

Exercise as Component of Standard Diabetes Management, the Challenges to Improve Performance among Sudanese Type 2 Diabetes

Hisham Mohammed Abdelrahim¹, Abdelhaleem Mustafa Madani^{2,3*},
Tarig Mohammed El-Hadiyah², Asma Noureldaim Mahmoud⁴

¹Medicine and Endocrinology, University of National Ribat, Khartoum, Sudan

²Pharmacology Department, Faculty of Pharmacy, International University of Africa, Khartoum, Sudan

³Clinical Pharmacy, Cardiac Center, Omdurman Teaching Hospital, Omdurman, Sudan

⁴Pharmacy Practice Department, Faculty of Pharmacy, International University of Africa, Khartoum, Sudan

Email: *helmi7011@gmail.com

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Abstract

Background: Exercise is important component of diabetes management. Regular exercise improves blood glucose, reduces hazard of cardiovascular diseases, decreases weight, increases insulin sensitivity and strengthens patients' general health. Regular exercise can prevent or delay type 2 diabetes in those of high-risk populations. Although there are great benefits of regular exercise, unfortunately majority of people with type 2 diabetes are not active. **Objectives:** The main goal of this study was to assess patients adherence to regular exercise among type 2 diabetes Mellitus (T2DM) attending Ribat University Hospital Diabetic Clinic (RUHDC) Khartoum state, Sudan. **Methods:** Analytical cross sectional hospital based study was carried out among 351 patients from August 2012 to February 2013. Structured questionnaire and patients cards were used to collect data. **Results:** Out of 351 patients, female were 65.8% and male 34.2%. Patients older than 60 years 48.4%, illiterate 21.0%, only 44.2% had basic educational level, house wife 56.1% and retired 18.5%. Majority had irregular exercise program (80.1%), 12.1% specified lack of time whilst 87.9% did not specify any other reasons as barrier for regular exercise "no reason". Daily activity was the main type of physical activity (59.8%). Although insignificant, irregular exercise was higher among female patients, their age above 60 years, patients had low education levels and those had financial problems. **Conclusion:** Regular exercise was low in this study. Lack of time, female, patients older than 60 years, had low education levels, and had financial problems, which were the main barriers of regular exercise. Family support, tailored patients' education and reduction of patients' use of technology and modern living can improve the patients' activity.

Keywords

Type 2 DM, Exercise, Physical Activity/Exercise, Ribat Diabetic Clinic

1. Introduction

Standard behavior management [1] and psychological well-being in patients with diabetes are fundamental challenge to achieve the recommended goals of diabetes [2]. The standard diabetes management is based on patient-centered approach; encompasses diabetes self-management education and support (DSMES), medical nutrition therapy (MNT), regular physical activity, smoking cessation counseling when needed, and psychosocial care.

Physical activity is the widened terminology that is identified as any body movement resulting from muscle contraction and causes energy expenditure above the basal metabolic level. Physical activity encompasses all activities and the individuals can carry out during the day such as occupational, household, travelling, sport, playing etc [3]. On the other hand, exercise is planned and structured physical activity [4] and considered as subdivision of physical activity, whilst in some references, physical activity and exercise are used interchangeably [5]. Exercise is an important component of standard diabetes management and it is proved that regular exercise improves blood glucose [6], protects against hazard of cardiovascular diseases, effectively reduces weight [7], increase insulin sensitivity and strengthens patients' general health [8]. Moreover, regular exercise can prevent or delay type 2 DM in those of high risk populations [9]. Conversely, physical inactivity is main reason of chronic diseases such as type 2 DM, coronary heart diseases, breast and colon cancer, and shortens life expectancy [10]. Although there are great benefits of regular exercise, unfortunately majority of people with type 2 diabetes are not active [11]. Frequency and type of exercise program should be stated after complete evaluation of diabetic patient health.

There are many types of exercise such as aerobic, resistance (strength), balance and flexibility (stretching) exercise. The American College of Sports Medicine (ACSM) defines aerobic exercise as any activity that uses large muscle groups, can do continuously and as rhythmic pattern. Examples of aerobic exercise encompass cycling, hiking, long distance running, swimming and walking [12]. Resistance exercise, such as pushups and lifting light an objects, are prescribed to increase strength and enlarge muscle mass [13]. Flexibility exercise such as high knees and back kicks is useful to enhance joints to be more flexible, and prevent stiffness. Flexibility exercise can be more beneficial for patients with type 2 DM who may not be able to perform other physical activities due to secondary complications such as, neuropathies, hypertension, and limb amputation [14] etc. Balance exercise such as walking on one leg at a time and walking backwards or sideways helps individuals to keep balance and prevents from falling down.

No studies had assessed attitude and determinants to exercise in patients with T2DM although great benefits are as component of the disease management. This cross sectional study aimed to explore attitudes and barriers to exercise in RUHDC. More over the study aimed to be a base for longitudinal study in all Sudanese diabetes centers.

2. Materials and Methods

2.1. Study Design, Setting and Participants

This cross-sectional hospital based study was a part of large study conducted at RUHDC, Khartoum state, Sudan during 2012-2017. The section regarding this paper was done from August 2012 to February 2013. A number of 351 type 2 diabetes were included in this study.

2.2. Inclusion and Exclusion Criteria

Patients aged ≥ 18 diagnosed as T2DM; on regular mediation at least three months was selected in this study along the period of the study.

2.3. Sample Size

All patients (100%) attended to RUHDC during study period and met criteria were enrolled in the study.

2.4. Tools of Data Collection

Self-administered questionnaire formulated in collaboration with staff-members in Ribat University; faculty of pharmacy according to updated literature. Finally questionnaire revised by medical providers who are expert in diabetes management to ensure validity. We informed patients about the aim of the study and then ten copies of questionnaire distributed for the pilot study. Minor changes were done on questionnaire contents for further validity assurance. Questionnaire then translated to Arabic to make patients interview more fluent. We used also Patients cards to confirm some patients' data.

2.5. Assessment of Exercise Types and Barriers to Regular Exercise

Personal interview was held to collect data. The questionnaire formulated of five main items and each one consisted of branched items. The main items of the questionnaire included: 1) Patients socio-demographic profile, 2) list of patients co-morbidity, 3) had you regular exercise program? 4) what were the barriers to regular exercise (**Table 1**)? and 5) what were the type (s) of physical activity you perform?

2.6. Specific Definitions in Questionnaire

Diagnosis of T2DM was defined according to American Diabetes Association (ADA) criteria [15]. Regular exercise was defined as performing of ≥ 150 minute

Table 1. Assessment of barriers for regular exercise (question No (4) in the study questionnaire)

| 4-If “no regular exercise” what are the “barriers”? |
|-------------------------------------------------------------------------------------------|
| Environmental barriers (such as hot, cold, rainy, etc). |
| Lack of willpower. |
| Lack of support (such as family, friend, etc). |
| Lack of money. |
| Social reasons (e.g. “I am female” it is against society traditions to perform exercise). |
| Lack of time (Busy). |
| Fear of injury. |
| Others (specify). |

of moderate to vigorous-intensity exercise per week for fit patient. Hypertension defined as blood pressure $\geq 130/80$, whilst other co-morbidities were specified by specialized physician [15].

2.7. Data Analysis

All data were analyzed using social package for social science (SPSS) version 16. Descriptive statistics expressed as percentage. Chi square used as appropriate and level of statistical significance was set at $p \leq 0.05$.

3. Results

From a total of 351 diabetic patients attended RUHDC female were 65.8%, male 34.2%, Patients their age above 60 years were 48.4%, illiterate 21.0%, only 44.2% had basic educational level, house wife 56.1% and retired were 18.5% (Table 2). Majority of patients (80.1%) had no regular exercise program (Figure 1), 12.1% identified lack of time whilst 87.9% did not specify any other reasons as barrier for regular exercise “no reason” (Figure 2) and 59.8% considered “daily activities” as enough type of physical activity (Figure 3). Co-morbidity was 54.4% and 41.9% of them had irregular exercise (Table 2). Although insignificant, irregular exercise was higher among female (53.5%), patients their age above 60 years (36.8%), patients had low education levels (51.8%) [basic + illiterate], had co-morbidity (41.9%) and those had financial problems (49.9%) (Table 2).

4. Discussion

Physical activity or specifically exercise has positive effects on diabetes management; reflecting on protection against long-term complications and strength of the patients’ general health. However, few patients with diabetes have regular physical activity [11].

Only one fifth of our patients had regular exercise program, and this low findings of regular exercise is consistent with that reported by many studies such as Janaki *et al.* study reported 21.3% [16], Sibai *et al.* from Lebanon reported 10% [17], Morrato *et al.* from U.S reported 39% [18] and Kamuhabwa *et al.* study from

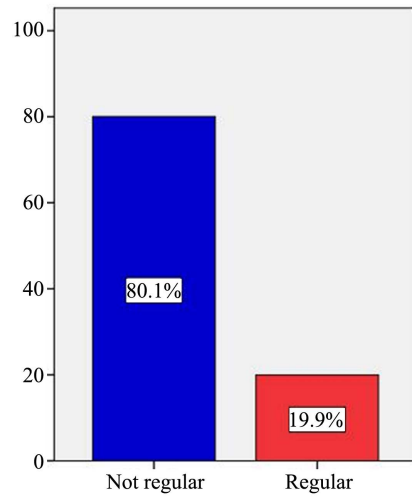


Figure 1. Patients' distribution according presence of regular exercise program

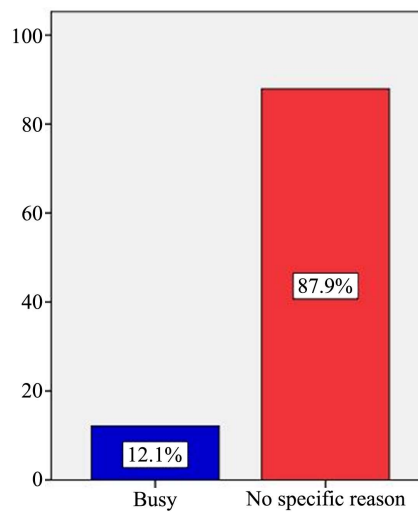


Figure 2. Patients' barriers for regular exercise program

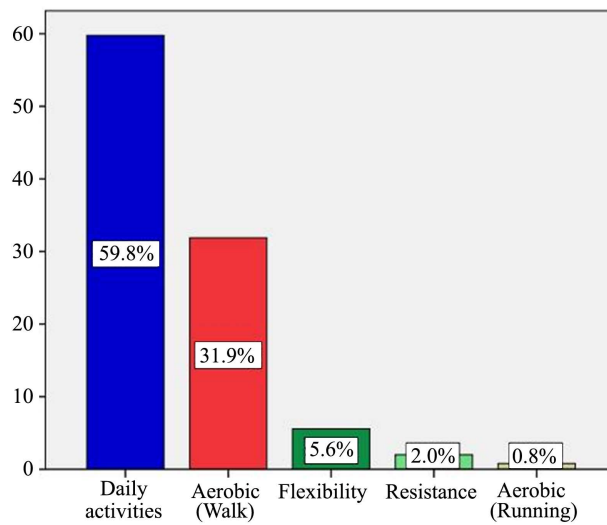


Figure 3. Patients' distribution according to types of exercise

Table 2. Patients socio-demographic, co-morbidity and their association with presence of regular exercise program.

| Variables | Total | Regular exercise | Irregular exercise | P value |
|---------------------------|------------|------------------|--------------------|---------|
| | N (%) | N (%) | N (%) | |
| | 351 (100) | 70 (19.9) | 281 (80.1) | |
| Gender | | | | 0.0388 |
| Male | 120 (34.2) | 27 (7.7) | 93 (26.5) | |
| Female | 231 (65.8) | 43 (12.3) | 188 (53.5) | |
| Age (years) | | | | 0.159 |
| ≥18 - 40 | 86 (24.5) | 13 (3.7) | 73 (20.8) | |
| 41 - 60 | 95 (27.1) | 16 (4.6) | 79 (22.5) | |
| Above 60 | 170 (48.4) | 41 (11.7) | 129 (36.8) | |
| Educational level | | | | 0.711 |
| Basic | 155 (44.2) | 30 (8.5) | 125 (35.6) | |
| High secondary | 59 (16.8) | 13 (3.7) | 46 (13.1) | |
| University | 49 (14) | 9 (2.6) | 40 (11.4) | |
| Non-formal | 14 (4) | 1 (0.3) | 13 (3.7) | |
| Illiterate | 74 (21.0) | 17 (4.8) | 57 (16.2) | |
| Occupation | | | | 0.304 |
| House wife | 197 (56.1) | 37 (10.5) | 160 (45.6) | |
| Retired | 65 (18.5) | 10 (2.8) | 55 (15.7) | |
| Officer | 49 (14) | 14 (4) | 35 (10) | |
| Laborer | 18 (5.1) | 6 (1.7) | 12 (3.4) | |
| Non-working | 12 (3.4) | 2 (0.6) | 10 (2.8) | |
| Other | 10 (2.8) | 1 (0.3) | 9 (2.5) | |
| Economical problem | | | | 0.756 |
| Yes | 220 (62.7) | 45 (12.8) | 175 (49.9) | |
| No | 131 (37.3) | 25 (7.1) | 106 (30.2) | |
| Co-morbidity | | | | 0.113 |
| Have co-morbidity | 191 (54.4) | 44 (12.5) | 147 (41.9) | |
| No co-morbidity | 160 (45.6) | 26 (7.4) | 134 (38.2) | |

Tanzania reported 33% had regular exercise [19].

American College of Sports Medicine and American Diabetes Association recommend aerobic training for at least 150 min per week and additionally resistance training at least 2 - 3 days per week together with drugs treatment as standard for diabetes management [6]. Approximately one third in this study carried aerobic (walk and running) and resistance exercises. Unfortunately, the vast majority of our patients performed these important activities irregularly and thus the patients deprived themselves from the sufficient benefits of standard

diabetes management. On the other hand, more than one-half of our patients considered daily activities as enough type of exercise. Although the benefits of daily activity is less effective than regular exercise in management of T2DM; nevertheless it can be considered as of beneficial clinical outcomes especially for older patients and those consider lack of time as barrier of regular exercise [20].

Although it is controversy, literature revealed varieties of factors, that affect physical activity such as patients' socio-economic and demographic characteristics, negative family history of DM, far distance from health centers, lack of time and depression [16] [18] [21] [22].

Physical activity in our study was low among female, individuals older above 60 years, those had financial problems and patients had low education. This findings consistent with Nelson *et al.* study [23] who reported low activity was among older, female, and those with low incomes. In contrast to our findings Morrato and his colleagues study reported no relation between physical activity, sex and education level [18]. Moreover, contrary to our findings Salam and his colleagues from Saudi Arabia reported that women were more active [24].

Lack of time as external factor is important barrier for regular exercise [24] [25], however only few of our patients considered lack of time as barrier of regular exercise, whilst majority did not defined specific reason for irregular exercise. These findings may be explained by high percent of low education level among our patients, thus negatively reflected on knowledge and attitude towards exercise and diabetes management as general. More over psychological barrier may contribute to these findings; specifically among patients their age's ≥ 65 . According to American diabetes association, screening for cognitive impairment and depression should be carried out for older diabetes (aged ≥ 65 years) [2] [note that 48.4% of our patients were older than 65 years].

5. Conclusion and Recommendations

Regular exercise as component of diabetes management was low among our patients. Lack of time, female, patients older than 60 years, had low education levels and had financial problems, which were the main barriers of regular exercise. Interventions include approach to further address barriers for regular exercise and tailored educational program regarding importance of regular exercise in diabetes management. Using of social media, such as SMS and whatsapp messages, as tool of education, can poster traditional face-to-face education. Additionally, encouraging patients to increase their daily activities and decrease extensive use of technology and modern living as far as possible, can serve effectively in improving percent of physical activity. Family support is essential motivator for individuals' readiness to change.

6. Limitation

This work was carried out in single tertiary hospital that limited the findings to be for all Sudanese population. Data regarding physical activity in this study was

obtained by self-report and may be limited by recall bias. Nevertheless, the study findings, as first study it had done in Sudan, provided valuable information that can help researchers to conduct studies that are more qualified in the future. This paper was a part of master thesis conducted 6 years ago; in this long period no Sudanese study was published regarding exercise among diabetes, therefore it is highly significant for this work to be published to constitute a concrete base line for researchers and to motivate the subsequent studies in Sudan.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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