ORIGINAL RESEARCH

Assessment of effects of Yoga in patients with type 2 diabetes mellitus and hypertension

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ABSTRACT

Background: A situation that interferes with a person's regular psychological or physiological functioning is referred to as stress. The present study was conducted to assess effects of Yoga in patients with type 2 diabetes mellitus and hypertension. **Materials &Methods:** 58 patients of type 2 diabetes along with hypertension of both gendersreceived yoga therapy for 45 days along with the standard treatment. Oxidative stress markers such as changes in RBC morphology (crenated edges and Heinz bodies), malondialdehyde levels along with fasting blood glucose levels, systolic & diastolic blood pressure, body mass index and symptoms associated with type 2 diabetes were evaluated before and at the end of the yoga therapy. **Results:** Out of 58 patients, 30 were males and 28 were females. Before and after yoga therapy BMI found to be 23.6 and 22.1, Malondialdehyde was 65.3 µM/L and 46.2 µM/L, glucose level was 210.5 mg/dl and 132.8 mg/dl, SBP was 142.6 mm Hg and 132.4 mm Hg and DBP was 84.2 mmHg and 80.6 mm Hg. The difference was significant (P< 0.05). There was significant change in the severity ranking of the RBC Morphology before and after Yoga therapy (P< 0.05). **Conclusion:** Frequent yoga practice helps to improve blood pressure, body mass index, glycemic parameter, and RBC shape by reducing oxidative stress-induced damage. It may also reduce the risk of illness complications.

Keywords: reactive oxygen species, diabetes, Yoga

INTRODUCTION

A situation that interferes with a person's regular psychological or physiological functioning is referred to as stress.[1] Stress can be acute or chronic that raises the creation of reactive oxygen species (ROS), which is followed by the release of stress hormones, and stimulates the sympathetic nervous system and hypothalamus pituitary adrenal axis (HPA axis). The stress hormones—particularly corticosteroid, glucagon, and adrenaline—cause neoglucogenesis, lipolysis, and elevated blood pressure, all of which contribute to metabolic syndrome.[2]

ROS damages cells and increases the production of inflammatory and proinflammatory mediators such as prostaglandins, interleukin-1, and tumor necrosis factor. Free radicals immediately produce the isoprostanes 8-iso PGF2 alpha from arachidonic acid without the use of enzymes. Chronic inflammation is brought on by these isoprostanes' binding to prostanoid receptors. Oxidative stress is the condition that occurs when the ratio of pro-oxidants to anti-oxidants is thrown off balance because of either inadequate levels of antioxidants or excessive generation of free radicals.[3]

Yoga is an age-old practice that aims to balance a person's mental, emotional, physical, and spiritual health.[4] The unique ability of yoga treatment to both positively improve a wide range of diseases and slow the progression of disease has made it popular in recent years. Along with a variety of traditional asanas and pranayama techniques, it incorporates breathing techniques and mild muscle stretching.[5]The present study was conducted to assess effects of Yoga in patients with type 2 diabetes mellitus and hypertension.

MATERIALS & METHODS

The study was carried outon 58 patients of type 2 diabetes along with hypertension of both genders.All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients received yoga therapy for 45 days along with

the standard treatment. Oxidative stress markers such as changes in RBC morphology (crenated edges and Heinz bodies), malondialdehyde levels along with fasting blood glucose levels, systolic & diastolic blood pressure, body mass index and symptoms associated with type 2 diabetes were evaluated before and at the end of the yoga therapy. Morphological changes in RBC's at baseline and after 45 days of yoga therapy were assessed using the following scoring pattern: No abnormal RBC/HPF = 0 10-25% abnormal RBC/HPF = 1+ 25-50% abnormal RBC/HPF = 2+ 50-75% abnormal RBC/HPF = 3+ >75% abnormal RBC/HPF = 4+. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table IDistribution of patients

Total- 58		
Gender	**Male**	**Female**
Number	30	28

Table I shows that out of 58 patients, 30 were males and 28 were females.

Table II Assessment of parameters before and after yoga therapy

Parameters	Before	After	P value
Body Mass Index (BMI)	23.6	22.1	0.05
Malondialdehyde (µM/L)	65.3	46.2	0.02
Blood glucose Levels (mg/dl)	210.5	132.8	0.03
Systolic blood pressure (mmHg)	142.6	132.4	0.05
Diastolic blood pressure (mmHg)	84.2	80.6	0.90

Table II, graph I shows that before and after yoga therapy BMI found to be 23.6 and 22.1, Malondialdehyde was 65.3µM/L and 46.2µM/L, glucose level was 210.5 mg/dl and 132.8 mg/dl, SBP was 142.6 mm Hg and 132.4 mm Hg and DBP was 84.2 mmHg and 80.6 mm Hg. The difference was significant (P< 0.05).

Graph I Assessment of parameters before and after yoga therapy

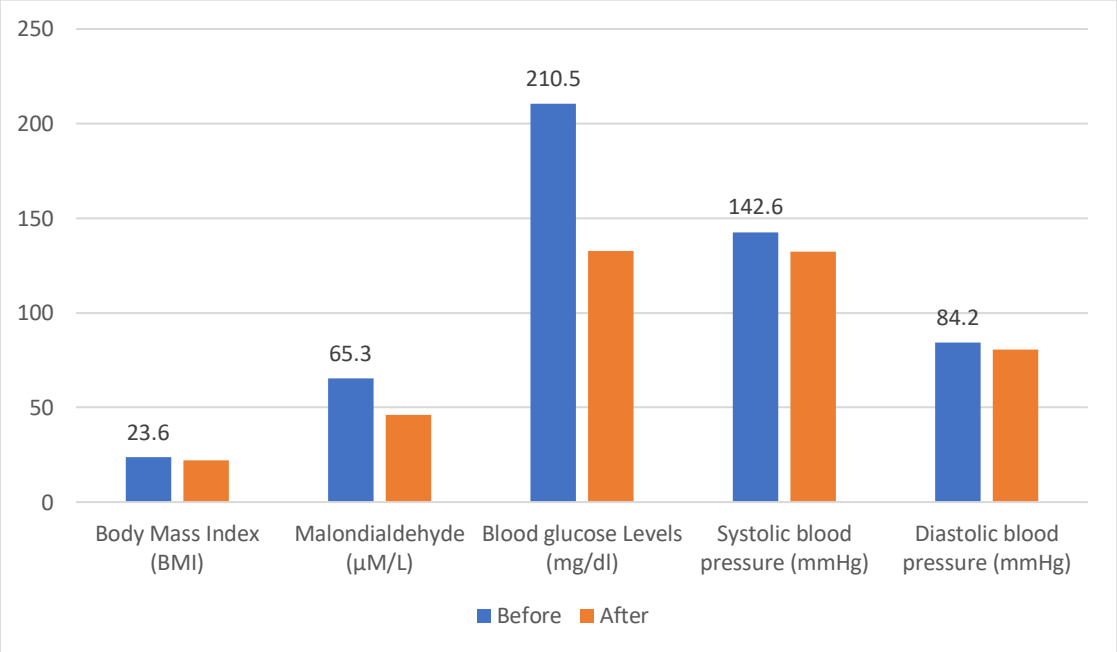

Table III Change in the severity ranking of the RBC Morphology before and after Yoga therapy

Parameters	Before	After	P value
0	5	27	0.01
1+	13	15	
2+	9	8	
3+	10	3	
4+	21	5	

Table III shows that there was significant change in the severity ranking of the RBC Morphology before and after Yoga therapy (P< 0.05).

DISCUSSION

Unsaturated fatty acids in cell membranes can also be harmed by free radicals. Lipid peroxides and extremely reactive dialdehydes are produced by plasma lipoproteins and have the ability to chemically alter proteins and nucleic acid bases.[6] Lipid peroxidation products can be used to calculate the overall body radical burden.[7] One of the most hazardous consequences of lipid peroxidation that is of significant toxicological relevance is malondialdehyde (MDA).[8] Because the harmful byproducts produced during lipid peroxidation have effects at a location distinct from where they are generated, they act as toxic secondary messengers.[9,10]The present study was conducted to assess effects of Yoga in patients with type 2 diabetes mellitus and hypertension.

We found that out of 58 patients, 30 were males and 28 were females. Hegde et al[11]assessed the effect of yoga on anthropometry, blood pressure, glycemic control, and oxidative stress in type 2 diabetic patients on standard care in comparison with standard care alone.The study involved 123 patients stratified according to groups with microvascular complications, macrovascular complications, and peripheral neuropathy and without complications and assigned to receive either standard care or standard care along with additional yoga for 3 months.In comparison with standard care alone, yoga resulted in significant reduction in BMI, glycemic control, and malondialdehyde and increase in glutathione and vitamin C. There were no differences in waist circumference, waist-to-hip ratio, blood pressure, vitamin E, or superoxide dismutase in the yoga group at follow-up.

We observed that before and after yoga therapy BMI found to be 23.6 and 22.1, Malondialdehyde was 65.3 µM/L and 46.2 µM/L, glucose level was 210.5 mg/dl and 132.8 mg/dl, SBP was 142.6 mm Hg and 132.4 mm Hg and DBP was 84.2 mmHg and 80.6 mm Hg. Sinha et al[12]conducted a study on healthy male volunteers from the Indian Navy, who were divided into two groups--a yoga (n = 30) group and a control (n = 21) group. The yoga group was trained in yoga for 6 months. The yoga schedule consisted of prayers, asana, pranayama, and meditation. The control group practiced routine physical training exercise for 6 months. Blood samples were collected when the volunteers were in fasting condition before and after completion of 6-month training period. Reduced and oxidized glutathione, glutathione reductase activity and total antioxidant status (TAS) were estimated.Reduced glutathione level increased significantly ($p < 0.05$) in the yoga group after completion of training. Glutathione reductase activity increased significantly in the control group ($p < 0.05$). TAS increased significantly ($p < 0.001$) in the yoga group and decreased significantly ($p < 0.001$) in the control group.

We found that there was significant change in the severity ranking of the RBC Morphology before and after Yoga therapy ($P< 0.05$).Jacob et al[13]evaluated the effects of yoga in modifying and improving the quality of life in type II diabetic with hypertension patients. Abnormal RBCs were markedly reduced as according to the severity ranking assessed after 45 days of yoga therapy. Significant reduction in the levels of malondialdehyde.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that frequent yoga practice helps to improve blood pressure, body mass index, glycemic parameter, and RBC shape by reducing oxidative stress-induced damage. It may also reduce the risk of illness complications.

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