Effectiveness of Apple Cider Vinegar in Management of Obesity: A Randomized Controlled Trial

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Abstract

Aim of Study: To explore the effectiveness of daily intake of apple cider vinegar (300mg, tablets 3 times daily) on lowering body mass index (BMI) among obese subjects.

Methodology: A total of 100 obese subjects were randomized into either an intervention group (who received 300mg apple cider vinegar tablets three times daily in addition to their prescribed routine management protocol) or a control group (who received their prescribed routine management protocol only). The researchers met all participants in both groups once monthly to measure their body weight, inquire about any health complaints related to their followed protocol, and to provide health education. In addition, each participant in the intervention group was given his/her monthly doses of apple cider vinegar tablets (90 tablets).

Results: By the start of the study, there was no significant difference between participants in the invention group and those in the control group regarding their BMI (33.72 ± 6.24 kg/m² and 33.60 ± 5.00 kg/m², respectively, p = 0.916). However, by the end of the study observation period (5 months), there was a significantly lower mean BMI among the intervention group than the control group (29.38 ± 5.70 kg/m² and 31.59 ± 4.68 kg/m², respectively, p = 0.037), which was not sex- or age-dependent. Reported side effects were in the form of mild heart burn (12%) or transient diarrhea (10%).

Conclusions: Apple cider vinegar can be safely prescribed for a short-term body weight reduction.

Recommendations: Further studies are needed to explore the mechanism by which its intake is associated with weight loss and to identify its long-term side effects.

Key Words: Apple cider vinegar – Herbal medication – Obesity – Randomized controlled trials.

Introduction

OBESITY has become a global epidemic in both developed and developing countries over the last few decades. Approximately 10-15% of all obese people become obese during adolescence [1-3].

Obesity is associated with psychosocial morbidity and the development of cardiovascular risk factors and diabetes [1].

Obesity represents energy intake from foods exceeding energy expenditure in physical activity. There has been a consensus that the source of the obesity epidemics primarily due to environmental changes [4].

Obesity is now a major problem in the Kingdom of Saudi Arabia. The percentage of overweight and obesity increases with older age groups and this leads to more health problems. In the last three decades, obesity among adults has increased and became a major health problem. In 2003, a study showed that 21% of adults aged 15 years and over were obese/overweight, with an increase from 17% in 1997. Studies in 2000 on the prevalence of overweight and obesity among hypertensive and diabetic adult patients found that 46% of them were obese [5,6].

Proper diet and physical activity are the classic management strategies to manage obesity. However, these usually proved not successful. So, surgical interventions and medical treatment were proposed, with an added list of side effects and complications. However, herbal medicines (e.g., apple cider vinegar) were tried, which frequently proved to be effective in animal experiments [7]. Some small studies have hinted that apple cider vinegar could also help in cases of diabetes and obesity [8].

Since apple cider vinegar is an herbal product, readily available in the market and may spare the usual side effects of medications as well as the complications of surgery in cases of obesity, it is a felt necessity to investigate the impact of this natural product on management of obesity among obese patients.
This study aims to explore the effectiveness of daily intake of apple cider vinegar (300mg) tablets 3 times daily, on lowering body mass index (BMI) among obese subjects.

Subjects and Methods

This research followed a randomized controlled trial design. During 2012, 100 obese/overweight subjects attending the Obesity Clinic in Abha City, Kingdom of Saudi Arabia, who accepted to participate in this study, were randomized into either an intervention group (50 subjects who received apple cider vinegar 300 tablets three times daily, in addition to health education on diet control and the recommended physical activity) or a control group (50 subjects who received health education on diet control and the recommended physical activity).

The inclusion criteria were adults with BMI more than 25kg/m$^2$. On the other hand, the exclusion criterion was the presence of associated comorbidity (e.g., diabetes, liver disease, renal disease, heart disease, arthritis, peptic ulcer, etc.).

A data collection tool was designed by the researchers, which included all study variables, e.g., study group, sex, age, and BMI.

Participants were followed-up for 5 months. The researchers met participants in both study groups once monthly to measure their weight, inquire about any complaints that may be attributed to their management protocol, and to provide health education. Moreover, subjects in the intervention group were provided with their monthly doses of apple cider vinegar.

During the first interview, objectives of the present study were fully explained to participants. It was clearly emphasized to every potential participant that each subject is totally free to accept or to refuse to contribute in the study and the collected data will be kept fully confidential and will be used only for research purposes only. Those who accepted to participate were included in this study.

The Statistical Package for Social Sciences (SPSS version 17.0) was used for data entry and analysis. Descriptive statistics were calculated and the appropriate tests of significance were applied accordingly (i.e., unpaired $t$-test and repeated measures ANOVA). Differences were considered as “statistically significant” when a $p$-value was less than 0.05.

Results

Table (1) shows no significant differences at baseline between participants in the control and intervention groups regarding their age, height, weight or BMI.

Table (2) shows that after four months of apple cider vinegar intake, participants in the intervention group started to have significantly less BMI than those in the control group ($p=0.039$). This significant difference was maintained till the end of the observation period, i.e., one month later ($p=0.037$).

Table (3) shows that BMI (kg/m$^2$) of male participants did not significantly differ from that of female participants in the intervention group all through the study period.

Table (4) shows that in the intervention group, BMI (kg/m$^2$) of younger participants (<40 years) did not significantly differ from that of older participants (≥40 years) all through the study period.

Table (5) shows that the most frequently reported side effects after 5-month medication with apple cider vinegar were heart burn which was reported by 6 participants (12%) and transient diarrhea, which was reported by 5 participants (10%). Participants who complained of heart burn were advised to take the apple cider vinegar tables after meals and were encouraged to drink a cup of milk whenever they experience heart burn. There was no need to prescribe any antacids to them. Those who reported to have diarrhea experienced it as “transient”. No specific advice was provided to them.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Control Group</th>
<th>Intervention Group</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>37.16 10.03 38.58 10.61</td>
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<td></td>
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<tr>
<td>Height (cm)</td>
<td>169.32 8.46 170.78 7.13</td>
<td>0.353</td>
<td></td>
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<tr>
<td>Weight (kg)</td>
<td>96.47 17.06 97.92 15.73</td>
<td>0.660</td>
<td></td>
</tr>
<tr>
<td>Body mass index (kg/m$^2$)</td>
<td>33.60 5.00 33.72 6.24</td>
<td>0.916</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timing</th>
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<th>Intervention Group</th>
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</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>33.60 4.98</td>
<td>33.72 6.24</td>
<td>0.916</td>
</tr>
<tr>
<td>One month</td>
<td>33.01 4.92</td>
<td>32.64 6.27</td>
<td>0.740</td>
</tr>
<tr>
<td>Two months</td>
<td>32.63 4.92</td>
<td>31.97 6.08</td>
<td>0.551</td>
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<td>Three months</td>
<td>32.50 4.96</td>
<td>31.97 6.11</td>
<td>0.252</td>
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<td>Four months</td>
<td>32.61 4.94</td>
<td>30.31 6.00</td>
<td>0.039</td>
</tr>
<tr>
<td>Five months</td>
<td>31.59 4.68</td>
<td>29.38 5.70</td>
<td>0.037</td>
</tr>
</tbody>
</table>

(1) Repeated Measures ANOVA.
The prevalence of overweight/obesity among adult Saudis in Riyadh was 67.4% [9].

Results of the present study revealed a significantly lower mean BMI among participants in the intervention group than the control group at the end of the observation period. This observed beneficial effect among participants in the intervention group was not sex- or age-dependent. Reported side effects during the whole study period (5 months) were heart burn or diarrhea. These side effects were both mild and transient.

These findings are in agreement with those of Kondo et al. [10], who investigated the effects of vinegar intake on the reduction of body fat mass in obese Japanese subjects, who were randomly assigned to three groups of similar BMI. During the 12-week treatment period, the subjects in each group ingested 500ml daily of a beverage containing either 15ml of vinegar, 30ml of vinegar, or a placebo. BMI levels were significantly lower in both vinegar intake groups than in the placebo group.

Experimentally, apple cider vinegar has been also reported to improve serum lipid profile in rats by decreasing serum TG, LDL-c and increasing serum HDL-c [7].

Different types of vinegar have been proposed as agents to enable weight loss [11]. The mechanism by which apple cider vinegar reduces weight has been hypothesized to be that it prolongs the sensation of satiety after eating [12]. Moreover, an experimental study on mice showed that consuming apple cider vinegar up regulates the expression of genes for fatty acid oxidation enzymes in the liver causing a suppression in body fat accumulation [10].

In conclusion, apple cider vinegar tablets can be safely prescribed for a short-term (e.g., less than one year) to overweight or obese subjects to assist weight loss.

Further studies are needed to explain the exact mechanism by which apple cider vinegar intake is associated with weight loss and to explore the its long-term possible side effects.

Acknowledgment:
This study has been fully supported by the Deanship of Scientific Research, King Khalid University, Saudi Arabia, (No. 26) of the first University Project for Research.

References


