COMPARATIVE STUDY ON PHYSICO-CHEMICAL AND SENSORY EVALUATION OF SOME BAKERY PRODUCTS MARKETED AT HYDERABAD

Mehar Dil Abro
Agriculture Extension Nasirabad ,Balochistan
Email: *mehrabro@gmail.com*
Cell# 03003708206
Tahseen Fatima Miano
Institute Of Food Sciences And Technology, Sindh Agriculture University Tando Jam Pakistan
Email: tahseenfm@yahoo.com
Cell# 00923323998173

ABSTRACT: *The present study was conducted to study the physico-chemical and sensory characteristics varied considerably bakery to bakery . Average weight of Bombay bakery (11.82g) per biscuit of v/s Panna Cassata bakery (11.03g) and diameter of per biscuits of Bombay bakery (5.50cm) v/s Khanzada bakery (5.40cm) of per biscuit recorded relatively similar (P > 0.05) , but significantly higher (P > 0.05) from that of Khanzada bakery (10.29g) and Arman bakery (9.28g) in term of weight and Panna Cassata bakery (5.13cm) and Arman bakery (4.53cm) in term of diameter respectively . Bombay bakery biscuits (6.87) and Panna Cassata (5.95) biscuits found similarly in pH values and appeared more (P < 0.05) intense with hydrogen ions compared to that of Arman bakery Hyderabad (6.96) and Khanzada bakery (7.49) biscuits . Protein and Total solids content of Panna Cassata bakery Hyderabad (24.49% and 98.58%) , responding and carbohydrates (54.30%) and moisture content (2.84%) of Bombay bakery biscuits recorded although high, but not varied significantly (P > 0.05) from the biscuits of other bakeries examined in the present study . Fat content of biscuits of Bombay bakery Hyderabad (16.33%) and Panna Cassata bakery (19.16%) found respectively similar (P > 0.05) and comparatively low from that of Arman bakery (26.16%) and Khanzada Bakery (29.31%) biscuits . Ash content of Bombay bakery (2.33%) , Arman bakery (3.0%) , and Khanzada bakery (1.33%) biscuits observed relatively similar (P > 0.05) and appeared significantly (P > 0.05) high from that of Panna Cassata bakery biscuits (1.25%) . Biscuits of Bombay bakery perceived comparatively (P <0.05) better score in all the sensory characteristics like color , flavor , taste and texture (8.92 , 7.66 , 8.20 and 7.06 each of from total score of 10 respectively .*

KEYWORDS: Biscuits, Bakery quality, physicochemical, sensory properties.

INTRODUCTION

Baked goods have been prepared around for centuries. People loved baked goods and demand for them often for important occasion such as feast and weddings etc. Due to the fame and desire that the art of baking well-known, nearby 300 BC, baking was familiar as a business and well-thought-of occupation for Romans. The bakers initiated to formulate bread at home in an oven, using grinders to grind grain into the flour for their breads. Though, the looming request for baked goods energetically non-stop and the first baker's association was established in 168 BC in Rome. This drastic appeal for baked goods promoted baking completely through Europe and prolonged into the eastern parts of Asia [10]. The bakery industry are one of the largest organized food industries all over the world and particularly biscuits are one of the most popular products because it is economically cheaper as well as consider to be luxurious gifts for infants and school going children who are under weight. [13]. Biscuit is a term used for a variety of baked, usually flour-based food products . The word be concern to two distinctive products such as biscuits and cookies . Biscuits today can be savory or sweet, but most are small at around 5 cm (2.0 inch) in width and flat[9] . There are various biscuits prepared such as sandwich-type biscuits , in which a layer of cream otherwise icing is sandwich among two biscuits such as the custard sweetened cream or a layer of jam . Sweet biscuits are generally eaten as a bite food and are in common , prepared by means of wheat flour and oats also sweetened with sugar and honey . Variety of various biscuits may contain chocolate , fruit , jam , nuts , and ginger . Frequently a fanatical piece for sweet biscuits is originate in most super markets . Biscuits and tea have a strong civilizing identity as the usual addition to a cup of tea and are commonly eaten as such . Many tea drinkers dunk their biscuits in tea, allowing them to absorb

liquid and soften slightly .as such. Many tea drinkers dunk their biscuits in tea, allowing them to absorb liquid and soften slightly before consumption[17] . Improvement of fortified biscuits or other combination flour bakery products is the modern drift in bakery industry. The rising attention in these types of bakery products is due to their improved nutritional properties and likelihood of their consumption in nourishing packages and in catastrophic situations such as starvation or earthquakes [11]. On the other hand, additional intake of fat in food may lead to high risk of diseases like obesity, coronary heart disease and cancer.[2]. Biscuits are convenient food products, becoming very popular among both rural and urban populations across the world. Some of the explanations for such wide popularity are low cost comparative to other processed foods, varied taste and longer shelf life. Biscuits have also been considered a better vehicle of fortification with protein because of their popularity, high nutrient density and long shelf-life[14]. Biscuits are nutritive appetizers produced from unpalatable dough those are converted into appetizing product finished the application of heat in an oven. Biscuits are the utmost widely consumed bakery items in the world. Good eating quality makes biscuits attractive for protein fortification and other nutritional improvements[3].

MATERIALS AND METHODS

 Bakery biscuits were used as raw material during the present study, they were collected from selected four bakeries from Hyderabad i. e Bombay bakery, Panna cassata and Arman bakery, and Khanzada bakery. A total of twelve bakery biscuits from each bakery were used for analysis of physical characteristics like average weight (g) and average diameter (cm) chemical characteristics like pH values, moisture content (%), fat content   (%), protein content (%),

carbohydrate content (%), ash content (%) and Total solids content (%) were determined by AOCC methods and sensorial attributes likes color, flavor, taste, texture was rated at hedonic scale of 10 while for crispness and overall acceptability, it was 20 and 40 respectively as described by Amerine *et al.*(1965). In order to observe the sensory analysis a group of judges was prepared. Instruments which were used for proximate analysis were pH meter (Model HI, Hanna Instruments, model No. HI 8424), Hot air oven (Memmert 854, Schawabch W. Germany), Analytical balance (Adam, Model No AAA 2502), Soxhlet extraction unit (lablin Melrose Park, ILL), Muffle Furnace (Newer Herm Mod; L9/11/8KM, Germany), Micro Kjeldhal digestion / distillation unit (LABCONCO Mod 60300-01) were used for the analysis of bakery biscuit samples. In order to observe the significant variation in trail, the experiment was replicated.

pH value Bakery biscuits sample (2g) homogenized in the distilled water (98ml) were used to measure the pH value of bakery biscuits using pH meter. (Ockerman, 1985).

Protein content (%)
Protein (%) was determined according to the method described by the Association of Official Analytical Chemists[5]. By fixing titration value in following formula:

$$N \% = \frac{1.4 \, (V_2\text{-}V_1) \times \text{normality of HCl} \times 250}{\text{Weight of sample taken}}$$

Where, V_1= titrated value, V_2= blank sample

Fat content(%)
Total fat content was extracted in soxhlet extraction unit as described by [5]. Fat content was calculated by using the following formula.

$$\text{Fat} \% = \frac{\text{final weight – initial weight}}{\text{Sample weight}} \times 100$$

Carbohydrates content (%) The carbohydrate was calculated according to the method described by [5] by difference by subtracting the sum of percent of fat, protein and ash content from that of total solids content of biscuits. Formula

   Total carbohydrate = Total solid content − (protein + fat +Ash).

Moisture / total solid content (%) The moisture content of observed according to the method of [5]. Moisture %was calculated by using the following formula:

$$\text{Moisture} \% = \frac{\text{final weight – initial weight}}{\text{Sample weight}} \times 100$$

Which total solids content was measured subtracting / calculate moisture content from 100 (i.e TS content = 100 − moisture %).

Ash content (%) The ash content of bakery biscuits samples were determined by gravimetric method as described by[5], using muffle furnace method No.33.2.10. The following formula was used to calculate the ash content:

$$\text{Ash} \% = \frac{\text{Weight of ashed sample}}{\text{Weight of sample taken}} \times 100$$

RESULTS
The results regarding bakery biscuit average weight of each biscuits indicatedin the (table 1) that the highest average weight of each biscuits 11.82g was observed in Bombay bakery Hyderabad was followed by Panna cassata bakery

Hyderabad which was recorded 11.03g of each biscuit . However average weight 10.29g per biscuit was examined in the Khanzada bakery . Lowest average weight of each biscuit noted in Arman Bakery Hyderabad which was 9.28g . The largest 5.50cm per biscuit average diameter was recorded in Bombay bakery Hyderabad as followed by Khanzada bakery with a mean average diameter of per biscuit 5.40cm . However, each biscuit average diameter 5.13cm was determined in Panna Cassata bakery Hyderabad . Smallest average diameter of per biscuit 4.53cm was noted in Arman bakery Hyderabad. The result showed that the largest 5.50cm per biscuit average diameter was recorded in Bombay bakery Hyderabad as followed by Khanzada bakery with a mean average diameter of per biscuit 5.40cm . However, per biscuit average diameter 5.13cm were determined in Panna Cassata bakery Hyderabad . Smallest average diameter of per biscuit 4.53cm w noted in Arman bakery Hyderabad . The result shows that the highest pH value of 7.49 were determined in biscuit made from Khanzada bakery as compared to Arman bakery Hyderabad with pH value of 6.96 . However, slightly lower pH value 6.87 in biscuit ws examined in Bombay baker Hyderabad . Lowest pH value 5.95 in biscuit was observed in Panna Cassata bakery Hyderabad .The result mentioned that the highest protein content 24.49% was noted in Panna Cassata bakery Hyderabad as compared to Bombay bakery Hyderabad which was recorded 24.20% . While the protein content (%) in Arman bakery Hyderabad was 21.16% . The lowest protein content 20.93% was noted in Khanzada bakery It was noted that the biscuits marketed at Hyderabad and resulted in maximum fat content 29.31% was recorded in Khanzada bakery followed by Arman bakery Hyderabad having fat content 26.16% . Moreover, fat content (%) of Panna Cassata bakery was recorded 19.16% . The lowest fat content 16.33% was recorded in Bombay bakery Hyderabad . The result indicated that the highest carbohydrates contents 54.30% was observed in Bombay Bakery Hyderabad and followed by Panna Cassata bakery Hyderabad which was recorded 53.68% . However, carbohydrates content 47.09% was observed in Arman bakery Hyderabad . Moreover the lowest carbohydrate content (%) was recorded in Khanzada bakery 46.68% respectively . The data on moisture content of biscuits showed that the highest moisture content% of 2.84% was noted in the biscuits obtained from Bombay bakery Hyderabad followed by biscuits obtained from the Arman Bakery Hyderabad which recorded 2.59% of moisture . The biscuits of Khanzada Bakery ranked third in moisture content of 1.75% . The lowest moisture content 1.42% was observed in the biscuit obtained from Panna Cassata bakery Hyderabad . The result indicated that the highest ash content 3.0% was recorded in the biscuit samples of Arman bakery Hyderabad while the biscuit samples of Bombay bakery Hyderabad was noted ash content 2.33% . However, ash content of Khanzada bakery was recorded 1.33% . Moreover , the lowest ash content of 1.25% was observed in the biscuit samples of Panna Cassata bakery Hyderabad respectively . The results indicates that total solids contents (%) biscuits samples of the different bakeries such as Bombay bakery , Panna Cassata bakery , Arman bakery Hyderabad and Khanzada bakery were 97.16%,98.58%,97.41% and 98.25% , respectively . It was revealed that Total solid content (%) were slightly greater in the biscuit sample of Bombay bakery of Hyderabad as compared to biscuits samples of Panna Cassata bakery

Hyderabad , Arman bakery Hyderabad and Khanzada bakery . The results further indicated that biscuits marketed by Bombay Bakery and Panna cassata we better in quality and long shelf life because of highest total solids compared to biscuits marketed at Arman Bakery and Khanzada Bakery . Results for sensory analysis of biscuits samples shows in (table 2) of Bombay bakery Hyderabad ranked superior in color with the average score of 8.92 out of 10 and Panna Cassata bakery Hyderabad ranked second in color with the score of 7.61 as per the observation of a panel of five judges while Arman bakery Hyderabad ranked 3rd achieving the score of 5.53 out of 10 the lowest color scored observed in Khanzada bakery Tandojam achieving the score of 5.33 out of 10 . Bombay bakery Hyderabad score 7.66 better flavor out of 10 , followed by Panna Cassata bakery Hyderabad achieving the average score of 6.36 out of 10 ranked in second in score is per sensing of the five judges . While Arman bakery Hyderabad ranked third achieving the score of 5.66 out of 10 . The lowest score of 4.60 was recorded out of 10 in Khanzada bakery . The result regarding the crispness score of the bakery biscuits that the penal of five judges awarded highest score of 17.20 out of 20 marks for biscuit crispness in Bombay bakery Hyderabad as compared to Panna Cassata bakery Hyderabad which was scored 14.53 .

However Arman bakery Hyderabad and Khanzada bakery were scored 14.13 and 11.40 so the Khanzada bakery achieved thlowest score respectively . The highest 8.20 biscuits taste score observed in the biscuits samples of Bombay bakery Hyderabad as compared to biscuits samples of Panna Cassata bakery Hyderabad which was recorded 6.53 biscuit taste score . Howeve,r biscuits samples of Arman Bakery Hyderabad and biscuits samples of Khanzada bakery was observed 5.60 and 5.20 biscuit taste score respectively . The result indicated that the highest 7.06 biscuit texture score was observed in Bombay bakery Hyderabad as compared to Panna Cassata bakery Hyderabad which was recorded 6.13 biscuit texture score. However Arman bakery Hyderabad and Khanzada bakery were observed 5.40 and 4.26 biscuit texture score respectively . The result indicated that the highest score sensed 37.53 overall acceptability of biscuits was observed in Bombay Bakery Hyderabad as compared to Panna cassata Bakery Hyderabad which was achieved the average score 35.93 out of 40 ranked second in score . As per sensing of the panel of five judges . While the Arman Bakery Hyderabad ranked third achieving the score of 31.73 out of 40 the lowest score 30.13 was sensed out of 40 in Khanzada Bakery respectively.

Table 1: Average Physico chemical analysis of various bakery biscuits

| Parameters | Treatments | | | | F-Value |
	T1	T2	T3	T4	
Average weight (g)	11.82	11.03	9.28	10.29	7.46
average diameter (cm)	5.50	5.13	4.53	5.40	47.33
pH value	6.87	5.95	6.96	7.49	104.26
Protein (%)	24.20	24.49	21.16	20.93	2.98
Fat (%)	16.33	19.16	26.16	29.31	44.26
Total carbohydrate (%)	54.30	53.68	47.09	46.68	1.09
Moisture (%)	2.84	1.42	2.59	1.75	0.58
Ash (%)	2.33	1.25	3.0	1.33	4.82
Total Solid (%)	97.16	98.58	97.41	98.25	1.56

T1:Bombay Bakery Hyderabad ,T2:Panna cassata, T3: Arman Bakery Hyderabad , T4 Khanzada Bakery

Table 2: SENSORY EVALUATION

| Parameters | Treatments | | | | F-Value |
	T1	T2	T3	T4	
Color	8.92	7.61	5.53	5.33	22.95
Flavor	7.66	6.36	5.66	4.60	45.44
Crispness	17.20	14.53	14.13	11.40	64.73
Taste	8.20	6.53	5.60	5.20	320.20
Texture	7.06	6.13	5.40	4.26	10.62
Overall acceptability	37.53	35.93	31.73	30.13	130.84

T1:Bombay Bakery Hyderabad ,T2:Panna Cassata, T3: Arman Bakery Hyderabad , T4 Khanzada Bakery

DISCUSSION

The result of present study showed that biscuit made at Bombay bakery Hyderabad were heavier in average weight 11.82g per biscuit , biscuit average diameter 5.50cm , carbohydrate content 54.30% , and moisture content 2.84% as compared to biscuits of other bakeries . The biscuit prepared from the Panna Cassata were highest in protein content 24.49% , fat content 19.16% and Total solids content 98.58% . These results are further supported by[7] in their study the protein content in biscuits were increased from 6.97% to 9.48% , similarly crude fiber increased from 0.28 to 1.36%

[7] discover an increase in the protein contents of the 30% by addition of cow pea flour (CF) in biscuits dough and 20% cow pea flour (CF)[8] report that the moisture content of biscuits was found to be increased with increase in proportion of dried carrot pomace powder[9] revealed that there was no significant difference observed among the industry wise category of biscuit samples in the analysis of moisture , protein , sugar and ash . While significant differences (p<0.05) were observed in fat , carbohydrate , vitamin A , iron and energy content when fortified with Maize Germ Cake flour (DMGC flour) in wheat flour for biscuit preparation .

Sensory evaluation of the biscuits showed that biscuits samples of Bombay bakery Hyderabad were accepted by the panel of judges . Similar results have also been reported by [8] Sensory evaluation of biscuits showed that 10% addition of DMGC flour had higher overall acceptability , taste , texture and flavor[12] found that quality , score for all sensory parameters declined with increase in soy flour . Taste and texture of biscuit should significant declining trend as compared to color and flavor . Quality score for overall acceptability was not all levels of soy flour were equally acceptable[6] showed that sensory analysis , 5% freeze dried biscuits hold the highest score in color , texture and overall acceptability ; and 10% hot air dried secured highest score in flavor[16-17] their sensory examination revealed there were no significant variation in taste among biscuits formed from ratio 100 : 0 , 90 : 10 and 70 : 30 of wheat-potato flour , except there were significant difference in taste among biscuits prepared from ratio 100 : 0 and biscuits made from ratio 60 : 40 and 50 : 50 wheat-potato composite flour.

CONCLUSIONS

Present study was concludes that bombay bakery biscuits were considerably good quality in term of weight and size (diameter) , low in fat and higher in sensory characteristics like color , taste , flavor , crispiness , texture and overall acceptability from the biscuits of other bakeries evaluate in the present study . Regardless, the total solids and protein contents were high in Panna Cassata biscuits from that of Bombay bakery , Arman bakery and Khanzada bakery biscuits , the differences among them were not statically similar. The fact stated in conclusion suggested that bakeries other than the Bombay bakery under current investigation may have to use good quality ingredients and modified processing measures to improve the quality of biscuits. Bombay bakery biscuits found all through superior in majority of quality characteristics in the current investigation, further study merits to evaluates the nutritional status of Bombay bakery biscuits v/s biscuits of other bakeries. Further study is also suggested to evaluate the micronutrients and structural quality of biscuits of different bakeries investigated in the current study. Physico-chemical, nutritional, structural qualities of biscuits produced or marketed by local bakeries v/s superior bakeries of Hyderabad are suggested to observe the quality status of biscuits of local bakeries.

REFERENCES

1. AACC, . *Approved Methods of the Association of American Cereal Chemists*. **10ᵗʰ** Ed., Minnesota, USA.(2000).
2. Akooh, K. Scientific status summary: Fat replacers. Food Technol. *Magzine*. **52** (3): 47-53.(1998).
3. Akubor, P. Functional properties and performance of cowpea/ plantain/ wheat flour blends in biscuits. *Plant Food for Human Nutrition*., **(58):** 1-8.(2003)
4. Amerine, M.A., R.M. Pangborn, E.B. Roessler. 1965. Principles of sensory evaluation of food. In: Food Science and Technology Monographs. *Academic Press, New York*. pp: **338**-339.(1965).
5. AOAC. Ash content (Gravimetric Method). In: *Official Methods of Analysis NO.33.2.10. AOAC International, Gathersburg, Maryland, USA.*(2000).
6. Asif – ul- Alam, S., M. M. Z. Isla, M. M. Hoque and K. Monalisa. Effects of drying on the physico-chemical and functional properties of green banana (*Musa sapientum*) flour and development of baked product.*American Journal of Food Science Technology*., **2(4)**: 28-133.(2014)
7. Frota, K. D. M. G. Utilization of cowpea flour in the development of bakery products. *Journal of Science Technology Aliment.*, **30**(1): 44-50.(2009).
8. Gayas, B., R.N. Shukla and B. M. Khan. Physico-chemical and sensory characteristics of carrot pomace powder enriched defatted soy flour fortified biscuits. *International Journal of Scientific Research Publication*., **2(8):** 93-97.(2009).
9. Hossain, M. A., A.K. Sarker and S. Parveen. Physico-chemical and microbiological quality of fortified high energy biscuits served in school of poverty prone areas in Bangladesh. *Journal of Biological Sciences.,* **1(2)**: 16-20.(2013).
10. Kumar, A. Y. Theory of bakery and confectionary. In Baked products: *Wikipedia browsed on 13.03.2014.(*2009)
11. Pratima, A. and Yadava, M.C. Effect of incorporation of liquid dairy byproducts on chemical characteristics of soy-fortified biscuits. *Journal of Food Sciences and Technology.,* **37 (2):** 158-61.(2000)
12. Siddique, N., M. Hassan, S. Raza, and T. Hameed. Sensory physical evaluation of biscuit supplemented with soy flour. Pakistan Journal of Food Science., **13(1-2)**: 45-48.(2003)
13. Sindhuja, A. M. L. Sudha and A. Rahim. Effect of incorporation of amaranth flour on the quality of cookies. *European Food Research and Technology.,* **(221)**: 597-601.(2005)
14. Sudha, M.L., R. Vetrimani and K. Leelavathi. Influence of fibre from different cereals on the rheological characteristics of wheat flour dough and on biscuit quality. *Food Chemistry*., **100: 1365**-1370.(2007)
15. Yadav. D. N. N. Thakur and K. V. Sunooj. Effect of partially de-oiled peanut meal flour (DPMF) on the nutritional, textural, and organoleptic and physic chemical properties of biscuit. *Food Nutrition Science.,* **3: 471**-476.(2012)
16. Onabanjo, O. O. and D. A. Ighere. Nutritional, functional and sensory properties of biscuit produced from wheat sweet pototo composite. *Journal of Food Technology and Research*., **1(3):**111–121.(2014)
17. Davidson, A. Oxford Companion to Food. *Oxford University Press*, Pp. **34**-35.(1999)