

A Study to Assess the Effectiveness of Home Based Aerobic Training, Muscle Strengthening and Stretching Exercise on Self Management Among Individuals with Diabetes Mellitus (DM) at Selected Villages in Kancheepuram District, Tamil Nadu.

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ABSTRACT

Context: Demonstration of exercise among individuals with diabetes mellitus include both aerobic and muscle strengthening, stretching exercise training although some studies have proved this exercise combination. Objective: This study aimed to assess the effectiveness of aerobic training, muscle strengthening and stretching exercise training on hemoglobin A1C (HbA1C) among individuals with diabetes mellitus. Design: The design was a Single blinded true - experimental study using a quantitative approach. Setting: Maraimalai nagar and 9 villages at Mamandoor, Kancheepuram District, Tamil Nadu India. Participants: 400 (200 study + 200 Control) patients who had been undergoing treatment for DM were selected by purposive sampling. HbA1c levels of 6.5 % or higher were enrolled in the 3 months' exercise program me between August 2013 and September 2014. Intervention: 200 participants were assigned to the study group, 200 in control group and engaged in muscle strengthening and stretching exercise training daily for 30 minutes for 3 months with nutritional counseling every 15 days. Main outcome: Change in HbA1c level. Secondary outcomes include Anthropometric measurement. Results: The study revealed the overall post interventional result showed from the baseline compared to control group there was an absolute mean change in walking exercise and stretching exercise ($p < 0.01$), hemoglobin A(1c), (HbA1c) at ($p < 0.01$), and waist hip ratio (WHR) ($p < 0.01$). There was an improvement in exercise pattern, HbA(1c) and WHR among patient with diabetes mellitus after the stretching exercise training program. Conclusion: As hypothesized the study concluded that Community based care is the ideal one to develop specific intervention, to manage DM, to maintain the healthy condition and to prevent complications.

Key Word: Diabetes mellitus, hemoglobin A1C, aerobic training, selfmanagement, Anthropometric measurement.

INTRODUCTION

Now a days the modern life has made people prone to different types of diseases. Among them diabetes mellitus is one of them. We come across young people in the age group 30 to 40 years have diabetes mellitus. This is because of the food habits as well as the life style of these young people. Most of the people in this age group are prone to diabetes mellitus because of unhealthy habits and practices. Another important factor is lack of awareness about diabetes mellitus. Rates of diabetes are increasing worldwide. The international diabetes federation predicts that the number of people living with diabetes will rise from 366 million in 2011 to 552 million by 2030¹. Patients with diabetes have an increased prevalence of silent ischemia that is thought to be related to diabetic neuropathy affecting the nerves that innervate the cardiovascular system. Nurses play an important role in patient education and modification of behavior². Lifestyle changes and exercise can significantly delay and possibly

prevent DM. Exercise significantly reduces the prevalence of hyper glycemia. Also muscle contraction triggers glucose uptake. Many patients with DM do not exercise. Many patients are facing non healing diabetic foot ulcer and toe amputations. All because of lack of aerobic exercise and thus have problems in maintaining euglycemia^{11-15,22}. Zarowitz, et al. stated passive static stretching of the skeletal muscles may be a modality that could result in increased cellular glucose uptake and increase in the glucose transporters of the muscle. Home health care provides mental and physical stress relief for patients at home environment. Home environment is credited with improving the clinical course of clients instructed in the home. Careful assessment of the home environment allows the nurse to identify problematic issues and enhances learning outcomes³⁻¹⁰. This study is important and significant because India has high prevalence and increasing incidence of DM. Regular screening for early detection and care will definitely give

Table 1: Frequency and percentage distribution of Pre test and Post test of Exercise among diabetic patients in study and control group. N=398

			Groups				Chi Square test	
			Study Group		Control Group			
			200	%	198	%		
Walking exercise	pre-test	No	72	36.0%	80	40.4%	$\chi^2=0.81$ P=0.36 not significant	
		Yes	128	64.0%	118	59.6%		
	post-tests	No	23	11.5%	78	39.4%		$\chi^2=40.88$ P=0.001*** significant
		Yes	177	88.5%	120	60.6%		
Stretching exercise	pretest	No	120	60.0%	129	65.2%	$\chi^2=1.12$ P=0.28 not significant	
		Yes	80	40.0%	69	34.8%		
	posttest	No	93	46.5%	120	60.6%		$\chi^2=7.95$ P=0.01** significant
		Yes	107	53.5%	78	39.4%		

Table 2: comparison of hba1c between pretest and posttest

HbA1c	groups				Difference	Student paired t-test
	Pre-test		Post-test			
	Mean	SD	Mean	SD		
Study group	8.66	2.29	7.48	1.71	1.18	t=8.48 P=0.001***significant
Control group	8.58	2.26	8.48	2.51	0.10	t=0.47 P=0.63 not significant

an insight to the diabetic patients to adopt self care skills. Furthermore, home based education is important to bring behavior changes and will control DM.

MATERIALS AND METHODS

The investigator selected Maraimalai Nagar and 9 villages around Mamandoor in Kancheepuram district, Tamil Nadu. Maraimalai Nagar is a urban division and Mamandoor is rural division on the outskirts of the kancheepuram district, Tamilnadu. The investigator used purposive sampling to recruit 398 self - reported diabetic patients. This study was carried out during the month of August 2013 and September 2014, based on morning and evening visits excluding Sundays. The participation rate was 100%. In Maraimalai Nagar NH I was allotted for study group NH II and NH III were allotted for control group . Regarding rural population around Mamandoor first 5 villages were assigned for study group and last 4 villages were allotted for control group. This study was carried out during the month of August 2013 and September 2014, based on morning and evening visits excluding Sundays. The study subjects were selected to meet the following criteria for inclusion to determine eligibility for this study. The study subjects diagnosed with DM (Type 1 and Type 2) who have hemoglobinA1c 6.5% and who were on usual medication above 3 months were included. The participants were aged 19 to 80 years and ability to understand and to participate in muscle strengthening and stretching exercise were involved in this study. Exclusion criteria were taking part in yoga and taking alternate treatments than usual care. To prevent contamination control group was assigned in different villages by purposive sampling method.

Ethical approval

The approval of the ethical standards of the institutional research committee which follows WHO standards and with 1964 Helsinki declaration and its later amendments was obtained. Permission from Director DPH and Village counselor was received prior to the study. After explaining the benefit of education, informed consent was signed by the respondents and the study was executed by the researcher.

Glucose assay

Glucose assay was performed by standard one touch gluco check instrument by the researcher.

HaemoglobinA1c

The accuracy of Hcl HbA1c results have been verified by the use of International bio-rad asserted control area of SRM central laboratory. The reliability of HbA1c was validated as (r=0.8).

Tool for Data collection

The tool used for this study consists of demographic variables which includes age, gender, marital status, educational qualification, occupation, duration of DM, heredity, monthly income type of DM, housing, hemoglobinA(1c) and anthropometric measurement.

Intervention of the Study

After completion of the pretest among the experimental group and control group muscle strengthening and stretching exercise was demonstrated by the researcher with patient participation for 30 minutes for 5 days, daily for 3 months for the experimental group with usual medication. Nutritional counseling was given every 15 days for 3 months. Educational booklet containing necessary information and hints about normal blood sugar values, glucose monitoring, 6 times meal plan, stretching exercise, oral medication, insulin injection and foot care was provided to them. During follow up visits progress, experience, concerns were reviewed and the un met

Table 3: comparison of waist hip ratio between study group and control group

waist hip ratio	groups				Difference	Student independent t-test
	Study Group		Control Group			
	Mean	SD	Mean	SD		
Pre-test	88.01	6.06	87.95	4.70	0.05	t=0.10 P=0.92 not significant
Post-tests	86.42	5.88	87.88	4.63	1.46	t=2.76 P=0.01** significant

objectives were renegotiated, and action plans were revised. Cultural background of the patients was respected. The control groups were given only the usual medication. After the 12th week of intervention all the patients were followed up and post test was done to study and control group with the same instrument.

Analysis

Totally 398 patients completed the study. The data collected was analyzed using SPSS (Statistical package for social sciences) software version 20 and MS-EXCEL spread sheet. For each test the p value of 0.05 level was used as the cut off value for statistical significance. Mean and standard deviations were calculated for HbA1c and waist hip measurement. Frequency and percentage was calculated for stretching exercise. Coding was cross checked at several points by other researchers to ensure inter rater reliability.

RESULTS

Key observation of the subjects in relation to demographic variables are shows average age among the 398 subjects in experimental group 103 (51.5% n=200) and in control group 96 (48.5% n =198) were between 51-70 years, while in both groups females were (73.2%) and males were in both groups (27.8%) Most of the subjects in experimental group 180 (90.0%) and in control group 174 (87.9%) were married. Among the 198 subjects in experimental group 64 (32.0 % n=200) had no formal education and in control group 78 (39.4% n=198) of them had completed primary school.

Results are given in number and percentage

(Table 1) Reveals in the pre test walking exercise in study group 128 (64.0%) and in control group 118 (59.6%) of them were walking regularly. Whereas in post test in study group 177 (88.5%) and in control group 120 (60.6%) were walking regularly. It is statistically significant in study group according to chi square test ($\chi^2=40.88$ P=0.001**) Regarding stretching exercise in pre test, study group 80 (40.0%) and in control group 69 (34.8%) and in post test 107 (53.5%) and control group 78 (39.4%) were doing stretching exercise. It is statistically significant in study group according to chi square test ($\chi^2=7.95$ P=0.01**)

Table:2 The comparison of study group HbA(1c) pre test mean(8.66%, SD=2.29) and the post test mean(7.48, SD=1.71) with mean difference (1.18%) is statistically significant at (t=8.48, p<0.001). Whereas in control group pre test mean(8.58%, SD=2.26), Post test mean (8.48%, SD=2.51) with mean difference (0.10%). It is statistically not significant (t=0.47, p=0.63).

Table 3: The comparison of study group WHR pre test mean 88.01cm, SD=6.06 and the post test mean 86.42cm, SD=5.88 with mean difference (1.46cm). It is statistically significant at (t=2.76 P<0.01). Whereas in control group

the pre test mean 87.95cm SD=4.70 and in post test 87.88, SD=4.63 with mean difference (0.05cm). It is statistically not significant.

DISCUSSION

In this present study stretching and walking exercise was target to the women and men. The result of this study support the effectiveness of Exercise training on self-management for the improvement in HbA(1c), WHR. It is believed that life style modification and muscle strengthening and stretching exercise combined with aerobic exercise improve health outcomes and reduce health care cost and reduce the hospital admission. Researchers included that all aspects of life style including health responsibility, nutrition, exercise, interpersonal communication and family support were improved.¹⁶⁻²² The findings of the present study shows there was a significant decrease from baseline of HbA(1c) mean from (8.6%) to (7.48%) with mean difference (1.18%) (t=8.48, p=0.001) in experimental group where as in control group the baseline mean was (8.58%) and the post Mean was (8.48%) with mean difference (0.10%) (t=0.47, p=0.63) and it was statistically significant in the experimental group. It correlates with the study done by Timothy et al. (2010) with glycated hemoglobin (HbA1c) were significantly decreased from 7.7% (1.0%) 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=0.03), and the waist measurement decreased (-1.9 to -2.8cm). Hence the ** hypothesis there will be significant difference between the pre and post interventional level of hemoglobin A(1c) among patients in study group and control group was accepted.¹⁸ It highlights the success of the self management exercise training. Regarding association between the post interventional levels of HbA1c among patients with diabetes mellitus with selected socio demographic variables none of the variables associated except education and monthly income in control group at (P < 0.01).

CONCLUSION

The present study highlights the success of the exercise training program among patients with diabetes mellitus. Therefore continuous follow up and mobile home health services must be developed and the patients must be motivated to regular exercise to maintain their healthy conditions.

GUARANTOR STATEMENT

T.S is the guarantor of this word and as such had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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T. Suseelal and K.R. John conceived and designed the study. T. Suseelal collected the data for the study and participated in the analysis with V.Christopher Amalraj, T. Suseelal, K.R.John, and Alexandra Brown were involved in the interpretation of data. T. Suseelal and Alexandra Brown were involved in the drafting and revising of the article, and T. Suseelal and K. R. John were involved in the final approval of the version to be published.

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