International Journal of Food and Fermentation Technology
Citation: *Int. J. Food Ferment. Technol.*: **12**(02): 113-116, December 2022
DOI: 10.30954/2277-9396.02.2022.6

ASSOCIATION FOR AGRICULTURE ENVIRONMENT AND BIOTECHNOLOGY

RESEARCH PAPER

Nutritional analysis of Value-added Noodles developed by incorporating *Panicum miliaceum*, *Lens culinaris* and *Triticum aestivum* flour

Shubhangi Srivastav, Kanak Chaudhary and Ekta Singh Chauhan*

Department of Food Science and Nutrition, Banasthali Vidyapith, Rajasthan, India

*Corresponding author: eschauhan266@gmail.com

Paper No.: 268 **Received:** 16-09-2022 **Revised:** 24-11-2022 **Accepted:** 03-12-2022

ABSTRACT

Noodles are a type of food made from unleavened dough which is rolled and cut into uniform, thin, long strips; having its origin from China and Japan. The noodles gaining popularity are majorly composed of refined wheat flour that imposes health complications to the consumers. This problem could be minimised by fortifying noodles with some nutrient rich ingredients that has good organoleptic acceptance by everyone. This study focuses on incorporating millet and lentil flour to the noodles development. The prepared samples are checked for organoleptic evaluation to find out the best variant prepared. The results indicated that the sample having 70% wheat flour, 20% proso millet and 10% lentil flour had the overall acceptability due to the presence of increased amount of protein, iron and decreased content of fat and moisture. However, the incorporation of proso millet flour, lentil flour and wheat flour has proved to be a viable method for enhancing the nutritional potential of the developed noodles.

Keywords: Unleavened, Fortifying, Organoleptic, Millet, Lentils

Noodles are a staple food of China and Japan; made from unleavened dough of refined wheat flour, which is stretched, extruded and rolled into thin strips of uniform length (Ahmed *et al.* 2016). Instant noodles are majorly consumed across the globe and have become one of the fastest growing industries. This is because of the convenience it offers like economical, ease of cooking, longer shelf-life and taste. Primarily the noodles have refined wheat flour as the ingredient but nowadays rice flour, buckwheat and starchy vegetables are also being utilised for the same (Kulkarni *et al.* 2012). Nowadays, many researchers have concentrated on the quality improvement of noodles through fortification due to obtaining stable noodles with high nutritional values, health benefits, desirable eating qualities, and the cost-effectiveness of noodle products.

Usually the noodles available in the market at present are made up of refined flour that makes the consumers more prone to obesity, diabetes, cholesterol issues, cardiovascular diseases, hypertension and malnourishment. The noodles already available in the market had toxic substances like lead, selenium, monosodium glutamate, nickel, mercury, aluminium that leads to serious health hazards and have deteriorated health status of many. The food experts have come up with the concept of fortifying the noodles composition to at least reduce its ill effects

How to cite this article: Srivastav, S., Chaudhary, K. and Chauhan, E.S. (2022). Nutritional analysis of Value-added Noodles developed by incorporating *Panicum miliaceum*, *Lens culinaris* and *Triticum aestivum* flour. *Int. J. Food Ferment. Technol.*, **12**(07): 113-116.

Source of Support: None; **Conflict of Interest:** None

and provide some beneficial nutrients and lessen the toxicity to a possible extent. The most effective and economical fortificant available is millets and pulses that will provide all possible nutrients (Pakhare *et al.* 2016).

Millets are a type of cereal commonly grown in most Asian, African countries and parts of Europe having arid and semi-arid climate. There are about 20 known species of millets belonging to Poaceae family. Among them, Proso millet (*Panicum miliaceum*) is the oldest cultivated millet for feed and forage. The other common names include common millet, hog millet, broomcorn millet, and red millet. Proso millet is rich in sulfur-containing essential amino acids such as methionine and cysteine and vitamins like B-complex, particularly niacin and folic acid. It is a good source of minerals like calcium, phosphorus, potassium, sodium, magnesium, manganese, iron, magnesium and zinc. It has a low glycemic index (GI) compared to rice, wheat, and barley, which makes it an ideal food for people with type-2-diabetes mellitus and cardiovascular diseases (Das *et al.* 2019).

Nowadays pulses are gaining more interest in the field of developing healthy and functional foods. Among the different pulses grown globally, lentils have proven to be of supreme health importance due to their unique nutritional components and bioactive phytochemicals. Lentil (*Lens culinaris*) is a leguminous plant high in fibre and low in fat. Lentil proteins are comprised of around 16% albumins, 70% globulins, 11% glutelins and 3% prolamins. Proteins include the essential amino acids: isoleucine and lysine and is deficit in methionine and cysteine. The nutritional characteristics of lentil have been associated with cholesterol- and lipid-lowering effects in humans, along with reducing the incidence of colon cancer and type-2 diabetes. In addition, lentils have high phenolic, flavonoid and condensed tannin contents. The seeds coat of lentils has higher content of flavan-3-ols, proanthocyanidins and flavonols. Human studies have found that lentils may improve cholesterol levels in people with diabetes and may protect against breast cancer in women (Chan et al., 2019).

Wheat (*Triticum aestivum*) is an important cereal grain for export and domestic consumption in many countries throughout the world. It is a good source of trace minerals like selenium and magnesium. Whole grain foods are associated with reduced risk of several chronic diet-related diseases. Wheat contains numerous other components that may play a role in health and disease risk reduction, such as polyphenols, carotenoids, vitamin E, and phytosterols. The additive and synergistic effects of these compounds may contribute to the health benefits of whole grain consumption (Dalton *et al.* 2012).

MATERIALS AND METHODS

Procurement of raw materials

Firstly, the raw materials like Proso millet seeds, lentils and wheat seeds have been purchased from the local market and are soaked for 5-6 hours to remove the anti-nutritional compounds. The seeds are grounded and flour is made in two different proportions.

Product development

The variant A had 70% wheat flour, 20% proso millet flour, 10% lentil flour and variant B had 60% wheat flour, 30% proso millet flour and 10% lentil flour. The noodles were made by kneading the dough and rolling it into thin, uniform strips.

Nutritional analysis

The noodles were tested for Moisture, Ash, Crude fibre, Protein by Microkjeldahl method, Fat by Soxhlet extraction, Calcium (Egbuna *et al.* 2018).

Phytochemical analysis

The noodles underwent phytochemical testing such as: Flavonoids by Shonda test; Tannins; Steroids by Libermann-Burchard's test; Saponins and Phenols (Egbuna *et al.* 2018).

Sensory evaluation

The panel members were selected by triangle test.

They were provided with the prepared noodle sample and were asked to mark their acceptability on the sheets on the parameters of colour, aroma, texture, appearance, taste, after taste on the 9-point hedonic scale.

Statistical analysis

The statistical tests deployed in the current research were Mean, Standard deviation and T-test. Later, the results were represented in tabular format.

RESULTS AND DISCUSSION

The present investigation was carried out to develop noodles by incorporating proso millet, lentils and wheat flour. The proximate, mineral and phytochemical analysis and sensory evaluation was performed on the noodles powder.

Proximate composition of the noodles

The results indicated that the moisture and ash content of the control noodles and fibre composition was in accordance with the results of the noodles prepared by Jayasena *et al.* (2008). Moisture content is an important proximate parameter which is vital for stability of a product during storage. The moisture, ash, and protein content decreased from the control sample to the other two developed variants. The Variant A had the highest protein and fibre content. The samples with low moisture content indicate that they will have longer shelf life (Bolarinwa and Oyesiji, 2021).

Table 1: Proximate analysis of the Noodles

Nutrients (g/100 g)	Control	Variant A	Variant B
Moisture	9.1±0.1	8.5±0.20	7.9±0.25
Ash	2.13±0.15	1.73±0.15	1.46±0.20
Fibre	7.2±0.2	7.8±0.02	7.1±0.01
Fat	14.9±0.15	14.1±0.15	13.2±0.15
Protein	4.03±0.02	6.20±0.03	5.89±0.04

**The values are Mean±SD.*

Mineral composition of the noodles

Both the variants A and B showed slightly low calcium content than the other fortified noodles (Okwu and Emenike *et al.* 2007) but had higher iron content in Variant A. The calcium composition decreased from the control sample to the other two variants.

Table 2: Mineral content analysis of the Noodles

Minerals (mg/100 g)	Control	Variant A	Variant B
Calcium	1.91±0.015	2.05±0.06	1.50±0.01
Iron	16.86±0.07	15.87±0.04	14.53±0.14

**The values are Mean±SD.*

Phytochemical composition of the noodles

Phytochemicals are non-nutritive bioactive, naturally occurring compounds found in fruits, spices and vegetables. They act as anti-oxidants and protect the cells against free radicals. It can stimulate certain enzymes, thereby reducing the risk of cancer and also play a significant role in stimulation of hormones (Okarter *et al.* 2010). The control as well as the other variant samples of the prepared noodles indicated the presence of phytochemicals in them. The control noodle sample lacks alkaloids and flavonoids.

Table 3: Phytochemical composition of the Noodles

Samples	Alkaloids	Saponins	Flavonoids	Phenols	Tannins
Control	-	+	-	+	+
Variant A	+	+	+	+	+
Variant B	+	+	+	+	+

'+' indicates presence; '-' indicates absence.

Sensory evaluation of the noodles

Sensory evaluation deals with interpreting the qualities of the food as perceived by the panel members in terms of their overall acceptability. The control and both the prepared variants were presented before the members to give their responses. As per the results obtained, the variant A showed good results as compared to the control noodles

Table 4: Acceptability evaluation of the Noodles

Samples	Texture	Taste	Appearance	Colour	Overall acceptability
Control	4.6±0.48	4.7±0.45	5.0±0.0	4.8±0.35	4.7±0.45
Variant A	3.6±0.48	3.0±0.37	2.9±0.25	2.0±0.53	3.0±0.37
Variant B	2.8±0.41	2.6±0.50	1.9±0.25	1.9±0.25	2.4±0.50

and variant B. The composition of the most accepted noodles include 70% wheat flour, 20% proso millet flour and 10% lentil flour.

CONCLUSION

Noodles are relatively more popular among children and adults as snacks, but noodles made up of only wheat flour are a poor source of dietary fibers, proteins, and minerals. Therefore, it can be overcome by fortifying the noodles with millets and pulses to increase its nutritional content. Purposive fortification may help instant noodle to carry some nutrition but there is much need to divert attention of people that there are healthier and natural resources of good and fast food other than instant noodles. The noodles available in the market lacks important nutrients like protein, Vitamin A, Vitamin B12, Vitamin C and thus is not a complete source of good nutrition. The consumption of these noodles leads to renal and neural toxicity in adolescents. To overcome this, the developed noodles from proso millet, lentils flour and wheat flour prove beneficial for the consumers and also help to manage their health issues. Adoption of a millet and legume based diet can potentially prevent deterioration of human health resulting from a sedentary lifestyle. PM can lower the risk of cardiovascular disease, and Type 2 diabetes and can help in maintaining obesity levels.

ACKNOWLEDGEMENTS

The authors have not received funding from any organization or institution.

REFERENCES

Ahmed, I., Qazi, I.M., Li, Z. and Ullah, J. 2016. Rice Noodles: Materials, Processing and Quality Evaluation: Rice Noodles: Materials, Processing and Quality Evaluation. Proceedings of the Pakistan Academy of Sciences: B. *Life and Environ. Sci.*, **53**: 215-238.

Bolarinwa, I.F. and Oyesiji, O.O. 2021. Gluten free rice-soy pasta: proximate composition, textural properties and sensory attributes. *Heliyon*, **7**: e06052.

Boye, J.I., Aksay, S., Roufik, S., Ribéreau, S., Mondor, M., Farnworth, E. and Rajamohamed, S.H. 2010. Comparison of the functional properties of pea, chickpea and lentil protein concentrates processed using ultrafiltration and isoelectric precipitation techniques. *Food Res. Int.*, **43**: 537-546.

Chan, E., Masatcioglu, T.M. and Koksel, F. 2019. Effects of different blowing agents on physical properties of extruded puffed snacks made from yellow pea and red lentil flours. *J. Food Process Eng.*, **42**: e12989.

Dalton, S.M.C., Tapsell, L.C. and Probst, Y. 2012. Potential health benefits of whole grain wheat components. *Nutr. Today*, **47**: 163-174.

Egbuna, C., Ifemeje, J.C., Maduako, M.C., Tijjani, H., Udedi, S.C., Nwaka, A.C. and Ifemeje, M.O. 2018. Phytochemical test methods: qualitative, quantitative and proximate analysis. *Phytochem.*, **1**: 381-425.

Jayasena, V., Leung, P., Nasar-Abbas, S., Palta, J. and Berger, J. 2008. Development and quality evaluation of lupin-fortified instant noodles. *In:* Proc. of the 12th International Lupin Conference: Lupins for Health and Wealth Fremantle, Western Australia: International Lupin Association, Canterbury, New Zealand.

Kulkarni, S.S., Desai, A.D., Ranveer, R.C. and Sahoo, A.K. 2012. Development of nutrient rich noodles by supplementation with malted ragi flour. *Intl. Food Res. J.*, **19**: 309.

Lee, S.J., Kim, J.J., Moon, H.I., Ahn, J.K., Chun, S.C., Jung, W.S. and Chung, I.M. 2008. Analysis of isoflavones and phenolic compounds in Korean soybean [*Glycine max* (L.) Merrill] seeds of different seed weights. *J. Agr. Food Chem.*, **56**: 2751-2758.

Okarter, N., Liu, C.S., Sorrells, M.E. and Liu, R.H. 2010. Phytochemical content and antioxidant activity of six diverse varieties of whole wheat. *Food Chem.*, **11**: 249-257.

Okwu, D.E. and Emenike, I.N. 2007. Nutritive value and mineral content of different varieties of citrus fruits. *J. Food Tech.*, **5**: 105-108.

Pakhare, K.N., Dagadkhair, A. and Udachan, I.S. 2018. Enhancement of nutritional and functional characteristics of noodles by fortification with protein and fiber: A review. *J. Pharma and Phyto.*, **7**(1): 351-357.