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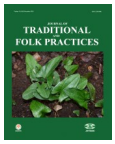

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Nutritive composition of *yava rotika*

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Abstract

There are some food items grouped under daily consumables like *yava* (barley), *godhuma* (wheat) and *mudga* (green gram). By including them in every day's food practices, one can stay healthy and keep diseases at bay. As life-style disorders keep increasing alarmingly, it is necessary to modify one's diet and dietary habits and life-style. Cereals like wheat and rice are used by majority of population all over the world owing to their availability and richness in nutrient composition. However, use of *yava* is comparatively less. *Yava* based preparations (recipes) is indicated in *santarpanajanyavyadhi* (life-style disorders). *Yava rotika* (flat bread made out of barley) is one such recipe specially indicated remedy for disorders of *kapha*. Hence, in this study, we have prepared and assessed nutritional composition of *yava rotika*. *Yava* purchased from local super market, cleaned, washed, sundried, and milled to obtain *yava* flour. *Yava* flour (100g/batch) was kneaded with sufficient quantity of water to make soft dough. Dough (30g) was flattened with a rolling pin and cooked on a pan to make *yava rotika*. The total carbohydrate, protein and total fat (% on dry wt. basis) content of *yava rotika* was 50.77, 13.80 and 3.6 respectively. The product also contained minerals like zinc, magnesium, potassium, manganese and sodium respectively. The energy (Kcal/100 g) value is 290.7. Results indicate that *yava rotika* is nutritionally superior including minerals.

Keywords: Diabetes, Lifestyle disorders, Nutrients, Traditional food

1. Introduction

Yava (barley) (Sharma, 2005) is one of the *Shukadhanya* (cereals) included in *Nityasevaniyaahara dravya* (daily consumable food items) (Acharya, 2011; Hari, 2012) and consumed in various forms like *odana* (cooked rice), *apupa* (oil fried recipe) and *rotika* (cooked flat bread). Even though *yava* is an everyday consumable food material, it is less in usage. Recipes of *yava* are suggested in *santarpanajanya vyadhi* (life-style disorders) (Acharya, 2011). Life-style disorders are the most concerned health problem like Diabetes Mellitus (DM) and obesity are associated with hyperglycemia and dyslipidemia which can be prevented by correcting out diet and lifestyle. Hyperglycemia and dyslipidemia occurs due to defective insulin action/secretion and defect in lipid metabolism and they influence macro-vascular (cardiovascular disease) and micro vascular (nephropathy, retinopathy and neuropathy) problems (Naveen and Baskaran, 2018). As mentioned in the traditional medicine like Ayurveda, food plays an important role in DM and obesity management (Forouhi *et al.,* 2018; Das *et al.,* 2021). Wheat (*Triticum dicoccum* Sch.) and barley (*Hordeum vulgare* L.) along with dried fruit shells of medicinal trees (*Terminalia chebula* Retz, *Terminalia bellerica* Roxb., and *Phyllanthus emblica* L.) described in traditional Indian food/medicine are practiced

testify their hypoglycemic and anti-obese nature (Bano *et al.,* 2015). Hence, presently traditional food therapy is getting consideration than synthetic drugs among diabetic and obese subjects. The health beneficial effect of these combinations is attributed to their nutritional profile like nature of carbohydrate, dietary fiber and phenolic compounds. (Naveen and Baskaran, 2018; Salunke *et al.,* 2019). Thus, by adding different kinds of healthy recipes in our dietary practice, one can mitigate diabetes and obesity to stay healthy (WHO, 2020). Therefore, in the current investigation, *yava* based *rotika* was prepared and examined for its nutrient composition. The outcome of the finding is likely to offer insight into an effective use of *yava rotika* to manage life-style disease as mentioned above.

2. Materials and methods

2.1. Preparation of *yava rotika*

Work was conducted at Council of Scientific and Industrial Research- Central Food Technological Research Institute (CSIR - CFTRI), Mysore. All chemicals used were purchased from Sisco Laboratories, Mumbai, India. *Yava* was purchased from local super market, cleaned, washed, sundried and milled to get flour. *Yava* flour (100 g/batch) was mixed with sufficient quantity of water to make soft dough. No other ingredients like oil, salt or sugar was added. The soft dough was prepared only with the flour and water. Dough (30 g/*rotika*) was flattened with a rolling pin, cooked on a heated metallic pan (Fig.1) and the resulted *yava rotika* was examined for proximate composition (total carbohydrate, total protein, total lipid ash and moisture) and energy value.

2.2. Proximate composition analysis

Yava rotika (n = 3) was analyzed for moisture, protein, fat and ash content as per AOAC methods (AOAC, 2005).

Fig. 1. Cooking of *yava rotika*

Protein was estimated by the nitrogen content (6.25 factors were used to estimate protein). Soluble, insoluble and total dietary fiber was estimated as per Englyst *et.al*., (1996). Percent carbohydrate content was calculated as: 100 – (protein + fat + ash + dietary fiber).

3. Results and discussion

Table 1 exhibits the nutritional compositions of *yava rotika* prepared in this study. Moisture content is slightly higher (30.53%) in *yava rotika*. The protein content is adequate (13.8%) for daily requirement of a healthy person. The products' total dietary fiberand total lipids level ranged from 14.4 – 17.3% and 3.6-4.1%, respectively. The total carbohydrate content is of the product and the energy value of the product is 50.77% and 418.43 Kcal/100g dry weight. Among micronutrients, minerals (mg/100g) of *yava rotika* was found to have 0.2 (zinc), 1.8 (magnesium), 12.14 (potassium), 0.17 (manganese) and 4.25 (sodium), respectively as shown in Table 2. Results specify that *yava rotika* prepared in this study is nutritionally superior.

Table 1. Proximate composition (dry weight basis) of *yava rotika*

Sample	**Total protein** (%)*	**Total fat** (%)*	**Total carbohydrate** (%)*	**Total ash** (%)*	**Moisture** (%)*	**Total solid** (%)*	**Energy** (Kcal/100g dry wt.)*
Yava rotika	13.80	3.60	50.77	1.30	30.53	69.47	418.43

**Values are mean of 3 independent analyses*

Table 2. Mineral composition of *yava rotika*

Sample	**Zn*** (mg/100g dry wt.)	**Mg*** (mg/100g dry wt.)	**K*** (mg/100g dry wt.)	**Mn*** (mg/100g dry wt.)	**Na*** (mg/100g dry wt.)
Yava rotika	0.2	1.8	12.14	0.71	4.25

**Values are mean of 3 independent analyses*

In recent years, cereal or cereal based food preparations are vastly recognized to manage diabetics, obesity and other life-style diseases owing to their antioxidant dense and low glycemic value (Bano *et al.,* 2015) as reported in classical medicine. Phenolics of barley used in in this study also found to exhibit antioxidant, antibacterial, ant diabetic, anti-inflammatory, immunomodulatory, anti -mutagenic, antineoplastic and chemo-protective effects (Naveen and Baskaran 2018; Salunke *et al.,* 2019) including insulin resistance (Forouhi *et al.,* 2018). These studies and the present study reveal that barley or barley based foods help in managing various health complications. However, not much scientific endorsements exist on their detailed nutritional profile and mechanism of efficacy. Hence, in the investigation, y*ava rotika* was prepared as indicated in classical medicine. Attributes of *yava* with respect to *rasa* (taste), *guna* and *karma* (qualities and actions), *dosha karma* (action on *dosha*) and therapeutic benefits are listed in Table 3.

3.1 *Yava rotika*

Rotika prepared from barley flour (*shushkayava churna*) is referred as *yavarotika*. The properties of *yavarotika* are *ruchya* (palatable), *madhura* (sweet in taste), *vishada* (having the capacity to clarify the channels), *laghu* (light) and *mala-shukra-anilakari* (stimulates to produce, *anila/vata*). It has property of strengthening and reduces *kapha* (Chunekar and Pandey, 2013). *Yava rotika* being a good source of protein (13.8%) found to have properties like *madhura, kashayarasa* and reported to enhance strength and firmness of body (*bala*, *sthairya*). Enhancing gastro-intestinal viscosity or fermentation of colonic micro-floras advocated helping in appetite control and decreasing food intake. Beta-glucan and fructo-oligosaccharide present in cereals including barley offered to have such efficacy. *Yava rotika* also reported to induce satiety. Schroeder *et al.,* (2009) reported that consumption of whole grain high-fiber barley foods significantly decreased hunger. Nematy, *et al.,* (2018) found that barley based bread conquer the appetite and improves satiety during the fasting compared with wheat bread. In addition to protein, the level of lipids in the *yava rotika* is 3.6% and its fatty acid profile was found as saturated fatty acids (0.104%), mono unsaturated fatty acids (0.007%) and poly unsaturated fatty acids (0.29%). *Yava* is *ruksha, lekhana* and *medanashana.* While *yava rotika* is *laghu* and *vishada*. As mentioned earlier, *yava* also rich in mineral content (1.3% ash). *Yava* and *yava rotika* is *lekhanakara* and *balakara*. Owing to unique carbohydrate content (53.81%), *yava* found to have attributes like *madhura, kashaya rasa, anabhishyandi, sheeta* and *picchilaguna.* Added to this, *yava rotika* provides a total energy of 275.48 Kcal and hence has the quality of rendering strength and endurance.

4. Conclusion

In ayurvedic literature, *yava* has been mentioned for day-to-day dietary use. The nutritive composition of the *yava* and *yava rotika* are well attributed to the health benefits as declared in Ayurveda literatures and hence can be included in routine diet, in specific diabetic and obesity subjects. The extensive use of *yava* and its recipes has been mentioned in *prameha* (diabetes) and in other *santarpanajanya vyadhi.* The food articles having the properties such as heavy, sticky and oily, obstructive causes above disorders. We propose the treatment options for such life-style

Table 3: Attributes of *yava* (Sharma, 2005)

***Rasa* (Taste)**	***Guna and karma* (Qualities and action)**	***Doshakarma* (Action on *dosha*)**	**Therapeutic benefits**
Kashaya (astringent), *Madhura* (sweet)	*Ruksha* (dry) *Sheeta* (cold) *Aguru* (easy to digest) *Mridu* (soft) *Picchila* (sticky) *Lekhana* (scraping action) *Agni vardhana* (increases metabolism) *Katupaka* (hot at the end of the digestion) *Anabhishyandi* (non-obstructive) *Balakara* (gives strength) *Sthairyakara* (gives stability)	*Kaphashamaka* (pacifies *kapha*), *vatavardhaka* (increases *vata*)	*Shleshma-pitta-medapranaashana* (nullifies *kapha-pitta*-fat)

disorders as to adopt heavy and non-nutritive dietetic factors. *Yava* and the *yava rotika* have such properties and thus prescribed to manage these complications. The property of heaviness helps in fullness of stomach in increased appetite. The property of dryness in diet helps in drying up of excess *kleda* (moisture), reducing *kapha* (one of three *doshas*) and *medas*, thus clear up *srotas* (channels). By this *uttarottaradhatu* will be formed properly. It helps in retaining balance among *dosha* and *dhatu* (balanced state of three humors and healthy status of tissues). Healthy traditional recipe when adopted judiciously in food practices has a major role in preventing life-style related disorders.

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