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EFFECT OF YOGIC TRAINING AND BRISK WALKING ON SELECTED BIOCHEMICAL VARIABLES (HIGH DENSITY LIPOPROTEIN (HDL-C) AMONG DIABETIC PATIENTS

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INTRODUCTION

YOGA

Yoga means the experience of oneness or unity with inner being. This unity comes after dissolving the duality of mind and matter into supreme reality. It is a science by which the individual approaches truth. The aim of all yoga practice is to achieve truth where the individual soul identifies itself with the supreme soul or God. Yoga has the surest remedies for man's physical as well as psychological ailments. It makes the organs of the body active in their functioning and has good effect on internal functioning of the human body. Yoga is a re-education of one's mental process, along with the physical. The stages of yoga are eight, *Yama, Niyama, Pranayama, Pratyahara, Dharana, Dhyana* and *Samathi*, they are all integrated (Iyangar, B.K.S. 1999).

WALKING

Walking, also called ambulation is the main form of animal locomotion on land, distinguished from running and crawling. When carried out in shallow waters, it is usually described as wading and when performed over a steeply rising object or an obstacle it becomes scrambling or climbing. The word walk is descended from the Old English weal can "to roll".

BRISK WALKING

Human walking is accomplished with a strategy called the double pendulum. During forward motion, the leg that leaves the ground swings forward from the hip. This sweep is the first pendulum. Then the leg strikes the ground

with the heel and rolls through to the toe in a motion described as an inverted pendulum. The motion of the two legs is coordinated so that one foot or the other is always in contact with the ground. The process of walking recovers approximately sixty per cent of the energy used due to pendulum dynamics and ground reaction force.

BIOCHEMICAL VARIABLES AND ITS IMPORTANCE

The exercises produces biochemical changes in the cardio respiratory system and other important alterations in body composition such as High Density Lipo Protein, Low Density Lipo Protein, blood cholesterol, blood glucose and triglyceride levels (Mathews, 1981).

High Density Lipoprotein (HDL-C)

The HDL contain the least amount of cholesterol HDL's may operate to protect against heart diseases in two ways:

1. To carry cholesterol away from the arterial wall for degradation to bile in the lives and subsequently excreted by the intestines.
2. To compete with the LDL fragment for entrance into the cells of the arterial wall.

A high level of HDL is associated with a lower heart disease risk, even among individuals with total cholesterol below 200 mg dl^{-1}. It is encouraging from an exercise perspective that HDL levels are elevated in endurance athletes and may be favourably altered in sedentary people who engage in either vigorous aerobic training or more moderate levels of regular exercise.

STATEMENT OF THE PROBLEM

The purpose of this study was to determine the relative "Effect of yogic training and brisk walking on selected biochemical variables **(High Density Lipoprotein (HDL-C)** among diabetic patients

METHODOLOGY

The purpose of the study was to find out the relative effect of yogic training and brisk walking on selected **biochemical variable(High Density Lipoprotein (HDL-C)** among diabetic patients. the selection of subjects, selection of variables, pilot study, reliability of the data, Training schedule, administration of tests, research design for the study, laboratory tests taken for the subjects, experimental procedure and the statistical technique used.,

SELECTION OF SUBJECTS

Thirty male subjects who were undergoing treatment in Government Hospital, Hyderabad for diabetic were randomly selected in the age group of thirty five to forty five years were selected and they were assigned into three different groups. The groups were considered as experimental group-I, experimental group-II and control group consisting of ten diabetic patients in each.

Control Group

Subjects who were in the control group didn't undergo any exercise but followed their routine diabetic treatment and diet pre-scribed by the physicians.

Experimental Group-I

Along with their routine diabetic medication subjects were provided with the brisk continuous walking for 30 minutes without rest. The walking exercise were performed from Monday through Saturday for six days in a week.

Experimental Group-II

Along with their routine diabetic medication subjects were provided with yogic training for 30 minutes. The training was provided from Monday through Saturday for six days in a week. The requirements of the experimental procedures, testing as well as exercise schedules were explained to them so as to avoid any ambiguity of the effort required on their part and prior to the administration of the study, the investigator got the individual consent from each subject.

SELECTION OF VARIABLES

The research scholar reviewed the various scientific literatures pertaining to diabetics, exercises for diabetic patients and on the effects of walking and yogic practices on physiological variables from books, journals, periodicals, magazines and research papers. Taking into consideration of feasibility criteria, availability of instruments and the relevance of the variables of the pre-sent study, the following variables were selected.

High Density Lipoprotein

HDL, a type of protein molecule carried in the blood that removes cholesterol from tissues and appears to

protect against coronary heart disease. Reduces the development of atheroma and atherosclerosis. HDL was estimated by phophotungstate method and is expressed as mg/dl.

High Density Lipoprotein

HDL was estimated by applying phosphtungstate method, as recommended by Castelli, *et al.*, Bio-chemistry analyzer (Model RA-50) Bayer Diagnostics was used for this purpose.

Principle

Chylomicrons, VLDL and LDL fractions in serum are separated from HDL by precipitating with phosphtumgstic acid and magnesium chloride. After centrifugation, the cholesterol in the HDL fraction, which remains in the supernatant is arrayed with enzymatic cholesterol method, using cholesterol esterase, cholesterol oxidase, peroxidase and the chromogen Aninoantspyrine.

Precipitating Reagent

Phosphotungstic acide - 2.4 mmol/l
Magnesium chloride - 39 mmol/l

Procedure

To 0.02 ml of sample, 0.20 ml of precipitating reagent was added and mixed well. The tubes were centrifuged at 4000 rpm for 10 minutes, 100 mg/dl clear supernatant was separated immediately to determine HDL cholesterol content by enzymatic cholesterol method and the readings were taken.

Serum HDL cholesterol was expressed as mg/dl.

Brisk Walking Training

Experimental group subjects for brisk walking were required to undergo brisk walk for 30 minutes continuously without any rest. They underwent this training from Monday to Saturday, six weeks per weeks, excluding Sundays, the experimental period was for 12 weeks. Proper warm up and warm down timings were given to the subjects during the experimental period

EXPERIMENTAL DESIGN

Random group design was followed in this study. Randomly selected (N=30) diabetic patients who were undergoing treatment in Government Hospital, Hyderabad were selected as subjects for this study with their consent. The subjects were divided into three groups, experimental group-I, experimental group-II and control group. Experimental group-I underwent yogic practices, experimental group-II underwent brisk walking and control group was not given any special treatment. Pre--tests were conducted for all the subjects on selected physiological variables such as, mean arterial blood pressure,. The experimental groups participated in their respective exercises, namely brisk walking for twelve weeks and yogic exercises for twelve weeks.

The post--tests were conducted on the above said dependent variables after a period twelve weeks. The difference between the initial and final scores was considered the effect of respective experimental treatments. To test the statistical significance ANCOVA was used. In all cases 0.05 level was fixed to test the hypothesis.

COLLECTION OF DATA:-The purpose of the study was to estimate the relative effects of yogic training and brisk walking on selected physiological variables among diabetic patients. For this purpose, the research scholar followed the following procedure

The subjects of the study were selected at random and divided into three groups. Among the three groups, the control group was strictly under control, without undergoing any special activity. The experimental groups were undergone with the experimental treatments.

The experimental groups were well acquainted with their allotted techniques and did only the experimental treatment given to them for a period of twelve weeks under the personal supervision of the researcher.

Pre- and post-experimental data on selected physiological variables from all the subjects to find out the effects of yogic training and brisk walking.

TRAINING PROGRAMME

Yogic Training

In order to give scientific yogic training to the subjects, the investigator selected *asanas* for warm up, *asanas* for practice, *pranayama* for breath holding and cleansing and *savasana* for relaxation.

Each session lasted for 45 minutes consisting of 10 minutes warm up, followed by five *asanas* each lasting for 15 minutes (5 x 3 minutes), 10 minutes *pranayama* and 10 minutes relaxation.

Suryanamaskar was given to the subjects as warm up *asana*, any five of the following *asanas Padmasana, Adhra Chakrasana, Vipareet Karanai Muudra, Ardha Paasantmuktasana, Vajrasana, Trikonasana, Padahastasana, Halasana, Bhujangasana, Salabasana, Dhanurasana, Paschimotanasana* were given to the subjects as *yagasana* practices. Any two of the three *pranayamas Nadi Sodhana Pranayama, Kapalabhati Pranayama* and *Sheetali Pranayama* were given to the subjects. As a relaxation *asana, savasana* was asked to be practiced for 10 minutes.

Table I
YOGIC PRACTICES FOR FIRST FOUR WEEKS

S.No.	Yogic Practices	Duration
1	*Surya Namaskar*	10 minutes
2	*Padmasana*	3 minutes
3	*Ardha Chakrasana*	3 minutes
4	*Vipareet Karani Mudra*	3 minutes
5	*Ardha Paasantmuktasana*	3 minutes
6	*Padahastasana*	3 minutes
7	*Kapalbhati Pranayama*	5 minutes
8	*Sheetali Pranayama*	5 minutes
9	*Savasana*	10 minutes

Table II
YOGIC PRACTICES FOR FIFTH TO EIGHTH WEEKS

S.No.	Yogic Practices	Duration
1	*Surya Namaskar*	10 minutes
2	*Vajrasana*	3 minutes
3	*Trikonasana*	3 minutes
4	*Padahastasana*	3 minutes
5	*Halasana*	3 minutes
6	*Bhujangasana*	3 minutes
7	*Nadi Sodhana Pranayama*	5 minutes
8	*Sheetali Pranayama*	5 minutes
9	*Savasana*	10 minutes

Table III
YOGIC PRACTICES FOR NINTH TO TWELVTH WEEKS

S.No.	Yogic Practices	Duration
1	*Surya Namaskar*	10 minutes
2	*Halasana*	3 minutes
3	*Bhujangasana*	3 minutes
4	*Salabasana*	3 minutes
5	*Dhanurasana*	3 minutes
6	*Paschimotanasana*	3 minutes
7	*Nadi Sodhana Pranayama*	5 minutes
8	*Kapalvali Pranayama*	5 minutes
9	*Savasana*	1- 3 minutes

Training Procedure

The training programmes, namely, yogic practices were given to subjects in circuit training basis for five days a week for a period of twelve weeks in the morning sessions were admitted. Proper warming up and very basic things required for the training were provided to the subjects. The investigator sought the help of two assistants who were well versed with these training programmes for the smooth functioning of the treatment and for controlling the subjects during the course of training.

Brisk Walking Training

Experimental group subjects for brisk walking were required to undergo brisk walk for 30 minutes continuously without any rest. They underwent this training from Monday to Saturday, six weeks per weeks, excluding Sundays, the experimental period was for 12 weeks. Proper warm up and warm down timings were given to the subjects during the experimental period

RESULTS AND DISCUSSIONS

RESULTS ON HIGH DENSITY LIPOPROTEIN

The statistical analysis comparing the initial and final means of High Density Lipoprotein due to Yogic practices and Brisk walking among diabetic patients is presented in Table IV

Table IV

COMPUTATION OF ANALYSIS OF COVARIANCE OF HIGH DENSITY LIPOPROTEIN

	Yogic Practices Group	Brisk Walking Group	Control Group	Source Of Variance	Sum Of Squares	Df	Mean Squares	Obtained F
Pre-Test Mean	54.40	56.30	56.20	Between	22.87	2	11.43	2.34
				Within	132.10	27	4.89	
Post-Test Mean	56.40	58.10	56.10	Between	23.27	2	11.63	2.53
				Within	124.20	27	4.60	
Adjusted Post-Test Mean	57.29	57.62	55.69	Between	20.93	2	10.46	4.86*
				Within	56.02	26	2.15	
Mean Difference	2.00	1.80	0.10					

Table F-ratio at 0.05 level of confidence for 2 and 27 (df) =3.35, 2 and 26 (df) =3.37.
*Significant at 0.05 level

As shown in Table I, the obtained pre-test means on High Density Lipoprotein on Yogic practices group was 54.40, Brisk walking group was 56.30 was and control group was 56.20. The obtained pre-test F-value was 2.34 and the required table F-value was 3.35, which proved that there was no significant difference among initial scores of the subjects.

The obtained post-test means on High Density Lipoprotein on Yogic practices group was 56.40, Brisk walking group was 58.10 was and control group was 56.10. The obtained post-test F-value was 2.53 and the required table F-value was 3.35, which proved that there was no significant difference among post-test scores of the subjects.

Taking into consideration of the pre-test means and post-test means adjusted post-test means were determined and analysis of covariance was done. The obtained F-value 4.86 was greater than the required value of 3.37 and hence it was accepted that there were significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post- hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table V.

Table V

Scheffe's Confidence Interval Test Scores on High Density Lipoprotein

MEANS				Required C.I.
Yogic practices Group	Brisk walking Group	Control Group	Mean Difference	
57.29	57.62		0.34	1.70
57.29		55.69	1.59	1.70
	57.62	55.69	1.93*	1.70

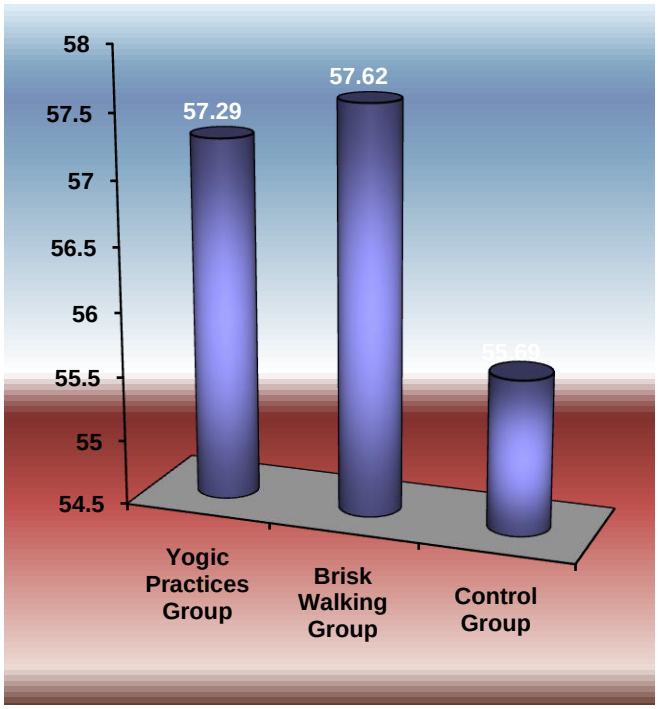
***** Significant at 0.05 level

The post-hoc analysis of obtained ordered adjusted means proved that there was no significant differences existed between Yogic practices group and control group (MD: 1.59). There was significant difference between Brisk walking group and control group (MD: 1.93). There was no significant difference between treatment groups, namely, Yogic practices group and Brisk walking group. (MD: 0.34).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure-I.

Figure-I

BAR DIAGRAM ON ORDERED ADJUSTED MEANS ON HIGH DENSITY LIPOPROTEIN



DISCUSSIONS ON FINDINGS ON HIGH DENSITY LIPOPROTEIN

The effect of Yogic practices and Brisk walking on High Density Lipoprotein is presented in Table I. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F-value 4.86 was greater than the required table F-value to be significant at 0.05 level.

Since significant F-value was obtained, the results were further subjected to post-hoc analysis and the results presented in Table II, proved that there was no significant difference between Yogic practices group and control group (MD: 1.59). There was significant difference between Brisk walking group and control group (MD: 1.93). Comparing between the treatment groups, it was found that there was no significant difference between Yogic practices and Brisk walking group among diabetic patients.

Thus, it was found that Brisk walking was significantly better than control group in beneficially altering High Density Lipoprotein of the diabetic patients.

The post-hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between control group and experimental treatments, namely, brisk walking. This proved that due to twelve weeks brisk walking exercises by the diabetic patients have stabilized their blood pressure. When comparing between the experimental groups, it was found that there were no significant differences between yogic exercises group and brisk walking group.

The twelve weeks *yogasana* training and brisk walking induced to exert more energy and exercise themselves along with their usual medication. As the subjects began to do the physical exertion there was increased blood circulation, which resulted in reduction of LDL cholesterol and improved HDL. With the additional aerobic power, the HDL cholesterol began to improve. Hence, there was improvement in HDL. The findings proved that the twelve weeks of brisk walking exercises has significantly improved high density lipo protein.

Yeater (1999) found two months supervised exercise sessions consisted of 40-45 minutes of walking and/or slow jogging resulted in triglycerides decreased. In the exercise group from 285 to 223 mg/dl. Body weight and total cholesterol and HDL cholesterol, glucose and insulin independent of dietary changes is an effective and feasible method of improving cardiovascular risk factors. The findings of this study are in agreement with these previous findings.

DISCUSSIONS ON HYPOTHESIS

There would be significant difference in selected biochemical variables, high density lipoprotein time due to yogic practices and brisk walking comparing to control group among diabetic patients. There would be no significant differences between yogic practices and brisk walking in altering selected biochemical variables among diabetic variables

CONCLUSION

It was found that twelve weeks yogic practices and brisk walking significantly altered biochemical variable, high density lipoprotein among diabetic patients and the comparisons between treatment groups proved that there was no significant difference between the experimental groups

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