EVALUATION OF NUTRITIVE VALUE OF KUSHMANDA AVALEHA

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ABSTRACT
Concept of Neutraceuticals and Ayurvedic principles of ahara emphasizes that food which not only provides nutrition but also helpful to prevent disease and maintain the healthy status is balanced food. Ayurveda is having number of dosage forms, where ahara dravyas has been used i.e. pathya kalpana etc. Kushmanda Avaleha is recommended as Rasayana. Hence it is used for pittaja prakruti and also useful in summer season, which is having dominancy of pitta. This work has been done to evaluate the nutritive value of kushmanda avaleha. It has been prepared as per reference given in classical text of Sharangdhar Samhita. Percentage of Carbohydrate, Protein, and other elements (Sodium, Zinc) in Kushmanda avaleha is evaluated. Kushmanda Avaleha contains 4.44 % of fats, 1.05% of proteins, 82.10% of carbohydrates, 60mg/100gm of sodium and 11mg/100gm of zinc which provides 372Kcals/100gm energy to the body.

Keywords: Nutraceuticals, Dietary supplements, carbohydrates, protein, fat

INTRODUCTION
Ayurveda mentioned five basic kalpana which are called as panchvidha kashya kalpana. Panchvidh kashya kalpana has several drawbacks such as less palatability, shorter shelf life. Hence to overcome these drawbacks, secondary formulations were developed. Avaleha kalpana, a secondary formulation1 developed by using primary formulations like swarasa (Juice), Kwatha (Decoctions). Avaleha formulations prepared by using herbal medicinal drugs and food articles like sugar, ghee (Clarified Butter), honey.2 Nowadays nutraceuticals has been considered as part of food that provides health benefits with prevention and treatment of diseases.3 Kushmanda avaleha is polyherbal ayurvedic formulation in semisolid state. Kushmanda is rich source of carbohydrates. It is nourishing medicine also used in respiratory condition such as kasa, shwasa and to improve immunity and strength. Main ingredient of Kushmanda Avaleha is kushmanda which is also known as ash gourd, white pumpkin etc. Its chemical constituents are proteins, mucins, mineral salts, starch, calcium, vit.B, vit. C. In ayurveda there are some preparations like avaleha, ksheerpaka, pathya kalpana can be compared with nutraceuticals.

Dr. Stephan De Felice coined the term nutraceuticals which means (Nutrition and pharmaceuti-
tics=nutraceuticals) in 1989. The nutritional treatment is a system using dietary therapeutics and nutraceuticals as complementary therapy this treatment is based on belief that foods can not only be source of nutrients and energy but could also provide medicinal benefit. These preparations provide adequate amount of vitamins, fat, carbohydrates proteins etc. needed for better health. So these preparations can be used by young as well as old people, alike as a medicine as well as a food supplement.

Ayurvedic principles of ahara can be correlated with the properties of dietics and nutraceutics that include antioxidants, digestive stimulants, probiotics etc. which are very important. With the help of ayurveda we can fill up the gap between food and medicine. Ayurveda has different concepts related to ahara that plays an important role in the prevention of disease and to enhance the immunity. Hence this study was selected to evaluate the nutritional value of kushmanda avaleha.

Materials and Method:
Table 1: Ingredients of Kushmanda avaleha

<table>
<thead>
<tr>
<th>English name</th>
<th>Latin name</th>
<th>Quantity in kg/gm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ash gourd</td>
<td>Benincasa hispida</td>
<td>2 kg</td>
</tr>
<tr>
<td>Water</td>
<td>-</td>
<td>4 L</td>
</tr>
<tr>
<td>Clarified butter</td>
<td>-</td>
<td>154gm</td>
</tr>
<tr>
<td>Sugar</td>
<td>-</td>
<td>2 kg</td>
</tr>
<tr>
<td>Long pepper</td>
<td>Piper ionum</td>
<td>38.5gm</td>
</tr>
<tr>
<td>Zinger</td>
<td>Zinziber officinale</td>
<td>38.5gm</td>
</tr>
<tr>
<td>Cumin seeds</td>
<td>Cuminum cyminum</td>
<td>38.5gm</td>
</tr>
<tr>
<td>Coriander seeds</td>
<td>Coriandrum sativum</td>
<td>9.6gm</td>
</tr>
<tr>
<td>Malabar leaf</td>
<td>Cinnamomum tamala</td>
<td>9.6gm</td>
</tr>
<tr>
<td>Cardamom</td>
<td>Elettaria cardamomum</td>
<td>9.6gm</td>
</tr>
<tr>
<td>Black pepper</td>
<td>Piper nigrum</td>
<td>9.6gm</td>
</tr>
<tr>
<td>Bark cinnamon</td>
<td>Cinnamomum verum</td>
<td>9.6gm</td>
</tr>
<tr>
<td>Honey</td>
<td>-</td>
<td>77gm</td>
</tr>
</tbody>
</table>

Preparation of Kushmanda avaleha:
Kushmanda avaleha was prepared by as per sharangdhar samhita. Kushmanda or white pumpkin collected from local market. Outer skin of the kushmanda was removed, then cut it into small pieces& boiled with 4 parts of water. Then well-boiled pulp was strained through a clean dry cloth and remaining liquid part was separated. Paste was fried with ghruta till it becomes brown in color. Fried paste of white pumpkin was added to mixture of sugar and separated liquid. The mild heat was applied till desired appearance of paka siddhi lakshana. (Appearance of three threads when drop of above mixture kept in between thumb and index finger).Lastly prakshepa dravyas were mixed in above mixture in lukewarm stage. Once avaleha achieves room temperature, honey was added and then mixed uniformly.

Estimation of Carbohydrate:
Test solutions (kushmanda Avaleha preparation) 10 gm of sample taken in volumetric flask and 20 ml of 2N H₂SO₄& 20 ml of water was added to it; hydrolyzed for 2 hrs by boiling on water bath. After cooling, neutralized with 1N NaOH and made it 200 ml with water.

Standard solution (Dextrose solution - 250 mg of dextrose anhydrase dissolved in water to make the volume 100 ml.

Titrination- 25 ml of Benedict’s solution was taken, 1-2 gm sodium bicarbonate added and titrated with test and standard solutions respectively and the reading was noted.

% carbohydrates = Std reading × 2.5 × 200 × 100/ Test reading × Test wt. × 1000

Estimation of Protein:
After gone through digestion and distillation procedures, titration of samples was
carried out. 2-3 drops of phenolphthalein indicator was added to sample and titrated against 0.1N NaOH solution till the pink color obtained. Burette reading was noted.

Conversion factor- 1 ml of 0.1N NH$_3$ $\rightarrow$ 0.0014 g of Nitrogen  
% of N$_2$ $\times$ 6.25 $\rightarrow$ % of protein

**Estimation of Fat**$^8$: Weight of dry round bottom flask of 250 ml capacity with 2-3 porcelain breeds was done. Accurately weighed 3 gram sample was kept in a thimble and fat free cotton wool was kept on the mouth of thimble. Thimble was kept in soxhlet apparatus at 60-80$^\circ$C Petroleum ether up to 1 complete siphon. The R.B. flask was heated gently till cycling of ether for 5-6 syphons gets completed. After disassembling the assembly, R.B. flask was placed in oven at 105 degree for 3-4 hours to evaporate the ether completely.

**Calculation of Energy**$^9$: Energy from per gram protein, carbohydrate and fat is calculated by multiplying with 4, 4 and 9 respectively. Total energy is calculated by addition of the energy getting from carbohydrate, protein and fat.

**Estimation of Sodium**$^{10}$: Determination of sodium was done by flame photometry method. Firstly photometer was calibrated using standard solutions, and then diluted sample solution was allowed to pass through photometer. When a particular color of flame appeared, galvanometer reading was noted. Same procedure was repeated during both samples. From the above values, sodium readings in the undiluted samples were calculated.

**Estimation of Zinc**$^{11}$: Firstly zinc standard solution i.e. stock and working solution had been prepared. A test acid has been collected for the measurement of zinc by AA and then sample has been prepared by mixing, blending or grinding. After dry ashing accurately weighted sample kept in to clean petry dish as represented sample that was used to estimate the contain 25-100µg zinc. Char under the IR lamp ash heated at temperature ≤ 525°C until it get free from carbon. Prepared ash had been dissolved with minimum volume HCL (1+1). Then 20 mL of H$_2$O has been evaporated up to steam bath get dried. 20mL of 0.1N HCL has added and heated continuously for 5 min. That was filtered through fast paper in to volumetric flask. After that dish was washed with 5-10 mL of 0.1 HCL, cool and diluted with 0.1N HCL, this procedure had done till it attains working range of instrument. Instrument has been calibrated per instructions. Then 2 readings have been taken and burner was flushed with water and 0 point between readings was checked. Zinc content was determined by plotting standard curve against the µg Zn/mL.

\[
\text{ppm Zn} = \left(\frac{\text{µg Zn/mL from curve} \times \text{diln factor, mL}}{\text{g sample}}\right)
\]

**Results –**

**Table 2:** Nutritive values of kushamanda Avaleha –

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Values/100gm</th>
<th>Constituents</th>
<th>Values/100gm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>82.10</td>
<td>Total energy</td>
<td>372.56 kcals</td>
</tr>
<tr>
<td>Protein</td>
<td>1.05</td>
<td>Sodium</td>
<td>60 mg</td>
</tr>
<tr>
<td>Fat</td>
<td>4.44</td>
<td>Zinc</td>
<td>11 mg</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Balanced diet is defined as one which provides all the nutrients in required amount and proper proportions of proteins, vitamins, minerals, fats, carbohydrate and other nutrients important for health and well being$^{12}$. *Kushmanda avaleha* provides total energy 372.56 kcal/100g to the body, out of this maximum part of energy (328.4 kcals) comes from 82 % of carbohydrate present in it. The recommended intake of carbohydrate in the balanced diet is 50-80 percent of total energy intake$^{13}$. Carbohydrate acts as instant energy
supplier and also essential for body function mainly nervous tissue function. Kushmanda Avaleha contains 1.05 g/100 g of protein, which provide 4.2 kcals energy. The daily requirement of protein is 0.83g/kg/d it gives 39 kcals/kg/d. Mainly Protein act as building blocks or for repair or maintains of body tissues. Occasionally they act as source of energy by providing 4 kcal per one gram.

Kushmanda avaleha contain 4.44 percentage of fat which can provides near about 39.96 kcals of energy. The minimum intake of fat ranges between 20-40g/day. So kushmanada avaleha provides only 10 to 20 % of daily intake of fat.

Some minerals especially the macro minerals are important as electrolytes. These minerals regulate nerve and muscle function and maintain acid-base balance and water balance. Heat stroke is the condition in which internal temperature of the body rises over 41°C as result of high body temperature, which cause fatigue, headache, dry skin, absence of sweating. Sodium lost from body through urine and sweat, that which is passed out in urine is regulated by the kidney but that which lost by sweating is not controlled. To prevent these symptoms body needs replenishment of electrolytes. Sodium (60mg/100gm) and zinc 11mg/100gm present in Kushmanda Avaleha may act as preventive to replenish the loss of sodium which occurs due to excessive sweating.

Zinc deficiency is common in children from developing countries due to lack of intake of animal food, high dietary phytate content, inadequate food intake. Suggested daily intake for adults is 12 mg per day for men, 10 mg for women and 10 mg per day for children. Adequate zinc intake is essential for maintaining the integrity of immune system. Zinc affects multiple aspects of the immune system, from the barrier of the skin to gene regulations within lymphocytes. Zinc plays an important role as antioxidant agent. Daily intake of Kushmanda avaleha in 40 gm provides 4.4 mg of zinc daily, which provide adequate amount of zinc.

Medhyarasayana drugs are used for the prevention and treatment of mental disorders. Kushmanda is described in Ayurveda as medhya drug, kushmanda controls vata pitta dosha and its prabhava is medhya. Kushmanda Avaleha is very useful in treatment of nervous system disorder due to its medhya property. Kushmanda is widely used for the treatment of amlapitta due to its pittashamak property.

Recent studies proves that extract of kushmanda prevent development of experimental ulcers. Study showed extract of kushmanda may be a natural drug with antiulcer activity. Kushmanda Avaleha provides strength and reduces aggravated pitta symptoms including burning sensation, acid reflux, hyperacidity and headache occurring during burning sensation is treatable by kushmanda avaleha. It soothes the stomach linings modulates the gastric secretion, which helps to reduce pungency and sharpness of gastric secretions. It gives relief from above all conditions related to amlapitta.

CONCLUSION

Kushmanda avaleha is beneficial for both young and old age group. It is used as an ayurvedic supplement that provides strength, nourishment to the body, enhances the immunity. Kushmanda avaleha contain high percentage of carbohydrates hence it plays an important role in nervous system. Its medhya prabhava described in Ayurveda so it can be best solution for mental disorders and Sodium present in it also helps to reduce excess of heat and elevated pitta in body.

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