World Journal of Biology Pharmacy and Health Sciences
eISSN: 2582-5542
Cross Ref DOI: 10.30574/wjbphs
Journal homepage: https://wjbphs.com/

(REVIEW ARTICLE)

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Meta Analysis: Physical activity and control of Diabetes Mellitus type 2

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World Journal of Biology Pharmacy and Health Sciences, 2025, 22(02), 419–423

Publication history: Received on 02 April 2025; revised on 10 May 2025; accepted on 12 May 2025

Article DOI: https://doi.org/10.30574/wjbphs.2025.22.2.0484

Abstract

The burden of Diabetes Type 2 has been increased enormously during the last 2 decades. Chronic complications of hyperglycemia associated with diabetes have affected many organ systems and accounts for the mortality of the disease. Diagnosis of diabetes is itself challenging to accept as many patients gets depression and become self-ignorant after being labelled as Diabetic. There is a clear lack of acceptance of disease and also sense of self management in many patients. Increasing physical activity by adding out door or indoor activities either in groups or single can improve Self-esteem of these patients and also can improve the glycemic levels by burning the calories in a friendly active and healthy environment. The present article was performed following a comprehensive search of literature through online search engine Cochrane and PubMed. Here different studies including Finnish diabetes prevention study, diabetes prevention program, Da Qing study of China and Look Ahead study were compared and analyzed for the benefits of physical activity in control of diabetes mellitus type 2.

Keywords: Diabetes Mellitus Type 2; Prevention; Physical Activity; Noncommunicable Disease.

1. Introduction

Regular physical activity plays a very important role for maintaining good health, similar rule applies while it comes to manage type 2 Diabetes Mellitus. The basic components of care in diabetes treatment as outlined by professional practice committee of American Diabetes Association are cardiovascular risk control, cardio renal protection, weight management and glycemic management.[1] None of them can be achievable without having engaged in physical activities.

As diabetes type 2 patients who are mostly in middle age and also have co morbidities and limitation to exercise, gets reluctant to physical movements and get dependent on medications in controlling their glycemic levels.

It is evident from the literature that simple exercises done at home can contribute to the glycemic control in diabetic patients. Amin et al (2023)[2] have elaborated on home-based Activity programs in improving metabolic syndromes in diagnosed type 2 Diabetes patients. Initially exercises can range from simple activities like walking up or down the stairs, push-ups against walls, standing stretch exercises to advanced activities like brisk walk on treadmills, aerobic exercises, resistance training and weight training.

Diabetes mellitus type 2 patients are more prone to develop Metabolic syndromes and hence the outcome of exercises can be evaluated from markers of metabolic instability like Blood pressure readings, Cholesterol and lipoprotein levels, Waist circumference and obviously fasting sugar levels. Adnan et al (2017) have cited the strong association between diabetes type 2 patient developing metabolic syndromes like hypertension, dyslipidemia, obesity and cardiovascular events.[3]

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2. Diabetes Prevention Program (DPP)

Literature is evident of multiple studies in the past that have driven the understanding and importance of physical activity in diabetic patients for example diabetes prevention program (DPP) carried out in United States which was a multicenter randomized controlled trial and compared the effect of intensive life style modifications with the administration of metformin drug and also with a placebo. Results of diabetes prevention program clearly showed that life style modification is far superior to medications in control of progression from impaired glucose tolerance to diabetes mellitus. In this study life style modifications decreased incidence of diabetes by 58 percent compared to placebo and also medication metformin which reduced the incidence of diabetes by 31 percent when compared to placebo.[14]

2.1. Finnish diabetes prevention study (DPS)

Another study which was carried out in Finland and is famous with the name of Finnish diabetes prevention study in which 523 individuals with impaired glucose tolerance and mean BMI of 31 were taken into study and followed up annually for seven years with oral glucose tolerance test and also physical parameters as BMI. patients were analyzed for up to seven years as a follow up paper was also published

The Finnish program introduced dietary and exercise interventions. The intensity of exercise was extensive in the intervention group, which included circuit training as well as walking and hiking options under the guidance of a nutritionist. This fairly intensive life style intervention resulted in long term changes in behavior and importantly the development of Type 2 diabetes. Results showed that

there was 3.5 kilogram of weight loss in intervention group and 0.8-kilogram weight loss in controlled group at 2 years. Incidence of diabetes mellitus was calculated 11 percent in intervention group compared to 23 percent in control group at 4 years. Hence risk of diabetes was reduced by 58 percent at 4 years of follow up in intervention group which can be considered as a milestone of this study.[15]

3. Look AHEAD Study

Look AHEAD Research Group critically analyzed the lifestyle interventions in a huge study and find out that Obesity is a major concern in dealing with diabetes and effective interventions in terms of increasing physical activity and improving diet can reduce the weight by 10% .[7]

3.1. Da Qing study (DQS)

In another extensive Da Qing study carried out in China from 1986 and the results were first published in 1997 demonstrating a significant decrease in the incidence of diabetes in high-risk individuals over a 6-year period. 110,660 men and women screened in 33 health centers in China all individuals included in the study were above 25yrs, with a Mean age 45 years and mean BMI of 25.8 Kg/m2.

Whole population was divided in three groups as per the interventions either following Diet or following exercise or following both diet and exercise. No medications were used in the study. All individuals were followed with OGTT every 2 years.

In clinics assigned to the diet only intervention, participants with BMI 25 kg/m2 were encouraged to reduce their calorie intake gradually. Participants in clinics assigned to the exercise only were taught and encouraged to increase the amount of their leisure physical exercise. The rate of increase and type of exercise recommended depended on age and existence of other health problems other than IGT. Appropriate indoor activities were suggested for winter. Participants from clinics assigned to exercise plus diet group received instructions and counseling for both diet and exercise interventions that were similar to those for the diet-only and exercise intervention.

Mean rate of Diabetes mellitus after 6 years of follow up was 47 percent in diet group, 45 percent and exercise group and 44 percent in diet plus exercise group compared to 66 percent in controlled group.[16]

4. Da Qing study (DQS) Review

The Lancet in June 2019 reviewed the findings of Da Qing diabetes prevention outcome study and concluded that Lifestyle intervention in people with impaired glucose tolerance delayed the onset of type 2 diabetes and reduced the incidence of cardiovascular events, microvascular complications and have increased life expectancy.

4.1. Role of NCD clinics and Dubai Diabetic Centre

At Dubai Health in UAE (United Arab Emirates), we have a blessing to have Dubai Diabetic Centre running under the umbrella of Dubai health and is running an active diabetic screening and education program for general community. Patient who are diagnosed cases for Prediabetes and Diabetes are being followed up in NCD (non-communicable disease clinics) in Primary health care setup. We have massive burden of diabetes type 2 patients. As per the published data of International diabetic federation in 2019 the Diabetes Prevalence in United Arab Emirates in year 2019 was 12.2% in age group of 20 to 79 years.[4] Now a days We encounter much more than the numbers mentioned the reason behind is increasing Obesity and also increasing levels of Inactivity in general population. Obesity is an endemic health issue for middle east and similarly for United Arab Emirates where every 4th person is obese and prone to develop metabolic disorders. Hot weather in summer which stays for almost 8 months in a year is a major determining factor as people cannot involve in outdoor open-air activities due to boiling mercury. They prefer to go for air-conditioned malls and indoor chilling enjoyments during leisure times.[6] Almheiri et Al (2024)[5] elaborated the knowledge and understanding of Diabetes type 2 patients at Dubai Diabetic Centre and evaluated that much more efforts are needed to improve the understanding of treatment and prevention of general diabetes population.[5]

NCD (Non-Communicable Disease) clinics in Dubai Health are having Diabetes Clinics where Physicians, diabetes Nurses and Physiotherapists are working together to promote the health behavior to increase physical activity. Diabetes nurses are trained to educate patients especially elderly to perform their daily house chores and also involve in some degree of physical exercises in their daily routines. Physical therapists are having role to train patients who have physical incapability or who are bed bound, they train them for exercises in the clinics and also for Special cases they are arranging home visits also.

Taking a broader view of our neighboring gulf countries in middle east and north Africa (MENA) region, condition of physical activity is not different from united arab emirates. As due to warm weather in summer people are bound to homes and physical activity is minimal. People only roam around in shopping malls or airconditioned areas.

5. What Kind of Physical Activity to be selected?

Choosing the type of exercise and when to perform is a diverse topic and also quite confusing for the patients. As per WHO guidelines 30 minutes daily moderate activity at least for 5 days, hence total of 150 minutes every week is essential for wellbeing. However same formula cannot be applied for all. Understanding individual patient psyche and emotions and giving psychological support can be helpful for them to start a routine. Gallardo-Gómez et al (2024) have proven that multiple Exercise patterns can be offered to patients including brisk walk alone or in Groups, or moderate exercises such as aerobics.[8] Galaviz et al (2018) states that increasing physical activity have Real world impact on control of blood sugar levels.[9] Dai Et al (2019) have stressed more on supervised structured Resistance training which can make a difference in people with pre diabetes, where a trainer led resistance training was offered for two years.[10]

High risk individuals should be encouraged to do not stick to their chairs either at home of in office. Driving is also accounted as inactivity so patients who are driving for long should be encouraged to add exercise to their daily routine. Sigal et al (2018) elaborated the role of increasing physical activity while at office work in control of diabetes.[11]

Changing human behavior is a difficult task, especially diabetes type 2 patients who prefer sedentary lifestyle. Even knowingly these patients do not adapt changes because they don't want to get better.[12] Psychologist have a role here in bringing up changes in patient's behavior. Motivational interviewing, Group mediation, increasing self-esteem and improving patient empowerment can develop positive changes. Soderlund (2017) raised the importance of motivational interviewing in a recent review.[13]

6. Conclusion

Diabetes diagnosis can be emotional, and learning to live with it can be Challenging. Promoting physical exercise, encouraging the patients to achieve BMI targets, ideal weight and waistline circumference could be stressful some. General awareness about the importance of physical activity should be aroused by lectures, audiovisual programs in

clinics and even by online podcasts. Government authorities especially ministries related to health must assign or increase allowances for proven diabetes type 2 patients so proper assisted physical activities can be arranged for those who are reluctant to join themselves, especially for those who have limitations and disabilities.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

We are committed to maintain transparency and upholding ethical standards in all our practices

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