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Proximate, textural and organoleptic attributes of breads enriched with *Ocimum basilicum* seeds flour

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ABSTRACT

Objectives: Bread, holds its place and grace from ancient days as it is the food for any person on any day, at any time, and anywhere. Bread is the most preferred soft diet because of the easy availability and convenience to carry. Bread is usually prepared by refined wheat flour and hence high in calories making it a less prioritized food for persons with metabolic disorders. Hence, this study is framed with the objective of enriching the nutritional quality of bread by incorporation of *Ocimum basilicum* seeds flour.

Material and Methods: The *Ocimum basilicum* seeds flour in a proportion of 5%, 10%, 15% and 20% of the wheat flour was substituted in the variations BV1, BV2, BV3, BV4 and the bread was prepared by following standardised baking procedures. All the variations of *Ocimum basilicum* seed flour incorporated breads were subjected to proximate, texture and organoleptic analysis.

Results: The results depicted that the proximate composition viz. moisture, energy, protein, fat, ash and fibre, of the *Ocimum basilicum* seed flour incorporated bread showed significant difference ($p < 0.05$) in all the variations, on comparison with control. The 20% *O. basilicum* seed flour incorporated variation BV4 holds maximum nutrients. The texture profile analysis has shown a significant difference in all the parameters on comparison with the control. The overall acceptability was high for variation BV3, which has 15% of *O. basilicum* seeds flour incorporation, on organoleptic evaluation.

Conclusion: It can be concluded that *Ocimum basilicum* seed flour can be effectively used in the preparation of bakery products like bread as a means of value addition.

Keywords: Breads, Nutrients, *Ocimum basilicum*, Sensory, Texture, Value addition

INTRODUCTION

The genesis of bread is linked with the advent of agronomy in the course of the Neolithic period in southwest Asia.[1] Bread, the most cherished fermented bakery product is prepared using all-purpose or refined wheat flour, water, yeast, and salt by a sequence of procedures beginning from mixing, kneading, proofing, molding, and finally baking.[2] The consumer preference for consumption of bakery products like biscuits and bread is ever growing, while the ingredients used in their preparation has been major concern as they are source of high calories. Bread is a high carbohydrate and low micronutrient food. In order to enhance the protein and essential amino acid content, flour-based baked products were prepared.[3] An attempt has been made to incorporate black sesame flours in bread formulations to increase the protein, good fat, and fiber content.[4] The cost-effective breads were prepared using varieties of cassava flour as wheat flour substitutes due to the high cost of wheat in African countries.[5] Germinated pumpkin seed flour and soybean flour were used as an alternate to refined flour for bread preparation as a means of value addition.[6,7] The antioxidant and fiber composition of the bread was increased by addition of apple pomace powder.[8] Bread was prepared using wheat germ fermented with *Lactobacillus plantarum dy-1* to enrich nutritional quality.[9] Also extruded wheat bran was used as an

ingredient to increase the dietary fiber and digestibility.[10] Similarly, in this study the bread was prepared by adding a novel ingredient *Ocimum basilicum* seed flour, as the *Ocimum basilicum* seed has been researched as a source of fatty acids, fiber, polyphenols, and flavonoids.[11]

MATERIAL AND METHODS

Selection of samples

The ingredients required for the bread preparation viz. wheat flour, basil, or sabja seed (*Ocimum basilicum L.*), yeast, vegetable oil, salt, and sugar were purchased from the local market of Salem district, Tamil Nadu.

Processing of *Ocimum basilicum* seeds into flour

The sorted *Ocimum basilicum* seeds were milled and sieved so as to obtain edible flours. 60 mesh (BSS) was used for this purpose. The flours were stored in air tight containers for further use.

Formulation of *Ocimum basilicum* seeds flour incorporated bread

The dough was prepared by mixing the ingredients namely wheat flour and *O. basilicum* seeds flour in the proportion 100 g, 0 g; 95 g, 5 g; 90 g, 10 g; 85 g,15 g; 80 g, 20 g respectively for control and variations BV1, BV2, BV3 and BV4 along with yeast (2 g), vegetable oil (1 ml), a gram of salt and sugar and 40 ml of water for 20 minutess by hand. Fermentation of dough was carried out at 29°C for one hour. The dough after raising was manually proofed for one hour at 30°C. The proofed dough was baked for 30 minutes at 220°C.[12] The control bread was also prepared adopting the same methodology as stated above, without adding *Ocimum basilicum* seeds flour.

Proximate analysis

The FSSAI[13] procedure for cereal and cereal products, was adopted for estimation of moisture, ash, fiber, and fat. With the Food and Agriculture Organisation[14] procedure, the calories were determined.

Texture profile analysis

The texture of each variation of bread and the control bread was analyzed using P/25 mm compression plate in Texture Analyzer, Perten Instruments, Sweden. The Texture Profile Analysis test consists of forcing a bite-size piece of bread two times in a reciprocating motion.

Organoleptic analysis

The bread samples of even size and shape were assigned random numbers. The panelist were asked to score and comment on the organoleptic characteristics like color, appearance, texture, mouth feel, taste, flavor, and overall acceptability of the different variations of prepared breads and control bread. These sensory attributes were measured by 120 panelists on a 9-point hedonic scale with the highest score representing extremely good and the lowest score representing poor.

Statistical analysis

The descriptive statistical analyses were done using IBM SPSS Statistics 16 Software package. The recorded data were subjected to analysis of variance (One-way ANOVA) with Duncan's Post Hoc test ($P < 0.05$) to determine the significant difference between the means.

RESULTS AND DISCUSSION

The formulated breads were subjected to proximate analysis, Texture profile analysis, organoleptic analysis and the results were analyzed statistically and discussed below.

Proximate analysis

Table 1 depicts the results of proximate analysis of the *Ocimum basilicum* seeds flour incorporated breads and the control bread. The moisture content of the *Ocimum basilicum* seeds flour incorporated breads ranged from 26% to 25%, which was found to be less than that of the control bread. The decrease in moisture content is proportional to the increase in the quantity of *Ocimum basilicum* seeds flour, which may be because of the water absorbing property of *Ocimum basilicum* seeds.[13] Moisture has a direct bearing on the texture, the shelf life, and microbial growth throughout storage.[14]

Table 1: Mean proximate analysis of the control and *Ocimum basilicum L.* seeds flour incorporated breads.

Variations	Moisture (%)	Energy (kcal)	Protein (%)	Fat (%)	Ash (%)	Fiber (%)
Control	27.35 ± 0.27^{a}	327.21 ± 1.67^{ab}	6.47 ± 2.64^{a}	8.41 ± 2.37^{ab}	1.24 ± 0.54^{c}	0.97 ± 0.34^{c}
BV1	26.30 ± 0.38^{ab}	321.50 ± 1.34^{a}	7.07 ± 2.41^{a}	7.70 ± 1.74^{c}	1.35 ± 0.68^{a}	1.44 ± 0.52^{a}
BV2	25.37 ± 0.44^{a}	322.52 ± 1.36^{ab}	7.18 ± 1.37^{b}	7.64 ± 1.88^{b}	1.45 ± 0.37^{ab}	1.50 ± 0.42^{b}
BV3	25.38 ± 0.64^{a}	325.16 ± 1.60^{c}	7.37 ± 0.97^{ab}	7.66 ± 1.67^{ac}	1.58 ± 0.88^{c}	1.52 ± 0.33^{ab}
BV4	25.87 ± 0.38^{ac}	325.30 ± 1.27^{a}	7.42 ± 1.37^{c}	7.58 ± 1.98^{a}	1.70 ± 0.97^{ac}	1.60 ± 0.45^{ac}

Each value in the table is represented as Mean ± SD. Means with same superscript are not significantly different using Duncan's Multiple Range Test ($P < 0.05$).

The calorie content of the *Ocimum basilicum* seeds flour incorporated variations has significantly decreased on comparison with control bread, while the calorie content among the variations BV1 to BV4 showed gradual increase proportional to the increase in concentration of *Ocimum basilicum* seeds flour as indicated in Table 1. Protein composition of all the variations of bread has increased marginally when compared to control as the basil seeds contribute to 17% to 20% of protein. The fat percentage was found reduced in the *Ocimum basilicum* seeds flour breads when compared with the control. The higher the proportion of *Ocimum basilicum* seeds flour lower is the fat content.

The mineral composition of the substrates is determined by the ash content.[15] The 20% basil seed flour incorporated variation, BV4 records highest percentage (1.58%) of ash. It is evident from Table 2 that the fiber content has shown a drastic increase in the highest proportion of basil seed flour incorporated variation of bread BV4, favoring the nutritional profile. The dietary fiber in basil seeds regulates blood sugar levels and proves beneficial for Type 2 diabetes.[16] It may be understood that the presence of fiber would prove to be a promising source of prebiotic, helping the maintenance of probiotic clusters in the gut, thereby dwindling the degenerative diseases.[17] The incorporation of *Ocimum basilicum* seed flour into high glycemic indexed breads may decrease the metabolic diseases which can be proved by clinical trials.

Texture profile analysis of control and *Ocimum basilicum L.* seeds flour incorporated bread

Texture profile analysis of the O*cimum basilicum L.* seeds flour incorporated breads is depicted in Table 2. Results in Table 2 show that there was a significant difference ($p < 0.05$) in the hardness of the basil seed flour incorporated bread prepared from different proportions. Firmness or hardness increased with the increase in basil seed proportion. Greatest hardness was noticed in variation BV4. As in case of moisture, the hardness may also be associated with the water absorption capacity of the *Ocimum basilicum* seed flour. Springiness similar to fluffiness, defines the magnitude of retrieval between the first and second compression.[18] Springiness ranged from 0.91 to 1.04 and significant difference was found in the springiness between variations and control bread ($p < 0.05$). More springiness has been observed in the variation BV1. Lesser the level of incorporation of *Ocimum basilicum* seeds flour more is the springiness. The gelatinization property of the *Ocimum basilicum* seeds flour may be attributed to all the textural characteristics of the bread-like hardness, stickiness, cohesiveness, and springiness, which are also inter-dependent.[19] Although, the *Ocimum basilicum* seeds flour incorporated variations of bread were found to be significantly different when compared with the control bread, it need not essentially mean that the developed products are undesirable. Hence, all the variations were further subjected to organoleptic evaluation.

Organoleptic analysis of control and *Ocimum basilicum L.* seeds flour incorporated bread

The sensory scores of *Ocimum basilicum* seeds flour incorporated breads are depicted in Table 3. According to the results presented, there is a significant difference in the appearance, color, flavor, texture, taste, mouth feel, and overall acceptability of the *Ocimum basilicum* seeds flour incorporated variations of the bread, with respect to control.

Table 2: Texture profile analysis of control and *Ocimum basilicum L.* seeds flour incorporated bread.

Variations	Hardness (N)	Springiness	Cohesiveness	Adhesiveness (J)	Stringiness (mm)	Gumminess (N)	Chewiness (N)
Control	149 ± 0.27^{a}	0.99 ± 1.34^{ab}	0.32 ± 0.24^{c}	4.1 ± 0.14^{ac}	0.08 ± 0.01^{a}	47 ± 3.41^{c}	47 ± 3.41^{ab}
BV1	164 ± 1.51^{ab}	1.04 ± 0.35^{a}	0.67 ± 0.35^{ab}	1.2 ± 2.51^{a}	0.30 ± 0.03^{ab}	109 ± 21.35^{ab}	114 ± 22.35^{a}
BV2	230 ± 1.35^{ac}	1.00 ± 0.41^{ab}	0.71 ± 0.41^{a}	1.4 ± 2.34^{ab}	1.37 ± 0.14^{a}	163 ± 25.31^{a}	147 ± 12.35^{c}
BV3	340 ± 2.54^{a}	0.91 ± 0.38^{b}	0.63 ± 0.22^{b}	1.5 ± 2.34^{b}	2.93 ± 1.47^{a}	214 ± 21.34^{b}	169 ± 11.24^{a}
BV4	364 ± 2.11^{a}	0.79 ± 0.37^{c}	0.71 ± 0.42^{c}	1.9 ± 1.60^{c}	3.48 ± 1.35^{b}	257 ± 23.47^{a}	257 ± 22.36^{b}

Each value in the table is represented as Mean ± SD. Means with same superscript are not significantly different using Duncan's Multiple Range Test ($P < 0.05$).

Table 3: Organoleptic analysis of control and *Ocimum basilicum L.* seeds flour incorporated bread.

Variations	Appearance	Texture	Mouth feel	Taste	Flavor	Overall acceptability
Control	8.00 ± 0.66^{a}	8.20 ± 0.78^{ab}	7.70 ± 0.82^{abc}	8.10 ± 0.73^{ab}	7.90 ± 0.87^{a}	8.30 ± 0.67^{abc}
BV1	8.20 ± 0.78^{a}	7.90 ± 0.73^{b}	8.20 ± 0.78^{c}	8.00 ± 0.81^{a}	8.10 ± 1.19^{a}	8.50 ± 0.51^{a}
BV2	8.10 ± 0.73^{a}	8.10 ± 0.73^{ab}	8.20 ± 0.78^{bc}	8.10 ± 0.96^{c}	8.10 ± 0.73^{a}	8.60 ± 0.51^{c}
BV3	8.00 ± 0.81^{a}	7.90 ± 0.73^{ab}	8.20 ± 0.78^{bc}	8.40 ± 1.19^{ab}	8.10 ± 0.73^{a}	8.70 ± 0.51^{c}
BV4	7.80 ± 0.78^{a}	7.90 ± 0.87^{ab}	7.50 ± 0.70^{abc}	7.80 ± 0.91	7.90 ± 0.73^{a}	8.00 ± 0.66^{abc}

Each value in the table is represented as Mean ± SD. Means with same superscript are not significantly different using Duncan's Multiple Range Test ($P < 0.05$).

The mouth-feel, taste, flavor, and the overall acceptability of the variation BV3 was high, followed by the variation BV2. The variation BV3 has 15% of the *Ocimum basilicum* seeds flour incorporation, while 10% of *Ocimum basilicum* seeds flour is incorporated in BV2. The literature has stated that the Texture Profile Analysis data need not be a relevant substitution for the sensory attributes always.[20]

CONCLUSION

Breads being a multipurpose traditional food product, the suitability after value addition is uncertain. So before supplementing the developed variations of *Ocimum basilicum* seeds flour incorporated breads were put to various tests to assess the nutritional, textural and sensory attributes. It can be concluded from the results that the nutritional parameters were better in variation BV4 in which 20% of the *Ocimum basilicum* seeds flour was incorporated and the organoleptic analysis has projected an overall acceptability of variation BV3 in which 15% of the *Ocimum basilicum* seeds flour was incorporated. Hence, considering the nutritional profile, textural analysis outcomes, and the overall acceptability the *Ocimum basilicum* seeds flour incorporation can be considered optimal for further studies. Being a source of protein, minerals, and fiber, the bread formulations can be recommended for diabetics, subjects with cardiovascular disorders and gastrointestinal disorders.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Conflicts of interest

Dr. Nazni Peerkhan is on the editorial board of this journal. She has no conflict of interest.

REFERENCES

1. Arranz-Otaegui A, Carretero LG, Ramsey MN, Fuller DQ, Richter T, Archaeobotanical evidence reveals the origins of bread 14,400 years ago in northeastern Jordan. Proc Natl Acad Sci 2018;115:7925–30. DOI: 10.1073/pnas.1801071115
2. Dewettinck K, Van Bockstaele F, Kühne B, Van de Walle D, Courtens T, Gellynck X. Nutritional value of bread: influence of processing, food interaction and consumer perception. J Cereal Sc 2008;48:243–57.
3. Young J. Functional bakery products: current directions and future opportunities. Food Indust J 2001;4:136–44.
4. Makinde FM, Akinoso R. Physical, nutritional and sensory qualities of bread samples made with wheat and black sesame (*Sesamum indicum* Linn) flours. Int Food Res J 2014;21: 1635–40.
5. Eriksson E, Koch K, Tortoe C, Akonor PT, Oduro-Yeboah C, Evaluation of the physical and sensory characteristics of bread produced from three varieties of cassava and wheat composite flours. Food Public Health 2014;4:214–22.
6. George S, Nazni P. Formulation and optimization of functional bread by using response surface methodology, Int J Curr Res 2012;4:8–14.
7. Kaur H, Kaur N. Development and sensory evaluation of value added bakery products developed from germinated soybean (glycine max) varieties. J Appl Natural Sci 2019;11:211–16.
8. Vijayaragavi E, Arivuchudar R, Development and characteristic evaluation of apple pomace powder incorporated breads. Infokara Res 2019;8:30–7.
9. Yansheng Z, Zhang J, Wei Y, Ai L, Ying D, Xiao X. Improvement of bread quality by adding wheat germ fermented with *Lactobacillus plantarum dy-1,* J Food Quality 2020;1–8.
10. Basinskiene L, Garmuviene S, Juodeikiene G. Application of extruded wheat bran for added value bread production. Consumer Driven Cereal Innovation 2008;109–12.
11. Sestili P, Ismail T, Calcabrini C, Guescini M, Catanzaro E, Turrini E, et al. The potential effects of ocimum basilicum on health: a review of pharmacological and toxicological studies. Expert Opin Drug Metab Toxicol 2018;14:679–92. doi:10.1080/17425255.2018.1484450.
12. Haque MM, Hossain MA, Zim AFMIU, Aziz MA, Hoque MA. Quality analysis of soy bread and its effects on glycemic index. Curr Res Nutr Food Sci 2020;8.
13. Hussain N, Ishak I, Abdullah MF, Rauh AA, Azhar N. Water soluble hydrocolloid from basil seed (*Ocimum basilicum* L.) Mucilage. Malaysian Appl Biol 2019;49:97–101.
14. Batool SA, Rauf N, Tahir SS, Kalsoom R. Microbial and physico-chemical contamination in the wheat flour of the twin cities of Pakistan. Int J Food Saf 2012;14:75–82.
15. Ntuli V, Mekibib SB, Molebatsi N, Makotoko M, Chatanga P, Asita OA. Microbial and physicochemical characterization of maize and wheat four from a milling company, Lesotho. Int J Food Saf 2013;15:9–11.
16. Cherian RP. Health benefits of basil seeds. Int J Scientific Res Sci Eng Technol 2019;6:511–5.
17. Ayyappan AA, Duraiswamy G, Prapulla SG. Short chain xylooligosaccharides: a potential prebiotic used to improve batter fermentation and its effect on the quality attributes of idli, a cereal–legume-based Indian traditional food. Int J Food Sci Technol 2011;46:1346–55.
18. Baker-Perrett J, https://www.campdenbri.co.uk/, 2019.
19. Blanchard C. On the study of the different factors influencing the structure and the texture of semi-humid baked aerated cereal products: sensory and instrumental dimensions of texture. Université de Bourgogne. 2014.
20. Thybo AK, Martens M. Instrumental and sensory characterization of cooked potato structure. J Texture Studies 2007;30:259–78.

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