



## Effect of progressive muscle exercise on glycemic control among patients with type 2 diabetes: A pre experimental study

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### ABSTRACT

*A pre experimental research study was conducted using quantitative approach with the main objective to assess the effect of progressive muscle exercise on glycemic control among diabetic patients. The study was conducted at a selected community, 41 subjects with type 2 diabetes mellitus has been recruited using purposive sampling technique. Setting permission, informed consent has been obtained prior to data collection. Tools used for data collection were; Section A consists of socio- demographic variables, Section B consists of clinical variables, Tool 2 was the tool for assessing the effectiveness of glycemic control by checking the pre and post HbA1c values. The results showed that the calculated t value is -.3884 which is less than the actual t value 1.68. Hence the null hypothesis is accepted, there was no significant relationship between progressive muscle exercise and glycemic control.*

**KEYWORDS** : progressive muscle exercise, glycemic control, diabetes mellitus type 2

### Introduction

Diabetes mellitus is a worldwide health problem. Diabetes in single words is increase in blood glucose level. Type 2 diabetes is most common form accounting 90-95% of all cases. It usually occurs in people who are over 40 years, overweight and have a family history of the disease. Diabetes has become a widespread epidemic, primarily because of the increasing prevalence and incidence of type 2 diabetes.

According to World Health Organization (WHO) type 2 diabetes affects 422 million people worldwide in 2016 and is expected to affect some 380 million by 2025. It represents as much as 7% of the global adult population with almost 80% of these patients in developing countries. The increase in the number of people with diabetes attribute to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity.

Type 2 diabetes is a significant cause of premature mortality and morbidity related to cardiovascular disease (CVD), blindness, kidney and nerve disease, and amputation. Although regular physical activity (PA) may prevent or delay diabetes and its complications, most people with type 2 diabetes are not active.

Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) conducted a study on the prevalence of diabetes and pre-diabetes in urban and rural India in Tamilnadu, Maharashtra, Jharkand and Chandigarh (2011). The study showed that the prevalence of DM was 10.4% in Tamilnadu, 8.4% in Maharashtra, 5.3% in Jharkand, and 13.6% in Chandigarh. The prevalence of pre-diabetes was 8.3%, 12.8%, 8.1%, and 14.6% respectively. The results provided evidence for increase in prevalence of diabetes not only in urban areas but also in rural areas.

A survey was conducted by Amrita Diabetes and Endocrine Population to assess the prevalence of diabetes and pre-diabetes in urban population of Kerala. Among 3069 adults the prevalence of known diabetes mellitus was 9.0%. Among the screened subjects who underwent blood testing, the prevalence of newly diagnosed diabetes was 10.5%. The finding of high prevalence of newly detected DM in this population of Kerala with the highest standards of health care and literacy level compared to other states of India emphasizes the need for routine screening of high-risk groups for early detection of the disease.

A randomized controlled trial was conducted in 2007 in which 262 sedentary men and women in Louisiana with type 2 diabetes and HbA(1c) levels of 6.5% or higher were enrolled in the 9-month exercise to examine the benefits of aerobic training alone, resistance training alone, and a combination of both on

hemoglobin A(1c) (HbA(1c)) in individuals with type 2 diabetes. Compared with the control group, the absolute mean change in HbA(1c) in the combination training exercise group was -0.34% (95% confidence interval [CI], -0.64% to -0.03%;  $P = .03$ ). The mean changes in HbA(1c) were not statistically significant in either the resistance training (-0.16%; 95% CI, -0.46% to 0.15%;  $P = .32$ ) or the aerobic (-0.24%; 95% CI, -0.55% to 0.07%;  $P = .14$ ) groups compared with the control group. Among patients with type 2 diabetes mellitus, a combination of aerobic and resistance training compared with the non-exercise control group improved HbA(1c) levels. This was not achieved by aerobic or resistance training alone. Materials and methods

A pre experimental research design was adopted using quantitative approach. The study was conducted at a selected community, 41 subjects with type 2 diabetes mellitus has been recruited using purposive sampling technique. Setting permission, informed consent has been obtained prior to data collection. Tools used for data collection were; Section A consists of socio- demographic variables like age, gender, religion, education, occupation and monthly income. Section B consists of clinical variables like duration of illness, family history, dietary pattern habit of smoking and alcoholism, exercise, modified diet, height, weight and body mass index, Tool 2 was the tool for assessing the effectiveness of glycemic control by checking the pre and post HbA1c values.

Blood samples were collected from the subjects for checking the pre HbA1c level and exercise was taught to them individually. Return demo was done by them. An information pamphlet on progressive muscle exercise was given to the samples. Exercise started at a pace of 5 times and increased to 10 times after 2 weeks and likewise progressively increased to 25 times in two and half months. Daily follow up was done in the evening as well as morning according to the availability of the study participants. The subjects were made to come to the clinic for at least 3 days a week and weekly twice visits were made to them individually.

### Results

#### a. Socio demographic characteristics of subjects

More than half of the subjects 68.2% belonged to the age group of 56- 65 years, about the male female ratio, more than half of the respondents were females (61%) and males were only 39%. Nearly half of the population, 48.2% was unemployed, 14.6% were service/market/shop workers, 12.2% were technicians, and 9.8% were in the agriculture field, 4.9% were belonging to managers/Legislators, 4.9% were unskilled workers, 2.4% were having clerical works and the remaining 2.4% were plant/machine operators. Among the subjects nearly half of the subjects (41.46%) belongs to lower middle socio economic status, 29.27% belongs to

middle socio economic status, 19.5% belongs to lower and 9.76% belongs to upper middle socio economic status. More than half of the subjects (31.7%) had duration of diabetes between 11- 15 years, 24.4% had diabetes between 6-10 years, 24.4% had onset for less than 5 years and 19.5% diabetic for more than 15 years. More than half (61%) of the subjects were not having family history of diabetes and 49% had the family history of diabetes. Among the subjects 87.8% were non-vegetarians and 12.2% were vegetarians. Among the subjects more than three fourth (85%) of the subjects were following modified diet and 15% were following regular diet. More than half of the subjects (54%) were having the habit of doing exercise and rest of them (46%) were not doing any exercise. Among the male subjects, 75% were non smokers and 25% were smokers and 93.75% were non alcoholics and 6.25% were alcoholics. More than half of the subjects (56.1%) had normal body mass index and 43.9% were in over weight group.

**b. Assessment of glycemc control.**

**Table 1:- Categorization of pre and postintervention glycemc level**

Category	Pre test		Post test	
	N	%	n	%
<b>Good control</b>	4	9.76	6	14.63
<b>Moderate control</b>	28	68.29	26	63.41
<b>Poor control</b>	9	21.95	9	21.95

Table 1 depicts that in the pre test 9.76% were having good control, 68.29% were having moderate control and 21.95% were having poor control. In the post test, 14.63% were on good control, 63.41% were on moderate control and 9% were on poor control.

**Table 2:- Effect of progressive muscle exercise on glycemc control (n= 41)**

	Mean	S.D	t value	df
Pre test	8.022	1.63	-0.3884	40
Post test	8.081	1.52		

Table 2 depicts that the calculated t value is -.3884 which is less than the actual t value 1.68. Hence the null hypothesis is accepted, there was no significant relationship between progressive muscle exercise and glycemc control.

**Discussion**

In the present study, the investigator has given exercise program for 12 weeks and then the post test was taken. There was a beneficial reduction in about half of the subjects and the other half had no reduction in the HbA1c concentration. The present study is supported by another study conducted in New Zealand. A meta analytical study conducted by Neil J Snowling and Will G Hopkins shows that for training lasting ≥12 weeks, the overall effect was a small beneficial reduction (A1C 0.8 ± 0.3% [mean ± 90% confidence limit]). There were generally small to moderate benefits for other measures of glucose control. For other risk factors, there were either small benefits or effects were trivial or unclear, although combined training was generally superior to aerobic and resistance training. Effects of covariates were generally trivial or unclear, but there were small additional benefits of exercise on glucose control with increased disease severity.

In contrast to the present study, a randomized controlled trial conducted in 2015 by Carus et al. among 43 type 2 diabetic patients .12 weeks of combined aerobic--resistance exercise was highly effective to improve muscle strength and fatigue and glycemc control in T2DM patients.

In the present study, there was an overall reduction in the HbA1c concentration but there was no significant change in the mean score.

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