



E-ISSN: 2321-2187  
P-ISSN: 2394-0514  
[www.florajournal.com](http://www.florajournal.com)  
IJHM 2020; 8(3): 32-35  
Received: 16-03-2020  
Accepted: 18-04-2020

**Saqib Hussain**  
Department of Molejat, Ahmed  
Garib Unani Medical College,  
Akkalkuwa, Maharashtra, India

**Iftikhar Ahmad**  
Department of Tahaffuzi-wa-  
Samaji Tibb, NIUM Bangalore,  
India

**Irfan Ahmad**  
Department of Mahiyat-ul-  
Amraz, State Unani Medical  
College, Allahabad, Prayagraj,  
Uttar Pradesh India

**Tanveer Khan**  
Department of Tahaffuzi-wa-  
Samaji Tibb, Ahmed Garib  
Unani Medical College,  
Akkalkuwa, Maharashtra, India

**Shahid Alam**  
Department of Tashreeh-ul-  
Badan, Rahbar Unani Medical  
College, Bhawaninagar, Punjab,  
India

**Imran Alam**  
Department of Munafe-ul-Aza,  
Rahbar Unani Medical College,  
Bhawaninagar, Punjab, India

**Corresponding Author:**  
**Saqib Hussain**  
Department of Molejat, Ahmed  
Garib Unani Medical College,  
Akkalkuwa, Maharashtra, India

## A brief overview of the use of barley (Shaeer) as Tibb-e-Nabwi

**Saqib Hussain, Iftikhar Ahmad, Irfan Ahmad, Tanveer Khan, Shahid Alam and Imran Alam**

### Abstract

Barley, also known as Shaeer in Arabic (Jav in Urdu/Hindi), is one of the best examples of the Tibb-e-Nabwi. Barley was one of the favorite food of our beloved Prophet (PBUH). It has a vast range of medicinal properties. Almost every part of this food grain plant, i.e., seed, fruit, leaves, and root is used as a medicine. The use of barley to treat lifestyle-related diseases like Obesity, Diabetes, and digestive problems is exceptionally beneficial. Apart from these lifestyle-related diseases use of barley in various medicinal forms like Decoction, hot water extraction of the whole plant, and in powdered form (Sattu) has the capabilities to cure the diseases like Malaria, urinary and respiratory tract infections, measles, influenza, jaundice, syphilis, kidney diseases, skin diseases, etc. Barley is a rich source of dietary fiber, vitamins, and minerals. Barley is the fourth most important food grain in India. Barley's share in the overall food consumption in India is  $\approx 15\%$ , which can be further increased by creating awareness and sensitizing its health benefit and medicinal use. In the present work, authors have provided a brief overview of the barley's nutritional profile, its health benefits, and its holistic therapeutic use.

**Keywords:** Barley, Tibb-e-Nabwi, food-medicine, therapeutic use

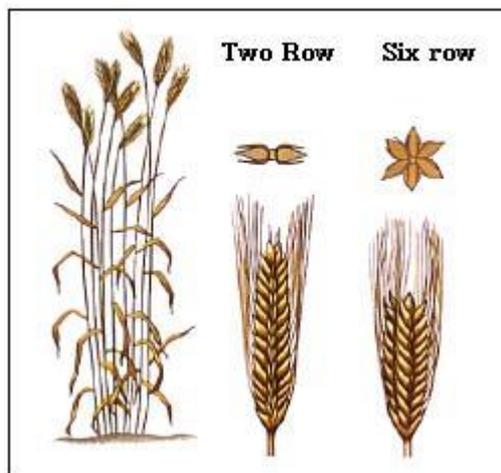
### Introduction

Barley (*Hordeum vulgare* L.) is one of the most ancient cereals known to society. It is also known as the Jav in Urdu/Hindi and Shaeer in Arabic. The barley cultivation was believed to be in practice around 5000 BC in Egypt [1]. It is also one of the Qur'anic plants, which is mentioned in Surah Yousuf, Verse No. 43. This Qur'anic plant finds the place in Prophetic Medicine (sayings and habits of Prophet (PBUH) essential for the healthy life). Prophet Muhammad (PBUH) said that Allah has created ailments, and there is no ailment for which he has not created the remedy (Sahih-Al-Bukhari, Volume no. 7, Hadees No. 582). He also mentioned that "The stomach is the home of sickness, and moderation is the most important medicine," and hence, the reason for most of the ailments is poor digestion [2]. Prophet Muhammad (PBUH) directed his followers to search for the novel remedies for various diseases in nature and recommended to use the medicinal plants. One of the great scholars, Al-Razi, in his book "Kitab al-Hawi fi al-Tibb" mentioned the importance of considering the complexities and side effects of drugs [3]. Al-Razi recommended that "If the physician is able to treat with nutrients, not medication, then he has succeeded. If, however, he must use medication, then it should be simple remedies and not compound ones [3]." 80% of the world's overall natural medicine consumption is from developing countries like India, Bangladesh, Pakistan, etc. The primary reason for this larger consumption is cultural acceptability and ease of access [2]. The medicine should not only readily available, but it should also have good human body adaptability characteristics viz. its digestion, absorption, excretion, and its toxicity should be such that it suits a wide range of temperaments. Barley was one of such cereal (food grain) which was not only loved by our beloved Prophet (PBUH) but also used as Tibb-e-Nabwi. It has all the properties of a good nutrient that can be used as herbal medicine also.

The amalgamation of food and medicine is the fundamental and essential characteristic of any prophetic medicine. The present study deals with this amalgamation in the context of the barley.

### Description of Barley Plant

Barley is the fourth most important food grain in India. Barley's share in the overall food consumption in India is  $\approx 15\%$  [4]. There are two types of barley which are mostly cultivated. The difference between the two types of barley plants is as shown below.



**Fig 1:** Two-row vs. six-row barley plant



(A) Hulled barley

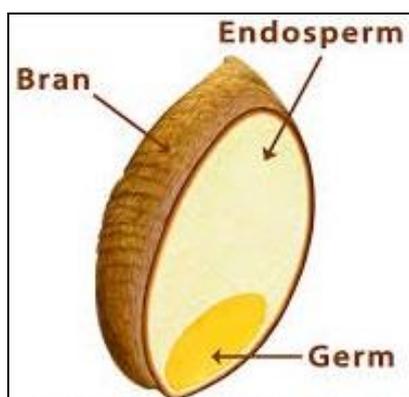
(B) Hullless barley

**Fig 2:** Images of Hulled and Hullless barley.

In the Indian context, barley is a Rabi crop which has a wide range of usages like human consumption, animal feed, and industrial application as raw material [6]. Among the top 10 significant consumers, India has the lowest average annual consumption ( $\approx 0.7$  kg/person) [1].

#### Nutritional characteristics and chemical composition of barley

As discussed above, barley genotypes are of two types, hulled and hullless barley. Hullless barley has higher nutritional values as they are minimally processed, and therefore retains all the Bran and Germ. Bran is the outer layer of the barley seed which contains essential antioxidants, vitamin B and fiber. The germ is the innermost part of the seed. It is the embryo of the seed or kernel. The Germ layer typically contains vitamin B, some protein, minerals, and healthy fats. The barley seed anatomy is as shown in Figure 3. The pearled barley is also called as the polished barley seed in which the bran is removed, and only endosperm and germ of the seed remain. The polishing of the seed removes most of the fiber and nutrients from it. Hence, hullless barley (whole food grain) is more prevalent in India [7].



**Fig 3:** Anatomy of the barley seed

The two-row and four-row barley plants are defined based on their stalks when viewed from the top. Figure 1 shows the top view and front view of the stalk. The two-row stalk produces approximately 15-30 grains. On the other hand, the six-row stalk can produce 25-60 grains. Most of the barley is covered with the outer thick layer which is called the hull. This outer layer is indigestible and must be removed to make the barley grain edible. Hulled barley is covered barley that has been minimally processed to remove only the tough inedible outer hull. As opposed to this, the hullless barley has the weaker outer cover which falls out while harvesting. The hullless barley does not require any processing to remove the indigestible outer hull [5]. Figure 2 shows the images of the hulled and hullless barley.

To be considered for the food-medicine use a herbal medicine should not only contain nutrients but also should have a good protein, starch and mineral digestibility [7]. The antinutrient like Phytic acid and Polyphenols reduce the absorption of some minerals like Iron, Zinc, and Calcium [8]. Jood and Kalra [7] compared the nutrients of various hulled and hullless barley cultivars in India. They observed the average protein content of the hullless barley is higher (10.53% protein) as compared to hulled barley (9.06% protein). The fat content of both the types (hulled and hullless) barley are more or less equal ( $\approx 3.35\%$ ). Total Lipid contents of the hulled barley varies from 1.39% to 3.45% while that of hullless barley is between 1.61% to 2.40%. They mentioned that the processing of the hulled barley removes a part of outer bran and most of the remaining part comprise of endosperm and germ, which increases the total lipid content of the hulled barley. The average total sugar content of the hullless barley was observed to be 2.77%, while that of hulled barley was 3.11%.  $\beta$ -glucan is a soluble fiber and important nutrient from the medicinal point of view. The hullless barley contains higher ( $\approx 4.73\%$ )  $\beta$ -glucan content as compared to hulled barley ( $\approx 3.05\%$ ). Similarly, the total starch content of the hullless barley is also higher ( $\approx 57.45\%$ ) compared to hulled barley ( $\approx 45.74\%$ ). Jood and Kalra [7] also observed that the total calcium content of the hullless barley was also higher ( $\approx 24.93\%$ ) compared to hulled barley ( $\approx 21.4\%$ ). The total Iron and Zinc contents are more or less similar – 1.53% Iron and 3.13% Zinc – in both the types of barley. The anti-nutrients like phytic acid ( $\approx 546.67$  mg/100g in hullless barley and  $\approx 724.88$  mg/100g in hulled barley) and polyphenols ( $\approx 374.33$  mg/100g in hullless barley and  $\approx 526.67$  mg/100g in hulled barley) are also less in hullless barley.

It is observed that the total protein, dietary fibers, essential amino acids, vitamins and minerals are in larger quantities in barley when compared with wheat and rice [9]. These characteristics of the barley add to the Prophetic recommendation of barley as a food-medicine over other grains.

### Barley as a food-medicine from Tibb-e-Nwbwi

The concept of phytopharmaceutical – fighting disease with natural substances – is very much related to the ideology of food-medicine. It was also found that nearly 70% of the active compound discovered as medicine have its origin from plants only 30% are purely synthetic<sup>2</sup>. This study can be correlated with the Tibb-e-Nabwi in which the concept of food-medicine has emphasized. Extensive use of barley as food by our beloved Prophet (PBUH) strengthens its importance as food-medicine. There are at least 17 sahih hadees which identify and underscore the use of barley as food-medicine by Prophet Muhammad (PBUH)<sup>[4]</sup>. The most relevant hadees in the favor of barley as food-medicine is as follows: Aisha (may Allah be pleased with her) narrated that the Messenger (PBUH) said: "you should eat profitability even if it is unpleasant to eat (Talbina), i.e. the stock." If any member of the family of the Messenger of Allah was ill, the pot would continue in the fire until one of two things, either the person recovered or died" (Saheeh Sunan Ibn Maja (3446) Hasan hadeeth). As per other ahadees, barley strengthens the heart, improves the digestion and cleanse the abdomen<sup>[4]</sup>.

Talbina is a simple dish (made of barley) that was recommended by the prophet Muhammed (PBUH) as food-medicine. It is made from barley flour, milk, water and is often sweetened with honey. The prophet (PBUH) used this dish as a means for curing the sick and to comforting those who have lost loved ones. Barley, honey, and milk are all foods of the sunnah and hold their own healing properties. Talbina lowers cholesterol and strengthens the heart; protects from cancer, alzheimer, and depression; controls blood sugar levels, Type 2 Diabetes, mellitus and hypertension, all without side effects.

**Ingredients:** 100% whole grain barley flour, milk, and honey.

#### Preparation:

- Mix 2 tablespoon (≈ 25 to 30 gm) barley flour with 1-2 cups of milk and stir solution over cookstove on low heat for about 10-15 minutes or until a porridge-like consistency is reached.
- Add honey to the taste.

Apart from Talbina, the barley sattu and barley bread are the other food loved by our beloved Prophet (PBUH). Once Prophet (PBUH) recommended Hazrat Ali (may Allah be pleased with him) to eat a dish made of barley bread and beetroot to expedite the recovery from illness<sup>[4]</sup>.

### Barley as food-medicine in Unani and Modern medicine

Barley is as a food-medicine from ancient times. In ancient Egypt barley was used as a purgative, applied to wounds to decrease healing time, decrease phlegm, and treat eye diseases. Roman gladiators believed barley bread imparted greater strength and stamina than other foods<sup>[10]</sup>. Almost every part of the barley plant viz., seed, root, leaves, and whole plant can be used as medicine<sup>[4]</sup>. In the present section, authors highlight the use of barley in Unani as well as Modern medicine.

In Unani, every substance is defined according to its temperament (Mizaj). It may be hot or cold and wet or dry in varying proportions. Specific types of foods are recommended for balancing each humour to ensure good health and mitigate or cure illness.

#### Barley water (Ma-ul-Shaeer)

The barley has cold and dry temperament. Hence, barley water (Ma-ul-Shaeer) makes its temperament cold and wet. It is an ancient drink, and its importance as a food-medicine is also discussed by the Hippocrates<sup>[11]</sup>. He considered it as a drink which helps to cool the body and removes the toxic materials. He considered it as a drink which provides a moderate amount of nutrient, and also easy to digest. Therefore, it can also be served to the patient who is recovering the illness. There are following therapeutic uses recommended by various scholars<sup>[11]</sup>:

Ziabetes, Suda-e-haar, Sil-wa-Diq, Pleurisy, Dry cough, Chronic cough, Zof-e-Meda, Nafakh-e-Shikam, Qulanj, and Hiddate Dam.

#### Preparation of barley water

Soak the whole barley in water for 4 hours, then boil the soaked barley in 20:1 proportion with clean water. Fatma *et al.*<sup>[11]</sup>

recommended the water is to barley proportion should be 24:1. They also recommended boiling this barley water until the ratio becomes 8:1. However, Zaman *et al.*<sup>[12]</sup> considered a more practical approach and recommended to boil the solution until the watercolor becomes reddish. After this, the water can be filtered out and stored in a separate bottle.

#### Scientific research available in the literature

1. Kumar *et al.*<sup>[13]</sup> mentioned a study, which shows the evidence that the use of aqueous barley extract reduced the fasting serum glucose level.
2. Barley water contains lignan that helps to prevent and reduce cancer cells<sup>[11]</sup>.
3. Barley water is used to reduce kidney inflammation, kidney pain, and other kidney-related diseases<sup>[4]</sup>.
4. A study conducted by Jackson *et al.*<sup>[14]</sup> showed that barley water keeps the urinary tract healthy.
5. Barley water has antibacterial properties, and hence, it can also be used externally to cure skin diseases like Erysipelas, Dermatitis and to reduce the aftereffects of Measles<sup>[4]</sup>.

#### Use of various parts of barley as food-medicine

Barley has a proven potential to be used as a food-medicine plant. It is evident from multiple studies that the whole barley plant, including leaves and roots, has its medicinal use. The present section briefly discusses the different aspects of barley as food-medicine. The leaves of the barley plant have Phenolic compounds, which help redox regulation activity<sup>[2]</sup>. The redox regulation is necessary to maintain cellular homeostasis, which is nothing but the equilibrium of cell proliferation and cell death<sup>[15]</sup>. The barley leaves are also used as a laxative or purgative which helps to evacuate the intestine<sup>[16]</sup>. Kawka *et al.*<sup>[17]</sup> in their study, found that the barley grass (leaves) specifically inhibits the proliferation of human colon cancer cells on human colon epithelial cells without any side effects. Ankuta *et al.*<sup>[18]</sup> in their review, collected some other therapeutic uses of barley grass, which comprise of antioxidant properties, hyperlipidemia, and cardiovascular disease. Takano *et al.*<sup>[19]</sup> in their study with statistical evidence shown that the use of green leaves juice, which contains insoluble fiber, reduces the postprandial blood glucose level in the patients who have higher levels of postprandial blood glucose level. Yu *et al.*<sup>[20]</sup> suggested that the antioxidant and hypolipidemic effects of barley leave essence help to prevent the cardiovascular disease in which atherosclerosis is important.

Obesity is associates with hypertension, dyslipidemia, insulin resistance, fatty liver disease, and type 2 diabetes<sup>[21]</sup>. Hairston *et al.*<sup>[21]</sup> discussed that obesity and other related disorders are lifestyle-related diseases. In their study, they showed that soluble fiber like  $\beta$ -glucan helps to reduce the visceral adipose tissue (fat). The presence of  $\beta$ -glucan is the highest in barley as compared to other whole grain. The  $\beta$ -glucan forms the viscous gel-like substance which prolongs the food absorption and increases the time of gastric emptying<sup>[22]</sup>. Hence, it reduces the appetite and eventually curbs the food intake.  $\beta$ -glucan which is the soluble fiber along with insoluble fiber also attenuates the blood cholesterol level<sup>[22, 23]</sup>. The presence of insoluble fiber adds to help the soluble in improving the bowel function by accelerating the intestinal movement and increasing the stool volume<sup>[24]</sup>. The short-chain carbohydrates like Acetate (C<sub>2</sub>), Propionate (C<sub>3</sub>), and Butyrate (C<sub>4</sub>) present in barley help to gut microbiota, and hence, improve the symptoms of gut disorders such as irritable bowel syndrome (IBS), Crohn's disease and ulcerative colitis<sup>[25-27]</sup>. The insoluble fiber present in the barley also helps to reduce the risk of the gallstones. Tsai *et al.*<sup>[28]</sup> discussed that 80% of the gallstones are cholesterol stones, and as discussed earlier, both soluble and insoluble fiber help to reduce cholesterol. From their study, Tsai *et al.*<sup>[28]</sup> concluded that the long term use of a product like barley helps to avoid gallstone surgery.

One of the interesting studies conducted by Nwaru *et al.*<sup>[29]</sup> showed that childhood asthma, allergic rhinitis, and atopic sensitization can be effectively reduced by adding the barley as complimentary food alongside mother's milk at the age of 5 to 5.5 months. Another important study<sup>[30]</sup> shows that the barley has strong skin hydration and anti-aging effect on the human skin. Lee *et al.*<sup>[30]</sup> in their study

showed that regular consumption of a formulation prepared by a combination of fermented barley and soybean is a natural product-based material with beneficial effects for skin health. Cade *et al.* [31] in their statistical study, concluded that the consumption of cereal fiber content in the pre-menopausal women can reduce the risk of breast cancer. As discussed earlier, the fiber content of the barley is the highest among the other cereals. Hence, this study supports that the consumption of barley avoids the risk of breast cancer.

### Conclusion

The present brief overview highlights the use of barley as Tibb-e-Nabwi. Some of the traditional Prophetic use of barley is discussed, and an endeavor is made to connect the traditional food-medicine concept with modern medicine. Barley has tremendous health benefits in addition to an excellent nutrient. In the present review, authors have tried to collect systematic scientific evidence to support the use of barley as food-medicine. Clinical studies discussed showed that consumption of barley has an excellent capability to prevent and cure some diseases. These studies further encourage more intense scientific research that will establish a correlation between the use of barley as Tibb-e-Nabwi and modern medicine. At present the barley is not a very popular food choice in typical households. Considering the benefits of barley discussed in the present review, authors want to sensitize the use of barley in day to day meal habits.

### References

1. Fox GP. Barley Production and Consumption. In: The Effect of Barley Structure and Composition on Malt Quality. 2009, 37-50. doi:10.1007/978-3-642-01279-2
2. El-Seedi HR, Khalifa SAM, Yosri N *et al.* Plants mentioned in the Islamic Scriptures (Holy Qur'ân and Ahadith): Traditional uses and medicinal importance in contemporary times. *J Ethnopharmacol.* 2019; 243(June):112007. doi:10.1016/j.jep.2019.112007
3. Tchamouoff SE. Al-Razi and Islamic medicine in the 9th century [8]. *J R Soc Med.* 2006; 99(9):437. doi:10.1258/jrsm.99.9.437
4. Khan Marwat S, Hashimi M, Usman Khan K, Aslam Khan M, Shoaib M. Barley (*Hordeum vulgare* L.) A Prophetic Food Mentioned in Ahadith and its Ethnobotanical Importance. *J Agric Environ Sci.* 2012; 12(7):835-841. doi:10.5829/idosi.ajeas.2012.12.07.1794
5. Oldways Whole Grains Council. Oldways Whole Grains Council. <https://wholegrainscouncil.org/whole-grains-101/whole-grains-101-orphan-pages-found/types-barley>. Published 2020. Accessed March 9, 2020.
6. Ketharaj M, Jeyajumar S. Barley Production on Rise.; 2009.
7. Jood S, Kalra S. Chemical composition and nutritional characteristics of some hull less and hulled barley cultivars grown in India. *Nahrung - Food.* 2001; 45(1):35-39. doi:10.1002/1521-3803(20010101)45:1<35::AID-FOOD35>3.0.CO;2-U
8. Petry N, Egli I, Zeder C, Walczyk T, Hurrell R. Polyphenols and Phytic Acid Contribute to the Low Iron Bioavailability from Common Beans in Young Women. *J Nutr.* 2010; 140(11):1977-1982. doi:10.3945/jn.110.125369
9. Serna Saldivar SO. (Instituto Tecnológico y de Estudios Superiores de Monterrey MNL, Mexico). Dietary Importance. In: Benjamin Caballero (Johns Hopkins University), ed. *Encyclopedia of Food Sciences and Nutrition*. Second. ACADEMIC PRESS INC.; 2003, 1032-1038.
10. Diane WKMS, RDN. LDN. Chapter B. In: *The A-Z Guide to Food as Medicine*. Second. CRC press; 2019, 438.
11. Fatma, Gazala, Siddiqui MJ, Wani P Habib A, Nikhat S. Therapeutic Uses And Benefits Of Barley Water (Ma-Ul- Sha'eer ) In Unani And Modern Perspective. *World J Pharm Res.* 2019; 8(11):396-405. doi:10.20959/wjpr201911-15866
12. Zaman R, Basar SN, Farah SA. Dieto Therapy In Unani System Of Medicine. *Int J Pharm Chem Biol Sci.* 2013; 3(4):1035-1039.
13. Kumar A, Aswal S, Chauhan A, Semwal RB, Kumar A, Semwal DK. Ethnomedicinal Investigation of Medicinal Plants of Chakrata Region (Uttarakhand) Used in the Traditional Medicine for Diabetes by Jaunsari Tribe. *Nat Products Bioprospect.* 2019; 9(3):175-200. doi:10.1007/s13659-019-0202-5
14. Jackson CB, Taubenberger SP, Botelho E, Journal J, Tennstedt SL. Complementary and Alternative Therapies for Urinary Symptoms: Use in a diverse population sample qualitative study. *Urol Nurs.* 2012; 32(3):149-157. doi:10.1038/jid.2014.371
15. Trachootham D, Lu W, Ogasawara MA, Valle NR Del, Huang P. Redox regulation of cell survival. *Antioxidants Redox Signal.* 2008; 10(8):1343-1374. doi:10.1089/ars.2007.1957
16. Shah GM, Khan MA. Check List of Medicinal Plants of Siran Valley Mansehra-Pakistan. *Ethnobot Leaflet.* 2006; 10:63-71.
17. Kawka K, Lemieszek MK, Rzeski W. Chemopreventive properties of young green barley extracts in in vitro model of colon cancer. *Ann Agric Environ Med.* 2019; 26(1):174-181. doi:10.26444/aaem/102624
18. Ancuța BE, Muntean L, Russu F. Barley (*Hordeum Vulgare* L.): Medicinal and Therapeutic Uses – Review. *Hop Med Plants.* 2019; 27(1, 2):87-95.
19. Takano A, Kamiya T, Tomozawa H *et al.* Insoluble fiber in young barley leaf suppresses the increment of postprandial blood glucose level by increasing the digesta viscosity. *Evidence-based Complement Altern Med.* 2013, 2013. doi:10.1155/2013/137871
20. Yu YM, Wu CH, Tseng YH, Tsai CE, Chang WC. Antioxidative and hypolipidemic effects of barley leaf essence in a rabbit model of atherosclerosis. *Jpn J Pharmacol.* 2002; 89(2):142-148. doi:10.1254/jjp.89.142
21. Hairston KG, Vitolins MZ, Borris JM, Anderson AM, Hanley anthony J, Wagenknecht LE. Lifestyle Factors and 5-Year Abdominal Fat Accumulation in a Minority Cohort: The IRAS Family Study. *Obesity.* 2012; 20(2):1-12. doi:10.1038/oby.2011.171.Lifestyle
22. Dikeman CL, Fahey GC. Viscosity as related to dietary fiber: A review. *Crit Rev Food Sci Nutr.* 2006; 46(8):649-663. doi:10.1080/10408390500511862
23. Bourdon I, Yokoyama W, Davis P. *et al.* Postprandial lipid, glucose, insulin, and cholecystokinin responses in men fed barley pasta enriched with  $\beta$ -glucan. *Am J Clin Nutr.* 1999; 69(1):55-63. doi:10.1093/ajcn/69.1.55
24. Li J, Kaneko T, Qin L-Q, Wang K, Wang Y. Effects of Barley Intake on Glucose Tolerance, Lipid Metabolism, and Bowel Function in Women. *J. Nutrition.* 2003; 19(11-12):926-930. doi:10.1016/S0899-9007(03)00182-5
25. Macfarlane S, Macfarlane GT, Cummings JH. Review article: Prebiotics in the gastrointestinal tract. *Aliment Pharmacol Ther.* 2006; 24(5):701-714. doi:10.1111/j.1365-2036.2006.03042.x
26. Scheppach W, Sommer H, Kirchner T *et al.* Effect of butyrate enemas on the colonic mucosa in distal ulcerative colitis. *Gastroenterology.* 1992; 103(1):51-56. doi:10.1016/0016-5085(92)91094-K
27. Di Sabatino A, Morera R, Ciccocioppo R. *et al.* Oral butyrate for mildly to moderately active Crohn's disease. *Aliment Pharmacol Ther.* 2005; 22(9):789-794. doi:10.1111/j.1365-2036.2005.02639.x
28. Tsai CJ, Leitzmann MF, Willett WC, Giovannucci EL. Long-term intake of dietary fiber and decreased risk of cholecystectomy in women. *Am J Gastroenterol.* 2004; 99(7):1364-1370. doi:10.1111/j.1572-0241.2004.30153.x
29. Nwaru BI, Takkinen HM, Niemelä O *et al.* Timing of infant feeding in relation to childhood asthma and allergic diseases. *J Allergy Clin Immunol.* 2013; 131(1):78-86. doi:10.1016/j.jaci.2012.10.028
30. Lee S, Kim J-E, Suk S *et al.* A fermented barley and soybean formula enhances skin hydration. *J Clin Biochem Nutr.* 2015; 57(2):156-163. doi:10.3164/jcbn.15
31. Cade JE, Burley VJ, Greenwood DC. Dietary fibre and risk of breast cancer in the UK Women's Cohort Study. *Int J Epidemiol.* 2007; 36(2):431-438. doi:10.1093/ije/dy1295.