Effect of Compound Fruit and Vegetable Tablet on Relieving Constipation and Defecating Feces Excretion in Mice

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Abstract. We aim to explore the effect of compound fruit and vegetable tablet (GSP) on relieving constipation and defecating feces excretion. GSP were oral administered by 2.0 g/kg, 1.0 g/kg, 0.5 g/kg BW dose to mice for 7 d, followed by monitoring the propulsive rate of intestines, first defecation time, feces particle number and weight. The results show that GSP effectively promotes the propulsive rate of intestines, shortens the first defecation time, increases the feces particle number and weight of the constipated mice, which have the positive effect on facilitating feces excretion.

Introduction

Constipation is a common and complicated clinical symptom. Incidence of constipation has increased continuously as people change their diet and suffer from psychological and social disturbance, which greatly affects the lives of a large number of office workers and the aged. Constipated people are prone to have intestinal flora disorder and long-term constipation is closely associated with acute cardio-cerebrovascular diseases, dementia and colorectal cancer[1-4]. Recent studies have shown that constipation treatments have not received adequate research and development over the last ten years as they presented a series of problems in clinical research and application, such as inexact curative effect, weak specificity, multiple side effects and limited therapeutic range[5]. Made from various kinds of natural dietary fiber such as oat fiber, carrot fiber, vegetable fiber, and pine valley soluble dietary fiber, GSP can maintain gastrointestinal health and prevent indigestion and constipation as well as regulating blood sugar and lowering cholesterol levels[6,7]. They are not only conducive to improving the health of the intestine and colon and decreasing the risk of serious intestinal diseases[8,9], but also help to control weight and reduce obesity caused by...
overeating and indigestion[10,11]. Moreover, GSP can increase satiety and reduce appetite if taken before meals[12].

Our research team has been engaged in the study of GSP. We have found that GSP not only has the effect of weight loss, but also possesses the effect on facilitating feces excretion. Therefore, this study aims to explore the effect of GSP on facilitating feces excretion.

**Materials and Methods**

**Materials and Animals**

GSP was provided by Guangzhou Boeng Bio-technology Co., Ltd., (Guangzhou, China); Activated carbon powder (Shanghai Aladdin Biological Technology Co., Ltd., C1607128), Arabic gum (Shanghai Aladdin Biological Technology co., Ltd., A1619001), Loperamide Hydrochlo-ride Capsules (Xi'an Yeung Sum Pharmaceutical Co., Ltd., 150827647), Tongbianling Capsules (Guangdong Yipiantian pharmaceutical group co., Ltd., 151101020). Male KM mice were obtained from the laboratory animal center, Southern Medical University , (Guangzhou, China)

**Methods**

**Dose.** The body recommended dosage of GSP was 3.0 g per person and set three dose groups: 2.0 g/kg, 1.0 g/kg, 0.5 g/kg BW of mice in this experiment (equivalent of 40, 20, 10 times to the human body recommended dosage respectively). Tongbianling capsules were 1.5 g per person a day and we set dose of 0.5 g/kg to mice (equivalent of 20 times to the human body recommended dose).

**Raising Environment.** The temperature was 23±2°C, relative humidity 40-70%, air changes >15 times/ hour, 12 hours lighting / 12 hours darkness alternation. Experimental animals use license was SYXK (Guangdong), 2012-1125.

**Effects on the Movements of Small Intestines by GSP.** Male KM mice were randomly divided into six groups of 10: the control group, the model group, the positive group (Tongbianling capsules, 0.5 g/kg), GSP high-dose (GSP-H), middle-dose (GSP-M) and low-dose group (GSP-L). In the modeling process, all mice were administered corresponding medicine or distilled, mice in the GSP-H, GSP-M, GSP-L groups were given with 2.0, 1.0, 0.5g/kg GSP daily, respectively.

Before administration, the mice were fasted for 16h. The control animals were given with distilled water, and the rest of the groups were given with loperamide hydrochloride capsule aqueous solution 3.0mg/kg. After 30min each group were given indicator ink (containing 5% carbon activated, 5% of gum Arabic), the control group and the model group given indicator ink. Mice dislocated executed after 25 min, open abdominal cavity, take out the mice throughout the gastrointestinal tract, intestinal tile to wetting of glass, pylorus of the stomach as the starting point, back to the blind end, the department for measuring small intestine length (cm) and measured since pylorus, ink inside bowel movement distance (cm), each calculation through ink moving distance of the small intestine length percentage as gastrointestinal propulsion rate of mice (P), and statistical analysis of data transfer (X) , X = Sin (P ½).

**Effect on Defecation by GSP.** All KM mice were administered with indicator ink, and those were fed with a regular diet and water. Record each row of the first grain of black time
and 5h feces particle number and weight of the bowel movement in mice after administered with indicator ink to fill the stomach in mice.

Results

Effects on the Movements of Small Intestines by GSP. Ink propulsion rate of the model group was significantly lower than the control group (P < 0.01), state constipated model was established successfully. GSP-H, GSP-M and GSP-L of ink propulsion rate were higher than the model group, and statistical analysis showed those had significant difference with the model group (P < 0.01), showed that GSP can promote the mouse small intestine movement function, the results are shown in table 1 and Fig.1.

Table 1. Effect on the Movements of Small Intestines by GSP (mean ± SD, n=10).

<table>
<thead>
<tr>
<th>Group</th>
<th>Dose (g/kg)</th>
<th>Propulsion rate (%)</th>
<th>Conversion value (X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>-</td>
<td>72.9±2.1*</td>
<td>1.03±0.08**</td>
</tr>
<tr>
<td>Model</td>
<td>-</td>
<td>46.2±2.7</td>
<td>0.75±0.09</td>
</tr>
<tr>
<td>Positive</td>
<td>0.5</td>
<td>58.2±1.7**</td>
<td>0.87±0.06'</td>
</tr>
<tr>
<td>GSP-H</td>
<td>2.0</td>
<td>57.9±3.1**</td>
<td>0.87±0.10'</td>
</tr>
<tr>
<td>GSP-M</td>
<td>1.0</td>
<td>56.3±3.4**</td>
<td>0.85±0.12*</td>
</tr>
<tr>
<td>GSP-L</td>
<td>0.5</td>
<td>47.5±3.0</td>
<td>0.76±0.10</td>
</tr>
</tbody>
</table>

Notes: * P<0.05, ** P<0.01 vs. model group

Figure 1. Effect of GSP on the movements of Small intestines (mean ± SD, n=10).

Effects of GSP on Defecation. The model group first defecated time were greater long than the control group (P < 0.01), while defecation of feces particle number and weight in mice were smaller than the control group (P < 0.01), showed constipated model was established successfully. Each dose group of the first defecated time shorter than the model group, all have significant difference with the model group (P < 0.01 and P < 0.05); defecation the feces particle number and weight of each dose group were greater than the model group, all have significant difference with the model group (P < 0.01). The above results show that GSP can reduce constipation first time, increase the feces particle number and weight in mice, the results are shown in table 2 and Fig.2.

![Graph showing propulsion rate and conversion value.](image)
Table 2. Effect of GSP on Defecation (mean± SD, n=10).

<table>
<thead>
<tr>
<th>Group</th>
<th>Dose (g/kg)</th>
<th>First Defecation time (min)</th>
<th>Defecation time (g)</th>
<th>feces particle number (g)</th>
<th>feces weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>-</td>
<td>56.45±18.42**</td>
<td>38.82±3.82**</td>
<td>0.78±0.07**</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>-</td>
<td>119.36±36.27</td>
<td>21.45±2.11</td>
<td>0.44±0.04</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0.5</td>
<td>64.91±19.91**</td>
<td>36.36±3.01**</td>
<td>0.73±0.07**</td>
<td></td>
</tr>
<tr>
<td>GSP-H</td>
<td>2.0</td>
<td>68.36±23.82**</td>
<td>34.82±2.99**</td>
<td>0.71±0.07**</td>
<td></td>
</tr>
<tr>
<td>GSP-M</td>
<td>1.0</td>
<td>85.91±24.76**</td>
<td>29.91±3.30**</td>
<td>0.63±0.06**</td>
<td></td>
</tr>
<tr>
<td>GSP-L</td>
<td>0.5</td>
<td>94.45±19.95*</td>
<td>24.36±3.72*</td>
<td>0.51±0.09*</td>
<td></td>
</tr>
</tbody>
</table>

Notes: *P<0.05, **P<0.01 vs. model group

Figure 2. Effects on defecation by GSP.

Conclusion

In the present study, we demonstrated that GSP can promote small intestine movement function, reduce constipation first time, and increase the feces particle number and weight in mice. According to The function of health food science evaluation procedure and inspection methods, the experiment results show that GSP has effect on facilitating feces excretion to mice. Concerning the serious side effects and adverse reactions caused by chemical drugs for Constipation, the development of an safe, natural substance of active ingredients seems to be more and more significant. Therefore, GSP play a not negligible role in various fields.

Acknowledgements

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References


