

INPLASY PROTOCOL

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Corresponding author:
Nwosu Ezinne

olivexy@yahoo.com

Author Affiliation:
University of Nigeria NSUKKA
Enugu campus.

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Conflicts of interest:
None declared.

EFFECTS OF PHYSICAL EXERCISE ON GLYCATED HEMOGLOBIN, CARDIOVASCULAR HEALTH, IMMUNE FUNCTION AND QUALITY OF LIFE IN TYPE 2 DIABETES–SYSTEMATIC REVIEW & META-ANALYSES

Nwosu, EO¹; Ibeneme ,SC²; Irem, F³; Nwosu, NI⁴.

Review question / Objective: What is the effect of physical exercise on HbA1c levels, quality of life, electrocardiograph parameters, and other health-related outcomes in individuals diagnosed with Type 2 diabetes?

Specific Objectives of the Study

1. To Evaluate the Effect of Physical Exercise on HbA1c Levels:

Assess the impact of various types and intensities of physical exercise on HbA1c levels in individuals diagnosed with Type 2 Diabetes Mellitus.

2. To Analyze the Influence of Physical Exercise on Quality of Life and Immunological component. Investigate how different exercise modalities affect the quality of life of patients with Type 2 Diabetes, focusing on both physical and psychological well-being as well as the immune system.

3. To Examine the Relationship Between Physical Exercise and Electrocardiographic Parameters:

Explore the effects of regular physical exercise on electrocardiographic parameters in individuals with Type 2 Diabetes to understand its implications for cardiovascular health.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 03 May 2022 and was last updated on 20 August 2025 (registration number INPLASY202250016).

INTRODUCTION

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Rationale: i. Consolidation of Evidence: By systematically reviewing and analyzing the current literature, this study aims to consolidate and clarify the evidence regarding the effects of various exercise modalities on key health outcomes in T2DM patients. This synthesis will facilitate the formulation of evidence-based exercise recommendations that are attuned to the specific needs and contexts of this population.

ii. Identification of Effective Interventions: A nuanced understanding of which exercise modalities yield the most significant health benefits will empower healthcare professionals to develop and prescribe tailored exercise regimens that optimize diabetes management.

iii. Enhancement of Quality of Life Insights: By prioritizing both generic and disease specific quality of life indicators, this review seeks to illuminate the broader implications of physical exercise on the holistic well-being of individuals living with T2DM, advocating for integrative management approaches that encompass physical, emotional, and social health.

iv. Promotion of Future Research Directions: By identifying prevailing gaps and inconsistencies within the literature, this systematic review will serve as a

catalyst for future research endeavors, promoting deeper exploration into the long-term effects of physical exercise and the investigation of under-researched health parameters.

This systematic review not only aims to bridge the critical gaps within the existing literature but also aspires to provide actionable insights that can enhance clinical practice and improve health outcomes for individuals living with Type 2 Diabetes Mellitus. By advancing our understanding of the multifaceted benefits of physical exercise, this review will contribute to the development of more effective, personalized management strategies for this chronic condition.

Condition being studied: Type 2 Diabetes mellitus. It is a medical condition characterized by hyperglycemia from resistance to Insulin. People in middle age are most likely to get this condition. Symptoms could be peeing alot, being cranky, blurry vision, fatigue and so on. Glycated haemoglobin can be used to confirm the condition.

METHODS

Search strategy: P- (diabetes mellitus type 2 OR type 2 diabetes OR Adult onset diabetes OR noninsulin-dependent diabetes) Human participant OR humans OR human OR participant) AND

I- (Exercise OR Physical exercise OR exercise training OR exertion OR aerobic exercise OR strengthening exercise OR physical activity OR Resistance exercise OR Isometric exercise OR Strength training) AND

(Randomised controlled trial OR Clinical trials OR Random allocation OR Control groups) AND

O- (Quality of life OR health-related quality of life OR life quality OR QoL OR HrQOL) AND

O - (Electrocardiogram OR electrocardiograph OR electrocardiographic markers OR QRS

complex OR QT interval OR atrial fibrillation OR P-wave OR T-wave OR ST-segment OR R wave OR QRS wave OR T wave) AND

O- (Mean cell volume OR glycosylated haemoglobin A1c OR HbA1c OR hematocrit OR mean corpuscular hemoglobin concentration OR hematological indices OR mean corpuscular hemoglobin OR neutrophil OR platelet ratio OR white blood cell OR red blood cell OR lymphocytes OR eosinophil OR leukocytes) AND

O- (Serum glutamate- pyruvate transaminase OR high density lipoprotein OR low density lipoprotein OR HDL-cholesterol OR VLDL- cholesterol OR LDL-cholesterol OR serum total cholesterol OR triglycerides OR serum glutamate-oxaloacetate transaminase OR NITRIC OXIDE OR nitrogen monoxide OR NO)

A) diabetes + Exercise + quality of life

B) diabetes + Exercise + electrocardiograph

C) diabetes + Exercise + haematological

D) diabetes + Exercise + biochemical

Participant or population: Adult who have being clinically diagnosed with type 2 diabetes.

Intervention: Physical exercises.

Comparator: Those that will receive usual care.

Study designs to be included: Randomized control trial studies.

Eligibility criteria: 1. This literature review will include studies involving adult human participants aged ≥ 18 years clinically diagnosed with diabetes mellitus type 2. 2. physical exercise interventions. 3. Studies that have the outcome of interest which are quality of life and electrocardiograph.

Information sources: Data bases searched;

AMED; CINAHL; The Cochrane Library; MEDLINE; PsycINFO; PubMed; Embase Emcare.

Main outcome(s): GLYCATED HEMOGLOBIN HbA1C.

Additional outcome(s):

QOL

WBC

NITRIC OXIDE

ECG PARAMETERS.

Data management: Search will be exported into refworks to check for duplication of studies. Bibliographic records will be exported from refworks into Microsoft excel following the duplication to facilitate the management and selection of articles for inclusion.

Quality assessment / Risk of bias analysis:

The first screening of the titles and abstracts against the inclusion and exclusion criteria to recognize potentially important articles will be carried out by E.O and N. I (reviewer 1 and 4). First screening results will be independently cross-checked by F.I (reviewer 2), and the first screening will be followed by a screening of the full articles of these papers by reviewer 1, which will again be crosschecked by reviewer 2, with disagreements at this stage being resolved by consensus or by consultation with S.C.I (reviewer 3) Following the initial selection of literature, the reviewers will use the PEDRO scale for risk of bias assessment, which includes reference to sequence generation, allocation concealment, blinding, incomplete outcome data (dropouts and withdrawals) and selective outcome reporting regarding the process to be followed for summarizing the studies. Data will be extracted from relevant papers using predefined evidence summary templates. Data will be collected regarding the reasons for exclusion, characteristics of included studies, participants, interventions and outcomes. The final decision for inclusion or exclusion will be made by a team consisting of three reviewers. Any potential disagreement will

be recorded and resolved by further discussion.

Strategy of data synthesis: The availability of appropriate data and resources to conduct a meta-analysis will be considered, where feasible. The effects of physical exercise on electrocardiograph and quality of life in, type-2 diabetic conditions will be determined by an assessment of all the quantitative study outcomes which have analyzed the effects of these interventions. The results will be presented, analyzed and combined in a table, and validated. Statistical methods will be used to evaluate the different variables.

Subgroup analysis: Sub analysis will be carried out where such distinctions are available.

Sensitivity analysis: Sensitivity analysis will be performed to study the potential influence of significant heterogeneity which could be due to intervention types or comparator on the treatment effect direction. This will be done only when there are more than two studies with homogeneous subsets. This will be performed on primary outcome only.

Language: English.

Country(ies) involved: Nigeria.

Other relevant information: None.

Keywords: Physical exercises, exercise, QOL, electrocardiograph, ST segment, quality of life.

Dissemination plans: It will be published, presented during clinical meetings, seminars and conferences.

Contributions of each author:

Author 1 - Nwosu Ezinne - Author 1 conceived the topic.

Email: olivexy@yahoo.com

Author 2 - Ibeneme Samuel - Author 2 will supervise the study.

Email: sam.ibeneme@unn.edu.ng

Author 3 - Irem Franklin - Author 3 will provide statistical expertise.

Email: franklin.irem.183015@unn.edu.ng

Author 4 - Nnamdi Nwosu - Author 4 will read and provide feedback on the final manuscript.

Email: nnamnwosu@yahoo.com