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## RESEARCH ARTICLE

### A STUDY ON UBIQUITOUSNESS AND AWARENESS OF BARLEY HEALTH BENEFITS FOR ALL PERDURABLE HEALTH ISSUES

\*<sup>1</sup>Mahboob Unnisa and <sup>2</sup>Tanveer Fatima

<sup>1</sup>Student of M. Sc Nutrition and Dietetics, Anwar Ul Uloom PG College, Affiliated to Osmania University, Hyderabad, India

<sup>2</sup>Assistant professor, Department of Nutrition and Dietetics, Anwar Ul Uloom PG College, Affiliated to Osmania University, Hyderabad, India

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#### ABSTRACT

The food constituent (Barley) that is the subject of health claim is sufficiently characterized. Cause and effect relationship has been established between the consumption of barley and lowering the different perdurable health issues. The target was general population who wants to lower their health issues. A product was developed using one as standard or reference which contain only wheat flour, other three samples were fortified with barley, flaxseed, sesame seeds and coriander leaves. Among the developed product variation-2 was highly accepted. The data collected from sensory evaluation was compiled & subjected to paired T- test statistical analysis and the value at P <0.05 is significant. A cross sectional study was conducted among the general population in Hyderabad. This high fiber, high calcium and high protein product was prepared to meet the needs of the body. The awareness program was done in various schools and colleges in Hyderabad where people were from different caste and backgrounds. Which was carried out to a great extend and the product developed was highly accepted. These results support that barley may be one of the best functional foods for preventive chronic diseases like, (Cancer, CVD, Type-II Diabetes, Osteoporosis) and the best raw material of modern diet structure for promoting the development of large health industry.

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#### INTRODUCTION

Although barley may not be as popular as other whole grains like oats, wheat, or even grain-of-the-moment quinoa, barley has some impressive *health benefits*. A very high-fiber content, vitamins and minerals, antioxidants, heart health and diabetes protection are just some of the barley nutrition benefits that make it one of the best whole grain choices. Barley provides a range of important vitamins and minerals: fiber, selenium, B vitamins, copper, chromium, phosphorus, magnesium, niacin, and more. And when compared to many other grains, even other ancient whole-grains, barley is lower in fat and calories, but higher in dietary fiber and certain trace minerals. For example a one-cup serving of cooked barley has less calories, but more fiber, than an equal serving of quinoa, brown rice, amaranth, sorghum, millet or wild rice.

**High Source of Fiber:** One of barley's most noteworthy health benefits is its high fiber content. Each one-cup serving of barley provides approximately 6 grams of fiber. Most of the fiber found in barley is the insoluble type which aids in healthy digestion, glucose metabolism, and heart health.

Consuming foods that are high in fiber also makes you feel fuller, since fiber expands within the digestive tract and takes up a high volume of space. This means you feel more satisfied after a meal, are better able to control blood sugar levels, and have fewer cravings.

**Can Help Improve Digestion:** Fiber also helps to *fight constipation* and diarrhea by forming bulk within the digestive tract, therefore regulating bowel movements. A 2003 study observed the effects of adding more barley to the diet of adult women and found that after 4 weeks, barley intake had beneficial effects on lipid metabolism and bowel function. Barley's fiber is also important for maintaining a healthy balance of bacteria within the digestive tract.

**Helps with Weight Loss:** Fiber provides volume to a healthy diet without any additional calories since the body cannot digest fiber. This makes the fiber found in barley beneficial for weight loss. A study in 2008 found that when adults added high amounts of barley's beta gluten fiber to their diets for 6 weeks, their weight significantly decreased, as did their levels of hunger. And many other studies have found that compared to more refined grain products, like white bread for example, consuming whole grains like barley significantly reduces hunger levels and positively impacts metabolic responses to

\*Corresponding author: Mahboob Unnisa,  
Student of M. Sc Nutrition and Dietetics, Anwar Ul Uloom PG College, Affiliated to Osmania University, Hyderabad, India.

carbohydrates by absorbing starches at a slower pace. **4. Helps Lower High Cholesterol:** A diet rich in fiber has been correlated with a lower incidence of heart disease, partially due to its ability to help *lower high cholesterol levels*. Barley's high source of insoluble fiber is mostly responsible for giving it its heart health benefits because it inhibits the amount of bad cholesterol that can be absorbed by the intestines. In a 2004 study, 28 men with high cholesterol levels were put on a diet containing high amounts of barley, with roughly 20% of overall calories coming from whole grain barley. After 5 weeks, total cholesterol, HDL "good" cholesterol, and triacylglycerols levels all showed significant improvements. Researchers concluded that by increasing soluble fiber through consumption of barley, as part of an overall healthy diet, people can reduce several important cardiovascular risk factors. Barley's fiber helps to form a type of acid known as propionic acid which helps inhibit enzymes that are involved in the production of cholesterol by the liver. The fiber found in barley also provides beta glucan, a substance that is needed to bind bile in the digestive tract to cholesterol and therefore to help pull it through the colon and out of the body in stool.

**Stabilizes blood pressure:** The dietary fiber of barley helps stabilize blood pressure. It is also low in fat content and has zero cholesterol.

**Helps manage diabetes:** Diabetic patients may benefit from barley due to its fibrous content. Since diabetic patients often need to lose weight to manage their blood sugar level, the inclusion of barley in their diet can be helpful. The grain also contains beta-glucan, a soluble fiber that slows down glucose absorption which is very beneficial for diabetics. Barley is a rich source of magnesium, a mineral that acts as a co-factor for more than 300 enzymes, including those involved in glucose metabolism and insulin secretion. It is also a very good source of fibers and selenium and a good source of phosphorus and copper. It was found that constant consumption of whole grains decreased the risk of type II diabetes by 31%, pointing out that whole grains extend special benefits in motivating healthy blood sugar control.

**Prevents formation of gallstones:** Barley prevents gallstone formation by reducing bile acid secretion. Based on a study, women consuming a fibrous diet have a lower risk of developing gallstones.

**Prevents osteoporosis:** Barley is rich in phosphorus which makes it ideal for preventing osteoporosis. Phosphorus plays an important role in the health of our bones. In fact, barley grass juice contains eleven times greater calcium content than milk. Ingesting enough phosphorus and calcium makes the bones strong and healthy.

**Prevents atherosclerosis:** Atherosclerosis is a thickened artery wall which may be due to the acquisition of fatty materials. Since barley contains B-vitamins, it reduces the cholesterol level and fatty deposits accumulated in the arteries.

**Other health benefits include:** Keeping the digestive system healthy, prevents heart disease, preserves skin elasticity, prevents asthma, and more.

#### Nutritive Value PER 100g

- Energy: 352 k.cal
- Carbohydrates: 77.7 g

- Fiber: 13.6 g
- Fats: 1.2g
- Protein: 99 g
- Calcium: 29 mg
- Iron: 2.5mg
- Magnesium: 79mg
- Manganese: 1.322mg
- Phosphorous: 221mg
- Potassium: 280mg
- Sodium: 9mg
- Zinc: 2.13mg

#### Objectives

- To conduct awareness program or progression.
- To assess the level of information regarding barley in urban city.
- To collect information for the cause of all perdurable diseases.
- To improve the quality of life among population by imparting knowledge about barley, fiber and calcium through questionnaire.
- To compare the diet quality indices and anthropometric measures between barley consumers & non consumers.
- To subject the compiled data to statistical paired T-Test analysis and presented in a graphical representation.

#### MATERIALS AND METHODS

**Product development:** Product development is a nutritional context that means the act of developing a basic product into a new or value added product. This is high in terms of nutrition and other health benefits. Because of quantity and sometimes almost mystical reputation and characteristic of primary product their addition to other product usually enhances the nutritive value or quantity of these sensory products. For these reasons the secondary products, with partial or wholly, can be made of primary product are referred to here as "value added" product or develop products. Hence the product is developed with combination of different calcium rich seeds to increase the consumption of calcium through Non-dairy food source. Basic recipe selected was barley chapatti.

**Procurement of material:** The raw material wheat flour, barley powder, flax seeds powder, sesame seeds, coriander leaves, salt and chili powder are obtained from local market. The product was standardized by mixing all the dry products together adding water making soft dough out of it. This was treated as control or reference 1. Three samples are prepared using sample one as reference or control. Wheat flour acts as primary ingredient. From sample 2 & 3 they are fortified with barley at the difference of 10 grams and different fiber & calcium rich products.

#### Method of preparation

- Firstly, take a bowl with whole wheat flour and add all the ingredients to the flour with some water.
- Make soft dough out of it and make round chapattis.
- Roast these chapattis on a pan until both sides are properly roasted.
- Serve them with desired raita /chutneys in a platter.

**Table- 1. Ingridients used in prepration of basic & variation in grams**

S.NO	Ingredients	Basic	Variation-1	Variation-2	variation-3
1	Wheat flour	40gm	40gm	20gm	30gm
2	Barley seeds powder	-	20gm	30gm	40gm
3	Flax seeds powder	-	20gm	20gm	10gm
4	Sesame seeds powder	-	10gm	20gm	10gm
5	Coriander leaves	10gm	10gm	10gm	10gm
6	Salt	2.5gm	2.5gm	2.5gm	2.5gm
9	Chili powder	2.5gm	2.5gm	2.5gm	2.5gm

**Table 2. Calculated cost of the chapati:**

S.NO	COST( 30 gm)
Basic	2.16/-
Variation-1	10.4/-
Variation-2	12.2/-
Variation-3	12.9/-

**Table 3. Nutritive value of basic and variations of product developed:**

BAR	ENERGY (K.CAL)	CHO (g)	PROTEIN (g)	FAT (g)	FIBRE (g)	CALCIUM (mg)	IRON (mg)
Basic	146.9	29.1	5.53	0.84	1.58	41.6	2.15
Variation-1	376.4	51.3	13.72	12.7	3.53	225.8	3.92
Variation-2	398.15	46.8	14.21	16.97	3.91	363.8	3.99
Variation-3	356.5	55.4	12.78	9.23	3.72	209.2	3.78

**Table 4. Nutrient analysis of basic and variation-2:**

Nutrient Analysis:	Calcium mg/5g	Fiber mg/5 g	Calcium mg/100g	Fiber mg/100g
Basic	0.08	0.04	1.6	0.8
Variation 2	0.107	0.06	2.14	1.2

**Standardization:** Sensory quality is a combination of different senses of perception, coming into a play is choosing and eating a food, appearance, flavor, and mouth feel decide the acceptance of the food. Once the standardization is completed 25 panelists were selected for both the trials of evaluation of sensory evaluation of both the basic and variation. The panelist included both working and retired elderly people some procedure and temperature were maintained and followed for both trials as to minimize any kind of changes in the preparation of the might bring difference in taste, texture, color, and odor. The sensory evaluation was done as soon as the chapatti was made and served to panelist. Samples were placed together in front of each member with a score card to rate the four different recipes. A glass of water was also provided to drink in between assessment of four samples so that the panelist gets the exact taste.

## CREATING AWARENESS

**Product Distribution:** The cross sectional study was conducted among the population of various schools and colleges and the place of study was Hyderabad.

**Sample size and selection of subjects:** The sample consists of a total of 438 subjects. The sample included the people of all age groups. The people belonged to different places with different backgrounds.

**Information Collection:** The information required for the study was collected using a questionnaire method. The questionnaire was developed in English. The objective of the study was kept in mind while constructing the questionnaire. It consisted of both open and close ended questions with multiple choices.

**General information:** The general information was collected to get the following details like personal information of the respondent viz name, age, qualification/profession, anthropometric measurements, lifestyle and sleeping pattern.

**Awareness information:** It includes questions of both open and close ended type. The question was regarding their dietary pattern, sleeping pattern, skipping meals, family medical history, personal medical history, treatment undergoing, consumption of junk food and beverages, preferred source of calcium and fiber whether it's a dairy source or a Non-dairy food source, idea regarding Barley, source of information, consumption in solid or liquid form etc.

**Acceptability of the product:** Each subject was provided with a sample of product and was seen whether it was accepted by all through five-point hedonic rating scale. The product was developed keeping in mind that the risk of their health issues will be lowered. It consists of wheat flour, barley seeds powder, sesame seeds powder, flax seeds and coriander leaves. In the basic only wheat flour and coriander leaves were used where as in variations different quantity of barley seeds

powder(20,30,40gms) were added respectively with different calcium rich seeds. The subject was given variation as it was more acceptable than others.

**D.T-TEST:** T test was applied to find out the significance of difference between the mean scored of the sensory properties of basic and variation.

Formula applied:

Let  $x_1$  and  $x_2$  be two independent samples of size  $N_1$  and  $N_2$  respectively. Suppose we want to test the hypothesis.  $H_0$ : is the significant difference between the means of basics and variations. Under the null hypothesis, the H have been drawn from the same normal population has a 't' distribution as per the statics.

$$t = (x-y)$$

$$\text{Where, } x_1 = (x_i - y_i)$$

$$y_1 = (y_i - y)$$

## RESULTS AND DISCUSSION

### PRODUCT DEVELOPMENT

Product development in a nutritional context means, the act of developing a basic product in to a new or value added product, which is high in terms of nutrients and other health benefits. Because if quantity and sometimes almost mystical reputation and characteristic of most primary product, their addition to other product usually enhance the nutritive value or quantity of these sensory products. For these reason, the secondary product, with partially or wholly, can be made up of primary product are referred to here as "value added" product or develop products. Hence the product is developed with combination of different calcium rich seed powder, known to provide dietary calcium and reducing the complication of many health issues. Basic recipe selected was wheat chapatti. Any food gives the person pleasure if it has to be accepted and become part of being habits. Thus acceptance naturally depends primarily on those qualities that he/she readily perceives and experiences.



Fig.1. Sensory evaluation on the product developed (Basic and all 3 variations)

These are appearance, color, taste, texture and flavor which are the sensory responses of the person to the food. For the measurement of the sensory responses form of estimates of individual dimension of overall quality we have to rely on human panels. Since each variation of product or a formulation could be tested at consumer level it becomes necessary to standardize the condition of testing with selected panel under optimal condition, the reason is that if by sensory testing a product will be approved by such panel of layman who is generally less critical or sees it as whole and not analytically will also approve the product.

### Awareness programe conducted at various schools and colleges

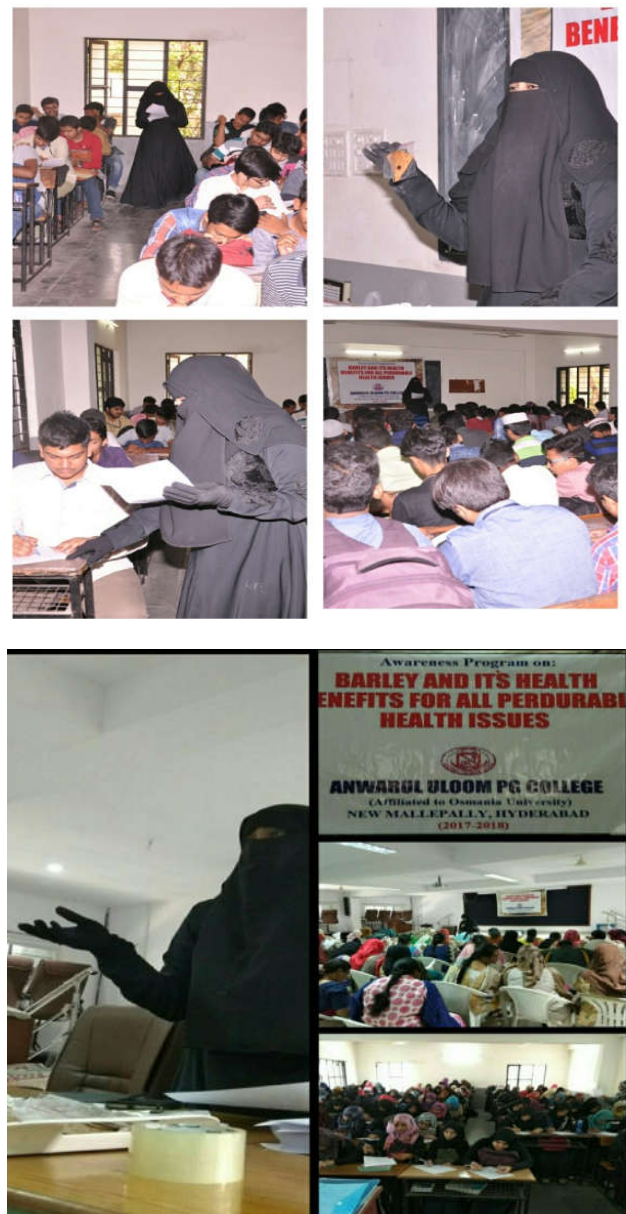


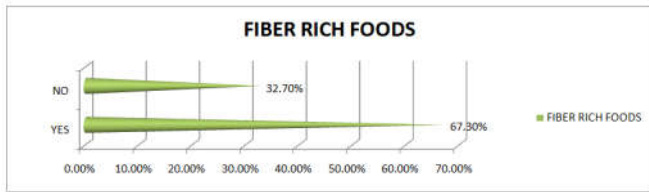
Fig. 2. And 3. Awareness done in various institutions in Hyderabad.

### Prepared barley chapatti and sendory evaluation done

**Awareness programe conducted at various schools and colleges:** The awareness study conducted among population from different places 438 samples were selected to know

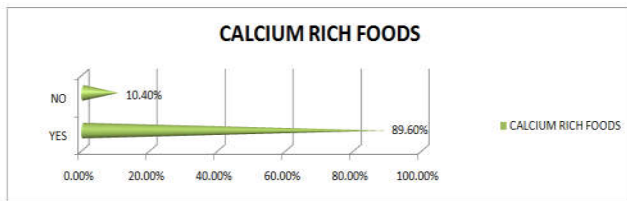


regarding the importance Of barley for decreasing risk of perdurable diseases showed the following results.



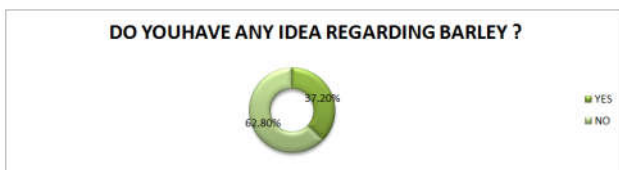
AWARENESS OF FIBER RICH FOODS	PERCENTAGE
Yes	67.30%
No	32.70%

**Awareness regarding fiber rich foods**



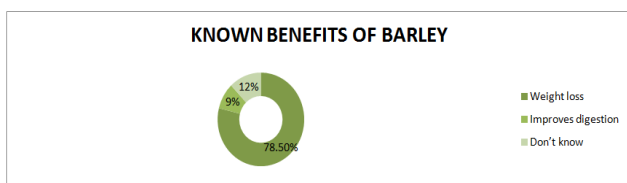
AWARENESS OF CALCIUM RICH FOODS	PERCENTAGE
Yes	89.6%
No	10.40%

**Awareness Regarding Barley**



AWARENESS REGARDING BARLEY	PERCENTAGE
Yes	37.20%
No	62.80%

**Known Benefits of Barley**



KNOWN BENEFITS OF BARLEY	PERCENTAGE
Weight Loss	78.50%
Improves Digestion	9%
Don't know	12%

**Summary**

Barley provides a range of important vitamins and minerals: fiber, selenium, B vitamins, copper, chromium, phosphorus, magnesium, niacin, and more. And when compared to many other grains, even other ancient whole-grains, barley is lower in fat and calories, but higher in dietary fiber and certain trace minerals. Consuming barley might have benefits for the heart, blood pressure, and bones.

Barley may be useful in maintaining a healthy weight. Barley provides a high percentage of an individual's daily requirement of manganese and selenium. Thanks to barley's versatility, it is easy to incorporate into meals Barley's Fiber for Regularity, Lower Cholesterol, & Intestinal Protection, Additional Protection against Atherosclerosis. Significant cardiovascular benefits for postmenopausal women, Prevent heart failure. Lowers risk of type 2 diabetes. Fiber protective against postmenopausal breast Cancer, Help prevent gallstones, Protective against childhood asthma. The present study was conducted to assess the knowledge of Barley and to create awareness among the population, which was conducted on a total of 438 subjects as per the study it was found that the majority of the population were student or was working as a private employee A Questionnaire method was conducted to assess the knowledge of calcium and fiber among the population and also to create awareness regarding it. 438 subjects were selected and also provided with the developed product to test the acceptability of it. The product was highly accepted in terms of appearance, color, flavor, texture and taste.

**Conclusion**

It was observed as majority of the subjects were aware of the importance of calcium and fiber, the foods rich in them and its function in maintaining good health. It was also observed that many out of all subjects were not aware of these nutrients and its benefits. From the finding of the present study investigation it is concluded that the product developed contained appreciable amount of different calcium and fiber rich ingredients. If these are incorporated into the diet, the health status can be maintained and improved in people dealing with the perdurable diseases. The basic along with the variations were prepared. The basic consists of only wheat flour and coriander leaves, where as in variations barley seeds powder, flaxseeds powder, sesame seeds powder along with wheat flour and coriander leaves were added. The 2 variation was the most acceptable among all. The same method of preparation was followed for preparing both the basic and variations. All the variations were formulated and standardized by conducting repeated trials. Panels of 25 judges evaluated the palatability and acceptability of the product. The palatability of basic and variation were accepted in terms of appearance, flavor, taste, texture and acceptability. Statistical analysis of the palatability trials shown that t'-values at p were found to be significant for variation-1 & 3 and insignificant for 2. Variation-2 was more accepted one. Cost of the developed products was calculated taking into account all the ingredients added. The cost was found to be economical and can be afforded by all population.

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