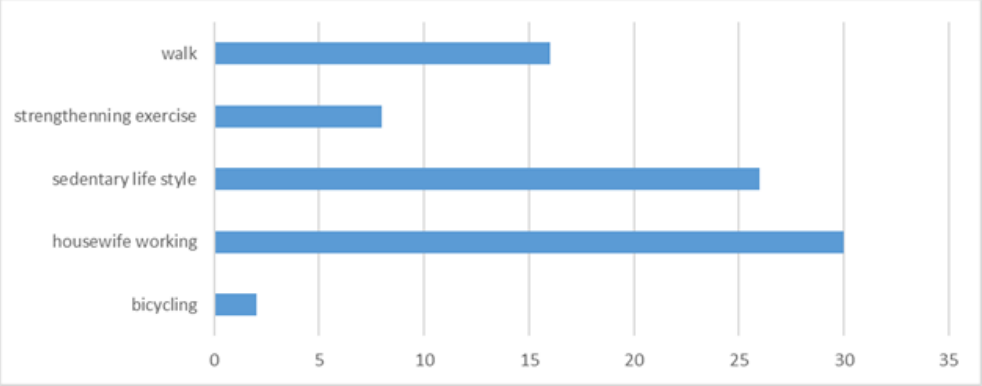


Figure 2- Correlation Between Diet Modification (Conformist) With NUMBER OF OHD ITEMS (Totally)

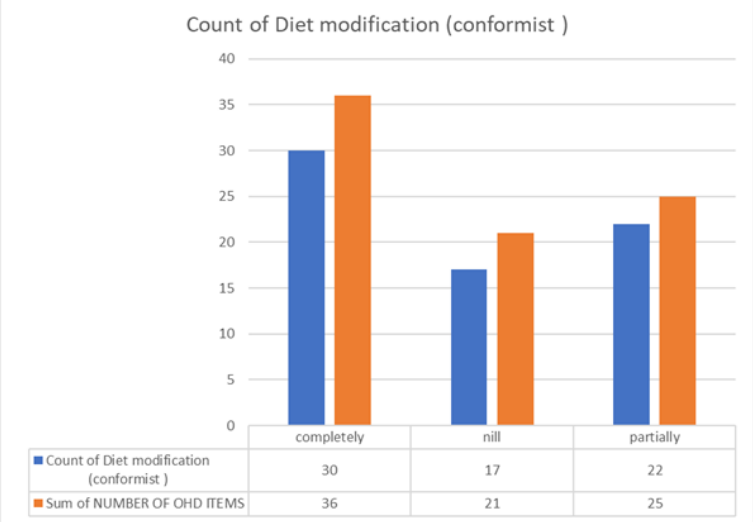
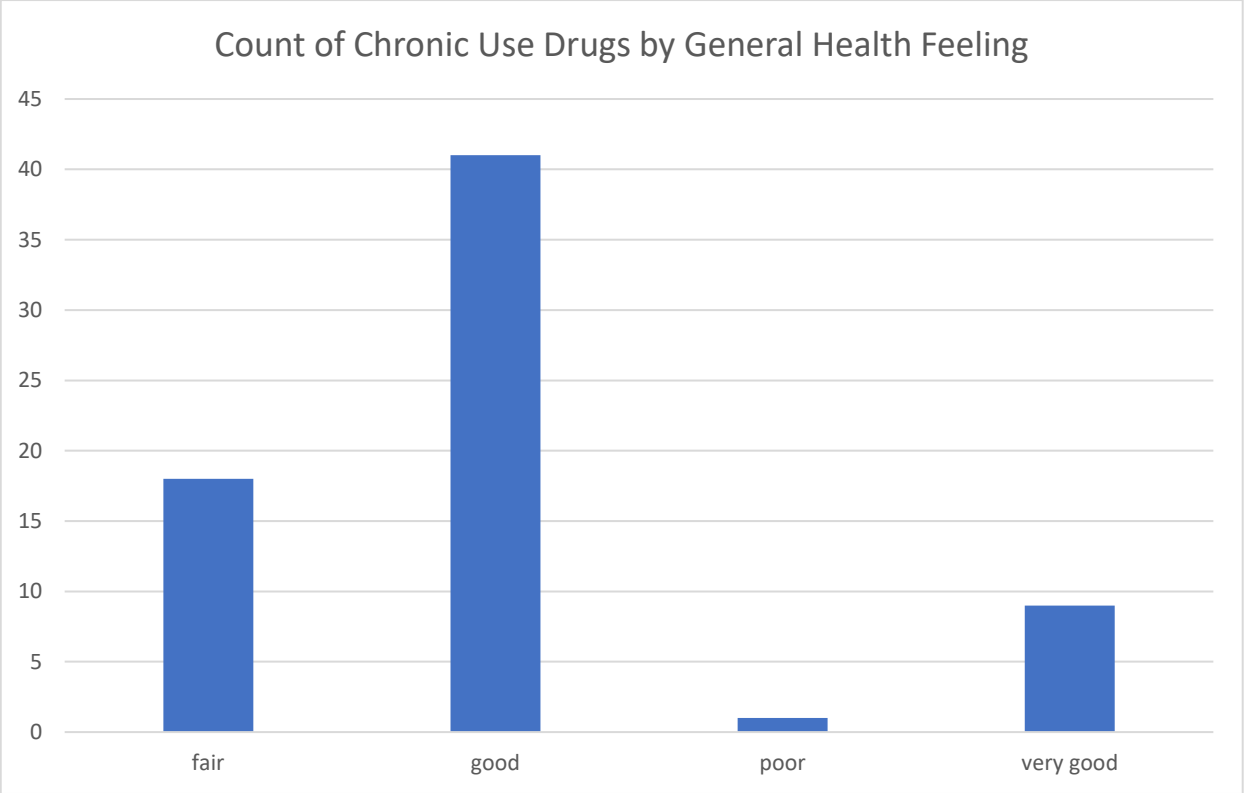


Figure 3- Correlation between the count of use chronic drug use drugs with general health feelinf



Discussion

as shown in table 1 refer to The demographic features described in Table 1 show a study population mainly between ages 40-69 years, of whom 42.0% were between 40-49 years of age, 24.6% were between 50-59 years of age, and 30.4% were between 60-69 years of age, based on This distribution is compatible with the typical presentation and prevalence of type 2 diabetes mellitus (T2DM), which presents typically in middle-aged and elderly adults due to the development of insulin resistance and metabolic changes that accompany aging wParticipants were predominantly female (56.5%) compared to males (43.5%), which may be due to gender-specific health-seeking practices or regional demographical patterns addition to Marital status distribution indicates the majority of the patients were married (78.3%), indicating the absence of a social support system that could have a positive influence on disease management since it has been established that social support has a bearing on lifestyle adherence across chronic conditions , according to Table 2 also shows high variability in the duration of diabetes among the study participants, with cases ranging between recent diagnoses (as short as 7 days or the first visit) to diabetes lasting as long as 26 years furthermore in our study The most common duration encountered was 5 years (21.7%), reflecting the high proportion of persons with medium-term disease exposure while also The high variability provides the basis for studying the influence of the duration of disease on adherence practices, glycemic control, and risk of complications, since long disease duration has been typically accompanied by increasing beta-cell dysfunction and increased risk of complications , although Additionally, the presence of recent onset allows one to study the very initial management practices.

As finding Age at diagnosis reported in Table 3 emphasizes that the large proportion were between ages 30-59, with 29.0% between ages 30-39 and 27.5% between ages 40-49, supporting the middle-age onset distribution typical of T2DM also reported The mode of diagnosis was significantly by glucose tolerance test (92.8%), the gold-standard test for diagnosis, securing soundness of diagnosis and reliability, in addition to More patients were identified by HbA1c (7.2%), which, despite being on the increase, may fluctuate due to hemoglobinopathies or anemia where These data on diagnosis validate the clinical characterization of the identified cohort and emphasize the need for standardized criteria of diagnosis in studies to uphold validity . as depend on Table 4 gives important information on

prior anti-diabetes therapy, so found Of interest, 60.9% of patients had no anti-diabetic medication use, which may reflect early disease, lifestyle-dominant diabetes, or potential access/treatment adherence issues even that In the medication group, the predominant therapy was glibenclamide at 24.6%, with combinations of glibenclamide and metformin at 4.3%, It was addressed in our study The prevalence of multiple therapy regimens including insulin analogues indicates differential disease severities and personalised management strategies , found This heterogeneity mirrors the challenge of managing T2DM and the imperative of personalised therapy according to patient response, side effects, and comorbidity.

According to figure 1 shows the association between exercise modality and weekly exercise, which suggests that some exercise types might be associated with greater physical activity levels. Moreover, as an example, aerobic exercise, which has been identified to improve insulin sensitivity and glycemic control, might be more popular for regular participation than resistance exercise or walking. Regular exercise is necessary for the best glucose metabolism, and the association gives information that can be used to design targeted intervention to enhance physical activity levels in persons, based on The correlation between dietary change adherence (diet adherence) and the overall number of oral hypoglycemic drug (OHD) products taken is shown in Figure 2, however found A positive correlation could reflect patients taking more drugs as being also more likely to follow dietary advice, reflecting greater disease severity awareness and greater blood glucose control motivation overall as well as poor diet adherence in the face of polypharmacy could be an indicator of treatment difficulty. This figure highlights pharmacologic intervention versus lifestyle management interaction, which is integral to comprehensive diabetes care. Additionally, as found in Figure 3 illustrates, the relationship between the quantity of chronic medications utilized and patients' overall perceptions of their health and found A negative correlation, which may indicate that polypharmacy, frequently indicative of various comorbidities, is linked to a diminished self-assessment of health status.

Exercise type and frequency significantly influence glycemic control in patients with type 2 diabetes mellitus (T2DM) and based on Research indicates that structured physical activity, particularly when performed multiple times a week, leads to notable improvements in glycemic markers such as HbA1c and fasting glucose levels, as litruture review found Thrice-Weekly Exercise A study found that participants engaging in structured exercise three times a week experienced a significant reduction in HbA1c (-0.38%) and fasting glucose levels (-0.25%) compared to those exercising once a week or receiving usual care, and secondally was General Recommendations: Most studies advocate for exercise frequency of 3-4 times per week, with sessions lasting 30-60 minutes, to optimize glycemic control moreover Exercise Type Aerobic and Resistance Training: Both types have been shown to improve glycemic control, with combined training yielding the best results in addition to Low-Intensity Activities like walking and yoga also contribute positively to glycemic management, emphasizing that even low-intensity physical activity can be beneficial as well as structured exercise is effective, some argue that individual preferences and barriers to exercise adherence can limit its implementation, suggesting a need for personalized approaches to enhance participation in physical activity[21]

The factors of physical activity, diet control, and attendance at medical appointments, identified by the World Health Organization (2003) as essential aspects for improving treatment adherence, are highlighted when considering that among the studies analyzed in this work, only one does not take any of them into account [22] a study with one of the lowest weights in the meta-analysis (5.14%) Therefore, the inclusion of sessions aimed at providing information on diet control, physical activity, and medication intake is considered appropriate when the situation allows, both to improve treatment adherence and to promote multidisciplinary work by integrating physical trainers, nutritionists, and at least physicians into this work Although psychological interventions for disease control are not considered a substitute for medical treatment, they provide appropriate support.

Conclusion

we concluded from our study Importantly, the associations observed between exercise type and frequency, diet conformity and medication burden, and polypharmacy with general health perception underscore the intertwined nature of lifestyle, pharmacological treatment, and patient well-being in addition to refer These findings reinforce the necessity of a holistic, individualized approach in T2DM management, integrating behavioural interventions with optimized medication plans to improve adherence and outcomes

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