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EFFECT OF SPINACH AND CHICKPEA FLOUR FORTIFICATION ON COOKING, FUNCTIONAL AND TEXTURAL PROPERTIES OF WHEAT PASTA

UTICAJ FORTIFIKACIJE SPANAĆEM I BRAŠNOM OD LEBLEBIJA NA TERMIČKA, FUNKCIONALNA I TEKSTURALNA SVOJSTVA PŠENIČNIH TESTENINA

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ABSTRACT

The present study was led to prepare pasta from wheat instead of semolina and effect of spinach powder and chickpea flour fortification on cooking, functional and textural properties pasta was assessed. Cooking losses were more in spinach wheat (SW) pasta while these are lowest in chickpea and spinach fortified wheat (CSW) pasta. Crude protein one of the imperative attributes of study was profoundly affected with the fortification and was found to be 10.5 per cent in SW pasta, 18.55 per cent in CSW pasta while it is 10.8 in W pasta. The crude fat were found to be extended from 0.98 per cent to 1.55 per cent. The moisture, ash and acidity were ranged from 8.1 to 8.5, 0.82 to 1.80 and 0.23 to 0.59, respectively. Free radical scavenging properties, ascorbic acid (20.4 mg/100 g) and total phenols (mg/100 g) were higher in CSW pasta while the lowest in wheat (W) pasta. Maximum hardness was also highest in CSW pasta. Overall the fortification increased the antioxidant properties along with textural properties.

Key words: *Cooking quality, Antioxidant activity, Texture, Fortified wheat pasta.*

REZIME

Cilj ove studije je da se istraži uticaj fortifikacije spanaćem u prahu i brašnom od leblebija na termička, funkcionalna i teksturalna svojstva pšeničnih testenina u odnosu na testenine od griza. Značajniji gubici su zabeleženi prilikom termičke obrade pšeničnih testenina sa spanaćem, dok su najmanji gubici zabeleženi kod pšeničnih testenina fortifikovanih leblebijama i spanaćem. Fortifikacija je znatno uticala na sadržaj sirovih proteina, koji je kod pšeničnih testenina sa spanaćem iznosio 10,5%, kod pšeničnih testenina fortifikovanih leblebijama i spanaćem 18,55%, a kod pšeničnih testenina 10,8%. Sadržaj sirovih masti se kretao u rasponu 0,98 do 1,55%, s najvišim vrednostima zabeleženim kod pšeničnih testenina fortifikovanih leblebijama i spanaćem i najnižim kod pšeničnih testenina sa spanaćem. Sadržaj vlage se kretao od 8,1 do 8,5%, sadržaj pepela od 0,82 do 1,80%, a kiselost od 0,23 do 0,59%. Čistači slobodnih radikala, askorbinska kiselina (20,4 mg/100g) i ukupni fenoli (mg/100g), su najzastupljeniji kod pšeničnih testenina fortifikovanih leblebijama i spanaćem, a najmanje zastupljeni kod pšeničnih testenina. Najviše vrednosti maksimalne tvrdoće su zabeležene kod pšeničnih testenina fortifikovanih leblebijama i spanaćem. Fortifikacija je generalno poboljšala antioksidativna i teksturalna svojstva testenina.

Ključne reči: *kvalitet kuvanja, antioksidativna aktivnost, tekstura, fortifikacija pšeničnih testenina*.

INTRODUCTION

Pasta is an extruded product, commonly prepared from hard durum wheat and is devoured everywhere throughout the world. Its creation and utilization is expanding because of its simplicity of transportation, handling, cooking and readiness *(Tudorica et al., 2002)*. Various alterations with respect to size, shape and stronghold have been carried out time to time to make pasta nutritious and charming. Pasta is generally considered healthy as because of its very low sodium and fat content and at the same time it is a rich source of complex carbohydrates *(Giese, 1992)*. But, still the quality of pasta depends on raw material, production recipe and the production process *(Dawe, 2001)*. A number of legumes fortifications has been done previously *(Zhao et al., 2005; Gallegos et al., 2010)*, yet there is absence of data on the advancement of wheat pasta. Spinach and chickpea are an inexpensive source of protein and iron, respectively but have never been reported to be used for making/fortification of pasta in any previous study. Therefore, present study was conducted with an aim to develop pasta from common wheat rather than semolina (as semolina is lower in fibres and nutrients compared to wheat) too, to use chickpea and spinach fortify the pasta in order to improve its protein, iron and vitamin A content and additionally to make it more fibrous and easily digestible.

MATERIAL AND METHOD

Preparation of fortified pasta

Wheat flour pasta (W Pasta) was prepared as per the standard procedure. The distinctive strides took after were mixing, kneading and after that extrusion. Prepared pasta was dried under room temperature to underneath 12 % moisture content. Spinach fortified wheat pasta (SW Pasta) was prepared by fortification of wheat flour with spinach leaf powder (10 %). Spinach powder was prepared by blanching of spinach leaves followed by drying and grinding in powder form. Fine chickpea flour was mixed with equal measure of wheat flour which likewise fortified with spinach powder (10 %) for making chickpea flour and spinach fortified wheat flour pasta (CSW Pasta).

Cooking quality

Cooking loss (%), weight and volume increase (%) were determined according to the method described by *Olfat et al. (1993)*. A 10 g sample of pasta was placed into 300 ml of boiling distilled water in a 500 ml beaker. After simmering for 10, 20 and 30 min., samples were washed with distilled water and allowed to drain for 2 min. Then drained samples were analyzed for their cooking loss, weight and volume increment ascertained by the following equations:

Weight increased (%) = [(weight increased of pasta- weight of uncooked pasta) /weight of uncooked pasta)]*100

Cooking loss (%) = [(weight of drained residue in cooking water) / weight of uncooked pasta weight of] *100

Volume increased (%) = [(volume of cooked macaroni – volume of uncooked macaroni) / Volume of uncooked macroni] *100

Optimum cooking time was established according to *Pinarli et al. (2004).*

Physico-chemical analysis

Moisture content (%), ash content (%), crude fat (%), total carbohydrates (%) and dietary fiber content (%) were determined according to AOAC method *(AOAC, 2004)*. Crude protein content was determined by using Kjeldhal Method and protein content in samples was obtained by using the conversion factor of 6.25. Titratable acidity (per cent citric acid) was estimated by titrating a known volume of the sample against standard 0.1 N NaOH solution by using phenolphthalein as an indicator up to the pink colour as end point *(Ranganna, 2009)*.

Quantitative analysis of antioxidant compounds

Ascorbic acid

Ascorbic acid content was determined as per standard AOAC method using 2, 6- dichlorophenol indophenol dye *(AOAC, 2000)*. The sample extracted in 3 % m-phosphoric acid was titrated with the dye to an end point of pink colour. Results were expressed as mg per 100 g of sample.

Total phenolics

The amounts of total phenolics in the fruits were determined with the Folin-Ciocalteu reagent according to the method of *Bray and Thorpe (1954)* using catechol as a standard. Grounded one gram sample was centrifuged at 5000 rpm and filtered. Filtrate was evaporated in oven up to dryness and dried extract was dissolved in 5 mL distilled water. 0.2 mL aliquot was taken in separate test tubes and volume was made up to 3 mL. Then 0.5 mL Folin-Ciocalteu reagent was added. After 3 min 2 mL of Na_2CO_3 (20 %) was added and mixed. Test tubes were placed in boiling water bath for one min and then cooled. Optical density of the sample was recorded at 650 nm with the help of Spectronic-20. The concentration was determined as per the standard procedure from the standard curve.

Antioxidant activity

Antioxidant activity (Free radical scavenging activity) was measured as per the method of *Brand-Williams et al. (1995)*. DPPH (2, 2-diphenyl-1-picrylhydrazyl) was used as a source of free radical. A quantity of 3.9 mL of $6x10^{-5}$ mol/L DPPH in methanol was put into a cuvette with 0.1 mL of sample extract and kept for 30 min. in dark and absorbance was measured at 515 nm against methanol as blank. The remaining DPPH concentration was calculated using the following equation:

$$\text{Antioxidant activity (\%)} = \frac{\text{Ab(B)} - \text{Ab(S)}}{\text{Ab (B)}} \times 100$$

Where,

$Ab_{(B)}$ = Absorbance of blank

$Ab_{(S)}$ = Absorbance of sample

Texture profile analysis

The textural properties of samples were measured using Texture Analyzer, TAXT2i (Stable 70 Microsystems, UK) using P/ 75 cylindrical probe. Force calibration of the instrument was done prior to start of the experiment to minimize measurement error. The instrument was operated at pre-test speed = 3.073 mm/s, test speed = 2 mm/s, post test speed = 10 mm/s, distance = 30 mm, stain rate = 60 %, trigger force = 5 g. and data acquisition rate of 150 pps. The textural data (force vs. time) was analysed by the instrument software (TEE 32) and parameters (rupture strength and adhesiveness) were measured.

Statistical analysis

Results were expressed as mean values ± standard deviations. Each analysis assay was done five times from the same sample to determine reproducibility. The samples were subjected to One-way analysis of variance and Tukey's test to check for significant differences ($p < 0.05$) using S-plus for Windows (version 8.0.4).

RESULTS AND DISCUSSION

Cooking Quality

The cooking nature of pasta as influenced by time of cooking has been displayed in Table 1. With the increase in cooking time, the increase in weight of WP, SWP and CSWP was measured as 146.2 to 259.0, 151.1 to 243.2, 113.7 to 216.5g, respectively. However the most elevated increment in weight was seen in SWP followed by WP and CSWP irrespective of increment in cooking time. Similarly with increase in cooking time, the losses were also increased in all the treatments. The most astounding loses were seen in SWP, while least in CSWP. Volume is another important characteristic of judging the cooking of pasta. In the present study volume of pasta increased with increase in cooking time. The most noteworthy volume was

Table 1. Physico-chemical properties of different fortified pasta's

Characteristics	SWP	CSWP	WP
Moisture (%)	8.2 ± 0.03^a	8.1 ± 0.04^a	8.5 ± 0.05^b
Ash (%)	0.85 ± 0.02^b	1.80 ± 0.01^c	0.82 ± 0.0^a
Acidity (%)	0.32 ± 0.01^b	0.59 ± 0.03^c	0.23 ± 0.02^a
Crude fiber (%)	4.19 ± 0.03^c	3.82 ± 0.02^b	2.48 ± 0.01^a
Crude protein (%)	10.5 ± 0.04^a	18.55 ± 0.03^b	10.8 ± 0.02^a
Crude fat (%)	0.98 ± 0.03^a	1.55 ± 0.02^c	1.03 ± 0.03^b
Total carbohydrates(%)	79.48 ± 0.23^b	70.47 ± 0.12^a	84.21 ± 0.14^c

**All data are the mean ± SD of five replicates. Mean followed by different letters in the same column differs significantly (p≤ 0.05).*

Table 2. Cooking quality of different fortified pasta's

Cooking time (min.)	SWP	CSWP	WP
Weight increase (g)			
10	151.1 ± 0.03^c	113.7 ± 0.03^a	124.5 ± 0.06^b
20	193.8 ± 0.03^c	185.8 ± 0.04^a	190.4 ± 0.02^b
30	243.2 ± 0.05^c	216.5 ± 0.02^a	229.2 ± 0.03^b
Cooking loss (%)			
10	1.6 ± 0.04^c	0.8 ± 0.06^a	0.7 ± 0.07^b
20	1.8 ± 0.07^b	1.1 ± 0.08^a	1.0 ± 0.06^a
30	2.2 ± 0.07^b	1.6 ± 0.05^a	1.5 ± 0.05^a
Volume increased (%)			
10	1.6 ± 0.03^c	0.8 ± 0.02^a	1.2 ± 0.04^b
20	1.8 ± 0.04^c	1.0 ± 0.04^a	1.4 ± 0.05^b
30	2.2 ± 0.05^c	1.4 ± 0.03^a	2.0 ± 0.02^b

**All data are the mean ± SD of five replicates. Mean followed by different letters in the same column differs significantly (p≤ 0.05).*

seen at 30 min cooking irrespective of different sample. However, maximum increase in volume was recorded in SWP whereas lowest in CSWP.

Increase in the cooking loss with the increase in wheat flour content in pasta may be related to gluten dilution and the protein solubility during cooking in water. It has been seen that a direct relationship exists between pasta cooking quality and protein content. Increase in gluten in pasta results in reduced amount of solid residue in the cooking water *(Pinarli et al., 2004)*. An immediate connection has been seen between cooking time and cooking loss. Comparable outcomes were likewise revealed by *Breen et al. (1977)* in spaghetti made from bean fortification.

Physico-chemical properties

The diverse physico-chemical characteristics such as moisture, ash, acidity, crude protein and crude fat were evaluated to compare the quality of developed fortified pasta. The moisture, ash and acidity content of pasta ranged from 8.1 to 8.5, 0.82 to 1.80 and 0.23 to 0.59 %, respectively. The low moisture content in the final product is associated with the long shelf life *(Prabhasankar et al., 2009)*. A comparative or slightly higher ash levels have been reported in durum wheat flour enriched with chickpea flour *(Sabanis et al., 2006)* and lentil flour fortified sphagetti *(Zhao et al., 2005)* in a range of 1.7 to 3.6 per cent, respectively.

Crude protein is one of the important characteristics of any food product. Amid the study it was found that crude protein was significantly affected by fortification of pasta and it ranged from 18.55 per cent (CSWP) to 10.80 per cent (WP). The crude fat was also analysed and found in a range of 0.98 per cent to 1.55 per cent, with highest content in CSWP and minimum in SWP. Like most of the legumes, chickpeas are considered a good source of protein and have been reported to possess 20.7 % to 24 per cent crude protein *(Bravo et al., 1999; Sabanis et al., 2006; Zhao et al., 2005 and Iqbal et al., 2006)*.

Antioxidant properties

Antioxidants are the important compounds which are required for the protection of our body from free radicals that causes oxidative stress. Ascorbic acid and phenols are the major intensifies that are naturally found in plant based foods. Information exhibited in table 3 demonstrates the ascorbic acid and total phenolics content in developed pasta. Maximum total phenolics and ascorbic acid content was recorded as 20.4 and 3.03 mg/100 g, respectively in CSWP.

Table 3. Antioxidant properties of different fortified pasta's

Characteristics	SWP	CSWP	WP
Ascorbic acid (mg/ 100g)	15.3 ± 0.03[b]	20.4 ± 0.04[c]	13.6 ± 0.02[a]
Total phenols (mg/ 100 g)	1.93 ± 0.02[b]	3.03 ± 0.02[c]	1.85 ± 0.03[a]

**All data are the mean ± SD of five replicates. Mean followed by different letters in the same column differs significantly (p≤ 0.05).*

Table 4. Texture profiling of different fortified pasta's

Test ID	Hardness (g)	Stickiness (g)
WP (Atta Pasta)	730.803	-7.742
SWP (Spinach Pasta)	1049.697	-5.579
CSWP (Chickpea Spinach Pasta)	1195.425	-6.148
Average	991.975	-6.489
S.D.	194.023	0.916
C.V.	19.559	-14.108

Ascorbic acid, a water-soluble vitamin, differs with the species of plants, ripeness, storage conditions, processing and handling *(Moser and Bendich, 1991; Ottaway, 1993)*. Indeed, even it is difficult to retain ascorbic acid during drying because ascorbic acid is susceptible to heat *(Takeoka et al., 2001)*. Moreover, ascorbic acid and its oxidation product (dehydro ascorbic acid), has many biological activities due to their antioxidant properties *(Davey et al., 2000; Lee and Kader, 2000)*.

Figure 1 shows the impact of fortification on free radical scavenging activity (FRSA) of fortified pasta. It was observed that FRSA of developed pasta increased with fortification and was found maxium in CSWP followed by SWP. This expansion in FRSA of wheat pasta can be attributed to the rise in ascorbic acid and total phenolics content due to fortification with spinach and chickpea flour, as antioxidant activity depends upon pigments like carotenoids and anthocyanins, ascorbic acid *(Brand et al., 1990)* and total phenolic content *(Oszmianski and Wojdylo, 2009)* in the product.

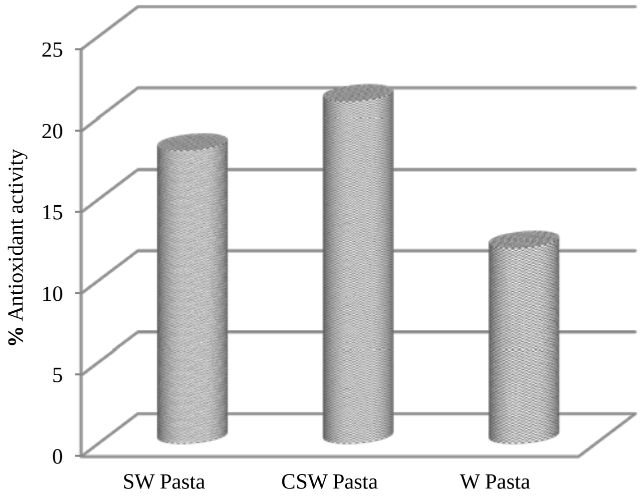

Fig. 1. Effect of fortification on antioxidant activity

Texture

The fortification of wheat pasta resulted in an increase in hardness, which can be clearly observed from the Figure 2. Information demonstrating the texture profile of developed pasta has been presented in Table 4. The maximum stickiness was found in WP (-7.742 g) and minimum in SWP (-5.579 g). Hardness and stickiness are related to the amount of starch and starch gelatinization in the product. During cooking, extreme changes occur in the microstructure of pasta. The consistency of dry pasta changes by the diffusion of water from outside to the inside and closer to the surface of the pasta strand the changes are more outrageous. Starch granules are responsible for poor structure of pasta. Protein matrix also breaks down due to denaturation which occurs due to cooking of product. Elasticity in pasta is somewhat protected by protein gluten *(Voisey et al., 1978)*. *Malcolmson et al. (1993)* found that protein level significantly affected the firmness, compressibility and cooking loss of optimally cooked spaghetti, whereas elasticity was found to relate to drying temperature. Lower firmness ensnares spaghetti with lower quality. *Rayas et al. (1996)* reported that using buckwheat and amaranth flours in pasta, there was a diminishing value in firmness but an increase with lupin flour. This could be related to the inclusion of insoluble fiber which makes the porous structure of pasta and subsequently influences firmness *(Petitot et al., 2009)*.

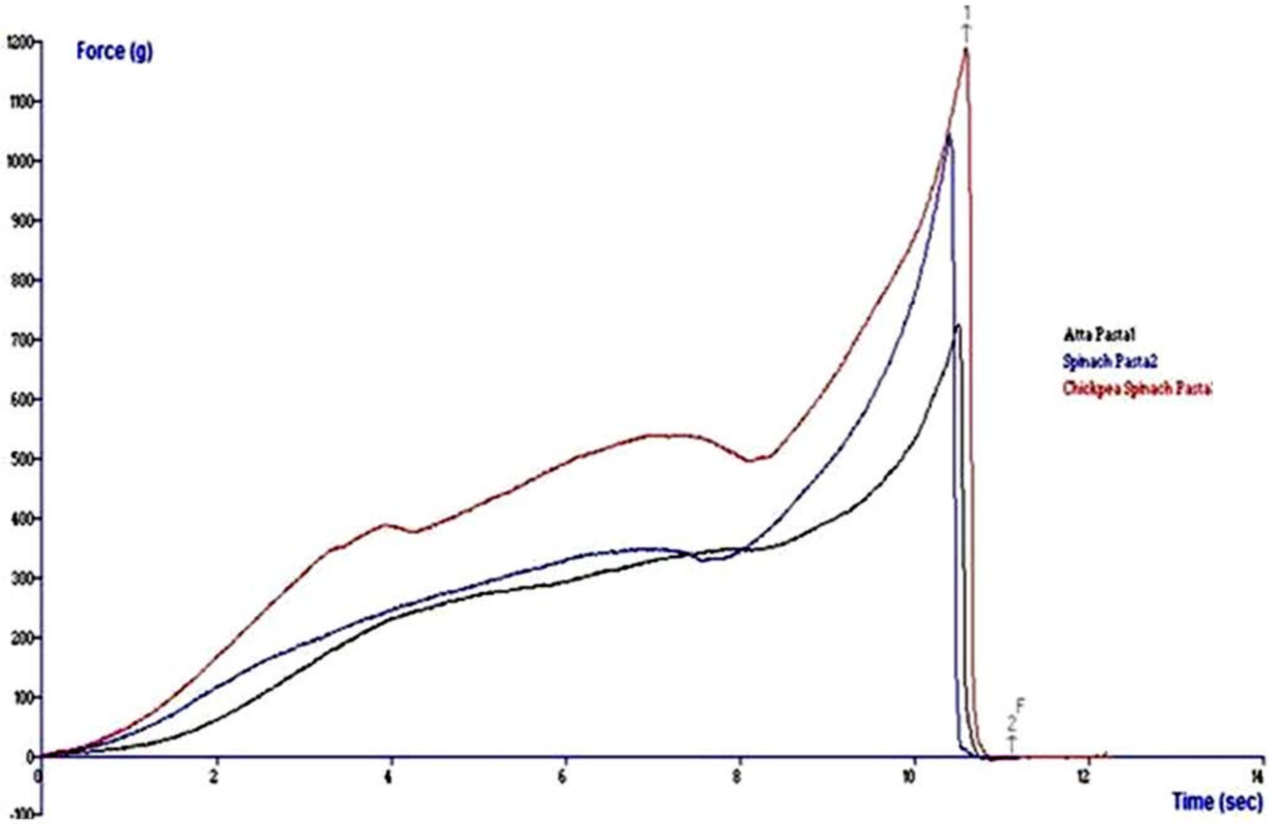

Fig. 2. Effect of fortification on textural properties of different types of pasta

CONCLUSION

Pasta is traditional instant product and getting to be noticeably prominent in present day world. Pasta produced using wheat flour higher in fibre and nutrient content than the conventional pasta made from durum wheat. The fortification of chickpeas and spinach in wheat flour makes it more healthy and worthy by expanding the wholesome quality as well as also functional properties which are deficient in the customary pasta. Cooking quality, physico-chemical and functional properties of wheat pasta are directly related to the fortification. CSWP was found to be the best as far as nutritional, functional and cooking quality. Fortification increased the antioxidant properties along with textural properties wheat pasta and fortified wheat could be produced and used as an alternative for conventional pasta and can add variety in food products.

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Authors' contribution All authors contribute equally in this article.

REFERENCES

A.O.A.C. (2000). Official Methods of Analysis. Association of Official Analytical Chemists, Washington, DC, USA.

Brand, J.C., Snow, D.J., Nabhan, G.P., Truswell, A.S. (1990). Plasma glucose and insulin responses to traditional Pima Indian meals. American Journal of Clinical Nutrition, 51, 416-420.

Brand-Williams, W., Cuvelier, M.E., Berset, C. (1995). Use of a free radical method to evaluate antioxidant activity. LWT - Food Science and Technology, 28, 25-30.

Bravo, L., Siddhuraju, P., Saura, C.F. (1999). Composition of underexploited Indian pulses. Comparison with common legumes. Food Chemistry, 64, 185-192.

Bray, H.G., Thorpe, W.V. (1954). Standard methods of biochemical analysis, Kalyani Publishers, New Delhi.

Breen, M.D., Banasik, O.J., Walsh, D.E. (1977). Use of various protein sources in pasta. Macaroni Journal, 26, 34.

Davey, M.W., Montagu, M.V., Inzé, D., Sanmartin, M., Kanellis, A., Smirnoff, N., Benzie, I.J.J., Strain, J.J., Favell, D., Fletcher, J. (2000). Plant L-ascorbic acid: chemistry, function, metabolism, bioavailability and effects of processing. Journal of the Science of Food and Agriculture, 80, 825–860.

Dawe, P.R. (2001). Pasta mixing and extrusion. In: Pasta and Semolina Technology. Blackwell Science, Oxford, UK, pp 86-118.

Gallegos, I.J.A., Rocha, G.N.E., Gonzalez, L.R.F., Corzo, N., Bello, P.L.A., Medina, T.L., Peralta, A.L.E. (2010). Quality of spaghetti pasta containing Mexican common bean flour (*Phaseolus vulgaris* L.). Food Chemistry, 119, 1544-1549.

Giese, J. (1992). Pasta: New twists on an old product. Food Technology, 46, 118-126.

Iqbal, A., Khalil, I.A., Ateeq, N., Khan, M.S. (2006). Nutritional quality of important food legumes. Food Chemistry, 97, 331-335.

Lee, S.K., Kader, A.A. (2000). Preharvest and postharvest factors influencing vitamin C content of horticultural crops. Postharvest Biology and Technology, 20, 207–220.

Malcolmson, L., Matsuo, R., Balshaw, R. (1993). Effects of drying temperature and farina blending of spaghetti quality using response surface methodology. Cereal Chemistry, 70, 1-7.

Moser, U., Bendich, A. (1991). Vitamin C. In: Machlin LJ (ed.). Handbook of vitamins, Marcel Dekker, New York, 195-232.

Olfat, Y.M., Yaseen, A.A.E., Aziza, I.A. (1993). Enrichment of macaroni with cellulose derivative protein complex from whey and corn steep liquor. Nahrung, 37(6), 544-552.

Osorio-Díaz, P., Tovar, J., Paredes, L.O., Acosta, G.J.A., Bello, P.L.A. (2005). Chemical composition and *in vitro* starch bioavailability of *Phaseolus vulgaris* (L) cv Mayocoba. Journal of the Science of Food and Agriculture, 85, 499-504.

Oszmianski, J., Wojdylo, A. (2009). Effects of blackcurrant and apple mesh blending on the phenolics content, antioxidant capacity and colour of juices. Czech Journal of Food Sciences, 5, 338-351.

Ottaway, P.B. (1993). Stability of vitamins in Food. In: Ottaway, P.B. (ed.). The technology of vitamins in food, Chapman and Hall, Cornwell, 90-113.

Petitot, M., Abecassis, J., Micard, V. (2009). Structuring of pasta components during processing: impact on starch and protein digestibility and allergenicity. Trends Food Science and Technology, 20, 521-532.

Pinarli, I., Ibanoglu, S., Oner, M.D. (2004). Effect of storage on the selected properties of macaroni enriched with wheat germ. Journal of Food Engineering, 64, 249-256.

Prabhasankar, P., Ganesan, P., Bhaskar, N., Hirose, A., Stephen, N., Gowda, L.R., Hosokawa, M., Miyashita, K. (2009). Edible Japanese seaweed, wakame (*Undaria pinnatifida*) as an ingredient in pasta: Chemical, functional and structural evaluation. Food Chemistry, 115, 501- 508.

Ranganna, S. (1986). Handbook of Analysis and Quality Control of Fruit and Vegetable Products. 2nd ed. Tata McGraw Hill Publication Company, New Delhi.

Rayas, D.P., Mock, C.M., Satterlee, L.D. (1996). Quality of spaghetti containing buckwheat, amaranth, and lupin flours. Cereal Chemistry, 73, 381–387.

Sabanis, D., Makri, E., Doxastakis, G. (2006). Effect of durum flour enrichment with chickpea flour on the characteristics of dough and lasagne. Journal of the Science of Food and Agriculture, 86, 1938-1944.

Takeoka, G.R., Dao, L., Flessa, S., Gillespie, D.M., Jewell, W.T., Huebner, B., Bertow, D., Ebeler, S.E. (2001). Processing effects on lycopene content and antioxidant activity of tomatoes. International Journal of Food Science and Nutrition, 56, 597-605.

Tudorica, C.M., Kuri, V., Brennan, C.S. (2002). Nutritional and physicochemical characteristics of dietary fiber enriched pasta. Journal of Agriculture and Food Chemistry, 50, 347-356.

Voisey, P.W., Wasik, R.J., Loughheed, T.C. (1978). Measuring the texture of cooked spaghetti: Explatory work on instrumental assessment of stickiness and its relationship to microstructure. Canadian Institute of Food Science and Technology Journal, 11(4), 180–188.

Zhao, Y.H., Manthey, F.A., Chag, S.K.C., Hou, H.J., Yuan, S.H. (2005). Quality characteristics of spaghetti as affected by green and yellow pea, lentil, and chickpea flours. Journal of Food Science, 70 (6), S371-S376.

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