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Development of Innovative Prophetic Food: Effect of Different Genotypes of Barley (Shaeer) on Quality Characteristics of Instant Talbina Drink

Pembangunan Makanan Sunnah Inovatif: Kesan Perbezaan Genotip Barli (Shaeer) Terhadap Karakteristik Kualiti Minuman Talbina Segera

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Abstract: Talbina is a prophetic barley-based product commonly used to treat pain and sorrow among Arabs. Barley crops consist of plentiful source of carbohydrate, soluble dietary fiber (β-glucan) with healing properties and high potential as functional food. Different barley varieties contain different nutrients density. Therefore, Instant Talbina Drink (ITD); an innovated prophetic dairy product supplemented with different genotypes of barley (commercial pearl (CT); act as control, hulled (HT) and hull-less (PT)) were produced. The purpose of this study was to determine the effect of different types of barley on the quality of ITD via scientific analytical approaches including chemical and physicochemical analysis as well as 9-scale hedonic evaluation. The total calories per 100 g of ITD samples were ranged from 363.5 kcal – 358.33 kcal. The result showed that CT had the highest caloric value followed by PT. Meanwhile, PT showed a significantly difference in protein content compared to HT and CT. Apart from that, HT had the highest value of fiber content which was significantly difference from CT and PT. In addition, the shelf life of the samples (in powder form) which has been packed in airtight containers were discovered up to 30 days when kept refrigerated temperature at 8 °C after a visual observation has been conducted. The highest degree of consumers' preferences toward PT in regard to their good sensory attributes and its nutritional density unhesitatingly revealed that PT is the best formulation of ITD for commercialization purpose.

Keywords: barley; functional; nutrient; prophetic; talbina

Abstrak: *Talbina adalah produk makanan sunnah berasaskan barli yang biasa digunakan untuk merawat kesakitan dan kesedihan di kalangan orang Arab. Tanaman barli terdiri daripada sumber karbohidrat yang banyak, serat makanan larut (β-glukan) dengan sifat penyembuhan dan berpotensi tinggi sebagai makanan berfungsi. Kepelbagaian barli yang berbeza mengandungi ketumpatan nutrien yang berbeza. Oleh itu, Minuman Talbina Segera (ITD); produk sunnah tenusu yang diinovasikan ditambah dengan genotip barli yang berbeza (mutiara komersil (CT); bertindak sebagai kawalan, lambung (HT) dan lambung (PT)) dihasilkan. Tujuan kajian ini adalah untuk mengetahui kesan pelbagai jenis barli terhadap kualiti ITD melalui pendekatan analitik saintifik termasuk analisis kimia dan fizikokimia serta penilaian hedonik 9 skala. Jumlah kalori setiap 100 g sampel ITD berkisar antara 363,5 kkal - 358,33 kkal. Hasil kajian menunjukkan bahawa CT mempunyai nilai kalori tertinggi diikuti oleh PT. Sementara itu, PT menunjukkan perbezaan yang signifikan dalam kandungan protein dibandingkan dengan HT dan CT. Selain itu, HT mempunyai nilai kandungan serat tertinggi iaitu perbezaan ketara dari CT dan PT. Selain itu, jangka hayat sampel (dalam bentuk serbuk) yang telah dikemas dalam bekas kedap udara ditemui hingga 30 hari ketika disimpan dalam suhu sejuk pada 8 ° C setelah pemerhatian visual dilakukan. Tahap keutamaan pengguna tertinggi terhadap PT berkaitan dengan sifat sensori yang baik dan kepadatan pemakanannya tanpa ragu-ragu menunjukkan bahawa PT adalah perumusan ITD terbaik untuk tujuan pengkomersilan.*

Kata kunci: *barli; berfungsi; nutrien; sunnah; talbina*

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Introduction

Talbina is a porridge-like (semi liquid) prophetic food product made from barley grain, milk and always sweetened with honey (Omar and Omar 2018; Saquib Hussain et al., 2020). Traditionally, this food is found enormously in middle east countries and well-known among the Arabic culture for treating sickness and promoting general well-being (Badrasawi et al., 2013; Youssef et al., 2013). This barley-based product has a great application as a functional food which could exert a beneficial effect on human health beyond basic nutritional functions (Hugget and Schliter, 1996). Recent study by Saquib Hussain, 2020 reported that barley has almost 70% of the active compounds which has turned it to be one of the best phytopharmaceutical food-medicine from Tibb-e-Nabwi (Prophetic medicine). According to Hathout et al. (2010), Talbina was prescribed for seven diseases in Islam such as relieves an intense sorrow, heart disease, high cholesterol levels, aging effect, diabetes, and hypertension. Talbina also has been mentioned in numerous hadith where its consumption is widely used since time immemorial. Prophet Mohamad (PBUH) used to recommend Talbina as a cure for sadness because of death. Aisha (RA) narrated:

"If someone from the family of the Messenger (PBUH) is sick, the messenger (PBUH) said, the Talbina relieves the heart of pains and cleans the diseased heart as well as what cleans the dirt form your face with water".

According to a famous hadith in Al-Bukhari, (1997), on Talbina. Aisha (RA) often advocated Talbina for the sick or for those who are in grieved or mourned. She (RA) said:

"I heard the Messenger (peace be upon Him) said: The Talbina gives rest to the patient's heart and make it active, and help relieves your pain and sorrow" (Al Jaouni and Selim, 2017).

Barley (also known as Shaeer in Arabic) is the fourth most vital cereal crops worldwide, after rice, wheat and corn and it belongs to the grass family Poaceae (Sharma and Gujral, 2010; Marwat et al., 2012; Mahfood Ali and Farouk Abdelsalam, 2020). These annual cereal crops have been produced approximately 130 million metric tons (9.4 %) around the world and rich in vitamins A, C, B1, B2, folic acid and B12, calcium, iron, potassium, and chlorophyll (Bawazir, 2010; Yamaura et al., 2012). As eloquently stated by Stanca (2016), barley has a great diversity in terms of its morphological forms and usage. For instance, it can be produced in the forms of six‐row, two‐row, hooded, covered and naked (hull‐less), awn, awn-less, feed (forage and grain), malting, food type as well. Some barley genotypes are categorized as hull-less, hulled types and there is also pearl barley which has been "polished" for the better attributes. Hull-less cultivars are commonly classified as waxy starch and is believed to have better nutritional values than hulled types do (Soares et al., 2007). This grain also can be grown in various harsh conditions including spring and winter. The level of nutritional value in barley-based food product depends on many factors such as the type of barley used and the level of supplementation. Therefore, this study has selected the best three different barley genotypes: commercial pearl barley, hulled barley, and hull-less barley.

Unfortunately, this prophetic consumption has been decreased among Arabs due to the changes in diet trend all over the world. A decades ago, Talbina food was commonly used, but it has been disappeared due to the rising of wheat cereal in processing instead of barley such as in bread-making (Youssef at al., 2013). This food should be revived otherwise it could either be forgotten or vanished. In addition, Malaysian's lifestyle is considered less in physical activities thus resulting in an increase prevalence of obesity (Ismail et al., 2002). Meanwhile, previous studies have revealed Talbina possessed various functional effects. Therefore, taking the current lifestyle into consideration, an easy prepared yet well- balanced drink product would be ideal, hence lead to the development of instant drink dairy-based product called Instant Talbina Drink (ITD). Hence, the quality characteristics for the nutritional, sensorial and shelf life of the reformulated Instant Talbina Drink (ITD) via scientific approaches is seen as a remarkable contribution to sustain community's health and well-being.

Methodology

Sampel preparation

The mixture of barley, milk and dates samples were dried using dehydrator and milled using Waring Laboratory Blender (Waring W-MX1100XTX). The basic ingredients of the ITD are described in Table 1. The samples were labelled as CT (Commercial Talbina); ITD produced from commercial pearl barley, HT (Hulled Talbina); ITD produced from hulled barley, and PT (Hull-less Talbina); ITD produced from hull-less barley). CT was used as control throughout this research study. The hulled barley and hull-less barley were purchased from a barley supplier in Mersing, Johor were grounded to powder using). Meanwhile, the commercial pearl Talbina

(Al-Azhar brand) was purchased online. All samples were sieved through standard size which was 60-mesh sieve prior to the production. The prepared formulation (HT, PT and CT) were kept in refrigerator at temperature (10 ℃) until further analysis.

Table 1. Basic Ingredients of ITD

Ingredients	Treatments		
	CT	HT	PT
Hulled Barley	0 g	10 g	0 g
Pearl Barley	0 g	0 g	10 g
Control Barley	10 g	0 g	0 g
Cow's milk	10 g	10 g	10 g
Date's flesh	10 g	10 g	10 g
Water	200 g	200 g	200 g

Abbreviation: CT; Commercial Pearl Talbina, HT; Hulled Talbina, PT; Hull-less Talbina. For production of ITD in solid form, the water is removed through dehydration. Meanwhile, to produce ITD syrup (liquid form), 100 mL of hot water need to be added in 10 g of solid sample.

Preparation of Instant Talbina Drink Powder

Fig. 1 indicated the steps involved throughout the ITD sample preparation. Pre-treatment was the first step in ITD preparation in which washing and drying process were included. This is to make sure that the barley seeds were in clean and hygiene condition prior to the next preparation process. The barley seeds were washed with running tap water followed by drying process using dehydrator at 55 °C for 24 h. Firstly, the remaining 100 mL was boiled until reach 75±5 °C. Then, the barley powder, milk powder and dates syrup were added into the pre-boiled water. The mixture was continuously stirred for 10 min until reached a homogenized solution. The solution was subjected to drying process using dehydrator at 135 °C for 24 h. The sample was milled into powder and sieved using 60-mm sieve after has been dried. The above steps were repeated using other selected kinds of barley. ITD was served and ready for quality characteristics observations (the proximate, shelf life and organoleptic properties) using appropriate standard methods. Prior to analysis, the powdered ITD samples were placed at room temperature for 30 minutes. The analytical methods were carried out in triplicate for HT and PT which standardize with the control sample, CT. The experiments were carried out for 1, 5, 9 days after preparation.

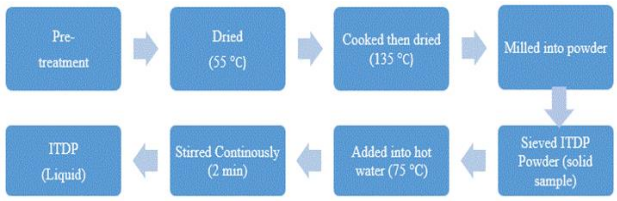

Fig. 1. ITD Sample Preparation Steps

Proximate Analysis

All the proximate analyses (protein, ash, crude fiber, lipid and carbohydrate) of the prepared samples were determined according to the Association of Official Analytical Chemists (AOAC, 2006).

Storage Time and Shelf Life

Shelf life for ITD using selected barley cultivars were studied using the previous method by Kamaljit et al. (2011) with some modifications. Each of the sample was analysed for apparent spoilage by visual observation for colour changes due to the mold growth under two conditions: room temperature (25 °C) and refrigerated temperature (4 °C) conditions. The observation was held at day 1 and 9.

Sensory Evaluation

Sensory evaluation was conducted on a nine-point hedonic scale to evaluate the overall acceptability of the different barley based in ITD samples. The sensory evaluation was done by 70 untrained panelists within the age group 20 to 30 years comprising of professionals, laboratories staffs and students of Faculty Science and Technology, Islamic Science of University Malaysia. The sensory attributes included appearance, colour, texture, aroma, taste, and overall acceptability (Gupta et al., 2011).

Statistical Analysis

Each measurement was conducted in triplicate except for sensory evaluation. The result was analysed using Minitab Statistical Analysis Software v.19®. Data was presented as mean values of three replicates and standard deviation which was subjected to One-way analysis of variance (ANOVA). For comparison of means, Tukey multiple comparisons test was used, and statistically significant difference will be determined at $p<0.05$ (Jauharah et al., 2014). Paired t-test was also used according to (Wolever and Jenkins, 1986) to assess the significant differences between ITDs.

Result & Discussion

Quality Characteristics

ITD was prepared by adding the mixed powder into a hot cup of water at temperature 70 ± 5°C. The mixture was continuously stirred for 2 min during preparation until a homogenized solution is formed. Then, its physicochemical changes were observed throughout the process. The quality of the samples obtained from different types of barley were affected by their different compositions and physical characteristics. In this study, the ITD which were produced from different kinds of barley; commercial pearl, hulled and hull-less barley were subjected to the analytical measurement for selecting the best ITD for commercialization purpose. The obtained ITD (without sieving) from commercial pearl, hulled and hull-less barley are illustrated in Figure 2 respectively.

Fig. 2. ITD Supplemented with Commercial Pearl Barley (CT), Hulled Barley (HT) and Hull-Less Barley (PT) (From Left to right)

Nutritional Characteristics

The proximate compositions of ITD samples are summarized in Table 2. The protein content is significantly higher in PT (8.66 %) respectively compared to HT (7.69 %) and CT (8.07 %) respectively. According to Erkan et al. (2006), Similar results were recorded by Erkan et al. (2006), which stated that protein content in hulled barley flour ranged between 8.75 % whereas in hull-less barley it recorded the highest percent 10.64 %. Hull-less barley has higher protein content than hulled barley (Šimić et al., 2021). Likewise, the whole kernels protein content was significantly higher in hull-less barley (12.9 % - 16.7 %) than in hulled barley (10.3 % - 13.6 %) (Sastry and Tummuru, 1985). As a result of thermal processing such as cooking, drying, and milling, most of the protein content in the samples has been denatured thus exhibited lower protein concentration compared to the concentration in the raw barley or flour.

The lipid content from HT had the highest value on dry weight basis (2.13 %) followed by CT (2.01 %) and PT (1.98 %). However, the differences among the samples were not significant. As eloquently mentioned by Youssef et al. (2013) in the previous study, the raw hulled barley content is 2.70 % while the raw hull-less is 2.90 %. Besides, fat content ranged between 1.61 % in hulled barley flour and 2.4 % in hull-less barley flour as reported by Saquib Hussain (2020). Likewise, the decreased in lipid content as mentioned by El-Gellel et al. (2016) was due to the activity of lipases during soaking. Move on, the values for crude fiber contents differ significantly, in which HT he highest content of crude fiber (2.46 %) while PT has the lowest values for fiber content (1.26 %). Lower contents of fiber were due the removal of outer layers, which eventually will reduce the contents of insoluble fiber. The crude fiber content has relatively similar result with the previous study which is higher in the hulled barley and lower in the hull-less barley in which the hull-less barley had more digestible energy than the hulled cultivars (Wang and Fields, 1978; Mahfood Ali and Farouk Abdelsalam, 2020).

From the table, the ash contents were considerably different in which HT exhibits the highest values of ash (2.46 %) followed by PT (2.33 %) and CT (1.81 %). Theoretically, the higher ash content depends on the presence of edible hull where HT is the most likely to possess the larger amount of hull due to its processing method. Significant amount of ash content in hulled barley (2.24% - 2.55 %) was recorded than in hull-less barley (1.49 % - 1.87 %) (Sastry and Tummuru, 1985). In contrast, Erkan et al. (2006) showed that ash content was higher in hull-less barley (1.31 %) than hulled barley (0.86 % - 1.03 %). Among all the treatments, CT significantly recorded the highest amount the carbohydrate content 78.35 % whereas HT and PT were not differing much, 77.10 % and 76.57 % respectively. The low amount of carbohydrate in PT was due to the barley grain has been ‘polished or pearled’ resulted in the increases of starch and β-glucan content. In terms of caloric value, high intakes of caloric value were represented by CT which is higher than the other samples but did not differ much. A total caloric per 100 g of CT is 363.5 kcal, HT is 358.33 kcal and PT is 359.01 kcal; were calculated in general Eq. (1) as follows:

(4 x crude protein) + (9 x lipid) + (4 x carbohydrate)

Table 2. Proximate Compositions of ITD

Proximate Composition	Treatments / 100 g sample		
	CT	HT	PT
Moisture (%)	8.05±0.14[b]	8.16±0.9[b]	9.17±0.35[a]
Crude Protein (%)	8.07±0.01[b]	7.69±0.01[c]	8.66±0.01[a]
Lipid (%)	1.98±0.29[a]	2.13±0.17[a]	2.01±0.27[a]
Crude Fiber (%)	1.74±0.81[ab]	2.46±0.41[a]	1.26±0.81[b]
Ash (%)	1.81±0.03[c]	2.46±0.03[a]	2.33±0.04[b]
Carbohydrate (%)	78.35±0.85[a]	77.10±0.66[b]	76.57±0.72[b]
Caloric Value (Kcal)	363.5	358.33	359.01

Means values with the same superscript letter within the same row do not differ significantly (p>0.05). Abbreviation: CT; Commercial Pearl Talbina, HT; Hulled Talbina, PT; Hull-less Talbina.

Storage Time and Shelf Life

Spoilage of ITD caused by the growing of mold was observed during storage study. ITD was categorized as highly stable foods. After packing in an airtight container, ITDs were stored under room (25 ℃) and refrigerated temperature (10 ℃) conditions. According to Table 3, it was found that under refrigerated conditions, no spoilage was observed for all the samples up to twentieth days of storage. Meanwhile, on twentieth days of storage in room temperature, PT showed changes in colour and produced a sticky texture. On thirtieth day of storage, all samples showed positive contamination and spoilage. The shelf life of the whole sample powders was high due to the lower water activity, moisture as well as thermal processing during preparation. Thermal processing will reduce or eliminate microbes and extend the shelf life of the microbes. However, PT has lower shelf life compared to CT and HT due to the higher availability of water activity thus produced an optimum condition for the mold to grow faster. The samples exhibited an inversed relationship between temperature and shelf life. The lower shelf life of the samples depends on the higher stored room temperature.

Table 3. Visual Observation of ITD Spoilage

Treatments	Days							
	1		10		20		30	
	RT	FT	RT	FT	RT	FT	RT	FT
CT	-	-	-	-	-	-	+	-
HT	-	-	-	-	-	-	+	-
PT	-	-	-	-	+	-	+	-

RT: Room temperature at which ITDs were stored for visual spoilage observations, FT: Refrigerated temperature at which ITDs were stored for visual spoilage observations. Abbreviation: CT; Commercial Pearl Talbina, HT; Hulled Talbina, Hull-less Talbina

Sensorial and Organoleptic Characteristics

Sensory panel evaluation is a crucial test to indicate level preferences of the potential consumers. The mean scores on sensory characteristics of the ITD obtained from different types of barley are presented in Table 4. The results indicated that there were no significant differences in the ITD prepared from CT, HT, and PT for the whole sensory attributes. However, ITD obtained from commercial barley and hulled type barley impaired all sensory characteristics of ITD, which scores for HT decreased from 5.98 – 5.68 (appearance), 6.34 – 6.16 (colour), 5.94 – 5.26 (texture), 5.96 to 5.50 (aroma), 5.82 to 5.24 (taste), 6.16 – 5.60 (overall acceptability). Similarly, the results showed by the CT decreased from 5.98 – 5.86 (appearance), 6.34 – 6.22 (colour), 5.94 – 5.54 (texture), 5.96 to 5.50 (aroma), 5.82 to 5.34 (taste), 6.16 – 5.64 (overall acceptability). From the table, it could be observed that PT has the highest scores for hedonic preference followed by CT and HT. Hence, it could be proposed that PT was found to be the best formulation for further potential commercialization in the market.

Paradoxically, the development of texture, creaminess, mouthfeel as well as overall sensations of lubricity in dairy-based product depend on the interactions of fat content with other ingredients. In corresponding to texture attribute, HT recorded the lowest score which might be caused by the disruption of the fat globule network due to the present of husk. This matter could seriously impact flavour and texture of the samples. The enhancement of texture and body of the ITD supplemented with CT and PT may be related to the lower content of crude fiber. Adding B-glucan into the formulation could assist in stabilizing and improving the texture (Abdel and Awad, 2015). However, this study is limited to the discovery of the B-glucan and should be vexed out further.

Table 4. Mean Scores for Hedonic Test of ITD Prepared with Different Types of Barley

Attributes	CT	HT	PT
Appearance	5.86	5.68	5.98
Colour	6.22	6.16	6.34
Texture	5.54	5.26	5.94
Aroma	5.5	5.5	5.96
Taste	5.34	5.24	5.82
Overall Acceptance	5.64	5.6	6.16
Rank	II	III	I

Note: Mean scores of 70 panelists; Sensory scores were based on 9-point scale, where 9= highly acceptable, 1= poorly acceptable. Abbreviation: CT; Commercial Pearl Talbina, HT; Hulled Talbina, Hull-less Talbina

Conclusion and Recommendation

In a nutshell, this study revealed that ITD supplemented with hull-less barley (PT) is the best compared to the ITD supplemented with commercial pearl barley (CT) and hulled barley (HT). ITD produced from hull-less barley, PT exhibits significant difference in term of protein content and has better quality of sensory attributes. Hull-less barley which requires little or no effort to remove the hull during threshing or processing would be more suitable for human food processing than hulled barley. Moreover, hull-less barley is said to have more digestible energy than hulled barley (Wang and Fields, 1978). Therefore, PT which possess the highest quality attributes among the samples should be taken into consideration for commercialization purpose in Malaysia. A systematic review on various aspects of barley in the fight against Covid-19 as a sustainable crop warrant further exploration.

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