Formulation and Percentage Evaluation of Gum -Acacia as A Binder W.S.R. to Jwaraghani Gutika (Herbo-Mineral Preparation)

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ABSTRACT
BACKGROUND & OBJECTIVES: Various types of binders are available in the market, of which some are natural and others are synthetic in nature. Different starches like rice, potato, maize, corn, wheat, tapioca starch and gums like ferula gummosa boiss, gum olibanum, beilschmiedia seed gum, okro gum, aegle marmelo gum, gum cordial, okra gum, gum acacia and cassia roxburghii seeds gum are the examples of natural binders. Acacia is mainly used in oral and topical pharmaceutical formulations as a suspending and emulsifying agent. Acacia has also been evaluated as a bioadhesive and has been used in novel tablet formulations and modified release tablets. In the present work, percentage quantity of gum acacia as a binder for Jwaraghani gutika (tablet) was evaluated.

MATERIALS AND METHODS: Different samples of Jwaraghani gutika were prepared with 5%, 8%, 10%, 15%, 20%, 25%, and 30% of gum acacia and evaluated for the parameters i.e. hardness, friability and disintegration time.

RESULTS: Gum acacia with 5 to 25% gum acacia have friability more than 1% but the disintegration time was 60min.

CONCLUSION: Increase in % of gum acacia enhances the hardness of the tablet and decrease in % friability but there was also an increase in disintegration time reported.

Keywords: Jwaraghani gutika, gum acacia, gum Arabica, antipyretic activity.

INTRODUCTION
Jwaraghani gutika is a herbo-mineral formulation mentioned in Ayurvedic classics1-4. It has antipyretic activity and cures all types of jwara (fever). It contains Sudha Parada (Mercury), Gandhak (Sulphur) and many other herbs1. No previous information regarding the pharmaceticals or clinical trial of Jwaraghini gutika was found. In recent pharmacetucals, natural binding agents are more popular due to their benefits over the synthetic one. Some of the natural binders used nowadays are mentioned in table no. 1. Among these natural binders, Gum acacia is commonly used binding agent in most of ayurvedic formulations (tablet) by most of the pharmacy. Acacia is a genus of shrubs and trees belonging to the subfamily Mimosoideae5-6, of the family Fabaceae or Leguminosae7-8. Gum acacia is an exudates from the stem of Acacia nilotica (babbul) also known as gum arabica or indian gum9. The gum contains 1.8% moisture, galactose, L-arabinose, L-rhamnose, four aldobiouronic acids, arabinose, 3-O-β-L-arabinopyranosyl and L-arabinose7,10-11. Further it contains calcium, polysaccharides, magnesium salts, potassium, sugar, moisture, ash and malic acid and oxidative enzymes10,12. It has astringent, emollient, liver tonic, antipyretic and anti-histaminic property13. Gum acacia can be used as a binder up to 20% in concentration14. In this study, different samples of Jwaraghani gutika were prepared with gum acacia as it can add on the efficacy of it due to its antipyretic activity. So, different samples were prepared with different percentage of gum acacia and evaluated for hardness, friability and disintegration time to assess the precise quantity of gum acacia binder.

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MATERIALS AND METHODS

Pharmaceutical Study: Tablet formulation using Wet Granulation Method Different samples of Jwaraghani gutika were prepared by 5%, 8%, 10%, 15%, 20%, 25%, and 30% of gum acacia and evaluated for the parameters i.e. hardness, friability and disintegration time. Ingredients of Jwaraghani gutika Sudha Parada (50 gm), sudha Gandhaka (50 gm), Aluva (50 gm), Akarkara moola powder (50 gm), Pippali powder (50 gm), Haritakai fruit powder (50 gm) and Indravaruni fruit powder (200 gm) were taken in pestle and mortar and mix thoroughly. Now three bhavana of indravaruni moola swarasa were given consecutively. After drying, granules were prepared with wet granulation method with aqueous 5% (w/w) gum acacia solution. This mass was placed in a hot air oven at 50°C for complete drying. Now the granules were made and passed through No.14 mesh screen. Now the above mixture was transferred to a hopper of a single - punch tabulating machine (Erweka-Germany), and compressed using die No.11. The weigh and pressure of the machine were adjusted to obtain a tablet of 500mg. Likewise, other samples of Jwaraghani gutika were prepared with 8%, 10%, 15%, 20%, 25% and 30% gum acacia.

Analytical Study

Hardness: Tablet hardness has been defined as the force required to break a tablet in a diametric compression test. It denotes the amount of strength required to withstand mechanical shocks of handling in manufacturing, packaging and shipping. The hardness of tablets was determined individually with Monsanto hardness tester, following 10 tablets were used and the mean hardness was calculated. Friability: Tablet hardness is not an absolute indicator of strength since some formulations, when compressed into very hard tablets, tend to cap on attrition, losing their crown portions. So to monitor the resistance of tablets to such stress they are subjected to friability test. Friability refers the ability of the compressed tablet to avoid fracture and breaking during transport.

of 10 tablets was determined using Roche friabilator. This device subjects the tablets to the combined effect of abrasions and shock in a plastic chamber revolving at 25rpm and dropping the tablets at a height of 6 inches in each revolution. Preweighed sample of tablets was placed in the friabilator and were subjected to 100 revolutions. Tablets were dedusted using a soft muslin cloth and reweighed. The friability (F) is given by the formula:

$$F = \frac{W_0 - W}{W_0} \times 100$$

Disintegration time: Disintegration is defined as that state in which any residue of the unit, except fragments of insoluble coating or capsule shell, remaining on the screen of test apparatus or adhering to the lower surface of the discs, if used, is a soft mass having no palpably firm core. Time required to completely disintegrate tablets or capsules known as disintegration time. The time shows how rapid de-aggregation of solid (tablet) in to solution occurs which is followed by absorption of the drug. Six tablets were placed in each compartment of the disintegration apparatus, with water thermo stated at 37± 1°C as the medium. The tablets were considered to have passed the test after the 6 tablets passed through the mesh of the apparatus in 15 minutes.

DISCUSSION

Jwaraghani gutika is one of the rasa preparation containing Kajjali (Parada+Gandhaka) as an ingredient. Parada used in medicines are purified by many process described in our classics and are proved to be safe as medicines by many researches. A large number of natural polymers have been used in pharmaceutical preparations. Natural substances like starches, mucilages, gums, and dried fruits have been used as binding agents. Acacia arabica or gum acacia as a natural material can be widely used in the field of drug delivery, because it is readily available, cost-effective, eco-friendly, capable of a multitude of modifications, potentially degradable, and compatible due to its natural origin. In the present study, natural binder Gum acacia was used to prepared Jwaraghani gutika (tablet) because it may add on the antipyretic activity of the gutika. Tablets were prepared with seven
different concentration of binder in an ascending order and evaluated for different physicochemical parameters as shown in Table 3. It can be accessed from the results that as the amount of binder increased, the hardness and disintegration time increased, whereas the friability values decreased. Tablets with Gum acacia 5 %, 8% and 10 % concentration did not have a single complete tablet remains after friability. If we increase the concentration to 20 and 25 there was decrease in friability but not less than 1 % however at 30 % friability becomes less than 1% but at this concentration the disintegration time rises to 60 min that is very high as per standards.

CONCLUSION
In various researches Gum acacia proves to be a good binder in tablet formulation but with the results of the study done, Gum acacia with 30 % concentration friability was less than 1% but the disintegration time was 60min. So further pharmacokinetics study will be done concerning the absorption, distribution, metabolism and excretion of Jwaragahani gutika containing Gum acacia as a binder.

Table 1: List of Natural Binders.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Binder</th>
<th>Percentage quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Okra gum</td>
<td>0.5-5.5 %</td>
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<tr>
<td>2.</td>
<td>Cassia roxburghhi seed gum</td>
<td>2.6 %</td>
</tr>
<tr>
<td>3.</td>
<td>Moringa oleifera gum</td>
<td>4.6 %</td>
</tr>
<tr>
<td>4.</td>
<td>Xanthum gum</td>
<td>7.5-15 %</td>
</tr>
<tr>
<td>5.</td>
<td>Hibiscus esculentus gum</td>
<td>7.5-15 %</td>
</tr>
</tbody>
</table>

Table 2: Formulation of Jwaragahani gutika (tablet)

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>JG1</th>
<th>JG2</th>
<th>JG3</th>
<th>JG4</th>
<th>JG5</th>
<th>JG6</th>
<th>JG7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parada (gm)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<td>50</td>
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<tr>
<td>Gandhaka (gm)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<tr>
<td>Aluva (gm)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<tr>
<td>Akarkara (gm)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<tr>
<td>Pippali (gm)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<tr>
<td>Haritaki (gm)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Indravaruni (gm)</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Gum acacia (%)</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
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</table>

Table 3: Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
<th>M5</th>
<th>M6</th>
<th>M7</th>
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<tbody>
<tr>
<td>Hardness (kg/sq.cm)</td>
<td>0.5</td>
<td>0.5</td>
<td>1.5</td>
<td>1.75</td>
<td>2.0</td>
<td>2.5</td>
<td>2.5</td>
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<tr>
<td>Friability (%)</td>
<td>1.5</td>
<td>1.5</td>
<td>2.6</td>
<td>1.84</td>
<td>1.35</td>
<td>3.14</td>
<td></td>
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<tr>
<td>Disintegration time (min)</td>
<td>20</td>
<td>20</td>
<td>32</td>
<td>35</td>
<td>45</td>
<td>45</td>
<td>60</td>
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</table>

REFERENCES
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