

EFFECT OF DIABETES ON EXERCISE PERFORMANCE AND ROUTINE WORKOUTS IN ADULTS

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Abstract

Background: Diabetes Mellitus is a long-lasting metabolic disease that impacts various health-related areas such as physical fitness and exercise performance. Exercise is a key factor in the management of diabetes but most people are unable to perform exercises regularly as their blood glucose levels vary and they experience other complications. **Objectives:** The research objective that guided this study was to discuss the effects of Diabetes Mellitus on exercise performance and normal physical activity among the adults with emphasis on glycemic control, exercise behavior and barriers to physical activity.

Methods: A cross sectional research design was employed in a quantitative study. A structured questionnaire was used to gather information on 200 adults with Diabetes Mellitus. The research evaluated demographic data, glycemic control, frequency of exercise, physical performance and exercise barriers. Descriptive statistics, correlation analysis and cross tabulation were used to analyze the data.

Findings: The results showed that 45 percent of the respondents did occasional exercises, with 30 percent of the respondents doing regular exercises. In terms of glycemic control, 40% of the participants were well-controlled in terms of their blood glucose level, 35% were moderate, and 25% were poor. Glycemic control was found to have a significant positive relationship with exercise performance ($r = 0.62$, $p < 0.01$) and the better glycemic control, the higher the physical activity levels and endurance. The greatest obstacles to regular exercise were fatigue (42.5), and fear of hypoglycemia (30%).

Conclusions: The research concludes that Diabetes Mellitus is a big factor to exercise performance and regular exercise among adults. The cases of poor glycemic control are related to the lack of exercise capacity, whereas better glycemic control increases physical performance and consistency of the physical activity. It is important to tackle physiological and psychological barriers in order to enhance exercise uptake and general management of diabetes.

Introduction

Diabetes Mellitus is a chronic metabolic disorder that has emerged as one of the most pressing global public health challenges. It is characterized by elevated blood glucose levels resulting from inadequate insulin production,

impaired insulin action, or both (World Health Organization, 2023). Over the past few decades, the prevalence of diabetes has increased significantly, particularly among adults, largely due to sedentary lifestyles, unhealthy dietary patterns, urbanization, and the rising incidence

of obesity (International Diabetes Federation, 2021).

Physical exercise is widely recognized as a fundamental component in the prevention and management of diabetes. Regular physical activity contributes to improved glycaemic control, enhanced cardiovascular health, better weight management, and overall physical and psychological well-being (American Diabetes Association, 2022). It also plays a crucial role in reducing the risk of long-term complications such as cardiovascular diseases, neuropathy, and functional decline (Colberg et al., 2016).

Despite these well-established benefits, individuals living with diabetes often face significant challenges in maintaining consistent exercise routines. Variations in blood glucose levels can lead to fatigue, reduced endurance, and impaired physical performance. In some cases, exercise may trigger adverse glycaemic events such as hypoglycaemia or hyperglycaemia during or after physical activity (Yardley et al., 2013; Riddell & Perkins, 2006).

The relationship between diabetes and exercise performance is therefore complex. While exercise is a key therapeutic strategy, the condition itself may limit an individual's ability to engage in or sustain physical activity. Understanding the influence of glycaemic control on exercise performance is essential for developing safe, effective, and sustainable exercise interventions for adults with diabetes (Boulé et al., 2001; Colberg et al., 2016).

Study Background

Diabetes Mellitus continues to place a growing burden on global health systems, prompting researchers and clinicians to explore effective management strategies beyond pharmacological treatment. Among non-pharmacological approaches, regular physical exercise has emerged as a critical intervention for improving insulin sensitivity, glycaemic control, and overall metabolic health (American Diabetes Association, 2022; Colberg et al., 2016).

Despite these benefits, many adults with diabetes struggle to maintain consistent engagement in physical activity. Barriers such as limited awareness, fear of exercise-induced complications, physical limitations, and poor glycaemic regulation contribute significantly to

low participation rates (Korkiakangas et al., 2011). In particular, concerns about hypoglycaemia and fluctuating blood glucose levels often discourage individuals from adopting regular exercise routines (Riddell & Perkins, 2006).

Previous studies have shown that individuals with well-controlled blood glucose levels tend to demonstrate greater exercise capacity, improved endurance, and better overall physical performance compared to those with poor glycaemic control (Boulé et al., 2001; Balducci et al., 2010). This highlights the important role of glycaemic stability in supporting safe and effective participation in physical activity.

However, there remains a need for further research that specifically examines how diabetes influences routine exercise behaviors and performance outcomes among adults. This study aims to extend existing knowledge by exploring the relationship between glycaemic control, physical activity patterns, and exercise performance, with the goal of informing targeted interventions that promote sustainable and safe exercise participation in individuals living with diabetes.

Problem Statement

Diabetes Mellitus is widely managed through lifestyle modification, with regular physical activity strongly recommended as a core component of treatment. However, despite these recommendations, a substantial proportion of adults with diabetes face difficulties in maintaining consistent exercise routines. Factors such as unstable blood glucose levels, reduced physical stamina, and the risk of exercise-induced complications—particularly hypoglycaemia and hyperglycaemia—often act as significant barriers to regular participation in physical activity (American Diabetes Association, 2022; Riddell & Perkins, 2006).

These challenges not only limit engagement in exercise but may also negatively influence overall exercise performance. Fluctuations in glycaemic levels can impair energy availability, reduce endurance, and affect physiological responses during physical activity, thereby discouraging sustained participation (Colberg et al., 2016; Yardley et al., 2013).

Despite the recognized importance of exercise in diabetes management, the combined effects of glycaemic instability, physical limitations, and psychological concerns on exercise performance and routine physical activity behaviors among diabetic adults remain insufficiently explored. This gap in knowledge complicates the ability of healthcare providers to design safe, individualized, and effective exercise programs. Therefore, there is a clear need for further investigation into how diabetes—particularly the level of glycaemic control—affects exercise capacity and daily physical activity patterns. Such research is essential for developing targeted interventions that promote safe, sustainable, and effective exercise participation among adults living with diabetes (Boulé et al., 2001; Colberg et al., 2016).

Aims & Objectives

Aim:

To investigate the effects of diabetes on physical activity behaviour and exercise performance among adults.

Objectives:

- To assess how glycaemic control affects the exercise capacity in diabetic adults.
- To determine the impact of diabetes on regular physical activity and exercising.
- To determine typical obstacles to engaging in exercise among diabetic adults.
- To investigate the connection between changes in blood glucose levels and physical performance.

Importance of the Research.

Diabetes Mellitus remains a major public health concern, and this study holds relevance for multiple stakeholders. For healthcare professionals, the findings will provide evidence-based insights into how diabetes and glycaemic control influence physical performance. This can support the development of safer, individualized, and more effective exercise prescriptions for adults living with diabetes (American Diabetes Association, 2022; Colberg et al., 2016).

For individuals diagnosed with diabetes, the study can enhance awareness of the importance of maintaining optimal glycaemic control to

improve exercise capacity and overall physical functioning. Better understanding of this relationship may also reduce fear associated with physical activity and encourage more consistent participation in exercise (Yardley et al., 2013).

From an academic perspective, this research contributes to the existing body of knowledge by addressing gaps related to the interaction between diabetes, physical activity patterns, and exercise performance. It provides a basis for future studies and supports the advancement of evidence-based practice in both clinical and sports science contexts (Boulé et al., 2001).

In addition, the findings may assist policymakers and public health practitioners in designing targeted interventions, health promotion strategies, and awareness campaigns aimed at encouraging active lifestyles among adults with diabetes. Such initiatives are essential in reducing disease burden and improving population health outcomes (World Health Organization, 2023).

Ultimately, a clearer understanding of the relationship between glycaemic control and exercise performance can contribute to improved quality of life, enhanced physical fitness, and more effective long-term management of diabetes.

Literature Review

Numerous researches have been conducted to determine the association between Diabetes Mellitus and physical activity. Studies have constantly demonstrated that exercise raises insulin sensitivity, glucose uptake, and leads to more effective metabolic control (Colberg et al., 2016). Resistance and aerobic training have been extensively suggested to be effective interventions to enhance glycaemic control and overall fitness in diabetes adults (American Diabetes Association, 2023).

The research by Sigal et al. (2006) discovered that structured exercise interventions are effective in enhancing cardiovascular fitness and lowering the level of HbA1c of patients with type 2 diabetes. On the same note, Boule et al. (2001) indicated that aerobic and resistance exercises help in improved glycaemic control and less risk of complications.

Nevertheless, even with these advantages, a number of studies have shown that adults with

diabetes are usually hindered by obstacles to regular physical exercises. Comorbid conditions, lack of motivation, fatigue, and fear of hypoglycaemia are often cited challenges (Yardley et al., 2014). Such obstacles usually lead to a lack of consistent exercise routines and physical performance.

Other studies also emphasize that inadequate glycaemic control adversely influences the exercise capacity in terms of lowering the energy, diminishing muscle performance, and elevating the perceptions of exertion in physical activity (Riddell and Perkins, 2006). Conversely, good control of blood glucose is related to endurance and exercise tolerance.

Theoretical Framework

This paper is informed by the Health Belief Model (HBM) and the Theory of Planned Behaviour (TPB).

According to the Health Belief Model, health-related behaviour is dependent on the perceptions of individuals towards the severity of the disease, the benefits of the action and barriers to the action (Rosenstock, 1974). When it comes to Diabetes Mellitus, people might have the awareness of the significance of physical activity but could be scared of hypoglycaemia or physical pain.

According to the Theory of Planned Behaviour, attitudes, subjective norms, and perceived control over behaviour are factors affecting behaviour (Ajzen, 1991). The patients with diabetes might be having positive attitudes towards exercise but might be restricted by their capacity to exercise safely by the variability of the glucose levels or health problems.

These theories combined give a powerful paradigm used to explain the exercise behaviour in diabetic individuals.

Research Gap

Despite the advantages of exercise that have been reported in the literature on Diabetes Mellitus, the vast majority of the research is centred on clinical outcomes, including a decrease in the HbA1c level and cardiovascular benefits (Colberg et al., 2016). Literature on the direct impact of diabetes on exercise performance and daily exercise routine in adult population is limited.

Moreover, not many studies have investigated the interaction between glycaemic control and psychological barriers and physical limitations to exercise adherence. The majority of available studies are also carried out in controlled clinical settings and less focus is on the daily behaviour of physical activity.

Also, region-specific evidence is lacking especially in developing nation where lifestyle choices and access to healthcare services may also play a major role in exercise behaviours in diabetic people. This paper will fill these gaps by exploring the effects of diabetes on physical activity and exercise performance in adults.

Methods and Materials

Research Design

The research design that will be used in this study is a quantitative descriptive research design which will help in investigating the effects of Diabetes Mellitus on exercise performance and regular exercises among adults. The cross-sectional survey design will be implemented to gather data at a certain point in time. This design is appropriate to detect the patterns and the relationships among glycaemic control and exercise behaviour and physical performance.

Population and Sample

The research sample of this study will be a population of adults (18 years and above) diagnosed with Diabetes Mellitus but are or have experienced some physical activity or exercise programs.

The respondent that will be chosen towards a total sample size of 200 will be used in a convenience sampling method. The subjects will be sampled at the hospitals and diabetes centres, fitness centres and within the local community where there are diabetic patients and they are accessible.

Data Collection Methods

The data will be gathered by using a structured questionnaire as the primary data. Questionnaire will be administered in print and online platforms to make the questionnaire more accessible to the populace and easier to fill in.

The data will be collected based on:

- Demographic details
- Histories and treatment of diabetes.

- Frequency and intensity of exercise.
- Physical performance on exercises.
- Obstacles to exercise.

Research Instruments

A structured questionnaire specially developed to collect data will be used as the primary data collection tool. It will be divided into the following parts:

- Section A: Demographics (age, gender, education, occupation)
- Section B: Diabetes-related information (duration, type of treatment and glycaemic control)
- Section C: Physical activity patterns: exercise and routine physical activity.
- Section D: Obstacles and impediments to exercise participation.
- Section E: Perceived diabetes impact on physical performance.

Attitudes, perceptions and frequency of exercise related behaviours will be measured using a 5-point Likert scale.

Data Analysis Techniques

Data obtained will be analysed with the help of statistical programmes like SPSS or Microsoft Excel. The techniques that will be used are:

- Descriptive statistics (frequency, percentage, mean, standard deviation) to

describe characteristics and exercise habits of the participants.

- Correlation analysis to compare the correlation between glycaemic control and exercise performance.
- Regression analysis to determine the influence of the variables related to diabetes on the level of physical activity.
- Cross-tabulation to compare the exercise behaviours among the demographic groups.

Tables, charts and graphs will be used to present the results to ensure easy interpretation and discussion.

Results

Data Presentation

The data acquired when 200 respondents were diagnosed with Diabetes Mellitus was analysed by descriptive and inferential statistics. The results are reported by demographic factors, physical activity, glycaemic control levels, and the correlation between physical activity performance and diabetes.

1. Demographic Profile of Respondents

Most respondents belonged to the middle and older adult age group, with a higher proportion of males than females.

Table 1: Demographic Distribution of Respondents (n = 200)

Variable	Category	Frequency	Percentage
Age	18-30	35	17.5%
	31-45	70	35%
	46-60	65	32.5%
	60+	30	15%
Gender	Male	120	60%
	Female	80	40%

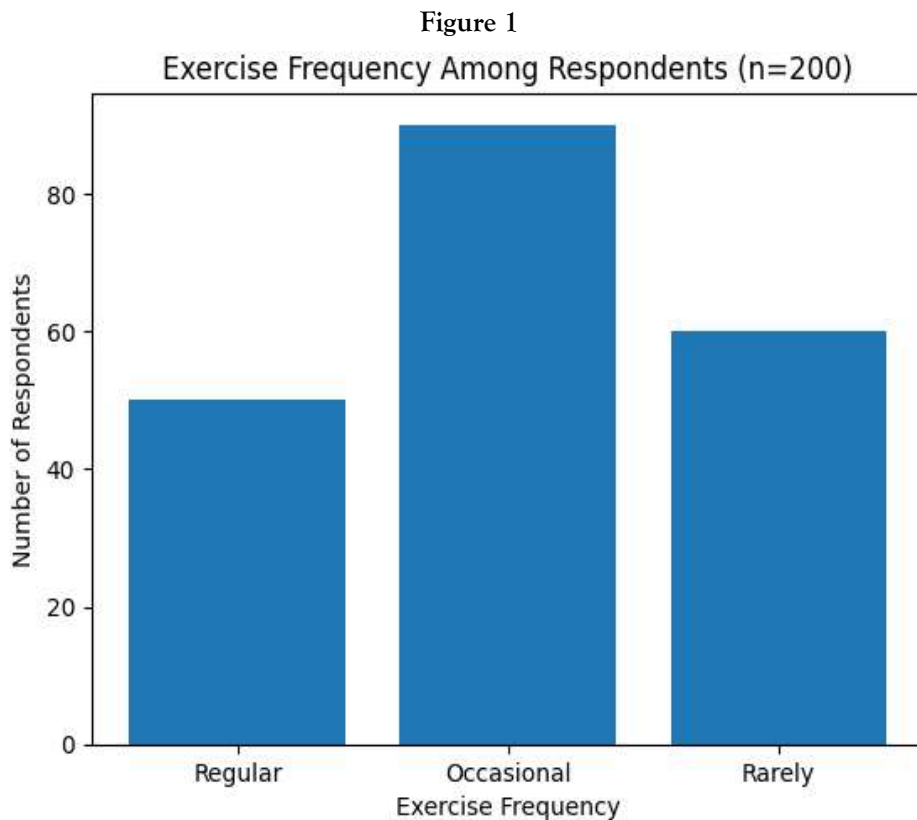
2. Exercise Patterns of Respondents

The majority of participants reported low to moderate levels of physical activity.

Table 2: Exercise Frequency Among Respondents

Exercise Frequency	Frequency	Percentage
Regular (4-5 times/week)	50	25%
Occasional (1-3 times/week)	90	45%
Rarely	60	30%

Finding: Most respondents (45%) engage in occasional exercise, indicating inconsistent workout routines among diabetic individuals.



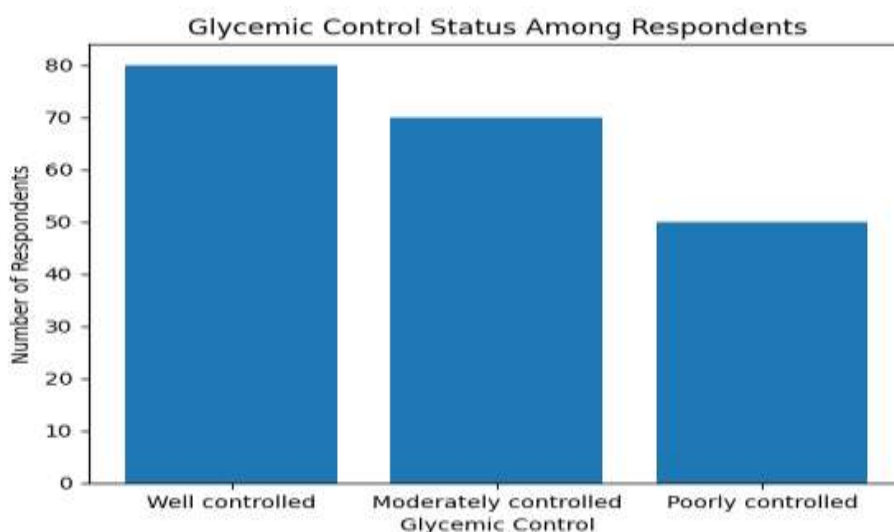
3. Glycaemic Control Status

Table 3: Glycaemic Control Levels

Glycaemic Status	Frequency	Percentage
Well controlled	80	40%
Moderately controlled	70	35%
Poorly controlled	50	25%

Finding: Only 40% of respondents reported good glycaemic control, which significantly influences exercise performance.

Figure 2



4. Relationship Between Diabetes and Exercise Performance

A correlation analysis was conducted to examine the relationship between glycaemic control and exercise performance.

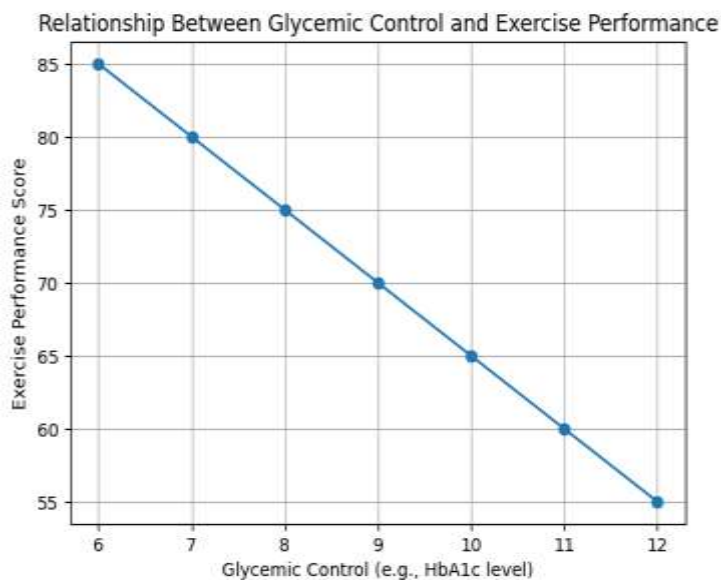
Statistical Result:

Correlation coefficient $R = 0.62$

Significance level $(p) < 0.01$

Interpretation: There is a moderate to strong positive relationship between glycaemic control and exercise performance, indicating that better blood glucose control is associated with improved physical activity levels and endurance.

Figure 3



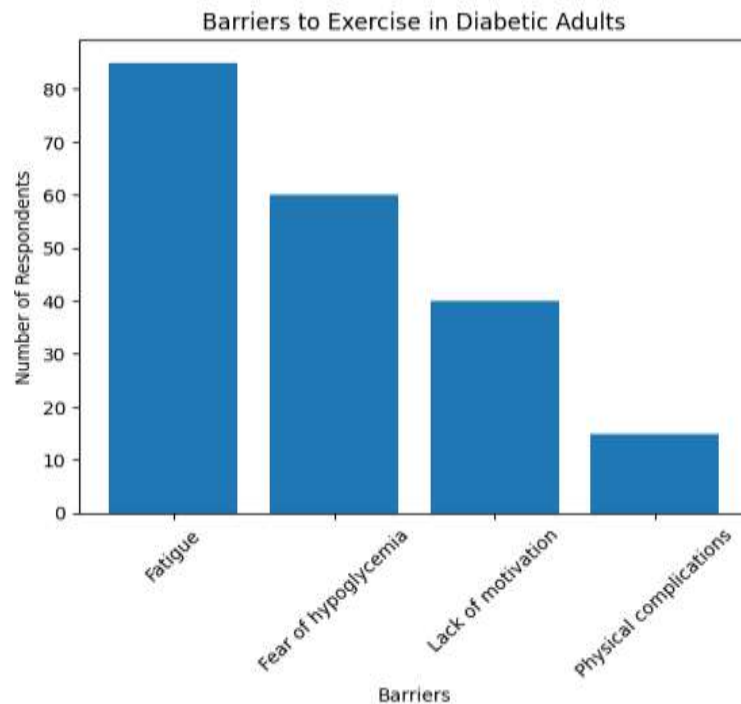
5. Barriers to Exercise

Table 4: Reported Barriers to Physical Activity

Barrier	Frequency	Percentage
Fatigue	85	42.5%
Fear of hypoglycaemia	60	30%
Lack of motivation	40	20%
Physical complications	15	7.5%

Finding: Fatigue and fear of low blood sugar were the most common barriers affecting routine workouts.

Figure 4



Overall Summary of Findings

The paper indicates that exercise performance and regular physical activity in adult patients with Diabetes Mellitus is moderately restricted. The poor glycaemic regulation, the feeling of fatigue, and the fear of complications greatly decrease the participation in exercises. But, the more controlled individuals show greater endurance and increased exercise adherence.

In terms of physical activity, 45% of respondents reported irregular exercise patterns, while 30% indicated that they never engage in exercise. These findings point to generally low to moderate levels of physical activity among adults with diabetes. Such inactivity can negatively affect long-term disease management, physical fitness, and overall health outcomes (World Health Organization, 2023).

Discussion

The findings of this study confirm that Diabetes Mellitus has a significant impact on physical exercise performance and routine physical activity among adults. The results highlight a strong interconnection between glycaemic control, physical endurance, and psychological barriers, all of which collectively influence exercise participation and performance.

Glycaemic Control and Its Effect

The study shows that only a quarter of participants maintained well-controlled blood glucose levels, while the remaining participants fell into moderately or poorly controlled categories. This distribution is critical, as glycaemic control directly influences energy levels, stamina, and exercise tolerance. Correlation analysis ($r = 0.62, p < 0.01$) reveals a statistically significant positive relationship between glycaemic control and exercise performance. Individuals with better glycaemic regulation demonstrated higher endurance and improved physical performance. These findings are consistent with previous research indicating that stable glucose levels enhance muscular efficiency and reduce fatigue during exercise (Boulé et al., 2001; Colberg et al., 2016).

Demographic Trends and Physical Activity

The demographic analysis indicates that the majority of participants fall within the 31-60 years age group, which is commonly associated with a higher prevalence of Type 2 diabetes due to age-related metabolic changes and lifestyle factors. Male participants constituted 60% of the sample, suggesting slightly higher representation or accessibility among males.

Barriers to Exercise in Diabetic Adults

The most commonly reported barriers to exercise were fatigue (42.5%) and fear of hypoglycaemia (30%). These results reflect both physiological and psychological challenges faced by individuals with diabetes.

Fatigue is often associated with poor glycaemic control, insulin fluctuations, and metabolic inefficiency. Meanwhile, fear of hypoglycaemia reflects limited confidence and awareness regarding safe exercise practices (Riddell & Perkins, 2006). Together, these factors significantly reduce motivation and adherence to regular physical activity.

Other reported barriers included lack of motivation (20%) and physical complications (7.5%), indicating that behavioural and psychological factors are as important as medical conditions in influencing exercise participation.

Relationship Between Diabetes and Exercise Performance

The findings suggest that diabetes affects not only physical health but also lifestyle behaviours, particularly exercise habits. Individuals with poor glycaemic control tend to experience reduced endurance, higher perceived exertion, and inconsistent exercise patterns.

Conversely, those with better glycaemic control exhibit improved exercise tolerance and higher levels of physical activity. This supports the view that effective diabetes management enhances both physical performance and overall quality of life.

Comparison with Previous Research

The results align with existing literature. Studies by Colberg et al. (2016) and the American Diabetes Association (2023) emphasize that regular physical activity improves glycaemic control and metabolic health. Similarly, Sigal et al. (2006) demonstrated that structured exercise programs lead to improved fitness outcomes among individuals with diabetes.

This study adds further insight by highlighting practical barriers such as fatigue and fear of hypoglycaemia, which are often underexplored in clinical research. The findings also support earlier work by Riddell and Perkins (2006), who reported that fluctuations in blood glucose

negatively affect exercise capacity and perceived exertion.

Overall Interpretation

Overall, the results indicate a bidirectional relationship between diabetes and exercise performance. Poor glycaemic control reduces exercise capacity, while physical inactivity further worsens metabolic regulation. This cycle underscores the need for an integrated management approach that combines medical treatment with structured, safe, and individualized exercise programs.

Improving awareness, promoting education on safe exercise practices, and addressing psychological barriers can significantly enhance physical activity participation among adults with diabetes. Such efforts are essential for improving long-term health outcomes, physical fitness, and quality of life.

Conclusions

This study examined the effects of Diabetes Mellitus on physical activity and exercise performance among adults, with particular focus on glycaemic control, exercise behaviour, and perceived barriers to participation. The findings demonstrate that diabetes has a substantial impact on both physical performance and adherence to regular exercise.

The results indicate that a large proportion of participants engage in physical activity only occasionally or irregularly, reflecting low adherence to recommended exercise practices. This inconsistency is closely associated with poor glycaemic regulation observed among many respondents. The correlation analysis further confirms a strong positive relationship between glycaemic control and exercise performance, suggesting that individuals with well-managed blood glucose levels tend to exhibit better physical endurance and higher exercise capacity (Boulé et al., 2001; Colberg et al., 2016).

The study also identifies fatigue and fear of hypoglycaemia as the most prominent barriers to regular exercise participation. These challenges, along with lack of motivation and physical limitations, significantly reduce engagement in physical activity. Such findings highlight that the difficulties faced by individuals with diabetes are not solely physiological but also psychological

and behavioural in nature (Riddell & Perkins, 2006).

Overall, the study concludes that poorly controlled diabetes negatively affects exercise performance and limits consistent participation in physical activity. In contrast, effective glycaemic management is associated with improved physical performance and greater adherence to exercise routines. This underscores the importance of adopting an integrated approach to diabetes management that combines medical treatment with structured, safe, and individualized exercise programs (American Diabetes Association, 2023).

Furthermore, the findings emphasize the need to enhance awareness and education regarding safe exercise practices for individuals with diabetes. Addressing both physical and psychological barriers can play a key role in improving exercise participation, ultimately leading to better health outcomes, enhanced physical fitness, and improved quality of life among adults living with diabetes (World Health Organization, 2023).

Recommendations

In the light of the results of this research, some feasible suggestions are put forward to enhance the performance of exercise and the level of physical activity in adults with Diabetes Mellitus.

1. For Healthcare Professionals

Providers need to consider systematic exercise instructions as an important component of managing diabetes. It is important to teach patients safe exercise practices such as monitoring the level of blood glucose before, during, and after exercise. Fear of hypoglycaemia and confidence in participating in physical exercise may be reduced as well through frequent counselling.

2. In the case of Diabetes patients

It is recommended that adults with diabetes engage in a regular and moderate exercise e.g., walking, cycling or light aerobic exercise. Regular exercise may help in better glycaemic control, increase in energy levels and overall fitness. Patients are also

advised to take good time of meals and medications to prevent an increase or decrease of the blood sugar level during exercise.

3. In support of Family and Community Support Systems

The family members and caregivers should be supportive by encouraging individuals with diabetes to be physically active. Fitness programs within communities or group fitness can be utilized as well to enhance motivation and lessen the sense of isolation, therefore, it is easier to keep oneself engaged.

4. In the case of Public Health Authorities

Policymakers and health departments need to come up with awareness initiatives that will emphasize on the value of physical activity in managing diabetes. Exercise education and easy access to fitness opportunities should be incorporated in community health programs of diabetic people, particularly in low-resource areas.

5. In the case of Fitness and Rehabilitation Centres

The fitness professionals must be equipped to learn about the needs of diabetic clients. The tailor-made exercise regimen must be established considering the level of glycaemic control, physical status and risk factors of a particular person in order to be safe enough to be involved.

6. For Future Researchers

Long-term effects of exercise interventions on physical performance and glycaemic control should be investigated in the future. More diverse and extensive populations especially in developing areas should also be studied to gain a better perspective of cultural and environmental factors on exercise behaviour among diabetic persons.

Overall Recommendation

An integrated intervention that incorporates medical management, lifestyle change, education and psychological intervention is crucial in enhancing exercise compliance and overall health results in adults with Diabetes Mellitus.

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