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Development and Physico-Chemical Analysis, Organoleptic Evaluation of Instant Noodle Using Spinach (*Spinacia oleracea*)

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ABSTRACT

The Development and Physico-chemical analysis of fibre-rich noodles were studied at the Department of Food Technology Parul Institute of Applied Science, Parul University, Vadodara. The goal of developing a fiber noodle is to utilize spinach (*Spinacia oleracea*). Dietary fiber intake may decrease appetite and result in a prolonged feeling of fullness after consumption. Which provide nutrients such as Protein, Fat, Carbohydrates, Dietary fiber and Minerals, respectively. Noodles were developed using spinach, oats flour, wheat flour, and olive oil. Four variations of the noodles were prepared T_0, T_1, T_2, and T_3 with the incorporation of 20 grams, 30 grams, and 40 grams of spinach puree along with control sample without spinach incorporation, the most acceptable sample (T_3) is used for sensory evaluation like colour, texture, taste, aroma and overall acceptability which was highly acceptable with 8.5 points. The cooking quality was also examined and conclusion are cooking time 6.05 min and cooking loss 1.35 gm. Physio-chemical parameters were analysed noodles had 5.6 gm protein, 4.3 gm dietary fiber, moisture 8.34%, carbohydrates 43.0 gm, ash 1.38%, fat 2.1 gm and calories 213.3 k/cal, along with mineral value of iron with 3.41 mg per 100 gm of nutritive value. Therefore, Spinach Puree had the potential to serve as a food fortifier for the future development of noodles as a functional food product.

Key Words : Spinacia Oleracea, Organolepticevaluation, Fiber-enrich, Physic-chemical properties, Cooking quality

INTRODUCTION

One of the staple foods eaten in many Asian nations is noodles. The popularity of instant noodles is increasing worldwide as a cuisine. Numerous researchers are investigating the possibility of fortifying noodles as a successful public health intervention and to enhance its nutritious qualities. The qualities of instant noodles, such as flavour, nutrition, convenience, safety, prolonged shelf life, and affordable pricing, have helped them become well-liked. Colour, flavour, and texture are variables, as well as cooking quality, rehydration rates during final preparation, and the presence or absence of rancid taste after prolonged storage are crucial instant noodle quality (Pakhare *et al.,* 2016). The demand for instant noodles is soaring globally, and this segment of the noodle market is expanding quickly. Second only to bread in terms of global consumption is noodle. In many cultures, noodles are a common dish. Noodle created with unleavened dough that is stretched, extruded, flattened flat, and cut into a variety of forms (Okoye *et al.*, 2008) .Indians primarily eat foods made from cereal. Cereal diets have poor micronutrient bioavailability, which can cause iron deficiency, anaemia, and vitamin "A" deficiencies. Some green leafy vegetables, which are more commonly grown in India, are a good source of β-carotene, a precursor to vitamin 'A. Despite the fact that India has more than 25 different species of green leafy vegetables (Premavalli *et al.,* 2001). The green vegetables that the Indians utilized were spinach, fenugreek, drumstick leaves,

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coriander, and curry leaves, among many others. Due of their short shelf life, proper processing and preservation can reduce loss and enhance availability in the diet during the off-season. Multiple micronutrient deficiencies are more prevalent than single deficiencies in impoverished nations, and their high incidence is caused by low dietary fibre and nutrients ingestion and bioavailability (Ramu and Malloo, 2016).

The incorporation of spinach paste (*Spinacia oleracea*) in noodles preparation can improve its nutritional status and provide various health benefits to diabetic and cardiovascular patients. Present investigation was carried out with an aim to prepare nutrients rich noodles with supplementation of spinach paste. The annual plant spinach (*Spinacia oleracea*) is a member of the Chenopodiaceae family. It is a South-West Asian native that is widely spread and grown around the world, including Iran, as vegetables because of their great nutritional content (Roughami and Miri, 2019). Whether eaten raw or cooked, it contains a high concentration of vitamins B6, riboflavin, folate, niacin, soluble dietary fibre, omega 3-fatty acid, and minerals, which helps to avoid disorders like osteoporosis and anaemia caused by iron deficiency. Spinach may also help to prevent age-related vision loss caused by macular degeneration and cataracts, which may also interact (Patricia *et al.*, 2014). With cancer-fighting herbs and vitamins. Consuming 200gm of spinach provides 41 calories and is an excellent source of vitamin K, flavonoids, carotenes, vitamin C, and folic acid compounds in spinach prevent the development of cancer cells. It has also been discovered that flavonoids compounds in spinach function as an antioxidant agent that acts as an anticancer agent in the body (Miano, 2016).

METHODOLOGY

Collection of Raw Material:

Spinach, whole wheat flour, oats flour, olive oil, salt was purchased from local market of Vadodara, Gujarat.

Equipment used:

Weighing balance (Electronic weighing balance), Electronic Grinder, Extruder Machine, Measuring Cylinder.

Preparation of Spinach Extract:

Fresh spinach leaves (*Spinacia oleracea*) purchased from local market was first sorted and then cleaned to remove the dirt and dust from the leaves. After steaming the spinach for 3-5 minutes and letting it cool for a short while, then it was then blended into a puree.

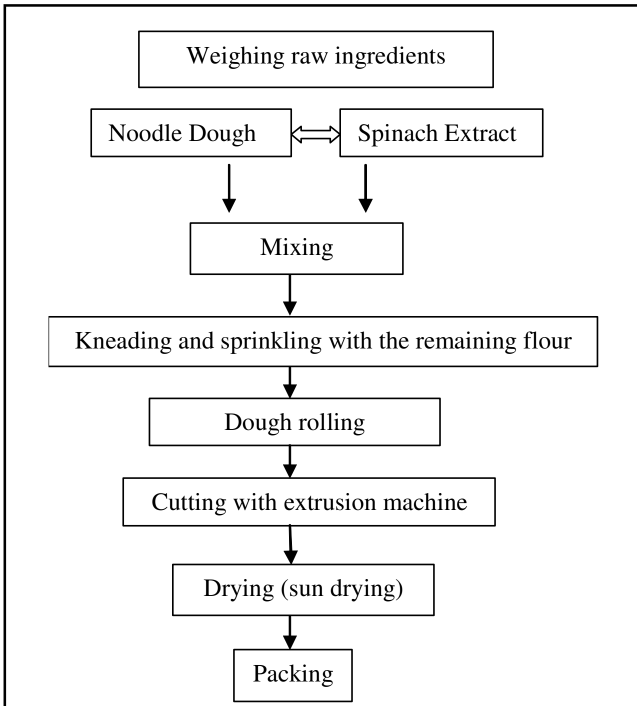

Fig. A : Flow chart of noodle making

Table 1 : Composition of noodle

Ingredient	Sample T_1	Sample T_2	Sample T_3
Wheat flour	70 gm	60 gm	50 gm
Oats flour	10 gm	10 gm	10 gm
Spinach puree	20 gm	30 gm	40 gm
Olive oil	1 tablespoon	1 tablespoon	1 tablespoon
Salt	2gm	2gm	2gm

Preparation of Noodle:

Sensory analysis and hedonic scale of noodle:

Samples of Instant noodles were cooked in mineral water for the optimum cooking time in order to assess their sensory qualities. Four semi-trained panellists performed sensory characteristics tests to assess the acceptance and preference of four variations of cooked noodles based on sensory attributes such texture, colour, aroma and overall acceptability were checked and hedonic (1-9 = dislike-like) were used in this test. Panellists were given a questionnaire sheet to use in order to rate products according to a random code.

Determination of physical characterises of noodle:

The cooking qualities of the dried noodles were evaluated with respect to optimum cooking time and cooking loss (Ramu and Basha, 2018).

Measurement of the optimum cooking time:

The following method was used to calculate the instant noodle cooking loss and cooked weight. In order to cook the noodles (5 g) for 1 minute longer than recommended, they were cut into 5 cm lengths and placed in 200 mL of boiling distilled water. Crushing cooked noodles between two glass plates until the white hard core in the noodles strand vanished calculate the optimum cooking time. After being rinsed with distilled water, the cooked noodles were filtered through a nylon screen and allowed to drain for 5 minutes (Ramu and Basha, 2018).

Measurement of the cooking loss:

Cooking loss was determined as the percentage of solids lost during cooking when the combined cooking water and rinse water were evaporated to dryness at 110^0 C as a percentage of the dry cooked noodle weight before cooking, cooked weight (CW) was calculated (Ramu and Basha, 2018).

Determination of Chemical composition of the noodle:

The sample noodle T_3 nutritional composition was examined for both macro and micronutrients, including moisture, carbohydrates, energy, protein, fat, crude fibre and Ash, using standard methodologies (AOAC, 1980). Iron content by (AOAC 19th Edn, 2012).

Moisture content:

Was determined by taking 10 g of sample in petri dish and followed by drying carried out in a hot air oven at 600C temperature, then cooled and weighed sample.

$$\text{Moisture per cent} = \frac{\text{Fresh sample (g) - Dry sample (g)}}{\text{Fresh sample (g)}} \text{ x } 100$$

Protein content:

Protein content of the noodle sample was calculated as percent total nitrogen by the Kjeldhal method.

$$\text{Protein (g/100g)} = \frac{\text{Titre value x Normality of HCl x 14.001 x 6.25}}{\text{Sample weight (g) x 1000}} \text{ x } 100$$

Fat content:

It was determined as crude ether extract by using sample which is basically moisture free. For the removal of solvent evaporation process was adopted and the weighing was carried out for residue of the fat.

$$\text{Fat content (g/100g)} = \frac{\text{Weight of the ether extract}}{\text{Weight of the sample taken}} \text{ x } 100$$

Crude fibre:

The estimation of crude fibre was carried out by using moisture and fat free samples and expressed as g/ 100 g of sample.

$$\text{Crude fibre (g/100g sample)} = \frac{\text{[100 - (moisture + fat)] x (We - Wa)}}{\text{Wt. of sample taken (moisture and fat free)}}$$

Ash content:

5 grams of sample was taken in crucible. Then the charring carried out slowly in a muffle furnace for about 240 to 300 min at 6000 C temperature. Later the sample was taken out cooled and weighing has done to know the ash content of the sample.

$$\text{Ash content (g/100g sample)} = \frac{\text{Weight of the ash}}{\text{Weight of the sample}} \text{ x } 100$$

Carbohydrate content:

Differential method was adopted to calculate Carbohydrates content of the sample.

CHO (g/100 g) = 100 – [Protein (g) +Fat (g) +Ash (g) + Fibre (g) +Moisture (%)]

Energy content:

The composition of energy was computed for all the samples.

Energy (Kcal) = Protein (g) × 4 + Fat (g) × 9 + Carbohydrate (g) × 4

Iron content:

Atomic absorption spectrophotometer was used to determine the Iron content of the sample and results were expressed in mg/100 g of sample.

RESULTS AND DISCUSSION

Organoleptic Evaluation:

The sensory evaluation of all three formulation samples plus the control sample is performed, but the graph shows that the control sample was most accepted on the basis of color only with 6 points (like slightly), other attributes were scored less than 6 points, and overall acceptability was disliked slightly. If we look at the formulation of spinach paste (*Spinacia oleracea*) into dough T_1 and T_2, the qualities were extremely similar, with points ranging from 7 to 6, and the color rated in both T_1 and T_2 was 7 points, which falls into the moderately liked area. In comparison, total product acceptability ranged from neither like nor dislike to like slightly. Finally, T_3 received the most favorable ratings in all categories, including color and smell (8 points), texture (9 points like extremely), and taste (7 points). This means that overall competence was 8.5 points. Between very lot and exceedingly much (Fig. 1).

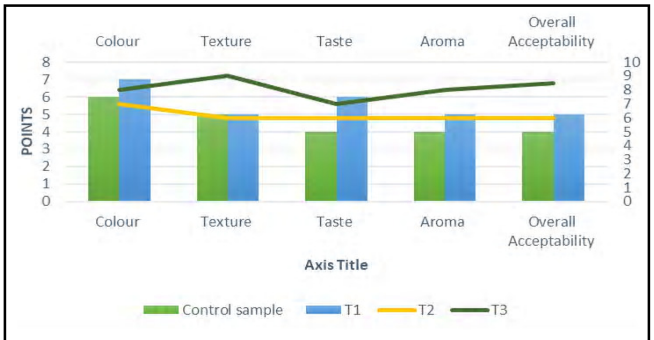

Fig. 1 : Sensory evaluation

Measurement of optimum cooking time:

Noodles require different amounts of time to cook due to differences in the ingredients they contain. The values recorded were 8.5, 7.5, 6.25, and 6.05 for the control sample and formulation T_1, T_2, and T_3, respectively. These values are shown in Fig. 2 In comparison with formulation T_1, T_2 and T_3, the cooking time for the control sample was considerably longer in all samples. Whereas T_3 took lesser time to cook.

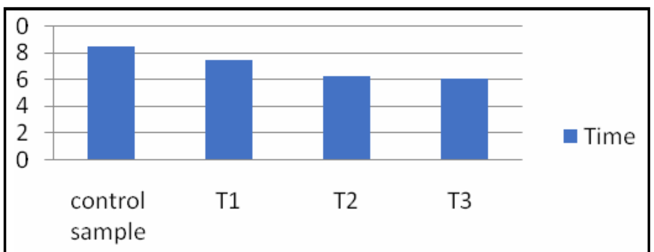

Fig. 2 : Cooking time

Measurement of cooking loss:

The cooking loss was 1.15 for control sample, 1.76, 1.40 and 1.35 minutes for the T_1, T_2, T_3 formulation as shown in Fig. 3 the cooking loss was higher in T than other formulation, respectively.

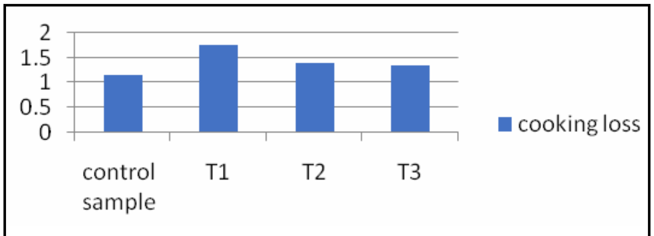

Fig. 3 : Cooking loss

Chemical and nutritional quality characteristics of noodle:

Table 2 : Chemical composition of noodle sample T_3

Sr. No.	Parameter	Per 100 gm
1.	Protein	5.6 gm
2.	Calories	213.3k/cal
3.	Carbohydrates	43.0gm
4.	Ash	1.38%
5.	Moisture	8.34%
6.	Dietary fibre	4.3gm
7.	Fat	2.1gm

Table 3 : Mineral value of noodle sample T_3

Sr. No.	Nutrient	Content
1	Iron	3.41mg

Conclusion:

Development of noodle by spinach *(Spinacia oleracea)* with 20gm, 30gm, 40gm ratio in wheat flour and oats flour noodles were studied. In which T_3 was found to be the best among all the different treatment, sample T_3, contain 5.6 gm protein, 4.3 gm dietary fibre, moisture 8.34%, carbohydrates 43.0 gm, ash 1.38%, total fat 2.1 gm, calories 213.3 k/cal, and iron with 3.41 mg In terms of sensory analysis 40 gm sample was highly acceptable with 8.5 points. Cooking time was reduced and cooking loss was 1.35 gm with the level of spinach incorporation.

The main objective behind product development was to develop a product that is nutrient-dense. The fibre-rich cooked noodles may also be the ideal choice for people who are unable to eat their meals on time because they include an adequate quantity of protein and calories. The daily diet currently only includes a small number of foods that include spinach, making it an under utilised leaf vegetable. The main cause is a lack of products that appeal to the urban community's tastes. So, for the promotion, commercialization, and enhancement of consumption, nutritional status, and hence improving profitability and better living conditions for society, spinach incorporation for the development of value-added and convenient food products would be a potential option.

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REFERENCES

AOAC 19th edn (2012) Official Method 999.11 Determination of Lead, Cadmium, Copper, Iron and Zinc in Foods Atomic Absorption Spectrophotometry after dry ashing.

AOAC (1980). Official Methods of Analysis, 13th edition. Association of Official Agricultural Chemists, Washington, D.C.

Miano, T.F. (2016). Nutritional value of Spinacia oleraecea spinach-an overview. *Internat. J. Life Sciences & Review*, **2**(12) : 172-174.

Okoye, J.I., Nkwocha, A.C. and Ogbonnaya, A.E. (2008). Production, proximate composition and consumer acceptability of biscuits from wheat/soybean flour blends. *Continental J. Food Science & Technology*, **2** : 6-13.

Pakhare, K.N., Dagadkhair, A. C., Udachan, I. S. and Andhale, R. A. (2016). Studies on preparation and quality of nutritious noodles by incorporation of defatted rice bran and soy flour. *Journal of Food Processing and Technology*.

Patricia, O., Zoue, L., Megnanou, R. M., Doue, R. and Niamke, S. (2014). Proximate composition and nutritive value of leafy vegetables consumed in Northern Cote d'Ivoire. *European Scientific Journal*, **10**(6).

Premavalli, K.S., Majumdar, T.K. and Madhura, C.V. (2001). Processing effect on colour and vitamins of green leafy vegetables. *J. Food Sci. & Technol. (Mysore)*, **38**(1) : 79-81.

Ramu, L. and Basha, S. L. (2018). V Baskher Physio-chemical analysis of spinach paste fortified instant noodles. *Internat. J. Chem. Stud.*, **6**(5) : 2373-2389.

Ramu, L. and Maloo, S. R. I. N. I. V. A. S. (2016). Physical, Chemical and Sensory Properties of Spinach Paste Fortified Instant Noodles. *Internat. J. Innovative Technol. & Res.*, **4** : 5318-5322.

Roughani, A. and Miri, S. M. (2019). Spinach: An important green leafy vegetable and medicinal herb. In *The 2nd International Conference on Medicinal Plants, Organic Farming, Natural and Pharmaceutical Ingredients* (pp. 1-6).

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