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Efficacy of Exercise and Diet Based Lifestyle Modification Program on Management of Body Weight in Type-Ll Diabettes Mellitus Patients

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Abstract - Type-ll diabetes has almost become a common ailment nowadays. The health-conscious diabetes patients do exercise and dieting as a means of curing their illness even with medicine, but to no avail. People becoming aware of the usefulness of yoga, yogic diet and lifestyle change etc. due to the widespread efforts of yoga gurus/ exponents, and subsequent mass media coverage, their demands are increasing. Keeping this in view three yogic lifestyle modules viz. Yoga and Diet-based Lifestyle modification Program YDLSP, Exercise and Diet-based Lifestyle modification Program, EDLSP and Yoga plus Diet plus Exercise-based Lifestyle modification Program YDELSP were developed for a wider and more comprehensive study on intervention of diabetes by comparing their efficacy among each other by means of eleven parameters. The present study was done by taking body weight as the only one parameter for 75 days to compare the efficacy between Yoga plus Diet-based Lifestyle modification Program YDLSP and Exercise plus Diet-based Lifestyle modification Program EDLSP on management of body weight of type-ll diabetic patients.60 female diabetic subjects within the age range of 30-60 years were selected by means of stratified random sampling from the three hospitals/clinics within the jurisdiction of Ajmer, Rajasthan, India. The patient status was identified by the said hospitals/clinics exclusive of those having cardio - vascular problems, retinopathy, end-stage kidney and the liver disease interfering with diet therapy and exercise. The identified subjects were divided into three groups, each consisting of 20 members in three mean age groups i.e. 47 ± 8.27, 51.5 ± 6.43 and 52 ± 6.71 and they were categorized respectively as Group-A YDLSP, Group-B EDLSP and Group-C YDELSP. This weight reduction efficacy of YDLSP was compared with that of EDLSP. Module EDLSP scored 12.01 percent, while YDLSP scored 7.75 percent in reduction of weight within 75 days of intervention. It was found that the module of Exercise and Diet-based Lifestyle modification Program EDLSP was more efficacious than that of YDLSP in reducing body weight of type-ll diabetic patients.

Keywords - ***Dieting, Exercise, Intervention of diabetes, Lifestyle modules, Mass-Media, Yoga, Yogic diet, Yoga gurus, Yogic lifestyle module.***

I. INTRODUCTION

Diabetes is a chronic condition that occurs either when the pancreas doesn't produce enough insulin or when the body cannot effectively use the insulin it produces. This leads to an increased concentration of glucose in the blood (hyperglycaemia).[WHO, 2015]. Insulin is a hormone that regulates blood sugar. Hyperglycemia or raised blood sugar is a common effect of uncontrolled diabetes, and over time leads to serious damage to many parts of the body system especially nerves and blood vessels[Srikanta s, et.al, 2012]. Diabetes mellitus type-ll [formerly noninsulin dependent diabetes mellitus (NIDDM) or adult onset diabetes] is a metabolic disorder that is characterized by hyperglycemia (high blood sugar) in the context of insulin resistance and relative lack of insulin. This is in contrast to diabetes mellitus type-l in which there is an absolute lack of insulin due to break down of islet cells in the pancreas. [Kumar Viney, et.al, 2005 and Shobak et.al, 2011].

The first described case of diabetes was believed to be of type-l diabetes. Indian physicians around 1500 B.C identified the disease and classified it as '*Madhumeh'* or 'honey urine'. The term 'diabetes' or to 'pass through' was first used in 200 B.C by the Greek Apolonius of Memphis. [Leonid Poretsky, 2009]. Regular physical exercise was recognized in ancient times as important part of treatment of diabetes (*Sushruta*, SCS) and was frequently prescribed during the pre-insulin era for patient who could now be diagnosed as having type-ll diabetes.[Jeanne H, et.al, 2004] Inspite of this recognition since antiquity, and the treatment of various efficacy having been known since the middle ages, pathogenesis of diabetes has been understood and experimented since about 1900.[Palak M, 2002].

In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) with the United State (17.7 million) in second and third place respectively. The prevalence of diabetes is predicted to be doubled globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increase in those affected by the disease. [Wild s, et.al, 2004 and Whiting Dr, et.al, 2011]

Obesity is believed to account for 80-85% of the risk of developing type-ll diabetes. If you are overweight or obese, you are at a greater risk of developing type-ll diabetes, particularly if you have excess weight around your tummy (abdomen).[Diabetes.co.uk, 2015].Among obese and type-ll diabetes exercise may even be an effective therapeutic favoring the loss of weight and absorption of insulin of tissues.[Zinman, et.al, 1985]. Therefore, Type-ll diabetes is initially managed by increasing exercise and dietary changes. If the blood sugar levels are not adequately lowered by these measures, medications such as metformin or insulin may be needed. [Williams and Smyth, et.al, 2006].

On the other hand, intense exercise can have opposite effect and actually temporarily increased blood glucose level right after one stops exercise. [Web MD, 2005-2015]. Appropriate use of diet and exercise can improve insulin sensitivity and glycaemic control and decrease the use of oral medication and insulin.[Pate RR, et.al, 1999].

A diabetic diet is simply a healthy eating plan i.e high in nutrients, low in fat and moderate in calories [Maya W Paul, et.al, 2011]. It is a myth that high level protein is needed in order to exercise. The most complex carbohydrates like those of beans, grams and vegetables have all amino acids required by the human. Protein is not an efficient source of energy. Muscle fatigue sets in when carbohydrate stored in muscles and liver is depleted, and diets that are high in carbohydrates found in whole grains, vegetable and pulses will prevent fatigue and muscle damage. [Durgananda, et.al, 2010].

With this background, three yogic lifestyle modules viz. Yoga plus Diet-based Lifestyle modification Program YDLSP, Exercise and Diet-based Lifestyle modification Program EDLSP and

Yoga, Diet and Exercise-based Lifestyle modification Program YDELSP were developed .Two modules i.e. YDLSP and EDLSP were taken for the present study, body weight was the single parameter taken, and the efficacy of these two modules on this parameter was compared.

II. MATERIALS & METHODS

60 female diabetes volunteers within the age group ranging from 30-60 years were put under intervention with 11(eleven) parameters viz., Body weight in kg, *guna* score by G inventory scale ,*Satvic, Rajasic, Tamasic*, Systolic Blood Pressure, BP, Diastolic Blood Pressure ,DBP, Body Mass Index ,BMI, Pulse Rate ,PR, Respiratory Rate ,RR, Breath Holding Time ,BHT, Fasting Blood Sugar, FBS, Post Prandial Blood Sugar ,PPBS and Triceps Skin Fold ,TSF. Private clinical labs were used for measurement of blood sugar, i.e. FBS and PPBS after every fifteen days of intervention program. Other parametric measurements viz., Body weight, *guna* score, SBP, DBP, BMI, PR, RR, BHT, TSF were measured regularly every fifteen days. Aerobic exercise was put to practice twice a week under the supervision of an expert and yoga practices consisting of *Yoga asanas, Pranayama,* Relaxation Techniques, and Meditation were done under the supervision of the author.

Selection of 60 subjects was done on multistage random sampling within the age range of 30-60 years out of 85 volunteers from three hospitals. The patients' status was identified by the concerned hospitals, exclusive of patients having cardio-vascular problem, retinopathy, end-stage kidney and liver disease interfering with diet therapy and exercises. Those 85 volunteers were assembled to form them up randomly into three strata of age groups each consisting of 20 subjects and put them under three different intervention modules.

This was done by lots drawn from a common container and put each of the lots into each of the three slit boxes relevant to the subjects in the three age-groups under respective intervention modules till each box got 20 lots. The intervention modules allotted age-wise is indicated below:

Yoga and Diet based lifestyle modification program YDLSP-30-40 years of age.

Exercise and Diet based lifestyle modification program EDLSP-41-50 years of age.

Yoga, Diet and exercise based lifestyle modification program YDELSP-51-60 years of age.

The age group average ± SD for the above three groups viz., YDLSP, EDLSP and YDELSP were calculated as 47.6 ± 8.27, 51.5 ± 6.45 and 52 ± 6.71, and they were categorized respectively as group-A, YDLSP, group-B, EDLSP and group-C, YDELSP. Anthropometric assessment was done according to Jelliffe 1966, weight in kg and Height in cm were measured. BMI was calculated according to the following formula, Quentelet, 1830-1850, BMI= weight in kg divided by Height m^2. The BMI is an attempt to quantify the amount of tissue mass, muscle, fat and bone in an individual and then categories that person as underweight, normal weight, overweight or obese, based on the value. Accepted BMI are underweight: under 18.5, normal weight: 18.5 to 25, overweight: 25 to 30, obese: over 30[Dr Malcolm K, 2015 and Eknoyan, Garabed, 2007]. Weight was taken wearing light and without shoes, using spring platform balance. Height was measured at the top of the head with the subject's feet on the concrete floor, and without shoes with a scale to the nearest 0.1 cm.TSF was measured with a Triceps Skin-fold Caliper. Blood pressure was measured by sphygmomanometer. Pulse rate was measured while at rest by radial pulse located on the lateral of the wrist, and respiratory rate measured by counting how many times per minute the chest rises. Diabetes veggie diet menu was updated by the Dietician, Department of Food Science and Nutrition, Maharshi Dayanand Saraswati University from the diet chart developed and put to use by Swami Vivekananda yoga Anusandhana Samsthana, Deemed University, Bangalore.

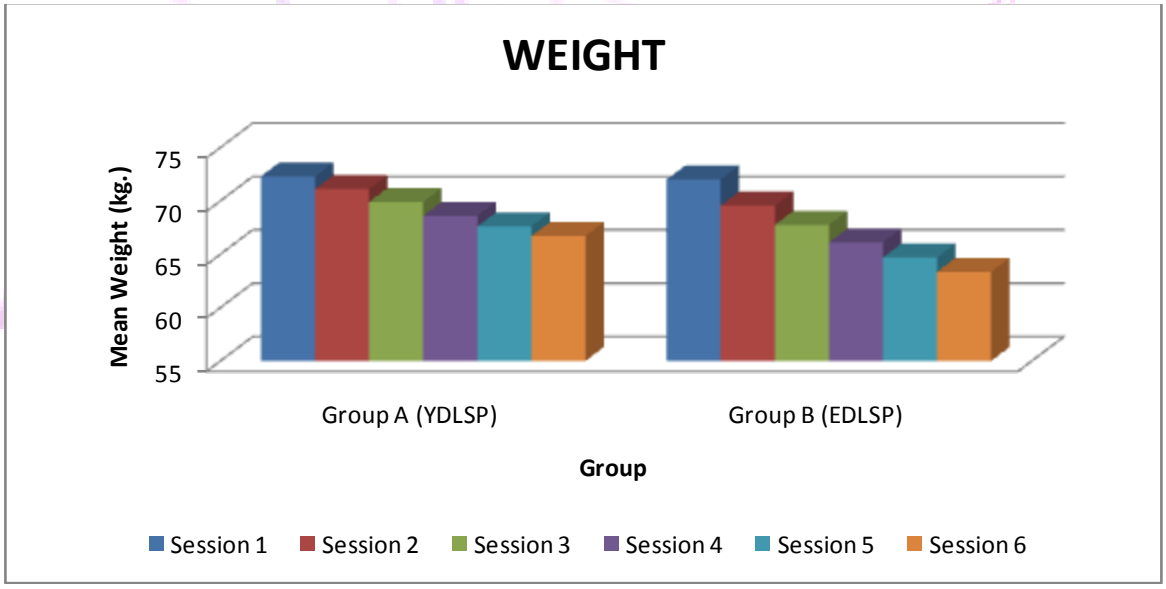
III. RESULT

Module YDLSP of Group-A could reduce body weight by 5.6 kg within 75 days session, bringing down initial weight of 72.3 ± 5.09 on 0 day to 66.7 ± 4.78 scoring 7.75 percent while the module EDLSP of Group-B could reduce body weight by 8.7 kg within the same period, bringing down the initial high of 72.0 ± 7.97 kg, to the low of 63.3 ± 7.81 Kg scoring a higher percentage of 12.01 percent, details as shown in table-1 and Graph-1

Table 1: Body Weight (mean±SD)

Weight (in Kg.)	Ses-1	Ses-2	Ses-3	Ses-4	Ses-5	Ses-6	% change (pre & post)
Group A (YDLSP)	72.3 ± 5.09	71.1 ± 5.20	69.9 ± 5.05	68.6 ± 4.83	67.6 ± 4.44	66.7 ± 4.78	7.75
Group B (EDLSP)	72± 7.97	69.5 ± 7.88	67.7 ± 7.70	66.1 ± 7.66	64.7 ± 7.69	63.3 ± 7.81	12.01

Graph-1: Body Weight (mean±SD)



IV. DISCUSSION

Reduction of 8.7 kg body weight within a period of 75 days was a good achievement. It was clear that the lifestyle module of exercise plus Diet-based Lifestyle modification Program, i.e. EDLSP was more efficacious than that of Yoga plus Diet Lifestyle modification Program, i.e., YDLSP.

V. CONCLUSION & RECOMMENDATION

Exercise and diet combined lifestyle modification Program i.e. EDLSP, was more efficacious than Yoga and Diet combined lifestyle modification program i.e. YDLSP in reducing body weight of type-ll diabetes patients who were not complicated with cardio-vascular problem, retinopathy, end-stage kidney and liver disease. It is recommended that aerobic exercise may be used as one of the effective components twice a week on alternate days in any yoga based lifestyle modification program used for intervening type-ll diabetes, not complicated with cardio-vascular problem, end-stage kidney, retinopathy and liver disease, interfering with diet therapy and exercise.

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