SHORT COMMUNICATION Bhartiya Krishi Anusandhan Patrika, Volume 38 Issue 4: 423-425 (December 2023)

Sensory Acceptability and Nutritional Attributes of Hummus Developed from Pearl Millet (*Bajra*) Microgreens

S. Yadav[1], M. Awasthi[1]

10.18805/BKAP660

ABSTRACT

Microgreens are young, tender greens and are excellent source of vitamins, minerals, bioactive and health-supporting components. But they have shorter shelf life. Therefore, the present study was conducted to prepare hummus from Pearl Millet microgreens and to evaluate its sensory and nutritional attributes. Microgreen-based Hummus was prepared by chickpeas and microgreens blended in different ratios. All the ingredients used in making hummus were procured from the local market. Chickpeas were soaked in water overnight and then strained and boiled. Microgreens were grown in an indoor setup. Different variations of hummus were developed using chickpea and microgreens *i.e.* T1 (100:0), T2 (80:20), T3 (60:40) and T4 (40:60), respectively. The formulated hummus was subjected to sensory evaluation to test its acceptability using a 9- point Hedonic scale. Hummus developed with the incorporation of 60 per cent pearl millet microgreens (treatment T4) was most acceptable out of all treatments. The incorporation of microgreens in hummus can be done to deal with the issue of short shelf life of microgreens. Conversion of Microgreens into Hummus can be a solution to make it rich in phytochemicals, carotenoids and phenolic compounds.

Key words: Bioactive compounds, Hummus, Microgreens, Sensory Acceptability, Shelf life.

Microgreens are young completely grown cotyledonary leafy greens that are harvested at the first genuine leaf stage, grow upto 1-3 inches in about 1-3 weeks days after germination (Zhang *et al*., 2021). Microgreens has gained popularity in high- end restaurants and markets and have developed a new dietary trend in recent years due to their wide variety of intense taste, colour, aroma, shapes and texture. Microgreens are rich in vitamins and minerals and various bioactive compounds (Kowitcharoen *et al*., 2021). Many microgreens have been found to contain micronutrients in appreciable amounts than their adult counterpart. Microgreens are found to be high in carotenoids, ascorbic acids, tocopherol, tocotrienols, phylloquinone and folate. In addition, phenolic compounds anthocyanin and chlorophyll have been discovered to be abundant in microgreens. As compared to mature leaves, microgreens have high concentration of phytonutrients therefore microgreens are considered as “Functional Food” or “Super Food” (Sharma *et al*., 2020). Functional food are type of food with additional health or disease-preventing qualities in addition to their regular nutritional value, they are great source of micronutrients, minerals and bioactive components (Treadwell *et al*., 2020). Microgreens have short life span, even at ambient temperature they have shelf life of 3-5 days (Chandra *et al*., 2012). Therefore, the present study was conducted to develop hummus from microgreens and to evaluate its sensory and nutritional attributes.

The present study was conducted in department of Nutrition and Dietetics, School of Allied Health Sciences, Manav Rachna International Institute of Research and Studies, Faridabad, India during Jan-June, 2023. The methodology opted for the study is as:

[1]Department of Nutrition and Dietetics, School of Allied Health Sciences, Manav Rachna International Institute of Research and Studies, Faridabad-121 001, Haryana, India.

Corresponding Author: M. Awasthi, Department of Nutrition and Dietetics, School of Allied Health Sciences, Manav Rachna International Institute of Research and Studies, Faridabad-121 001, Haryana, India. Email: madhviawasthi84@gmail.com

How to cite this article: Yadav, S. and Awasthi, M. (2023). Sensory Acceptability and Nutritional Attributes of Hummus Developed from Pearl Millet (*Bajra*) Microgreens. Bhartiya Krishi Anusandhan Patrika. 38(4): 423-425. doi: 10.18805/BKAP660.

Submitted: 30-06-2023 **Accepted:** 03-01-2024 **Online:** 13-01-2024

Growing microgreens

Pearl Millet (*Bajra*) were procured from local market of Faridabad (Haryana, India) and grown in coco peat using the seedling trays of depth 2-3 cm. Before sowing seeds into cocopeat, they were soaked overnight for 8 hours and kept covered in dark for 2 days for the sprouting. Soaked seeds were sprinkled and again covered with a thin layer of coco peat. Using fine water sprinkler, trays were watered in every 12 hours and the trays were kept in LED for 8 to 10 hours. After the completion of 2 to 3 weeks, microgreens were harvested with sterilized scissor 1 cm above the roots.

Hummus preparation

The portions of microgreens used for hummus preparation are given in Table 1. Sensory evaluation of microgreen-based hummus was assessed by 9 point hedonic scale with a group of semi trained panelist. Data analysis was done using SPSS one way ANOVA (Fig 1).

Nutritive value of microgreens-based hummus was calculated. For hummus, the nutritive value was taken as given by Wallace *et al*. (2016). While nutritive value of microgreens was analysed by standard method of AOAC (Latimer Jr., 2023).

Sensory acceptability of hummus from pearl millet based microgreens

The data for sensory evaluation of pearl millet microgreen-based hummus is presented in Table 2. In case of appearance, treatment T4 (60:40) was liked very much (8.12), while treatment T1 (100:0), T2 (80:20) and T3 (60:40) were liked moderately with scores 7.76, 7.0 and 7.0, respectively. Colour of microgreens have enhanced the appearance acceptability of hummus as compared to standard hummus.

In case of attributes of aroma of hummus, treatment T4 (80:20) got the highest score *i.e*. 8.12 (liked very much) as compared to treatment T1, T2, T3. Treatment T1 was scored as liked moderately (7.29) and liked slightly (6.82, 6.76), respectively. No grassy aroma because of Microgreens was reported by panellists. In case of taste, treatment T4 got the highest score (7.71) as it was liked slightly, treatment T1 was also liked slightly with score (7.41), treatment T2 and T3 were liked slightly with score (6.53) and (6.76) respectively.

In case of texture T4 got the highest score (8.00) was liked very much and treatment T1, T2 and T3 were liked moderately with score (7.76), (7.18) and (7.29) respectively. According to one way ANOVA there was significant difference ($p<0.05$) between the treatments. For mouth feel treatment T4 was liked moderately with score (7.82), treatment T1 was liked moderately (7.59) and treatment T2 and T3 was liked slightly with score (6.88) and (6.94) respectively. No rough mouthfeel because of microgreens was reported. There was no significant difference ($p<0.05$) between Treatments for appearance, aroma and mouthfeel. In overall-acceptability of treatment, T4 treatment was liked very much and got the highest score (8.53), treatment T1 was also liked very much with score (8.00) and treatment T3 and T4 both were liked moderately with score (7.59) and (7.24) respectively. Treatment T4 containing 60% microgreens was most acceptable in all the sensory parameters. In the study done by Anand and Sharma (2020), hummus prepared from banana blossoms and Indian gooseberries increased iron bioavailability, which is beneficial to anaemic patients.

Nutritive value of pearl millet microgreens-based hummus

Nutritional value of treatment T1 (standard has energy 166 Kcal, protein 7.90 g, carbohydrate 14.29 g, fat 9.60 g whereas, Treatment T4 (40 g chick-pea and 60 g microgreens) has energy 573 Kcal, protein 9.068 g, carbohydrate 35.12 g, fat 2.644 g. In case of micronutrients, among all treatments, treatment T4 (containing chick pea and microgreens in ratio

Table 1: Portion of microgreens and chickpea used for hummus preparation.

Treatment	CP* (%)	Peral millet MG** (%)
T1	100	0
T2	80	20
T3	60	40
T4	40	60

*CP: Chick pea **MG: Microgreens.

Table 2: Sensory acceptability scores and nutritive value of pearl millet microgreens based hummus.

Parameters	Treatment T1	Treatment T2	Treatment T3	Treatment T4	P value
			Sensory acceptability scores		
Appearance	7.76±0.970	7.00±1.732	7.00±1.225	8.12±0.600	0.16
Aroma	7.29±0.686	6.82±1.590	6.76±1.88	8.06±0.748	0.23
Taste	7.41±1.460	6.53±1.842	6.76±1.715	7.71±1.887	0.155
Texture	7.76±1.147	7.18±0.951	7.29±1.047	8.00±0.791	0.059
Mouth feel	7.59±1.176	6.88±1.654	6.94±1.600	7.82±0.883	0.122
Overall acceptability	8.00±0.500	7.59±0.870	7.24±1.033	8.53±0.943	<.001
			Nutritive value		
Nutrients	Treatment T1	Treatment T2	Treatment T3	Treatment T4	Pearl millet microgreen
Energy (Kcal)	166	991	782	573	155.28
Protein (g/100 g)	7.90	15.576	12.30	9.06	2.6
Fat (g/100 g)	9.60	5.89	3.46	2.64	1.0
Total carbohydrates (g/100 g)	14.29	38.08	36.6	35.12	32.16
Vitamin C (mg/100 g)	-	4.27	8.54	12.82	21.37
Total carotenoids (µg/100 g)	1018.9	4255.15	7491.40	10727.09	17200.15
Iron (mg/100 g)	6.08	17.83	29.58	41.34	64.86
Calcium (mg/100 g)	46.32	174.85	303.40	441.21	689.04

Values are expressed as mean±SD.

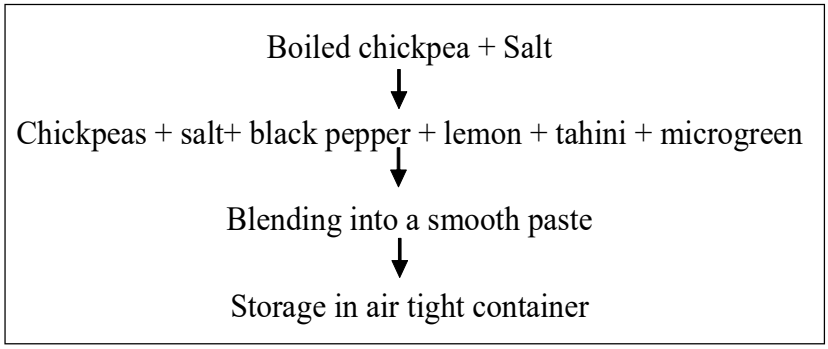


Fig 1: Hummus preparation method.

40:60) was containing good amount of vitamin C, total carotenoids, iron and calcium. It is evident form Table 2 that vitamin C was lacking in treatment T1 which increased to 12.82 mg/100 g in T4 after addition of microgreens. Also, the total carotenoids, iron and zinc in the treatment T4 were 10727.09 µg/100 g, 41.34 mg/100 g and 441.21 mg/100 g, respectively. Klug *et al.* (2018) worked on broccoli hummus and the study revealed that it has good nutritional and bioactive quality. Microgreens are rich sources of micronutrients and bioactive compounds. Xio *et al.* (2012) revealed in a study on edible microgreens that they are excellent source of vitamins and minerals. The findings of both studies are in support with the present study where microgreen based hummus has been found to be rich in micronutrients.

Conflict of interest

All authors declared that there is no conflict of interest.

CONCLUSION

The hummus having 40 g chickpea and 60 g of microgreens was more nutritious and was more acceptable. Microgreens have short life span and cannot be stored for long period of time. Therefore, the study concludes that conversion of microgreens into a value-added product can be a possibility to relish the nutritive value of microgreens. Addition of microgreens enhanced the nutritive value and therapeutic property of hummus.

Conflict of interest

All authors declared that there is no conflict of interest.

REFERENCES

Anand, S. and Sharma, M. (2020). Organoleptic evaluation of product developed from banana blossom powder and Indian gooseberry powder for anaemic population. Plant Archives. 20(2): 4-7.

Chandra, D., Kim, J.G. and Kim, Y.P. (2012). Changes in microbial population and quality of microgreens treated with different sanitizers and packaging films. Horticulture Environment and Biotechnology. 53(1): 32-40. https://doi.org/10.1007/s13580-012-0075-6.

Klug, T.V., Hernández, G.B.M., Collado, E., Francisco, A., Francisco, A.H. (2018). Effect of microwave and high-pressure processing on quality of an innovative broccoli hummus. Food and Bioprocess Technology. 11: 1464-1477. 10.1007/s11947-018-2111-8.

Kowitcharoen, L., Phornvillay, S., Lekkham, P., Pongprasert, N., Srilaong, V. (2021). Bioactive composition and nutritional profile of microgreens cultivated in Thailand. Applied Sciences (Switzerland). 11(17): 7981-7985. doi: 10.3390/app11177981.

Latimer Jr., G.W. (Ed.). (2023). Official Methods of Analysis of AOAC INTERNATIONAL 22nd Edition. Oxford University Press. https://doi.org/10.1093/9780197610145.001.00 01.

Sharma, P., Sharma, A., Rasane, P., Dey, A., Choudhury, A., Singh, J., Kaur, S., Dhawan, K. and Kaur, D. (2020). Optimization of a process for microgreen and fruit-based functional beverage. Anais Da Academia Brasileira de Ciencias. 92(3): 1-15. https://doi.org/10.1590/0001-376520202 0190596.

Treadwell, D., Laughlin, W., Landrum, L. and Hochmuth, R. (2020). Microgreens: A New Specialty Crop: HS1164, rev. 9/2020. Extension Data Information Source.

Wallace, T.C., Murray, R. and Zelman, K.M. (2016). The nutritional value and health benefits of chickpeas and hummus. Nutrients. 8(12): 1-11. https://doi.org/10.3390/nu8120766.

Zhang, Y., Xiao, Z., Ager, E., Kong, L. and Tan, L. (2021). Nutritional quality and health benefits of microgreens, a crop of modern agriculture. In Journal of Future Foods. 1(1): 58-66. Beijing Academy of Food Sciences. https://doi.org/10.1016/j.jfutfo.2021.07.001.

Xiao, Z., Lester, G.E., Luo, Y., Wang, Q. (2012). Assessment of vitamin and carotenoid concentrations of emerging food products: Edible microgreens. J. Agric. Food Chem. 60(31): 7644-7651. doi: 10.1021/jf300459b.