**ABSTRACT**

**Introduction:** Ramadan fasting is a religious obligation which is practised by Muslim population all over the world. However, there is scarcity of scientific literature regarding its effects on health determinants in cardiovascular disturbances like hypertension.

**Objective:** The present study was done to assess the (BP), body weight and serum cholesterol changes over the period of Ramadan fasting in patients with hypertension.

**Materials and Methods:** This prospective observational trial was done on 15 hypertensive subjects who were in the age group of 35 to 65 years, who were determined to complete Ramadan fast. All subjects were on antihypertensive therapy. Outcome measures of (BP), body weight and serum cholesterol were assessed in all the subjects before and after Ramadan month.

**RESULTS:** Mean age of subjects was 44.6 ± 5.62 years. Systolic BP decreased from 148 ± 19.6 to 132.5 ± 17.9 mm of Hg. The decrease of 15.5 units (95% CI: 7.5 to 24.4) was statistically significant (p = 0.0009). Diastolic BP decreased from 90.4 ± 7.8 to 81.1 ± 6.3 mm of Hg. The decrease of 9.3 units (95% CI: 5.7 to 13) was statistically significant (p < 0.0001). There was statistically significant decrease in body weight from 66.6 ± 13 to 65.2 ± 12.7 kg (p < 0.0001). There was no significant difference in serum cholesterol from 187.3 ± 28.9 to 192.7 ± 31.3 mg% (p = 0.37).

**Conclusion:** Hypertensive patients with continuation of their medicines showed a decrease in blood pressure and reduction in body weight at the end of Ramadan fasting duration. However there was no change found in serum cholesterol levels.

**METHODS**

**Study design:** A prospective, observational trial.

**Study site:** Department of Physiology, Government Medical College and Hospital, Aurangabad, India.

**Selection of subjects:** Fifteen hypertensive patients who were in the age group of 35 to 65 years, with no history of diabetes, tuberculosis or any other major disease and who were willing to be a part of the study were enrolled. Informed consent was taken from each of them. The patients continued their treatment with antihypertensive agents during the course of the study. All the subjects gave negative history of addictions like smoking or alcoholism.

**Data collection and blood sampling:** Subjects came at study site after 10–12 hours of fasting, in the morning hours, for data collection. Before the beginning of Ramadan month, the data was collected between 7 days and 2 days before start of Ramadan month and from the 3rd to 6th day after the end of Ramadan month. Five millimetres of fasting blood sample was collected from the median cubital vein by vacuum sampling method and it was then sent to laboratory for the analysis. The systolic and diastolic blood pressures were estimated twice by using sphygmomanometers (Omron Corporation, Netherlands). If there was a difference of more than 5% in between two measurements, then a third reading was repeated and the average of the two near readings see mss recorded as the mean BP. Body weight was measured to the nearest 100 g, with subjects wearing light clothing. Serum cholesterol was estimated by the CHOD-PAP method [15].

**DATA ANALYSIS**

Quantitative data was expressed in the form of mean ± standard deviation. Paired t-test for two tailed hypothesis was used to
compare the observations before and after fasting. A p-value of less than 0.05 was considered to be statistically significant.

RESULTS
Mean age of subjects was 44.6 ± 5.62 years. [Table/Fig-1] summarizes the results which were obtained from the study.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Before Ramadan</th>
<th>After Ramadan</th>
<th>Difference in means</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Pressure (millimetres of mercury)</td>
<td>148 ± 19.6</td>
<td>132.5 ± 17.9</td>
<td>15.5 units</td>
<td>0.0009*</td>
</tr>
<tr>
<td>Diastolic Pressure (millimetres of mercury)</td>
<td>90.4 ± 7.8</td>
<td>81.1 ± 6.3</td>
<td>9.3 units</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Body weight (kilograms)</td>
<td>66.6 ± 13</td>
<td>65.2 ± 12.7</td>
<td>1.4 units</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Serum cholesterol (milligram %)</td>
<td>187.3 ± 28.9</td>
<td>192.7 ± 31.3</td>
<td>-5.3 units</td>
<td>0.37 **</td>
</tr>
</tbody>
</table>

[Table/Fig-1]: Blood pressure, body weight and serum cholesterol before and after Ramadan fasting
SD: Standard deviation* indicates statistically significant** indicates statistically not significant

DISCUSSION
Significant reductions in both systolic and diastolic BP were found in the present study. There was also a significant reduction in body weight. However, there was no significant change in serum cholesterol levels.

Lifestyle related factors like high consumption of see mss which are rich in saturated fats and refined carbohydrates, combined with lack of physical activity, is found to be a causative factor for hypertension, obesity, diabetes and dyslipidaemia. Thus, maintaining a healthy lifestyle, which includes consuming a balanced diet and having regular physical activity, plays an important role in the prevention and management of cardiovascular diseases like hypertension, obesity, diabetes and dyslipidaemia [16].

Ramadan fasting in Islam provides an opportunity to decrease the intake of food while increasing physical activity. Although food intake reduction may not be uniform and though it may differ from person to person, extra congregational prayers are more widely mismatch with mss. The extra congregational prayers called ‘Tarawih’, which are performed around 1–2 hours after sunset, along with increased tendency to offer non-obligatory ‘Nafl’ prayers, lead to increase in physical activity [17].

Fasting may have a protective effect, as hunger has been associated with catecholamine inhibition and a reduced venous return, which cause a decrease in the sympathetic tone leading to a fall in blood pressure, heart rate and cardiac output [2].

Imtiaz et al., concluded in their systematic review of related literature, that Ramadan fasting significantly improved the lipid profile, (BMI) and BP in normal healthy people, in patients with stable cardiac illnesses, metabolic syndrome, dyslipidaemia and hypertension [18].

Body weight decreased significantly in the present study. Most studies have shown similar results [19,20]. However, some studies have shown no significant change in body weight [21,22] after Ramadan fasting.

We found no significant change in serum cholesterol values. Some researchers have reported increased concentrations of serum cholesterol, which may have been related to loss of weight during Ramadan fasting. However, some researchers have found either no change or decreased values of serum cholesterol during Ramadan fasting [23-27].

LIMITATIONS
Study was done on a single group which practised Ramadan fasting and blood pressure reading was evaluated over single time points before and after fasting.

RECOMMENDATION
Doing further studies with large sample sizes and with comparative groups, along with assessment of more parameters of cardiovascular health, may help in better understanding of the subject.

CONCLUSION
Hypertensive patients with continuation of their medicines showed a decrease in blood pressure and reduction in body weight at the end of Ramadan fasting duration. However there was no change found in serum cholesterol levels.

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REFERENCES
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