Research Article

PHYSICOCHEMICAL AND NUTRITIONAL EVALUATION OF YAVA (*HORDEUM VULGARE* LINN.)

Kumari Rajesh^{1*}, Kotecha Mita²

¹Research Officer, Department of Botany, S.R.K.K. Degree College, Morcha, Firozabad, India

²Department of Dravya guna Vigyan, National Institute of Ayurveda, Jaipur, Rajasthan, India

*Corresponding Author Email: dr.rajeshwari.singh@gmail.com

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ABSTRACT

Yava (barley) is a well-known cereal used as dietary article generally in north India. An Ayurvedic text entails the uses of Yava in religious ceremony, dietary and medicinal preparations. Disease specific dietary measures are the unique concept of Ayurveda. As per Indian traditional drug knowledge, Yava is used for lekha karm. The drug which reduces or scrapes away the unwanted dhatu (tissue) and mala (metabolic wastes) and thus helpful in removing extra fat (meda dhatu) is known as Lekha karm. Evaluation of nutritional status was required to check which could be a good nutritional substitute in overweight. The grains were collected, pulverized and analyzed for various physical, chemical, nutritional and organo-leptic qualities. The present paper deals with the physico-chemical and nutritional evaluation of yava (*Hordeum vulgare* Linn.)

Keywords: (*Hordeum vulgare* Linn.) Yava, Barley, Lekhana

INTRODUCTION

Barley (*Hordeum vulgare* Linn.) belongs to family Poaceae. Yava is famous shukadhanya (cereal) used in Indian systems of medicines viz., Ayurveda and used in different medicinal preparations as well as in dietary form for many santarpanjanya roga like prameha, kustha and medoroga etc. for lekha karm¹⁻². Acharya Susruta considers Yava is kashaya rasa (astringent taste), madhura (sweet), katu (pungent) vipaka, sitavirya (cold in potency), pacifies kapha and pitta, is always wholesome for wounds like tila (sesamum), antidiuretic, produces abundant flatus and faeces, stharya (promotes firmness), agni (digestive power), medha (intellect), swara (voice) and varna (complexion), lekha (reduces weight in the obese), pichilla (slimy), eliminates meda (fat), vata and trishna (thirst), atiruksha (excessively rough) and normalizes rakta (blood) and pitta³. Barley, *Hordeum vulgare* Linn. is an annual, erect, stout and tufted grass, reaching a height of about 0.5-1.2 m. leaves are few and linear-lanceolate; spike is terminal, 5-6 cm long and densely flowered. Glumes are two, small, narrow; short awned and enclosing three spikelets. Its fruit is caryopsis, elliptic, 9 cm long, short pointed, smooth and free or adherent to palea or both to lemma. Flowering and fruiting is during February-April⁴. It is considered having lekha property, so can be used in obesity. So, the present study to conduct physico-chemical and nutritional evaluation of yava (*Hordeum vulgare* Linn.) was aimed.

MATERIAL AND METHODS

Good quality husked Barley (*Hordeum vulgare* Linn.) was procured direct from the cultivator. The samples were authenticated by the Botanical Survey of India, Arid Zone regional circle, Jodhpur-08 (Rajasthan), India on date April 29, 2010. Prior to all analysis of physical properties, chemical properties, chemical constituent all the raw materials were cleaned to remove any foreign materials and dust. The seeds of the *Hordeum vulgare* Linn. were dried in shade for 12 days then pulverized (milled) in a flour mill into powder of 120 mesh. Prepared flour was stored in an airtight container. For accuracy, each analysis was carried out in triplicate and average values of the parameters are reported. The various parameters analyzed are as under:

Physical parameters

The physical parameters analyzed were shape, color (through visual perception), weight and size.

Physicochemical, Phytochemical and Nutritional parameters

Physicochemical and phytochemical screening for were carried out as per the guidelines given by World Health Organization (WHO)⁵, for medicinal plants and Pharmacopoeia of India 2007⁶. Various qualitative chemical tests for preliminary phytochemical screening of the extract for different types of chemical constituents were applied. Prepared ash was used for inorganic analysis. The ethanolic extract of both drugs were subjected to thin layer chromatographic analysis. T.L.C. plates pre coated with 0.25 mm layer of silica gel GF 254 with fluorescent indicator, (Merck's) were used. It was cut in size of 8 × 2 cm. ethanolic extract was applied on the plate above 1 cm from base line. The separated spots were visualized under UV 366 nm. The qualitative evaluation of the plate was done by determining the migratory behavior of the separated substances given in the form of R_f values⁷. The edible part of the grain was analyzed for nutritional assessment as per methods reported by Raghuramulu *et al*⁸. Moisture was determined by oven dehydration method at 105°C up to the constant weight. Crude protein was determined by estimating the nitrogen content of the food materials, using Kjeldahl method. Crude fat was determined by ether extraction method using Soxhlet apparatus for 16 hours. Crude fiber was determined by Acid digestion and Alkali digestion and by using fibertech. Ash content was determined in muffle furnace at 550°C for 6 hours. For all these determinations powdered and oven dried sample were used in triplicate. Total carbohydrate was obtained by subtracting the values of moisture, crude fiber, crude protein, crude fat and ash from 100. Food energy calculation is derived by multiplying the percentage of crude protein and carbohydrate by 4.1 and crude fat by 9.3⁹. Vitamins (Riboflavin, pyridoxine) by using sophisticated instrument, Double beam spectrophotometer manufactured by Electronic Corporation of India and vitamin C, accordance to Pharmacopoeia of India 2007.

Table 1: Phsico-chemical observations of seeds of the *Hordeum vulgare* Linn.

S. No	Paramaters	<i>Hordeum vulgare</i> Linn.
1.	Weight (g/100 grains)	3.311 $\pm$ 0.00412
2.	Length (cm)	1
3.	Width (cm)	0.2 - 0.3
4.	Color (powder)	Light creamish yellow
5.	Foreign organic matter	0.4404 $\pm$ 0.00565
6.	Moisture content	3.035 $\pm$ 3.72
7.	Total Ash	2.433 $\pm$ 0.326
8.	Acid Insoluble Ash	0.5125 $\pm$ 0.00071
9.	Water - Soluble Ash	0.7278 $\pm$ 0.00075
Extractive Values of successive extraction		
1	Pet. ether	1.08 %
2	Benzene	0.616 %
3	Di-chloro-methane	0.34 %
4	Ethyl acetate	2.19 %
5	Methanol	2.734 %
6	Water	4.622 %
Water soluble extractive values and Ethanol soluble extractive value		
1	Water	6.7 %
2	Alcohol	3.2 %

Table 2: Qualitative analysis of Inorganic matters in the drug *Hordeum vulgare* Linn.

S. No.	Name of the minerals / electrolytes	<i>Hordeum vulgare</i> Linn.
1.	Calcium	+ ve
2.	Phosphorus	+ ve
3.	Magnesium	+ ve
4.	Iron	+ ve
6.	Sulphur	+ ve
7.	Sodium	+ve
8.	Cupper	+ ve
9.	Zinc	+ ve
10.	Antimony	- ve
11.	Lead	- ve
12.	Barium	- ve
13.	Bismuth	- ve
14.	Potassium	- ve
15.	Manganese	- ve

Table 3: Observations of Qualitative analysis of Organic matter in drug *Hordeum vulgare* Linn.

S. No.	Chemical constituents	Test	Observations	<i>Hordeum vulgare</i> Linn.
1.	Protein	Ninhydrin test	Red/ Blue-Violet colour	+
2.	Fat	Saponification Test	After first drop no colour .When KOH was added - Pink colour	+
3.	Reducing sugar	Fehling solution	Brick red colour	+
		Benedict test	Brick red ppt	+
4.	Glycoside	Legal Test	Pink Red colour	+
		Killer killiani Test	Reddish brown colour at junction which changes to Bluish green	+
5.	Alkaloid	Dragon Droff Reagent	Orange brown ppt	+
		Mayer's Reagent	Yellowish buff colour	+
6.	Phytosterol	Salkowski test	Red color in CHCl ₃ layer	+
7.	Tannin	Vanillin test	Brick red colour	+
8.	Starch	Iodine test	Blue- black colour	+
9.	Flavonoids	Shinoda Test	Yellow colouration	+
10.	Saponin	Foam test	No foaming	+

Table 4: Thin layer chromatographic data of *Hordeum vulgare* Linn.

Plant	Solvent system	No of spots	Visualizing agent And Spraying agent	Spot colour after spraying	R _f value (R _f x 100)
<i>Hordeum vulgare</i> Linn.	n Butanol : Acetic Acid : Water (4:1:1)	7	Iodine and 5 % phoshomolybdic acid	Green	1.00, 2.00, 28, 35, 66, 88, 96

Table 5

S. No.	Attributes	<i>Hordeum vulgare</i> Linn.
1.	Carbohydrate (g)	67.934 $\pm$ 0.002
2.	Protein (g)	5.1625 $\pm$ 0.030
3.	Fat (g)	3.524 $\pm$ 0.230
4.	Crude fiber (g)	9.189 $\pm$ 0.11
5.	Total calorie (kcal)	332.466 $\pm$ 0.32
6.	Riboflavine (mg)	0.011 $\pm$ 0.0012
7.	Pyridoxine (mg)	0.290 $\pm$ 0.005
8.	Vitamin C (mg)	absent

Yava (*Hordeum vulgare* Linn.)

Plate 1: Whole Plant

Plate 2: Grains

Plate 3: Flour

RESULTS AND DISCUSSION

The physicochemical parameters are given in Table 1. Preliminary phytochemical tests for inorganic and organic matter are given in Table 2 and Table 3. Details of TLC were given in Table 4. The nutritional parameters are given in Table 5. Barley is a good source of fiber, carbohydrate etc.

CONCLUSION

Barley should be used frequently for health and provides all the essential nutrients for normal body functions when consumed in appropriate combination. Cereals are nutritious foods that provide sufficient amount of nutrients needed for normal body function, maintenance and reproduction. They are good source of fiber and can decrease the concentration of high cholesterol level in body. Even Carbohydrate plays an important part of normal Indian food. Barley, rich in carbohydrate and also providing lekhana effect, so can be practice sized in a daily routine regime.

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