

A Hospital Based Study to Assess the Importance of Influence of Exercise on Diabetics and Hypertensive PatientsAbha Prasad¹, Mritunjay Kumar Azad², Malti Kumari³¹Tutor, Department of Physiology, J.N.K.T. Medical College, Madhepura, Bihar, India²Assistant Professor, Department of Physiology, J.N.K.T. Medical College, Madhepura, Bihar, India³Professor, Department of Physiology, J.N.K.T. Medical College, Madhepura, Bihar, India

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Conflict of interest: Nil

Abstract**Aim:** The aim of the present study was to assess the importance of influence of exercise on diabetics and hypertensive patients.**Methods:** The study was a cross-sectional study, all the patients attending the medicine Out Patient Department for 15 months. It is a cross sectional study, 200 patients having both hypertension and diabetes were selected including both males and females of age group 35-50 years.**Results:** Among 200 study population, 117 (58.5%) males and 83 (41.5%) females are categorized following age groups from 35-50 years. In this study of 200 diabetic patients, 100 patients were regularly doing exercises, in that 65 (65%) had a controlled diabetic status and 35 (35%) were not under control; 100 patients were not doing exercises regularly, in that 35 (35%) had a controlled diabetic status and 65 (65%) were not under control. P value <0.001 showed statistically significant. In this study of 200 hypertensive patients, 100 patients were regularly doing exercises, in that 62 (62%) had a controlled hypertensive status and 38 (38%) were not under control; 100 patients were not doing exercises regularly, in that 38 (38%) had a controlled hypertensive status and 62 (62%) were not under control. P value <0.001 showed statistically significant.**Conclusion:** The study found that known cases of type 2 diabetic mellitus and hypertension are benefitted by regularly doing exercise when compared with not doing exercise. The various studies suggest that T2DM patients and hypertension require reinforcement of DM education including dietary management through health-care providers, health facilities, etc.) to encourage them to understand the disease management better, for more appropriate self-care and better quality of life.**Keywords:** Type 2 Diabetes mellitus; Hypertension; Body mass index (BMI); ExerciseThis is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Currently, the American Diabetes Association (ADA) recommends the use of any of the following four criteria for diagnosing diabetes: 1) glycated hemoglobin (A1C) value of 6.5% or higher, 2) fasting plasma glucose ≥ 126 mg/dl (7.0 mmol/l), 3) 2-h plasma glucose ≥ 200 mg/dl (11.1 mmol/l) during an oral glucose tolerance test using 75 g of glucose, and/or 4) classic symptoms of hyperglycemia (e.g., polyuria, polydipsia, and unexplained weight loss) or hyperglycemic crisis with a random plasma glucose of 200 mg/dl (11.1 mmol/l) or higher. In the absence of unequivocal hyperglycemia, the first three criteria should be confirmed by repeat testing (4). Prediabetes is diagnosed with an A1C of 5.7–6.4%, fasting plasma glucose of 100–125 mg/dl (5.6–6.9 mmol/l; i.e., impaired fasting glucose [IFG]), or 2-h post load glucose of 140–199 mg/dl (7.8–11.0 mmol/l; i.e., impaired glucose tolerance [IGT]). [1]

The Framingham Heart Study [2,3] and the Multiple Risk Factor Intervention Trial [4] suggest that at any level of BP the risk for a cardiac event is increased in both sexes with impaired glucose tolerance compared with those with normal glucose tolerance. The risk for cardiovascular (CV) events increased linearly in the “normotensive” BP range and extended into the range of BP usually considered “hypertensive.” These data suggest that intensive BP lowering in patients with type 2 diabetes (T2DM) would reduce cardiovascular disease (CVD) risk. Pharmacological trials [5] in persons with T2DM report a reduction of stroke incidence with more intensive therapy using multiple drugs when SBP was reduced to ≤ 120 mmHg, but at the expense of increased serious adverse events. Moreover, there are no added benefits for pharmacological therapies on other CV outcomes, compared to less intensive

therapy. These findings underscore a need for treatments that lower BP while avoiding the side effects often associated with antihypertensive drug therapy.

Exercise has been shown to lower BP in persons without T2DM, with few if any side-effects. [6] Yet, studies on exercise for BP reduction in T2DM have yielded inconsistent results. A 2010 joint position statement from the American College of Sports Medicine (ACSM)/American Diabetes Association (ADA) concluded that “exercise may slightly reduce SBP and reductions in DBP are less common in T2DM”. [7] The report further noted that the efficacy of exercise for reducing BP in those with T2DM has not been adequately addressed and rated the evidence for these effects at Level C, due to a lack of randomized controlled trials or meta-analyses.

The aim of the present study was to assess the importance of influence of exercise on diabetics and hypertensive patients.

Materials and Methods

The study was a randomized cross-sectional study, all the patients attending the medicine Out Patient Department of J.N.K.T. Medical College, Madhepura, Bihar, India for 15 months. It is a cross sectional study, 200 patients having both hypertension and diabetes were selected including both males and females of age group 35-50 years.

They were then divided into two groups based on exercise status like regularly doing exercise (n=100) and not doing exercise (n=100). All of them were screened for diabetes and hypertension by checking fasting blood glucose, post prandial blood glucose and blood pressure levels.

Inclusion Criteria:

- Subjects having both Type 2 Diabetes and Hypertension, having at least one of them for 5 years or more and under treatment and compliant with treatment.
- Age group 35-50 years.
- Exercise group consisted of patients who were doing exercise 5 days in a week, 30-45 minutes/day.
- Non-exercise consisted of patients who were not doing any form of exercise.

Exclusion Criteria:

- Cardiovascular disorders other than hypertension
- H/o of Major surgeries in the past 6 months
- H/o/smoking/alcohol intake
- H/o Reno vascular diseases.
- H/o infectious diseases.

Statistical analysis: R software was used for analysis of data. Chi square value and test of significance used.

Results

Table 1: Distribution of age and gender

Age (years)	Male	Female	Total (%)
35-40	32	18	50 (25%)
40-45	38	26	64 (32%)
45-50	28	20	48 (24%)
>50	19	19	38 (19%)
Total	117	83	200 (100%)

Among 200 study population, 117 (58.5%) males and 83 (41.5%) females are categorized following age groups from 35-50 years.

Table 2: Diabetic status and exercise

Diabetic status	Regularly doing exercise	Not doing exercise	Total (%)
Under control	65	35	100
Not under control	35	65	100
Total	100	100	200

In this study of 200 diabetic patients, 100 patients were regularly doing exercises, in that 65 (65%) had a controlled diabetic status and 35 (35%) were not under control; 100 patients were not doing exercises regularly, in that 35 (35%) had a controlled diabetic status and 65 (65%) were not under control. P value <0.001 showed statistically significant.

Table 3: Hypertension and exercise

Hypertension status	Regularly doing exercise	Not regularly doing exercise	Total
Under control	62	38	100
Not under control	38	62	100
Total	100	100	200

In this study of 200 hypertensive patients, 100 patients were regularly doing exercises, in that 62 (62%) had a controlled hypertensive status and 38 (38%) were not under control; 100 patients were not doing exercises regularly, in that 38 (38%) had a controlled hypertensive status and 62 (62%) were not under control. P value <0.001 showed statistically significant.

Discussion

In India, the younger adults getting type 2 diabetes mellitus (DM) has alarmed the nation and the fear that the productive population getting the disease related complication might decrease the working productivity and in turn development of the nation. India has made an overwhelming economic progress in recent years and is the emerging market but on the other hand it is lagging behind others in healthcare outcomes. Every fifth person in India is diabetic, which made it the world's capital of Diabetics. [8] Hypertension (HTN) is a close associate of diabetes which runs parallel. It is projected that the total number of people with diabetes will rise from 171 million in 2000 to 366 million by 2030. The number of adults with hypertension is predicted to increase by 60% to a total of 1.56 billion people by 2025. [9]

Among 200 study population, 117 (58.5%) males and 83 (41.5%) females are categorized following age groups from 35-50 years. Several factors might explain the lack of change in BP. First, the metabolic abnormalities associated with diabetes impair vascular function, inhibit vasodilation and augment vasoconstriction, which could contribute to arterial structural remodeling and stiffening, leading to raised systolic BP. [10] One study [11] reported no change in SBP or aortic stiffness among men with diabetes, but who were not necessarily hypertensive, after 2 years of exercise training. It is possible that adverse vascular changes in persons with diabetes [12] reflects end organ damage that cannot be reversed with exercise alone. Moreover, while ACE inhibitors and diuretics may improve vessel wall structure, beta blockers may have an opposite effect. [13,14] Thus, current antihypertensive therapy may differentially affect responses to exercise treatment. Second, the JNC 7 guidelines [15] recommend that physicians consider drug therapy, with exercise as an adjunct treatment for elevated BP in T2DM.

In this study of 200 diabetic patients, 100 patients were regularly doing exercises, in that 65 (65%) had a controlled diabetic status and 35 (35%) were not under control; 100 patients were not doing exercises regularly, in that 35 (35%) had a controlled diabetic status and 65 (65%) were not under control. P value <0.001 showed statistically significant. In this study of 200 hypertensive patients, 100 patients were regularly doing exercises, in that 62 (62%) had a controlled hypertensive status and 38 (38%) were not under control; 100 patients were not doing

exercises regularly, in that 38 (38%) had a controlled hypertensive status and 62 (62%) were not under control. P value <0.001 showed statistically significant. The present findings agree with the study done by Wens J Vermeire [16] who assessed perspectives of type 2 diabetes patients adherence to treatment and concluded that the overall effects of lack of lifestyle measures information would include knowledge and skill deficits and thus, leading to poor glycemic control. This suggests the need for diabetes educational program to improve diet and exercise adherence. The present result is similar to study done by Egan [17] in which need to identify the specific barriers to exercise in the individual to improve health outcomes. The study revealed that level of diabetes and hypertension awareness among patients and general population was low. Another study conducted in India by Shah¹⁸ reported that 63% of Type 2 Diabetes Mellitus patients did not had the insight of these diseases and the majority were also unaware about its complications.

Conclusion

The study found that known cases of type 2 diabetic mellitus and hypertension are benefitted by regularly doing exercise when compared with not doing exercise. The various studies suggest that T2DM patients and hypertension require reinforcement of DM education including dietary management through health-care providers, health facilities, etc.) to encourage them to understand the disease management better, for more appropriate self-care and better quality of life.

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