



A Clinical Evaluation of Additional Effectiveness of Yoga Package In Diabetes Mellitus (Prameha)

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ABSTRACT

Diabetes is a growing challenge with the increasing surge of it in India having estimated 8.7% diabetic population in the age group of 20-70 years. The rising prevalence is because of combined factors like sedentary life style, unhealthy diet and life style. Yoga is a cost-effective life style modulation, easy to adopt that can help manage various life style related disorders one of which is diabetes mellitus. Being a scientific and cost-effective lifestyle modification, a study is planned to evaluate the add on effectiveness of Yoga package in diabetes mellitus. The main aim of the study is to evaluate the add-on effectiveness of Yoga package in Diabetes mellitus. The subjects reported at the Out Patient of Swasthavritta who are on medications for Diabetes mellitus were allocated to control group of 21 Subjects and after a period of one month of observation they shifted to study group for Yoga package. The subjects were assessed by analysing the biochemical parameters and subjective criteria. Marked improvement were noted in blood sugar level and subjective parameters

Keywords: Diabetes mellitus, Yoga Package, Prameha, Swasthavritta

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INTRODUCTION

Yoga is considered as a lifestyle, which is adapted now a days for its various health benefits. The Yoga practices, generally aims to cultivate the body and mind and it is possible to measure the physical and physiological changes that occur through Yoga practice. If a proper lifestyle is not followed according to place of inhabitation, body nature, seasons and activities, it is likely to cause diseases [1]. All these diseases can be prevented by practice of Astanga yoga [2]. Therapeutic Yoga, also called as Yoga therapy is a self-empowering process that addresses the illness in a multi-dimensional manner [3].

Yoga aims at balancing and harmonizing the body, mind, and emotions [4]. The abdominal contraction and relaxation during the yogic practices may help in rejuvenating the pancreatic cells thereby increasing the activity of β -cells. The blood circulation in the muscles can improve the insulin sensitivity of the receptors thereby increasing the glucose uptake by the tissues. This helps in lowering the blood glucose [5]. Increasing evidence suggests that Yoga practice tackles the pathophysiologic mechanisms of diabetes and helps in controlling diabetes and its complications [6,7,8]. Being a scientific and cost effective lifestyle modification, a study is planned to evaluate the add on effectiveness of Yoga package in diabetes mellitus.

MATERIAL AND METHODS

The study was planned as a comparative clinical trial with modified cross over design. The subjects who are known case of diabetes mellitus type 2, on medication reported at the OPD of SDM College of Ayurveda and Hospital, Hassan. They were allocated to control group of 21 Subjects initially and after a period of one month of observation they shifted to study group for Yoga package along with their regular diabetic medication. The wash period is not given as it is a study of add-on effectiveness; also sudden stoppage of medication in diabetes may prove harmful to the subject. This is the reason why crossover design is modified here.

Diagnosis of Diabetes Mellitus was based on presence of any one of the Fasting blood sugar (FBS) ≥ 126 mg/dl or Random blood sugar (RBS) ≥ 200 mg/dl or 2-h(post prandial) blood sugar (PPBS)

≥200mg/dl or Glycated hemoglobin (HbA1C) ≥6.5%.^[9] Subjects fulfilling at least one of the diagnostic criteria, age group between 30-70 years irrespective of gender, occupation, socio – economic and marital status and participant who signed written informed consent were included. Those with poly cystic ovarian syndrome, post-operative cases, pregnancy and whose physical condition restricted attaining correct postures in package were excluded. The assessment done included serum FBS, PPBS, FUS, PPUS, and HbA1C. Subjective Criteria included *Prabhoota Mootrata*(Increased urine) *Aavila Mootrata* (Turbid urine), *Kara daha* (Burning sensation of palm), *Pada Daha*(Burning sensation over sole), *Kara Suptata* (Numbness of palm), *Pada Suptata* (Numbness of sole) *Pipasa* (Polydypsia) , *Thaalushosham* (Dryness of mouth), *kantashosham* (Dryness of throat), *Aalasya* (Laziness), State of Agni (Polyphagia), *Madhurasayatha* (Sweetness in Mouth), *Nidra* (Sleepiness), Fatigue, Weight loss, Muscle Cramps, Blurring of vision. Statistical analysis included independent student t test for quantitative data and chi square test, Fisher's exact test and risk estimate for qualitative dichotomous data.

Table No 1 – Treatment plan

Sl.No	Type of asana	Count	Duration
1.	Loosening exercises a. Eye exercise(up,down,right,left) b. Neck exercise(up,down,right,left) c. Shoulder rotation d. Elbow movements e. Wrist rotation f. Finger movements(flexion and extension) g. Body twisting(Right & Left) h. Knee joint movements i. Ankle joint movements j. Toe movements	5 counts each	15 minutes
2.	Standing series a. <i>Parivritta Trikonasana</i> (~revolved triangle pose)	3 counts	5 minutes
3.	Sitting series a. <i>Paschimottanasana</i> (~seated forward bend yoga) b. <i>Ardhamatsyendrasana</i> (~half fish pose) c. <i>Shashankasana</i> (~hare pose)	3 countseach	10 minutes
4.	Prone series a. <i>Bhujangasana</i> (~cobra pose) b. <i>Dhanurasana</i> (~bow pose)	3 countseach	10 minutes
5.	<i>Kapalabhathi</i>	20 counts * 3 rounds	3 minutes
6.	Pranayama a. <i>Bhastrika</i> b. <i>Nadishodana</i>		10 minutes
7.	Meditation in <i>Shavasana</i> (~corpse pose)		10 minutes

RESULTS AND DISCUSSION

Table No 2 Result on Objective parameters

Biochemical Parameters	T	Df	Sig.(2- tailed)	Mean Difference	Std.Error Difference
FBS	5.738	28.713	0.000003	39.916	6.9565
PPBS	2.199	21.072	0.039187	30.797	14.005
FUS	6.286	26.820	0.000001	0.437	0.0696
PPUS	5.547	22.077	0.000014	0.480	0.8668
HbA1C	1.699	25.190	0.101595	0.271	0.0703

Table No 3 Result on Subjective parameters

Subjective Parameters	Pearson chi-square			Fisher exact test		Odd's Ratio
	Value	Df	Asymptotic Significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)	Value
Increased micturition	11.675	1	0.001	P<0.05	P<0.05	12.955
Turbid urine	1.511	1	0.219	0.269	0.203	2.850
Burning sensation over palm	24.474	1	P<0.05	P<0.05	P<0.05	66.667
Burning sensation over sole	10.854	1	0.001	0.002	0.001	8.400
Numbness of palm	4.362	1	0.037	0.055	0.037	4.400
Numbness of sole	0.402	1	0.526	0.731	0.390	1.566
Increased thirst	3.801	1	0.051	0.068	0.049	3.643
Dryness of mouth	4.080	1	0.043	0.081	0.045	5.029
Dryness of throat	1.511	1	0.219	0.269	0.203	2.850
Laziness	33.406	1	P<0.05	P<0.05	P<0.05	0
Increased hunger	0.059	1	0.808	1.000	0.539	1.179
Sweetness in mouth	0.024	1	0.877	1.000	0.699	0.800
Sleepiness	1.520	1	0.218	0.245	0.176	2.143
Weight loss	0.011	1	0.916	1.000	0.623	1.091
Muscle cramps	11.367	1	0.001	0.001	0.001	20.000
Blurring of vision	0.000	1	0.987	1.000	0.641	1.012

Discussion on FBS, PPBS, FUS and PPUS

There is a statistically significant reduction in fasting blood sugar (n=30; Mean FBS= -37.7 ± 28.9) at the end of the study compared to control group (n=30; Mean FBS = 2.25 ± 15.10), $t(28.71)=5.73$, $p=0.000003$ i.e., <0.05 ; post prandial blood sugar (n=30; Means PPBS= -26.04 ± 63.33) at the end of the study compared to control group (n=30; Means PPBS= 4.79 ± 11.52), $t(21.07)=2.19$, $p=0.039187$ i.e., <0.05 ; fasting urine sugar (n=30; Means FUS = -0.48 ± 0.30) at the end of the study compared to control group (n=30; Means FUS = -0.038 ± 0.13), $t(26.82)=6.28$, $p=0.000001$ i.e., <0.05 ; post prandial urine sugar (n=30; Mean PPUS = -0.05 ± 0.38) at the end of the study compared to control group (n=30; Mean PPUS = -0.5 ± 0.38), $t(22.07)=5.54$, $p=0.000014$ i.e., <0.05 who adapted one month of yoga package along with their regular medication for diabetes mellitus type 2.

The decrease in blood sugar and urine levels indicates the potential role of yoga in preventive and management strategies for diabetes mellitus type 2. The beneficial effect of yoga in diabetes mellitus type 2 has been attributed to increased insulin sensitivity at target tissues which decreases insulin resistance and consequently increases peripheral utilization of glucose. [10]

Yogasana also enhances insulin stimulated GLUT4 (insulin-regulated glucose transporter) translocation. Increases in muscle GLUT4 protein content contribute to this effect, and in addition it has been hypothesized that the depletion of muscle glycogen stores with exercise plays a vital role. Physical training potentiates the effect of exercise on insulin sensitivity through multiple adaptations in glucose transport and metabolism. In addition, asanas may elicit favourable changes in lipid metabolism and can bring about improvements in the regulation of hepatic glucose output, which is especially relevant to diabetes mellitus type 2 [4]. It has also been postulated that yoga can rejuvenate or regenerate beta cells of pancreas. In addition, yoga has positive effect on general well-being and stresses [11].

Discussion on Laziness

In case group (n=21 ;), a total of 17 participants showed reduction in laziness. It is reported that in subjects with diabetes mellitus, there will be increased plasma fatty acids in skeletal muscles. The low intensity endurance exercises as in yoga probably reduce this plasma fatty acids and improve insulin sensitivity which in turn might help reducing laziness [12]. Recent studies showed that exercise increases serum concentration of endocannabinoids which also produce a sense of well-being [13].

On Burning sensation over palm and sole

Burning sensation in diabetes is caused by the nerve damage which is called as diabetic neuropathy. Regular practice of yoga activates the parasympathetic system and releases endorphins. Endorphins are endogenous opioids (neurotransmitters that produce cellular and behavioural effects similar to morphine) released from pituitary gland which regulate and essentially inhibit pain perception. These endorphins are neuro-modulators that act by modifying the way in which nerve cells respond to neurotransmitters [14]. Also, endorphins tend to minimize the discomfort during practice of asana. The endorphins are even associated with a feeling of euphoria [15]. Though, it is not possible to reverse the nerve damage, yoga practice can reduce the impact of nerve damage.

On Muscle cramps

In case group (n=21), a total of 9 participants had muscle cramps and out of that 8 participants showed improvement. In Diabetes mellitus, because of reduced insulin sensitivity, it will reduce the bioavailability of magnesium in the diabetic persons. Magnesium deficiency is one of the reasons for muscle cramps [14]. Various studies prove that practice of yoga improves the insulin sensitivity.^[16] It is assumed that because of increased insulin sensitivity, magnesium bioavailability gets increased and thus it manages the muscle cramps.

CONCLUSION

Pre-formed Yoga package along with the antihyperglycemic drugs has statistically significant effect in subjective parameters of diabetes mellitus like increased micturition, burning sensation over palm and sole, muscle cramps, laziness and also in biochemical parameters like FUS, PPBS, FUS and PPUS in study group compared to control group. This clearly shows that with the addition of yoga package along with the medicines the subject already taken for diabetes mellitus gives better result.

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