Evaluation of certain medicinal plants for antiobesity properties

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Obesity is not limited to developed countries and is spreading globally. Although some studies have been successful in achieving initial weight loss but most obese patients eventually regain their weight. Therefore, an effective means to sustain weight loss is still a major challenge. Ayurvedic classics give sufficient focus on obesity (sthaulya or medoroga) and advise diet to control the disease. To address the challenge, certain plants, Apamarga (Achyranthes aspera Linn.), Agnimantha [Clerodendrum multiflorum (Burm. F.) O. Ktze.], Vrikshamla [Garcinia gummigutta (L.) Robs.] and Mustak (Cyperus rotundus Linn.) reported with antiobesity properties and compound plant powder, obeloss (Apamarga agnimanthadi churna=kalpita) were clinically tested on 60 patients. Results of the study are encouraging in the management of obesity.

Keywords: Obesity, Indigenous drugs, Ayurveda drugs, Antiobesity activity
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Ayurvedic classics give sufficient focus on obesity (sthaulya or medoroga) and serves as a guideline to advise diet, etc. present or to control the disease. Obesity is not limited to developed countries but it is spreading globally. In United States and some European countries, it is an epidemic condition. Numerous studies clearly showed an increase in mortality rate associated with Body Mass Index (BMI) of at least 30. Individuals with a BMI of at least 30 have a 50-100% increased risk compared with individuals with BMI of 20-25, due to cardiovascular diseases. Traditionally, obesity was believed to be associated with life style, several studies have shown that changes in dietary pattern, physical activity levels, life styles are related to increasing frequencies of obesity and the risk of associated diseases. Present work was conducted on four medicinal plants, Apamarga (Achyranthes aspera Linn.), Agnimantha [Clerodendrum multiflorum (Burm. F.) O.Ktze.], Vrikshamla [Garcinia gummigutta (L.) Robs.] and Mustak (Cyperus rotundus Linn.) having antiobesity properties as mentioned in Ayurvedic classical texts.

Patients of 12-60 yrs age of both gender and without any complicate diagnosed patient were included. Patients having hormonal disorder, obesity produced due to certain secondary causes, drug induced obesity, hereditary indisposition and pregnant woman were excluded. All the patients were diagnosed on the basis of clinical sign and symptom, i.e. Chala, sphiga, udara and stana, Udar vridhdi, Atikshudha, Atitrisha, Atinidra, Krichhavyavayata, Gaurav, Ayathopachya, Shaithilya, Daurbalya, Sweadadhikya, Daurgandhya, Aalasya, Angasada, Kshudra swasa, Sukumarya, Tanda and snigdagratra; raised hip and waist circumference; raised arm, thigh, neck, chest circumference; raised body mass index (BMI); and pathological Investigations such as serum cholesterol and serum triglycerides. Phytochemical, physicochemical & clinical evaluation of Apamarga, Agnimantha, Vrikshamla and Mustak was carried out along with the clinical study on the compound herbal powder. Although some studies resulted in initial weight loss but most of the obese patients eventually regained their weight and therefore an effective means to sustain weight loss is still a major challenge. So, a study was conducted by selecting certain plants, which reported having antiobesity activity and an herbal formulation obeloss by using deepan, pachan, and lekhan drugs.

Methodology

Preliminary phytochemical screening of selected plants was done. A compound herbal drug powder, obeloss (Apamarga agnimanthadi churna = Kalpita)
was prepared by NIA pharmacy. One part each of Apamarga tandul powder, Mustaka tuber powder, Agnimantha stem powder, and Vrikshamla fruits decoction (bhavnarth) was taken. No preservative used in the formulation. 60 clinically diagnosed patients were randomly divided into 3 groups (Tables 1 & 2). Group A (n=20) patients were given obeloss powder @ 4 gm/day/patient along with madhoodaka @ 2 teaspoon twice a day for 60 days; Group B (n=25) patients were given obeloss powder @ 4 gm/day / patients along with lukewarm water for 60 days; Group C (n=15) patients were treated as control. Yava powder capsule (500 mg) was administered as placebo along with madhoodaka (10 gm). All the patients were given simple and light food. Patients were followed up after 30 and 60 days. Laboratory investigations were repeated after treatment.

Results and discussion

Significant improvements were observed in all the 3 groups; Group A showed maximum improvement and moderate improvement was observed in group B. Group C showed mild improvement (Table 3). The moisture content of Apamarga (A1) 9.15%, Mustaka (A2) 8.63%, Agnimantha (A3) 7.10% and Vrkishamla (A4) was 12.68% while ash value of above samples were 53.14%, 6.41%, 7.96%, and 3.93%, respectively. Acid insoluble ash of all these samples results was 5.026%, 21.9300%, 0.5067%, 2.3067%, respectively. Water soluble ash results were 15.2533%, 17.4400%, 22.3753%, and 6.8530%. Alcoholic extractives result was 4.9680%, 3.0960%, 1.7520%, and 34.7920%. Aqueous extractive values were 11.6560%, 11.2640%, 8.2560%, and 45.3920%. Ether extraction result was 8.4880%, 47.0320%, 4.4240%, and 25.0640%, respectively. TLC analysis of all drugs sample showed, Rf values of Apamarga in xylene extractive 4 spots under UV light. Agnimantha alcoholic extractive Rf value was 0.68 & 0.12, while Agnimantha ether extractive showed Rf value of 7 spots under UV light. Mustaka extractive showed in aqueous Rf values was 2 spots and alcoholic extractive showed 4 spots Rf values was 0.12, 0.15 & 0.15, 0.43, 0.55, 0.61, respectively. Vrikshamla in ethyl alcohol Rf values was 0.46, 0.5, and 0.87 of 3 spots under UV light 254 nm.

<table>
<thead>
<tr>
<th>Causative factors</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Total</th>
<th>%</th>
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<tr>
<td>Gurvati sevana</td>
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<td>22</td>
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<td>Aitisnagha sevana</td>
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<tr>
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<td>12</td>
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<td>Shitahara sevana</td>
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<td>08</td>
<td>05</td>
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<td>48.33%</td>
</tr>
<tr>
<td>Keerthna sevana</td>
<td>15</td>
<td>12</td>
<td>05</td>
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</tr>
<tr>
<td>Navavana sevana</td>
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<td>08</td>
<td>05</td>
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<tr>
<td>Mithanna sevana</td>
<td>20</td>
<td>23</td>
<td>14</td>
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<tr>
<td>Ati bhooja</td>
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<td>06</td>
<td>02</td>
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<tr>
<td>Nalina madhaya sevana</td>
<td>03</td>
<td>05</td>
<td>01</td>
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<table>
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<th>Symptoms</th>
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<th>%</th>
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<td>Gaurava</td>
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<tr>
<td>Chalshigaudarastra</td>
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<tr>
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<td>59</td>
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<td>24</td>
<td>13</td>
<td>57</td>
<td>95.00%</td>
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<tr>
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<tr>
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<td>21</td>
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</tr>
<tr>
<td>Shailthiya</td>
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<td>22</td>
<td>09</td>
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<tr>
<td>Sukumarya</td>
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<td>09</td>
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<td>Daargrandhya</td>
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<tr>
<td>Sinigdra gatrata</td>
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<td>25</td>
<td>06</td>
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<tr>
<td>Alasya</td>
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<td>23</td>
<td>14</td>
<td>57</td>
<td>95.00%</td>
</tr>
<tr>
<td>Angasada</td>
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<td>20</td>
<td>11</td>
<td>51</td>
<td>85.00%</td>
</tr>
<tr>
<td>Kshudra swasa</td>
<td>17</td>
<td>23</td>
<td>14</td>
<td>54</td>
<td>90.00%</td>
</tr>
</tbody>
</table>

Table 3 — Patients showing Improvement

<table>
<thead>
<tr>
<th>Objective Improvement</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
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<tr>
<td>Weight</td>
<td>5.22%</td>
<td>5.46%</td>
<td>0.79%</td>
</tr>
<tr>
<td>Body mass index (BMI)</td>
<td>5.02%</td>
<td>5.47%</td>
<td>0.83%</td>
</tr>
<tr>
<td>Arm circumference</td>
<td>3.58%</td>
<td>1.84%</td>
<td>0.50%</td>
</tr>
<tr>
<td>Thigh circumference</td>
<td>3.80%</td>
<td>3.75%</td>
<td>2.94%</td>
</tr>
<tr>
<td>Hip circumference</td>
<td>3.74%</td>
<td>3.46%</td>
<td>0.43%</td>
</tr>
<tr>
<td>Abdomen circumference</td>
<td>4.67%</td>
<td>3.85%</td>
<td>0.38%</td>
</tr>
<tr>
<td>Nape of Neck</td>
<td>1.42%</td>
<td>1.27%</td>
<td>0.18%</td>
</tr>
<tr>
<td>Chest circumference</td>
<td>1.27%</td>
<td>1.25%</td>
<td>0.13%</td>
</tr>
<tr>
<td>Serum cholesterol</td>
<td>7.21%</td>
<td>4.76%</td>
<td>4.29%</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>9.63%</td>
<td>7.94%</td>
<td>1.43%</td>
</tr>
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</table>
Phytochemical results showed that Apamarga has sugar and saponin in sufficient condition. In Agnimanthha, sugar, tannin, saponins were positive, while reducing sugar was more positive. Mustaka was found to have sugar and saponin. Vrikshamla showed presence of sugar, reducing sugar, tannin, saponin, phenolic compounds and alkaloids. The drugs, obeloss (Apamarga agnimanthadi churna = kalpita herbal powder) showed efficacy in reducing kshudha, sweda and trishna. Aparmarga seeds were able to suppress kshudha (hunger) and trishna (thirst). Mustaka, Vrikshamla and Agnimanthha mobilized medodhatu from the body after dhatupaka. Medodhatu was converted into mala (faeces) and mutra (urine) by Pachan of med. Increase in mala and mutra volume resulted in srotosuddhi (purification of channel) and laghatwa (lightness) in the body. These drugs have deepan (appetizer), pachan (digestive) and lekhan (scraping) properties. Ayurveda has also suggested treatment of sthahlya roga by drugs having apatarpna and lekhana karma properties. The efficacy of the drug was due to the combined effect on medodhatu, aamodsha, dhatvagni and koshthagni. The ingredients of composition, Apamarga, Agnimanthha, Mustaka are katu, tikta, kashaya rasa (taste), usna veerya (potency), katu vipaka & laghu, ruksha and teekshna properties. These properties work against kapha, and resultant is reduced fat. Apamarga also suppresses appetite (CS su 27). Ruksha dravya works against snigdha guna and absorb excessive water contains (SS su 46). Teekshna dravya acts as lekhana on dosha, dhatu and mala (BP). Usna veerya consisting of agrinahabhoot acts as kaphahara (AS su 17). Katu and amla vipaka work against vitiated kapha dosha. Vrikshamla is having amla ras, usna veerya, amla vipaka, laghu and ruksha properties. Amla rasa is deepan, pachan, rochan, hrdya while laghu and ruksha dravya are kaphanashak. Amla vipaka acts as kaphanashak. Garcinia cambogia (Vrikshamla) is reported to be effective in inhibiting lipogenesis, lowers production of cholesterol & fatty acids, increases production of glycogen in liver, suppresses appetite, increases body’s heat production by activating thermogenesis and encourages weight loss in laboratory animals due to presence of hydrocitric acid (HCA) in these fruits. HCA enhances weight loss due to its fewer tendencies to convert carbohydrate to fat. HCA supplementation may decrease appetite and also inhibit the actions enzyme, ATP citrate lipase in liver. The enzyme is specifically responsible for the conversion of carbohydrates to fat. After the completion of drug schedule, patients were regularly followed up to three months for assessment of increasing fat deposition and other symptoms of obesity. Approximately 70% patients did not regain unwanted fat.

Conclusion

The compound herbal powder, obeloss (Apamarga agnimanthadi churna=kalpita) was found to be effective in the treatment of medoroga (obesity). Patients in Group A showed high improvement; in Group B moderate improvement was observed while in Group C no improvement was observed. In Group C, where yava powder was used as a placebo along with madhoodaka mild significant results were observed due to the madhoodaka and not due to yava churna because the churna amount was so less.

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