INTRODUCTION
Integrative medicine practices incorporating meditation and Eastern healing modalities are popular but there is a paucity of literature on their effects on human physiology and metabolism. Previous studies have reported improved psychosocial outcomes in healthy subjects as well as improved psychological parameters in depressed patients (Conboy, 2009; Dubey, 2010). However, little evidence has been reported regarding the physiological and metabolic effects of such therapies. The present study attempts to explore the effect of Shivyog Shambhavi, a component of Shivyog Cosmic healing, on various metabolic parameters. Shambhavi—a powerful vedic healing modality—involves mainly deep meditation along with specific breathing techniques as well as simple physical exercises and helps purify physical and energy systems, improve health and inner wellbeing. Shivyog, led by Dr. Avdhoot Shivanand, has been offering life transformative programs for the past four decades.

This pilot study aims to assess the short-term effects of ShivYog Shambhavi intervention program on metabolic parameters like weight, body mass index and BP and biochemical parameters in the serum.

MATERIALS & METHODS:
Study setting:
This study was conducted during the 2 ShivYog Shambhavi seminars held at 2 different Indian cities (Gwalior and Kolkata), each of which was a 5-day program lasting eight hours each day. Participants were provided a simple meal and breaks in between each of which was a 5-day program lasting eight hours each day. No dietary restrictions were advised during the two-hour sessions. All participants underwent assessment of their metabolic and biochemical parameters before and after Shambhavi seminar.

Results:
A total of 52 participants underwent the study, including 31 males and 19 females, with mean age of 54.8 (45.2 – 64.3) years. Following ShivYog Shambhavi intervention over a follow-up of 1 week in one seminar & one month in the other, significant improvements were seen in unhealthy weight, blood glucose, and serum uric acid levels. There was a trend towards improvement in Hb, serum total cholesterol and LDL levels.

Conclusions: This study demonstrates beneficial physiological and metabolic effects of short term ShivYog Shambhavi meditative practice.

Statistical Analysis
Mean blood pressure (MAP) was calculated as \[\frac{SBP + 2(DBP)}{3}\]. Hypertension was defined according to the most recent JNC Joint Commission Guidelines (Chobanian, 2003). BMI was calculated based upon height and weight and then patients were grouped into categories (Underweight, Normal, Overweight, Obese, Morbid Obese) based upon the most recent Center for Disease Control (CDC) recommendations.

Continuous variables were presented as mean SD and were compared with student’s t-test. Categorical variables are compared by the Pearson chi-squared or Fisher exact test. All statistical tests are two sided and a \(p \leq 0.05\) was considered significant. All statistical analysis was performed using STATA version 15.1 (StataCorp, LLC College Station, TX).

Results
There were 10 participants in the Gwalior seminar and 42 in the Kolkata seminar. End of the study parameters were collected at one week and one month following the Shambhavi intervention in the Gwalior and Kolkata seminars, respectively.

Gwalior Shambhavi Seminar Analysis
Hbpre and Hbpost are the hemoglobin data. BSpree and BSpost are the blood sugar data. UApre and UApost are the uric acid data and CHOLpre and CHOLpost are the total cholesterol numbers measured before and after the intervention.

The mean age of participants was 54.8 years (45.2 – 64.3; 95% CI). The mean Hb value increased post intervention. The mean Hbpre value was 11.7mg/dl (10.7 – 12.8, 95% CI) and mean Hbpost value was 12.17mg/dl (11.1 – 13.3, 95% CI), though \(p\) value was only 0.07 (Table 1) demonstrating a trend towards statistical significance. Random blood sugar values decreased significantly from a mean of 146mg/dl (90 – 203, 95% CI) to 105 mg/dl (83 – 129, 95% CI, \(p = .03\)) (Figure 1). Serum uric acid also decreased significantly from a mean of 5.0 mg/dl (4.2 – 5.9, 95% CI) to 4.4mg/dl (3.8– 5.1, 95% CI, \(p = .002\)) (Figure 2). Total Cholesterol levels decreased from a mean of 183mg/dl (145 - 222, 95% CI) to 175mg/dl (140 - 210, 95% CI, \(p = .03\)) (Figure 3).
164 mg/dl (144 – 185, 95% CI) revealing a trend towards statistical significance (p = .07) (Figure 3). Although changes in blood glucose and serum uric acid have been statistically significant, with p value <0.05, the CI overlap is due to small number of participants (n=10).

**Table 1: Measurements before and after Shambhavi Seminar Intervention in Gwalior**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Start (Pre) Mean Value</th>
<th>Post Mean Value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb</td>
<td>11.2 (10.7 – 12.8, 95% CI)</td>
<td>12.17 (11.1 – 13.3, 95% CI)</td>
<td>&lt;0.07</td>
</tr>
<tr>
<td>Uric Acid</td>
<td>3.04 (2.4 – 5.9, 95% CI)</td>
<td>4.4 (3.8 – 5.1, 95% CI)</td>
<td>&lt;0.007</td>
</tr>
<tr>
<td>Random Blood Sugar</td>
<td>146 (90 – 203, 95% CI)</td>
<td>105 (83 – 129, 95% CI)</td>
<td>&lt;0.03</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>183 (145 – 122, 95% CI)</td>
<td>164 (144 – 185, 95% CI)</td>
<td>&lt;0.07</td>
</tr>
</tbody>
</table>

**Kolkata ShivYog Seminar**

Kolkata data included 42 patients, 15 males and 27 females with a mean age 53 years (range 28 - 77 years). The following data was collected before and after the intervention 1 month apart: Systolic and diastolic BP, Height, Weight, Random Blood Sugar (RBS), HbA1C, and LDL cholesterol. BMI was calculated from the measured height and weight using standard nomogram. The patients were then grouped into the following categories (Underweight, Normal, Overweight, Obese, Morbidly Obese). When the weight classification group was compared before and after intervention, there was a significant improvement based upon the reclassification of patients (Table 2, Figure 5). There was an increase weight gain among the normal weight group. However, those in obese and morbidly obese showed statistically significant reduction in body weight.

**Table 2: Obese Classification before and after Intervention**

<table>
<thead>
<tr>
<th>Group</th>
<th>Frequency Before</th>
<th>Percent Before</th>
<th>Frequency After</th>
<th>Percent After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under</td>
<td>1</td>
<td>2.3</td>
<td>1</td>
<td>2.38</td>
</tr>
<tr>
<td>Normal</td>
<td>12</td>
<td>28.6</td>
<td>15</td>
<td>35.7</td>
</tr>
<tr>
<td>Overweight</td>
<td>15</td>
<td>35.7</td>
<td>15</td>
<td>35.7</td>
</tr>
<tr>
<td>Obese</td>
<td>7</td>
<td>16.7</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td>Morbidly Obese</td>
<td>7</td>
<td>16.7</td>
<td>5</td>
<td>11.9</td>
</tr>
</tbody>
</table>

The reclassification of obese grouping variable was analyzed using the Pearson Chi-squared test and Cramer’s V. There was a statistically significant shift in the number of patients who decreased the group they were in (P < .001) (i.e., went from morbidly obese to obese, obese to overweight, overweight to normal weight).

There was a trend toward a significant change with serum LDL levels and blood glucose (Table 3). The systolic BP showed a reduction of 5 mm Hg (142/86 at the start and 137/87 post), though not statistically significant, was encouraging. The diastolic and mean blood pressures did not change from baseline.

**Kolkata ShivYog Seminar**

ShivYog Shambhavi intervention, pioneered by Dr Avdhoot Shivanand, is known to produce remarkable effects in individuals with multiple health disorders. This short-term pilot study showed promising positive results in improving various metabolic parameters. The effect of yogic breathing exercises (pranayama), cleansing practices and meditation on reducing the inflammation of patients with rheumatoid arthritis coupled with significant...
reduction in serum uric acid levels and other inflammatory mediators have been previously reported (Singh, et al, 2011). Our study showed a statistically significant reduction in serum uric acid with one week of intervention. In a randomized study of stress reduction in 201 black men and women with angiographically documented coronary artery disease randomized to meditation or health education, 5.4-year follow-up found a 4.9 mm Hg lower systolic blood pressure, in those randomized to meditation (Schneider, 2012). A 2013 American Heart Association scientific statement on alternate approaches to lowering blood pressure concluded that meditation modestly lowers blood pressure and that its use may be considered (Ospina, M.B, 2007). In our study, there was a promising 5 mm Hg reduction in Systolic BP within a short term of one-month intervention. In a study of 103 patients with coronary artery disease randomized to meditation or active control (health education), meditation improved metabolic parameter of insulin resistance (Paul-Labrador, M, 2006).

In our study, we found a significant reduction in blood glucose levels commensurate with improved insulin resistance and marked reduction in percent of obese and morbidity obese subjects with just one month of intervention. Regular practice of ShivYog Shambhavi, by itself, resulted in significant reduction in BMI in a brief period of one month, without any additional dietary restrictions. Compared to Gwalior Seminar results of one-week practice, relatively longer (one month) practice after the Kolkata seminar possibly enabled the participants to achieve impressive changes in their internal milieu resulting in significant changes in the body weight and appreciable improvement in serum LDL cholesterol level and systolic BP, among others.

LIMITATIONS:
We have not explored the effects of this specific ShivYog Shambhavi meditative technique on psychological outcomes and it would be worthwhile to correlate the physical health benefits with improvements in levels of perceived stress and overall well-being. Though there was trend towards improvement, the less than significant changes in serum hemoglobin and serum total cholesterol in the Gwalior seminar & blood pressure, blood glucose, and serum LDL levels in the Kolkata seminar may be due to the small number of the study subjects, shorter duration of practice, and possibly the lack of a control group in both the interventions. Further large scale randomized studies with longer periods of intervention are highly warranted to explore the true potential of this practice.

CONCLUSION:
In this pilot study, with ShivYog Shambhavi meditative procedure, there was a significant improvement in blood glucose and serum uric acid levels after one week & in unhealthy body weight at the end of one month. There was a trend towards significant improvements in hemoglobin, weight sub-classification, serum total and LDL cholesterol.

Acknowledgement: We sincerely acknowledge the efforts and guidance of Dr. Avdhoot Shivanand in healing the patients. We also acknowledge the efforts of Sadhna Verma MD, Apurva Bhatt MD, Hari Tunuguntla MD, Jayme Sack and Jacob Shivanand in reviewing and analysis of the data and Dr. Bindu kumar C. Kushpanda for help in design of study.

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