International Journal of Pharmaceutical Science Invention
ISSN (Online): 2319 – 6718, ISSN (Print): 2319 – 670X
www.ijpsi.org Volume 6 Issue 9 ǁ Septembre 2017 ǁ PP. 52-55

Comparative Study of the Nutritive Values and Acceptability of Different Types of Bhatura in India

Priyanka Sharma[1*], Ranjana Nagar[2], Rasmeet Kaur[3]
[1]*College Education, Rajasthan, India*
[2]*Rajasthan University Jaipur, Rajasthan, India*
[3] *Rajasthan University Jaipur, Rajasthan, India*
Corresponding Author: Priyanka Sharma

ABSTRACT*: The Indian population depends mainly on cereals, pulses and their products for nutrition. All cereals and pulses undergo several processing methods (soaking, malting, germination, fermentation, cooking etc.). Among these fermentation is one of the oldest techniques that improves flavour and digestibility of ingredients for human consumption and enhances keeping quality and shelf life. Therefore, fermented foods like Bhatura, Kulcha, Idli, Dosa, Khaman etc. are becoming popular. It was found that fermentation and cooking both had increased the iron, total soluble sugar, reducing sugar and non reducing sugar content in all types of bhaturas, whereas moisture, starch and phenol content were decreased. No change in calcium and fibre content was observed after processing in all types of bhatura samples. When different types of bhatura were compared in relation to their nutrients ash, fat, calorie, total soluble sugar, non reducing sugar, phenol, and titrable acidity were found to be highest in traditional bhatura as compared to instant and bread bhatura. At the same time instant bhatura was found to have lowest ash, protein, fat, calories, iron, total soluble sugar, phenol, amylase activity and terrible acidity with highest carbohydrate, reducing sugar and starch content when compared to traditional and bread bhatura, Although moisture, iron and amylase activity were found maximum in bread bhatura while starch and carbohydrate were found minimum when a comparison was made with traditional and instant bhatura. Relationship of amylase with reducing sugar and starch in all bhatura samples was also studied and it was observed that as amylase activity was increased starch content was decreased with a simultaneous increase in reducing sugar with processing. On performing the sensory evaluation instant bhatura was found to be the most acceptable following the bread bhatura and traditional bhatura.*

Keywords*: Germination, fermentation, sensory evaluation, starch, reducing sugar*

Date of Submission: 26-10-2017 Date of acceptance: 09-11-2017

I. INTRODUCTION

Diets consumed by a large majority of population in developing countries are based mainly on cereals, legumes, roots, tubers, vegetables and fewer amounts on animal foods like milk, meat, fish and eggs. These diets are in general lacking in protein, certain vitamins (like vitamin A, riboflavin, and folic acid) and minerals (like calcium and iron).Common household processing methods like germination, malting, steaming, roasting, fermentation etc., enhance qualitatively and or quantitatively the nutritive value of food. Among these fermentation is one of the most popular methods since ancient times. All these processes also improve the shelf life of food and its digestibility. Fermentation has been used for several thousand years as an effective and low cost means to preserve the quality and safety of foods.Animal and plant tissues subjected to the action of micro organism or enzymes to give desirable biochemical changes and significant modification of food quality are referred to as fermented foods. According to Steinkraus, (1995) the traditional fermented foods contain high nutritive valued and develop a diversity of flavour, aromas and textures in food substrates. The fermentation can be broadly defined as the process in which the carbohydrate or carbohydrate like compounds are broken down under anaerobic or aerobic conditions (Joshi and Pandey, 1999.) In the fermentation of food a complex mixture of carbohydrate, protein, fats, etc. undergo modifications simultaneously under the action of a variety of micro organism and enzymes present. Thus, the carbohydrate and carbohydrate lke materials undergo "Fermentation", proteinceous material undergo proteolysis or Putrefactive" breakdown and lipids," Lipolytic" breakdown. The nature and extent of these changes depend upon the food, types of micro organism present and condition effecting their growth and metabolic pattern. Fermentation typically refers to the conversion of sugar to alcohol using yeast under anaerobic conditions. The fermentation of monosaccharides by yeast involves glycolytic to the production of pyruvic acid. Yeast then decarboxylases pyruvic acid to acetaldehyde and reduce the latter to ethyl alcohol (West and Todd, 1974). In glycolytic sequence the end product, pyruvic acid either converts to lactic acid by Lactic Acid Dehydrogenase enzyme or converts to acetabldehyde, which further converts either to

acetic acid or ethyl alcohol (West et al, 1974). Lactic acid is a by-product of the fermentation of glucose by lactic acid bacteria with the help of enzyme lactic acid dehydrogenase. Since fermented food constitute an integral part of human diet, evaluation of their nutritional contribution is essential especially the presence of nutrients in the original raw material and fermented products, presence of any toxic compound in fermented product and their significance is also reviewed (Joshi et al, 1999). In the present time fermentation technology is developing very fast. Bhatura, naan, khaman, dosa etc. are the commonest dishes at fast food centres which are cereal and legume based foods prepared by fermentation technology.

The present study has been carried out on Bhaturas cooked by different methods-traditional and instant. Chola-bhatura is a popular breakfast food item of North India. Bhatura is a large puffy fried bread made out of made out of maida (Bleached and refined wheat flour). It is often eaten in combination with chole (spicy chick peas curry) mainly eaten in North India and along with chole seems to be originated in Punjab. It is a snack food sold by vendors on the street and a very common item on the menu of a party.

Bhaturas are fried version of naan. A typical recipe includes white flour, curd and oil. Once kneaded, the dough is left to rise, and then small balls are pluck out of it either hand rolled or flattened using a rolling pin to 12-18 cm in diameter, Then the bread is deep fried until they puff up into a lightly brown, soft puffy bread which is elastic and chewy (V.K. Joshi and Ashok Pandey, 1999) Sour curd is sometimes added to the dough in Bhaturas cooked by traditional method to reduce the fermentation time and consequently influence the microbial profile of the total fermentation process. Instant Bhatura is made by kneading the dough with liquid soda instead of water. Bread Bhaturas are also prepared in Punjabis by making use of white bread for fermentation. Fermentation time also varied with the type of bhaturas from as long as 14 hours to as small as 1 hour. Potato puffies (or potato Bhatura), stuffed bhaturas are other examples of the types of Bhatura eaten in different regions. Three different types of Bhaturas (Traditional, Instant and Bread bhatura) have been included in the study at different stages of preparation for assessing their nutritive value. They also have been evaluated for their acceptability by sensory evaluation. The objective of the study was to analyze the bhatura sample at different stage of preparation for assessment of nutritive value and acceptability.

II. MATERIALS AND METHODS

Fermented foods are those foods produced by the modification of raw material of either animal or vegetables origin by the activities of microorganisms. The production of many fermented foods involves organism that are biochemically fermentative. The effect of fermentation has been studied on three types of bhaturas (Traditional, Instant and Bread Bhatura) at different stages of preparation. For the analysis or nutritive value of bhaturas, different biochemical estimations were carried out in the samples prepared by different methods of cooking and at different stages of preparation. All the Bhatura's are analysed raw, fermented and fried. The bhatura samples were oven dried at 100^0 C to a constant weight. The dried samples were milled and stored in plastic polythene packets and then stored in a dessicator until required for further analysis.The samples were analysed twice and the mean values are reported in the tables under results and discussion. The samples were analysed on the following parameters:

1. Proximal composition
    1. Moisture
    2. Ash
    3. Total nitrogen and crude Protein (NX6.25)
    4. Fat
    5. Available carbohydrate
    6. Total energy
    7. Crude fibre

II. Mineral Content
    8. Calcium
    9. Iron

III. Nutrients soluble in Ethanolic Extract
    10. Total soluble sugars
    11. Reducing sugars
    12. Non reducing sugars
    13. Starch
    14. Phenol (Antinutrient)

IV. Enzyme
    15. Amylase

V. Titrable Acidity

Moisture content was estimated as described in the method of Raghuramulu (1983). Ash content was estimated by the method given in Raghuramulu, (1983). Nitrogen was estimated by the microkjeldhal method of Hawk and Oser, (1965). Fat content was estimated by the method of Raghuramulu, (1983). Fat content of bhatura was estimated by Soxhlet method.Available carbohydrates were estimated by the method given by Gopalan and Rama Shastri ,(1996).

Calorie content was calculated as given in Gopalan et al. (2002).Crude fibre content was estimated by the method of Raghuramulu, (1983). Calcium was estimated by the method of (Hawk and Oser, 1965).Iron was estimated by colorimetry using Wong method (Raghuramulu, 1983). The Phenol sulphuric acid method given by Dubois et al. (1966) was adopted for the detection of total sugars.The supernatant extracted from dried powder was proceeded for estimation of reducing sugar, adopting method of Nelson, (1944).The amount of non-reducing sugars was calculated as the difference between total soluble sugars and reducing sugars. Starch from the sugar free pellet obtained after centrifugation was estimated by method of clegg, (1956).The phenol was analyzed by modified method of Goldstein and Swain, (1963).Estimation was done by diagnostic reagent kit for the in vitro determination of the activity of amylase adopting the method of Street and Close (1956).Titrable acidity was determined as gm of lactic acid per 100ml by the method of Amerine et al, (1967).

ANALYSIS OF ACCEPTABILITY

To measure the acceptability of different types of Bhaturas, sensory evaluation was done.Three methods has been used for sensory evaluation of recipe. Triangle test has been used for selecting panelist. The most commonly used scale for preference testing is a nine point hedonic scale. According to Amerine et al, (1965) its an approach which refer to the psychology of pleasurable and unpleasant state of consumer. Hedonic rating test is used to measure the consumer acceptability of food products. In this samples are served to the panelists and are asked to rate the acceptability of the product on a scale, usually of nine points, ranging from 'like extremely' to ' dislike extremely'. In Composite scoring test rating scale is defined as specific characteristic of a product are rated separately (Srilakshni, 1999). In this test scores are given for various quality characteristics of the sample or product such as colour, flavour, consistency and absence of a sample product (Swaminathan, 1979).

III. RESULTS

The processing of food by fermentation, germination, cooking etc. increases its digestibility, palatability and nutritive value. In general the nutritive value of foods after fermentation has been shown to be higher than their raw counterparts. Therefore, fermented foods are very popular all over the world.'Bhatura' and 'Kulcha' in Punjab, 'Idli' and ''Dosa' in South India, 'Rabadi' in Rajasthan and 'Dhokla' and 'Khaman' in Gujarat are some of the traditionally fermented foods popular in India. Among them Bhatura is not only a traditional food eaten in rural and urban areas of Punjab but also a popular snack all over North India. It is prepared from white wheat flour and often eaten in combination with masala chana (spicy chick pea curry) and is a very famous party snack as well as a very common food sold by vendors on the street. Samples were assessed for their nutritive value (through biochemical estimation) and acceptability through sensory evaluation).For biochemical estimation, following parameters were taken Proximal Composition, Calcium and Iron (Minerals),Nutrients soluble in Ethanolic Extract ,Enzymes,Titrable Acidity .

Effect of processing, it was found that fermentation and cooking both had increased the iron, total soluble sugar, reducing sugar and non reducing sugar content whereas moisture, starch and phenol content were decreased in all types of bhatura. No change was observed in the calcium and fiber content of all the samples. Effect of fermentation, when the nutrients were compared after fermentation, it was observed that the fermentation has brought about a decrease in the moisture, fat, energy, starch and phenol content of all the samples. At the same time, there was a considerable increase in ash, protein, CHO, iron, total soluble sugar, reducing sugar, non reducing sugar, amylase and titrable acidity in the different types of Bhaturas. Effect of cooking, in the cooked samples of all types of Bhatura moisture, CHO, starch and phenol content was found les while an increase in the fat, energy, iron, total soluble sugar, reducing sugar and non reducing sugar content was observed. Traditional Bhatura, when the nutrients of the cooked sample of traditional bhatura were compared with other types it was seen that ash, fat, calorie, total soluble sugar, non reducing sugar, phenol and testable acidity were found to be the highest among all types of Bhatura. At the same time reducing sugar and moisture content were found to be the lowest.Instant Bhatura, in contrast to the traditional bhatura which was found to have the highest amounts of mostly all the nutrients, instant bhatura was found to have lowest ash, protein, fat, calories, iron, total soluble sugar, non reducing sugar, phenol, amylase activity and titrable acidity

However, carbohydrate, to other types of bhatura. In Bread Bhatura moisture, iron and amylase content were found to be the maximum while starch and carbohydrate were found to be minimum in the bread bhatura as compared to rest two types of bhatura.

It was observed that all the samples were acceptable, although instant Bhatura was preferred than other samples and score was given as like very much on Hedonic scale test. During composite score test also, instant bhatura was most acceptable in terms of appearance, taste, texture, flavour, colour and acceptability than other samples. Traditional Bhaturas were preferred less as compared to the rest two types. Traditional Bhatura was found superior in terms of major biochemical parameters, following the bread and instant bhatura whereas instant bhatura as found lowest in fat and calorie content with highest acceptability. Moreover, it is less time consuming in its preparation.

A Summarized table for different biochemical estimations carried out in different types of Bhatura samples is as follows:

Table: Summary Table for Biochemical Parameters

S.No.	Nutrients	Traditional Bhatura			Instant Bhatura			Bread Bhatura		
		Raw	Fermented sample	Cooked sample	Raw	Fermented sample	Cooked sample	Raw	Fermented sample	Cooked sample
1	Moisture (g)	8.8	6.1	2.2	9.6	8.5	5.5	10.5	9.6	8.6
2	Ash (g)	1.3	2.2	2.2	0.6	0.7	0.6	0.8	1.0	1.0
3	Crude Protein (g)	10.9	12.5	11.7	10.9	11.2	10.2	12.5	12.96	11.72
4	Fat content (g)	5.6	1.7	22.9	2.9	0.1	7.1	1.1	0.5	20.3
5	Available CHO (g)	75.87	76.5	57.68	75.67	79.15	76.34	74.65	76.84	57.38
6	Energy (kcal)	397.6	371.3	483.7	.372.5	362.5	409.9	363.7	358.5	459.08
7	Fibre (g)	0.2	0.3	0.2	0.3	0.3	0.3	0.25	0.3	0.3
8	Calcium (mg)	600	600	600	600	600	600	600	600	600
9	Iron (mg)	0.5	2.5	7.5	3.3	4.00	4.0	2.5	6.5	8.0
10	total soluble sugar (g)0.96	2.93	3.83	3.92	2.32	2.66	2.66	2.32	3.01	3.52
11	R2.93educing 56.4sugar (m81g)	0.96	3.84	5.27	5.89	10.85	10.85	2.88	7.55	9.34
12	Non reducing sugar (g)	.93	3.83	3.91	2.31	2.65	2.65	2.32	3.00	3.51
13	Starch (mg)	56.4	35.0	3-.2	40.5	31.2	31.2	20.4	16.8	15.5
14	Phenol (mg)	81	75.6	7-.1	58.0	20.6	2-.6	48.7	32.0	27.2
15	Amylase activity (units)	798	840.3	-	0	-	-	413.6	927.7	-
16	Titrable acidity (g)	0.055	0.135	0.135	0.044	0.036	0.036	0.029	0.042	0.042

All the above nutrients are in 100 g dry weight basis except enzymes and titrable acidity. These were estimated in fresh bhatura samples.

REFERENCES

[1]. Amerine MA, Pangram RA & Cruess WV (1967):The technology of wine making. The AVI Pub. Comp. Westport CT.
[2]. Clegg KM(1956) : The application of anthorne reagent to the estimation of starch in cereals. J. Food Sci. Agric.,7:40.
[3]. Dubois M,Gillus KM, Hamilton JK, Rebers PA and Smith F(1966): A Colorimetric method for determination of sugars and related substances. Anal Chem, 28,350-356.
[4]. Goldstein and Swain (1963): Change in tannins in ripening fruits. Phytochemistry, ,371-381.
[5]. Gopalan C, Ramashastri BV and Balasubramian SC (2002):Nutritive value of Indian Food. Hyderabad; NIN, Revised edition;27-28.
[6]. Hawk and Oser (1965) : Practical Psychological Chemistry.14th edition ,1214.
[7]. Joshi VK and Pandey A.(1999):Biotechnology; Food fermentation in Biotechnology,; Food fermentation ,microbiology ,biochemistry and technology, Joshi VK and Pandey A (eds) Basic educational Pub. And Distribution ,New Delhi, Vol II, 1-24.
[8]. Nelson NJ (1944): A photoelectric adaptation of the samyogi method for the determination of the glucose. J.Biol Chem.153,375-380.
[9]. Raghuramulu N,Madhavan K, Nair, kalyansunduram S (1983): A manual of laboratory techniques.NIN,Hyderabad, 55-57,183
[10]. Srilakshmi B (1999): Food Science New Age International (P). Ltd., New Delhi.
[11]. Steinkraus K H (1994): Nutritional significance of fermented foods.Food Research International,27:259.
[12]. Street HV and Close SR (1956) :Clin Chem, Acta I.
[13]. Swaminathan M (1979):Food sciences and experiment food. Ganesh and Company, Madaras, 294.
[14]. Westes, ToddWR, Masson HS. An Bruggen JTV (1974): Text book of biochemistry. Edition 4th, Oxford and Publishing Co. Ltd., 1174-1175.

International Journal of Pharmaceutical Science Invention (IJPSI) is UGC approved Journal with Sl. No. 4098, Journal no. 44583.

Priyanka Sharma Comparative Study of the Nutritive Values and Acceptability of Different Types of Bhatura in India." International Journal of Pharmaceutical Science Invention(IJPSI), vol. 6, no. 9, 2017, pp. 52-55.