



ORIGINAL ARTICLE

Determine the Quality of Bread Samples Used in Qazvin, Iran

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ABSTRACT: In most societies, rich and important source of food considered bread. Some bakeries using sodium bicarbonate as baking soda and extra salt in bread production that his chemical compounds has adverse effects on the public health. That's why in this study we decided to evaluation of produced bread in Qazvin province in terms of sodium bicarbonate and salt. Assessment of pH and salt take place according to Institute of Standards and Industrial Research of Iran (IRIS). Our Results demonstrated the mean±SD of pH for sangak, lavash, taftun, barbari and baguette 5.95±0.37, 5.76±0.54, 5.80±0.71, 6.10±0.68 and 7.86±1.26 respectively, and the mean±SD of salt 1.10±0.47, 1.41±0.57, 1.45±0.36, 1.40±0.32 and 1.55±1.09 respectively and the results demonstrated the value of pH and salt in the samples 65.77% (98 out of 149) and 12.75% (130 out of 149) respectively, out of standard range. Baking Soda in sangak breads and salt in baguette breads, more common of other breads. Although the Ministry of Health has banned officially the use of baking soda in breads production process, but demonstrated in this study baking soda and extra salt used in the process of breads production. Thus require more supervision and training on the non-use of sodium bicarbonate for bakers its necessary.

INTRODUCTION

The main ingredients of bread include wheat flour, water, salt, yeast or sourdough that must be mixed complying with Iranian Standards [1].

Other ingredients include milk, egg, sugar, spice, fruits, vegetables, nuts and seeds that the amount of they depends on the type of bread [2].

The most important production of wheat is bread that the staple food considered in many countries of the

world and daily basis significant proportion of the energy, protein, minerals and vitamins provide your body needs. Bread is a staple in the Iranian diet as far as any person in Qazvin Province 7/200 kg per month consumption of bread so the main food for energy and protein intake in daily is bread [3].

One of the frequently-consumed foods in most countries is bread so evaluation bread quality has an important

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role in public health. Thus in this study we decided to evaluating quality of all type bread produce in Qazvin province, Iran [4-6].

Bread is one of the important sources for micronutrients such as iron for the body and it can be provided 10% of the iron needed by the body [7, 8] and also bakery products are important sources of fiber [9].

For manufacturing bread with good-looking, dough should be elastic and porous uniform. Bread crusts should be golden brown, crisp and chewable. Quality and amount of bread ingredients can affect the color, crisp and chewable characteristics [10].

In the Iran some bakeries due to reduced fermentation time used of chemicals and harmful additives that are dangerous for health of consumers. One of these dangerous additives is sodium bicarbonate [11].

Reasons for the use of sodium bicarbonate in bakeries can be indicated to save time and rapid dough preparation, workers impatience, lack of skills of workers and lack of knowledge bakery workers of the risks use of sodium bicarbonate. Baking soda (sodium bicarbonate) used as a leavening agent for the dough in bakeries due to sodium bicarbonate in contact with water produces heat and carbon dioxide that causing leavening bread. A portion of sodium bicarbonate turns into sodium carbonate, which remains heat-resistant and remains in the bread and creates an unpleasant taste. Sodium bicarbonate causes anemia, increased absorption of heavy metals such as lead, cadmium, mercury, impaired absorption of iron, zinc, calcium, osteoporosis, heart disease and vascular especially in children and women, cause or aggravate seizures in children, weakness rational, fatigue, trembling hands, disable vitamins, avoid the fermentation process due to increased pH, disruption in digestive enzyme activities and in resulting lack of digest food causing cramps in the stomach and bloating, and lead to diseases of the stomach and intestines. As well as reduces the flavor of bread and bakery waste is increasing [12-15].

Phytic acid is the most important phosphor composition in wheat that can be combined with calcium found in other foods and create insoluble calcium phytate and disturbances in absorption of calcium food products [8]. Phytic acid can be reacted with two or polyvalent minerals (such as zinc and iron) material obtained from this reaction non-digestible in the digestive tract so this reaction is important in terms of diet [16-19].

Phytase enzymes degrading phytic acid exist in bacteria, yeasts and fungi [20, 21]. Microbes found in yeast and bread dough in relatively weak acidic conditions (pH=4/5 to 5/5) are optimal growth and proliferation. Under these conditions, 70% of phytic acid in the flour destroyed and phytase enzyme activity is provided. As a result, materials such as alcohols, ketones, carbon dioxide and organic material aromatic produced and taste and actual flavor and aroma created in the bread. In generally conditions necessary for the absorption of minerals, vitamins, antioxidants and micronutrients provided and preventing human exposure to diseases associated with nutritional deficiencies [20, 22, and 23]. Iran's health ministry banned the use of sodium bicarbonate in the bread in 20/3/2002 [24].

Two types of sangak breads exist in Qazvin bakeries include without sesame and with sesame. Sangak bread with sesame is more expensive than (about 30 to 50%) without sesame [25].

One other type of bread is taftun. Before the baking process, the baker makes dimples all over the dough with fingertips or a metal jagged blade. Piercing the dough results in production of homogenous bread. Also, excessive puffing will be prevented [25].

Barbari can be used with all types of foods. The staling process results in a very hard and dry texture and the bread can only be used with watery and soupy foods. Three types of barbari bread exist in Qazvin bakeries include soft without sesame, crispy with sesame and crispy without sesame [25].

Due to low thickness of different types of lavash, it is not correct to use this bread in watery and soupy foods. Three types of lavash breads exist in Qazvin bakeries include soft, crispy and very thin and crispy (this type of lavash will be dried quickly). The shelf-life of dried bread is several weeks. If lavash is put into plastic bags, not only will the bread not be dried, but also a pasty and very soft texture will be achieved [25].

Some types of common breads in Qazvin bakeries include 1. Barley bread: this is barley-based bread. Although barley is cheaper than wheat in Iran, barley bread is more expensive than wheat bread due to low production of barley breads in the bakeries. 2. Vegetables bread: the required vegetables for preparation of this bread often include parsley, dill and tarragon. 3. Sandwich bread: this is similar to baguette bread. 4. Shirmal bread: this bread alone or accompanying butter or milk can be used as a full meal. Baguette breads that evaluations in this study include 3 and 4 [25].

MATERIALS AND METHODS

Studied area

In this cross-sectional study take place in 2015 to 2016. At total 149 samples of various bread (including 26 sangak, 58 lavash, 14 taftun, 31 barbari and 20 fant baguette ezy breads) were randomly collected from local bakeries in different parts of Qazvin province.

Sampling method

The samples were collected in polyethylene bags and transferred to the food quality control laboratory of Food and Drug Administration Qazvin province for analysis according to institute of standards and industrial research of Iran No.2628 [1].

Sample preparation and chemical analysis

Assessment of pH

To determine the level of pH, 10 g of homogenized sample was weighted in a 250 cc flask and then 90 cc of neutral distilled water was added and shaken for 15 min alternatively. Then, its pH was measured by digital pH meter (Mettler MP 220, Switzerland) [1].

Salt Evaluation

In order to determine the amount of salt in the sample, first the samples were hydrated, ground and then 1g of them was weighted and taken. Then ground samples were poured into a 250 cc flask; then, 10 cc of 0.1 N silver nitrate and 10 cc of concentrated nitric acid were added and the mixtures were boiled. Next, 5 cc of saturated potassium permanganate solution was added to the boiling solution until it became colorless. When the solution was cooled, 100 cc water and 5 cc ferric ammonium sulfate were added and it was titrated by 0.1N ammonium thiocyanate solution until its brownish red color disappeared and became stable for 15 s. Salt quantity was obtained from the following formula [1]:

Salt (%) = (amount of silver nitrate (0.1 N) – amount of ammonium thiocyanate (0.1 N)) × 0.585

STATISTICAL ANALYSIS

Mean value obtained from three replications of each experiment was reported as mean±SD. The collected data were analyzed using by software SPSS 19.

RESULTS

In two below table reported the amount of pH and quantity of salt in samples breads collected from local bakeries in different parts of Qazvin, Iran.

Table 1. Status pH of different bread types in Qazvin province

Bread type	N	Min	Max	Mean	SD	L-IRSI*	Number in standard range	Percent of non-standard range (%)
Lavash	58	4.30	6.71	5.76a**	0.54	5 to 6	25	56.89
Barbari	31	4.10	7.46	6.10b**	0.68	5 to 6	9	70.96
Sangak	26	5.27	6.84	5.95 ^a	0.37	4.6 to 5.6	4	92.30
Baguette	20	5.45	9.47	7.86 ^{c**}	1.26	5 to 6	4	80
Taftun	14	4.89	7.50	5.80 ^a	0.71	5 to 6	9	42.85

*Limits in Institute of Standards and Industrial Research of Iran

**Means in the same column with different letters are significantly different (P<0.05)

Table 2. Status salt content (%) of different bread types in Qazvin province

Bread type	N	Min	Max	Mean	SD	L-IRSI	Number in standard range	Percent of non-standard range (%)
Lavash	58	0.29	3.20	1.41 ^a	0.57	2<	50	13.79
Barbari	31	0.93	2.34	1.40 ^a	0.32	2<	29	6.45
Sangak	26	0.11	1.86	1.10 ^b	0.47	2<	26	0
Baguette	20	0.62	4.32	1.55 ^a	1.09	2<	12	40
Taftun	14	0.97	2.10	1.45 ^a	0.36	2<	13	7.14

Means in the same column with different letters are significantly different (P<0.05).

DISCUSSION

Table 1 presents the minimum, maximum and mean±SD for pH status of different bread types in Qazvin, Iran. In our study obtained the amount of pH in sangak, lavash, taftun, barbari and baguette 7.7% (4 out of 26), 43.11% (25 out of 58), 57.15% (9 out of 14), 70.96% (9 out of 31) and 20% (4 out of 20) respectively, in the accept limit. The accept limit of pH according to Institute of Standards and Industrial Research of Iran No. 2826 for sangak is 4.6 to 5.6 and for lavash, taftun and baguette is 5 to 6 [1]. According to this range, the highest amount of standard range observed in taftun and the highest amount of non-standard range observed in sangak. The most important reason for increasing the level of sodium bicarbonate in sangak breads can be expressed using by strong flour (high protein) in the production of sangak bread. Strong flour will make the baking process harder and more difficult. Thus for softening dough and improved fermentation process using excess amounts of sodium bicarbonate.

Table 2 presents the minimum, maximum and mean±SD for salt status of different bread types in Qazvin, Iran. Our study obtained the amount of salt in sangak, lavash, taftun, barbari and baguette 100% (26 out of 26), 86.21% (50 out of 58), 92.86% (13 out of 14), 93.55% (29 out of 31) and 60% (12 out of 20) respectively, in the accept limit. The maximum acceptable of salt according to Institute of Standards and Industrial Research of Iran No. 2826 for all types of breads (include sangak, lavash, taftun, barbari and baguette) are less than 2 [1]. According to table 2 the highest value of non-standard range observed in baguette breads and the highest value of standard range observed in sangak breads. In total results demonstrated status for pH and salt of the samples 34.22% (51 out of 149) and 87.24% (130 out of 149) respectively, in the standard range. As can be observation from the results which the highest amount of non-accept limit in breads related to pH and the highest amount of accept limit in breads related to salt.

In most societies, the rich and important source of food considered bread. Population growth has led to increase in demand for bread, that's why bakers begins to use chemicals compounds for reduce fermentation time. This chemical has adverse effects on the public health. Some bakeries are using sodium bicarbonate as baking soda and extra salt in bread production.

In study by Paseban (2005) indicated 75.50% of bakeries in Eslamshahr city, Iran using of sodium bicarbonate. Our results less than this study which indicates the breads quality in our study area was relatively good [3].

In other study mentioned the amount of non-accept limit for pH and salt 8.50% and 64.50% respectively, that the amount of pH in contrasted with our results and salt quantity was matched with our results [26].

In study take place in Kerman province, Iran reported the value of salt and pH in different types of breads. It showed that sodium bicarbonate was widely used, and only 24.20% of the bakery was in hygienic conditions. These results were consistent with our study. [27].

In a study by Kamani et al. (2008) demonstrated 65.77% of all samples had higher than accept limit in terms of use sodium bicarbonate and obtained 82 bakeries (37.30%) produce breads by adding sodium bicarbonate. This results was less than our study [28].

In a study conducted in Zabol city, Iran reported, 67.36% the value of pH the samples were more than 6. The highest pH observed in taftun breads 73.97% (19 out of 54) while in our study the highest pH observed in sangak breads 92.30% (22 out of 26) and in this study 30.52% (29 out of 95) the value of salt the samples more than the accept limit while in our study 12.75% (130 out of 146) observed in more than the accept limit [29].

The average salt in the breads produced in Mashhad province, Iran was obtained 1.95 g per 100 g [30] and the average salt in the breads produced in Isfahan province, Iran was obtained 2.66g per 100g. According to

these results Mashhad less than standard range and in Isfahan, more than standard range [31].

In a study conducted in Zanjan province, Iran the most frequent using of sodium bicarbonate in breads observed in barbari (55.80%) and lavash (28.50%), but in our study the most frequent using of sodium bicarbonate in breads observed in sangak (92.30%) and baguette (80%) [32].

In a study by Malakootian and Dolatshahi (2005) [12] evaluated of salt and sodium bicarbonate in Jiroft city, Iran. The reported demonstrated the mean of pH in taftun, baguette and sangak breads 5.78. This result less than our result (i.e. 6.29) and also reported the amount of salt in all type breads 2.38 that more than our result (i.e. 1.38). In total our study compared with this study indicated the value of pH approximately matched and salt quantity unmatched.

In a study take place Kurdistan province, Iran by Zabi-hollahi et al. (2013) evaluated the amount of salt and sodium bicarbonate in bakeries [33]. They reported the mean±SD of pH and salt in all type breads (include sangak, lavash and barbari) 6.01±0.32 and 2.19±0.26 respectively. In these study the amount of pH and salt were approximately in accept limit. The amount of pH was in contrast with our results and the salt quantity was more than our results.

In most cases, bakeries use baking soda rather than yeast. Due to the rapid preparation dough and also save time. The results of this study indicated that sangak breads have a high content of sodium bicarbonate than other types of breads.

In a study by Khamirchi and Tavana (2008) [34] the amount of salt was reported 24±2.07, the amount of salt was higher than our findings. In some studies the amount of salt has been reported according to our results [35-37].

In a study conducted in Zahedan province, Iran reported the mean±SD of pH 5.93±0.34 and the highest amount of pH observed in lavash and lowest amount of pH

observed in sangak. This reported of pH less than our study [38].

According to results obtained in various study, in most cases were matched our study. These results in various study demonstrated the absence of the similar guidelines for the production of different types of bread, as well as lack of supervision and training systems continued to be felt. Thus The difference in the various studies, it can be justified.

CONCLUSIONS

According to these results, the main results obtained from this study follow as:

The precision of the limit for the use of salt in the sample population was high, while the precision of the limit for using the baking soda was low. The results of this study and other studies indicated that the use of baking soda illegally in the preparation of breads, especially baguette bakery, despite losses of baking soda and announced ban on its use in bread production by Ministry of Health, health authorities and other agencies responsible for the control and removal of its use have not been successful.

To reduce the amount of sodium bicarbonate in the bread, it can be achieved by training, supervision and continuous monitoring bakeries helped to enhance the quality of bread and also distribute similar instructions for the production of identical breads in different bakeries. In addition to producing high quality breads and help to remove other unauthorized additive production process bread.

At the end, suggested in the epidemiological study, monitored relationship between per capita consumption of sodium bicarbonate with the prevalence of gastrointestinal diseases, especially gastric cancer due by increasing the gastric pH with consume sodium bicarbonate, it can be impose adverse effects on public health.

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Conflict of interests

The authors declare that there is no conflict of interests.

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