MANUFACTURING PROTOCOL AND PHARMACEUTICAL ANALYSIS OF AYURVEDIC PAUSHTIKA BISCUITS

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ABSTRACT

Today Ayurveda is spreading its wings all over the world, where the drug tradition of this system has been the center of global interest. Ayurveda advocates that at, as the Prakriti/Nature vary from person to person similarly every drug has got its own physical and chemical characteristics which help to separate it from another closely related drug. The physicochemical studies of these drugs done by making use of various parameters help in standardizing the drug and authenticate it. In this modern era, it is an expected imminent need for a well-coordinated research plan touching physicochemical study of the drug. It is essential to gratify the international standards and quality control of the drug used for convincing the drug regulatory authorities. The analytical study of the samples was undertaken at the Pharmaceutical Chemistry laboratory, I.P.G.T. & R.A. Gujarat Ayurved University, Jamnagar with the following aim and objective.

To analyze the samples by using different physical and chemical parameters. The tested drug samples were collected from Pharmacy Gujarat Ayurved University, Jamnagar. Biscuit form used for the present study and sample Drug is Paushtika Biscuits.

KEYWORDS: Ayurveda, Standard, Quality control, physicochemical, Paushtika Biscuit.

INTRODUCTION

The biscuits are important bakery products which are favorable due to lower production costs, convenience, and long shelf life. Usually, are consumed as a dessert or as a light snack between meals. The herbal biscuits have functional and therapeutically properties, so it is necessary to for the growth of the person for their daily Diet. The component used for making this Biscuits’ is Kharjura, Yashtimadhu, Mandukparni, Godhuma, Amalaki, and Guduchi.[1]

Traditional Indian foods have been prepared for many years and preparation varies across the
country. Food systems can deliver numerous biological functions through dietary components in the human body.[2,3] Indian traditional foods are also recognized as functional foods because of the presence of functional components such as body-healing chemicals, antioxidants, dietary fibers, and probiotics.[5,6] These functional molecules help in weight management and blood sugar level balance and support immunity of the body. The functional properties of foods are further enhanced by processing techniques such as sprouting, malting, and fermentation. At different stages of life, the constitution of the human body changes and it requires unique eating habits to sustain normal physiological functions.[7-10] As indicated by these diverse stages, our ancestors had different foods that were healthy and nutritionally dense. Dating back to Indian civilizations and Indian old literature, namely Bhagavad-Gita, Ramayana, and Manusmriti, every community that lived in India had a clear and separate food belief system. Most of these, however, have been influenced by Aryan beliefs and practices. According to Aryan belief, food was considered as a source of strength and a gift from God. On optimal nutrition which presents an ambitious long-term goal, "functional food" look new, interesting concept.[11-15] This concept should be built on solid scientific foundations while being accepted by consumers. In accordance with FUFOSE functional food is characterized by the following features: conventional or daily food or supplements; natural components present in food; a proven beneficial effect on certain functions outside the nutritional value of the product; possess conclusive scientific studies proving the enhanced well-being and health and/or reducing the risk of disease and/or improve the quality of life including physiological and psychological improvement.[16-20] In a broad concept of functional food Mishan lists the: natural nutrition-rich food, food that is enriched with functional ingredients, food which excludes certain ingredients, food in which are changed the properties of certain components, food in which the bioavailability of one or more components has been modified and all combinations of these possibilities. Biscuits are the type of cookies with a grain base and containing a large number of sugars and fat levels. The composition of biscuits contain a number of raw materials and different enhancers, and other accessories, so they differ in appearance and texture, composition, mass, consistency, structure and production technology.[21-25] There are sufficient possibilities for the production of this type of dietetic biscuits with sugar replacement, using fats with different characteristics, as well as enrichment of biscuits with different functional components. Dietary fiber has many characteristics which include them as an important ingredient in the recipes for production of functional foods. Insulin is used in food industry to increase the proportion of dietary fiber in the final product. The advantage over "traditional" dietary fiber
is that insulin does not possess a distinctive raw taste and does not contribute to increased viscosity of the final product, so its usage results in products enriched with dietary fibers that retain the organoleptic properties of the standard recipe composition.\textsuperscript{[25-30]}

MATERIALS AND METHODS

Drug Material

Raw drug materials were collected from the pharmacy store of Gujarat Ayurved University. The ingredients and the part used are given in the table.

Table No. 1: Ingredients of \textit{Paushtika} Biscuit.

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Name</th>
<th>Latin Name</th>
<th>Part to be used</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Godhum</td>
<td>\textit{Triticumturgidumvarmirabile}</td>
<td>Seed</td>
<td>50%</td>
</tr>
<tr>
<td>2</td>
<td>Makhana</td>
<td>\textit{Euryale feroxaliscb}</td>
<td>Fruit</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>Amalaki</td>
<td>\textit{Emblica officinalis} Gaertn</td>
<td>Dried Fruit</td>
<td>1 Part</td>
</tr>
<tr>
<td>4</td>
<td>Madhuyashti</td>
<td>\textit{GlycyrrhizaglabraLinn}</td>
<td>Root</td>
<td>1 Part</td>
</tr>
<tr>
<td>5</td>
<td>Mandukaparni</td>
<td>\textit{CentellaasiaticaLinn.}</td>
<td>Whole plant</td>
<td>1 Part</td>
</tr>
<tr>
<td>6</td>
<td>Guduchi</td>
<td>\textit{TinosporacordifoilaWilld.}</td>
<td>Stem</td>
<td>1 Part</td>
</tr>
<tr>
<td>7</td>
<td>Atibala</td>
<td>\textit{Abutilon indicumLinn.}</td>
<td>Root &amp; seeds</td>
<td>1 Part</td>
</tr>
<tr>
<td>8</td>
<td>DryKharjoora</td>
<td>\textit{Phoenix dactyliferaLinn}</td>
<td>Dried Fruit</td>
<td>1/3\textsuperscript{rd} of Total</td>
</tr>
<tr>
<td>9</td>
<td>Shunthi</td>
<td>\textit{ZingiberofficinaleRoxb}</td>
<td>Rhizome</td>
<td>1/10\textsuperscript{th} Part</td>
</tr>
<tr>
<td>10</td>
<td>PravalaBhasma</td>
<td>-</td>
<td>-</td>
<td>1/10\textsuperscript{th} Part</td>
</tr>
<tr>
<td>11</td>
<td>ManduraBhasma</td>
<td>-</td>
<td>-</td>
<td>1/10\textsuperscript{th} Part</td>
</tr>
<tr>
<td>12</td>
<td>Sharkara</td>
<td>-</td>
<td>Q.S</td>
<td></td>
</tr>
</tbody>
</table>

Method of Preparation of the \textit{Paushtika} Biscuit

\textit{Godhum Churna}, Amalaki, Makhana, Madhuyashti, Guduchi, Atibala, Dry Kharjura Pravala Mandura, and sugar were taken in given proportion. All these contents were mixed with powdered \textit{Sharkara}. Ghee was added to this mixture and homogeneous mixture of these entire was made in the machine. This mixture was spread on the clean surface and equal size biscuit was made of this mixture. Then these biscuits were arranged in a tray in single layer. Then these trays were kept in a furnace for 20 min at a temperature of 150\textdegree C. After confirming that proper baking is done biscuit trays was taken out. Efforts were taken to make every biscuit of approximately 10 grams.

PHYSICO-CHEMICAL PARAMETERS

Following \textbf{Six} parameters were studied for Biscuit Standardization.

1. Uniformity of biscuit
2. Water-soluble extract
3. Alcohol soluble extract
4. pH Value  
5. Ash value  
6. Loss on drying  

**Uniformity of Biscuit**  
It is desirable that each biscuit in a batch should be uniform in weight. A small variation in weight of individual Biscuits expected and is admissible. The weight variation, if any should be within the permissible limits.  

**Procedure**  
In this parameter 10 biscuits were taken and then their individual weight was taken. Among this highest weight, lowest weight and average weight values were noted down.  

Average Weight = Total weight of 10 Biscuit/ 10  

**Water Soluble Extract (WSE)**  
This test was carried out to determine the water-soluble extract and approximate measures of their chemical constituents of the test drug. Water-soluble extract value shows the content of polar compounds such as Flavonoids, Glycosides, Tannins, and Saponins which are soluble in water.  

**Procedure**  
5 gm of sample in 250ml conical flask was taken → 100ml Dist H2O Added → Sample was kept for soaking at overnight → Sample was filtered ( by simple filter paper ) → 20 ml filtrate was taken in Evaporating dish (Weighted dish) →dried on water bath → dried in Hot Air Oven for 1 hour → weight noted when sample cooled down.  

**Methanol Soluble Extract (MSE)**  
This test was carried out to determine the methanol soluble extract of the test drug. Methanol soluble extract values show the presence of non-polar compounds such as Alkaloids, Glycosides, etc. present in the sample.  

**Procedure**  
2.5 gm of sample was taken in 250ml conical flask → 50 ml Methanol was added → Sample was kept for soaking at overnight → sample was filtered ( by simple filter paper ) → 20 ml
filtrate was taken in Evaporating dish(Weighted dish)→dried on water bath → dried in Hot Air Oven for 1 hour → weight noted when sample cooled down.

**pH Value**
This test was carried out to determine the pH of the test drug with the help of pH meter.

**Procedure**
5gm of the sample was taken in 250ml Beaker → 100ml of Dist. H$_2$O added → Shake for 10 min. → Sample was filtered by simple filter paper → Filtrate was collected in 100ml Beaker → pH of the filtrate was measured.

**Ash Value (AV)**
This test was conducted to evaluate the percentage of inorganic salts, naturally occurring in the drug or adhering to it or deliberately added as a form of adulteration.

**Procedure**
2gm of the sample was taken in crucible → Ignited in Muffle furnace at 500 $^\circ$C until free from carbon→ weight noted when sample cooled down.

**Loss on Drying at 110 $^\circ$C**
The moisture content of a drug should be determined for the percentage of its active chemical constituents because its percentage depends upon air-dried basis. So the moisture content present in drugs should be minimized in order to prevent decomposition of the crude drugs either due to chemical change or microbial contamination.

**Procedure**
1 gm of sample was taken in petry dish → Put for drying in a hot air oven at 110$^\circ$C for 4 hours → weight noted when sample cooled down.

**High-Performance Thin Layer Chromatography (HPTLC)**
HPTLC (High-Performance Thin Layer Chromatography is the most beneficial tools for herbal fingerprinting in today’s Era. It is most sophisticated and highly precise for the results. This is based on the principle of TLC (Thin layer chromatography). It is a higher version of TLC. It is very suitable Instrument for the herbal standardization with the help of its marker compound we can easily identify the compound present in plant and quantity is also measure if with the help of Quantitative analysis. Basically, the important process in HPTLC is
Preparation of samples, loading the samples through sample applicator and at last scanner will help us to read the samples in multiwavelengths.

**The principle of HPTLC**

The principle remains the same as of TLC i.e. adsorption. One or more compounds are spotted on a thin layer of adsorbent coated on a chromatographic plate. The mobile phase solvent flows through because of capillary action (against gravitational force). The component with more affinity towards stationary phase travels faster. Thus, the components are separated by a thin layer chromatographic plate based on the affinity of the components towards the stationary phase.

**Steps involved in HPTLC**

- Selection of chromatographic layer
- Sample and standard preparation
- Layer pre-washing, Layer pre-conditioning.
- Application of sample and standard
- Chromatographic development
- Detection of spots
- Scanning
- Documentation of chromatic plate

**Chromatographic conditions**

- Application mode: CAMAG Linomat V Hamilton Syringe
- Development chamber: CAMAG Twin trough chamber (20 x 10 cm2)
- Plates: Precoated silica gel GF254 plates
- Chamber saturation: 30 min
- Development distance: 10 cm
- Development time: 30 min
- Scanner: CAMAG TLC Scanner III
- Scanning mode: Linear at wavelength 254 nm and 366 nm
- Detection: Deuterium lamp, Mercury lamp
- Photo documentation: CAMAG reprostar
- Data system: CATS software (Ver. 3.17)
- Drying device: Oven
• U.V. Spectrum: 200 nm to 700 nm

Solvent System HPTLC studies

RESULTS AND DISCUSSION
Table No. 2: Values of physicochemical parameters.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>TEST</th>
<th>Paushtika Biscuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uniformity of Biscuit</td>
<td>10 g</td>
</tr>
<tr>
<td>2</td>
<td>Average weight</td>
<td>11.40 g</td>
</tr>
<tr>
<td>3</td>
<td>Highest weight</td>
<td>13.00 g</td>
</tr>
<tr>
<td>4</td>
<td>Lowest weight</td>
<td>9.30 g</td>
</tr>
<tr>
<td>5</td>
<td>Water soluble extract</td>
<td>16.84 % w/w</td>
</tr>
<tr>
<td>6</td>
<td>Methanol soluble extract</td>
<td>22.6 % w/w</td>
</tr>
<tr>
<td>7</td>
<td>pH of 5% aqueous solution</td>
<td>7.0</td>
</tr>
<tr>
<td>8</td>
<td>Ash value</td>
<td>1.19 %</td>
</tr>
<tr>
<td>9</td>
<td>Loss on drying at 110 C</td>
<td>4.88 % w/w</td>
</tr>
<tr>
<td>10</td>
<td>Total sugar</td>
<td>11.4 mg</td>
</tr>
<tr>
<td>11</td>
<td>Reducing Sugar</td>
<td>4.6 mg</td>
</tr>
<tr>
<td>12</td>
<td>Non reducing Sugar</td>
<td>6.8 mg</td>
</tr>
</tbody>
</table>

Table 3. Consolidated data of HPTLC.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Paushtika Biscuit</th>
<th>Paushtika Biscuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short UV (254 nm)</td>
<td>7, 0.01, 0.22, 0.33, 0.67, 0.75, 0.85, 0.96</td>
<td>0.01, 0.66, 0.70, 0.96</td>
</tr>
<tr>
<td>Long UV (366 nm)</td>
<td>4</td>
<td>0.01, 0.66, 0.70, 0.96</td>
</tr>
</tbody>
</table>

254nm
CONCLUSION

Physicochemical evaluation of *Paushtika* Biscuit was performed which is a potent medicine in the management of *Kaṛṣhya*. In this analysis, water soluble & alcohol soluble extract, pH, Ash value was assessed. Though the groundwork requisites for the standardization of *Paushtika* Biscuit are covered in the current study, additional important analysis investigations are required for the identification of all the active chemical constituents of the test drug to substantiate the clinical efficacy.

ACKNOWLEDGMENT

The authors are very thankful to Dr.Vinay Kumar Shukla, Head of the department, Department of Pharmaceutical Chemistry laboratory, IPGT&RA Jamnagar, Gujarat, India for providing the Research facilities.

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