Study on Development of Noodles Supplemented with Soya Flour and Carrot Powder

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ABSTRACT

Noodles supplemented with carrot powder and soya flour were developed and assessed for their nutritional and sensory parameters. Total three formulations were prepared. First formulation prepared by supplementing refined wheat flour (250 gm) with carrot powder at 10 % & 5 % with soya flour. Second formulation prepared by supplementing refined wheat flour (250 gm) with carrot powder at 10 % & 10 % with soya flour. Third formulation prepared by supplementing refined wheat flour (250 gm) with carrot powder at 10 % & 15 % with soya flour. A control was prepared with Wheat flour, Salt & Egg. Nutrients like carbohydrate, Protein, fat and crude fiber were also assessed. Sensory acceptability was assessed by 9-point Hedonic Scale.

The highest value of moisture content was observed for the formulation at the level of 10 % carrot powder with 5 % soya flour and lowest was seen at the level of 10 % carrot and 15 % soya flour. Protein and Fat content were highest in the formulation with 15 % soya flour & 10 % carrot powder (C). Fiber, Ash, were highest for the formulation with 15 % soya and 10 % Carrot powder(C).Sensory scores were highest for the formulation with 15 % soya flour and 10 % carrot powder making it the most acceptable formulation.

Keywords: *Refined Wheat Flour, Noodles, Soya Flour, Carrot Powder.*

INTRODUCTION

Noodles are a type of pasta that is generally made from flour, rather than semolina or farina, and contain salt in addition to flour and water. Noodle products are usually made from common wheat fine flour by a process of sheeting and cutting as opposed to pasta products, which are processed from coarse semolina milled from durum wheat by extrusion (Emine Aydin and Duygu Gocmen-2011)

The word noodle is derived from the German Nudel (noodle) and may be related to the Latin word nodus (knot). Noodle is a generic term for unleavened dough made from many different types of ingredients. Noodles can be traced back over 6000 years to northern China (Hou 2001). In 2005, the discovery by Lu et al. (2005) of a pot of thin noodles preserved for 4000 years in Yellow river slit, the oldest noodles yet discovered were found at Qinghai, China. The 4,000-year-old noodles appeared to have been made from millet and suggest that noodles originated in China. During the 13 th century, Marco Polo brought the Chinese noodle technology to Europe, where noodles evolved into the pasta products (Hou 2001). Noodles disseminated from China and were quickly adopted by other countries of South East Asia: Korea, Philippines, Thailand and Malaysia, and were wellestablished in Japan by the 16th century (Hatcher 2001). Buckwheat flour, which had been used as a substitute for rice in Japan, was incorporated into buckwheat (soba) noodles by the seventeenth century. A relatively recent event was the development of the

automated deep fried instant noodle (ramen style) in Japan in 1957 by Nissin Foods where they were quickly adopted as a convenience food. By the 1970s the instant noodle had migrated successfully to the United States. In 1997, it was estimated that 40 billion servings of instant noodles were consumed annually. The manufacture of noodles was revolutionized by the Japanese with the development of power-driven machinery in 1884. At the beginning of the 20th century, the alkaline salt noodle spread gradually throughout Japan by the Chinese immigrants in Yokahama city (Fu 2008). The first instant noodle, called chicken ramen, was produced by Nissin Foods of Japan in 1958. Instant noodles became a mainstream food instantly and their consumers are not only in Asia but worldwide. Most noodles today are produced by machine.

Noodles can be made from wheat flour alone or in combination with buckwheat flour. Wheat flour noodles include Chinese and Japanese type noodles. There are many varieties in each noodle type, representing different formulations, processing methods and noodle quality characteristics. These noodles are typically light brown or gray in color with a unique taste and flavor. Chinese type noodles are generally made from hard wheat flours, characterized by bright creamy white or bright yellow color and firm texture. Japanese noodles are typically made from soft wheat flour of medium protein. It is desirable to have a creamy white color and a soft and elastic texture in Japanese noodles. Egg as an ingredient in noodle formulations act as firming agent giving strength to the dough for sheeting (Emine Aydin *et al.*2011).

Based on the absence or presence of alkaline salt in the formula, noodles can be classified as white (containing salt) noodles or yellow (containing alkaline salt) noodles. Alkali gives noodles their characteristic yellowness. White salt noodles comprise Japanese noodles, Chinese raw noodles or dry noodles. Chinese wet noodles fall under the alkaline noodle category.

Based on processing noodles can be of various nature like *Fresh* (packed after slitting without further processing and stored under refrigeration conditions), *Dried* (Fresh noodle strands are dried by sunlight or in a controlled chamber with an extended shelf life but fragile), *Boiled (*Fresh noodle strands are either parboiled (90 % complete cooking) or fully cooked and packed with coated oil), *Steamed (*Fresh alkaline

noodle strands are steamed in a steamer and may or may not be dried later). Even though there are many types of popular varieties of noodles in China, Japan and Italy based on processing technologies there has been very less focus on formulating noodles with new ingredients to improve the nutritional profile of the product.

Soya Flour . More a high-protein powder than a true flour (typically produced from carbohydrate-rich cereal grains), soy flour is generally made from dehulled, usually heat-processed whole soybeans or defatted soybean flakes, which are ground finely enough with a hammermill so that 97% will pass through a 100-mesh screen and 95% will pass through a 200-mesh screen. Flour passing through the highest rated (finest mesh) screen has the highest protein content. The various types of soy flour are subjected to various amounts of heat processing for different end uses. The more moist heat treatment (usually steaming, which may also be called toasting), the higher the protein quality and nutritional value, and the lower the protein solubility or dispersibility. Heating also greatly reduces the soybean's natural (beany) flavor and inactivates natural enzymes (lipases, oxidases, peroxidases), thus improving the flour's keeping quality. Some flour, however, called "enzyme active," is deliberately given little or no heat treatment; its active lipoxygenase enzymes are used as a natural bleach in bread doughs

Other than whole soybeans, soy flour is generally the least expensive soyfood. If the price index of defatted soy flour and grits is 1, textured soy flour (TSP or TVP) will be about 1.8, soy protein concentrate about 2.3, and soy protein isolate about 5.1 (Langsdorf, in Baldwin 1981). Soy flour is also one of the easiest soy foods to introduce into people's diets (as in breads, chapatis, tortillas, etc.) to greatly improve their nutritional value without significantly altering their cost or the people's eating habits. Good quality soy flour and grits are comparable in protein quality to milk and meat (especially when consumed, as they virtually always are, with cereal grains), yet they cost only about 15% as much er gram of protein. Lightweight, easy to transport, stable, and versatile, soy flour is used extensively worldwide. It also finds special uses in wartime provisions, foreign feeding programs, and relief or refugee foods.

Soy flour is most widely used in baked goods; 2-15% is added to breads, crackers, muffins, donuts, cakes, rolls, cookies, tortillas, or chapatis. It is also used in

pasta products (spaghetti, noodles, macaroni), processed meats (sausages, bologna, frankfurters, meat loaves), gravies, sauces, soups, cereals, prepared mixes (pancake and waffle), dairy substitutes, candies (caramels and toffees), special diet foods (diabetic, allergenic, high protein), and spice bases. In baked goods, soy flour increases the storage life and nutritional value, while adding moisture as needed with little or no increase in cost. In other products, it generally lowers the cost and improves the functional properties by serving as a conditioner, emulsifier, moisture retainer, antioxidant, and/or extender (Wolf and Cowan 1975). In addition to these food uses, soy flour is also used industrially, as in various adhesives and as a nutrient for yeasts and antibiotic-producing microorganisms.

Carrot (Daucus carota) is a root vegetable, usually orange, purple, red, white or yellow in color, with a crisp texture and a rich source of β-carotene and contains other vitamins, like thiamine, riboflavin, vitamin B-complex and minerals (Walde et al., 1992). Carrot is also an excellent source of calcium pectate; an extraordinary pectin fiber that has the cholesterol lowering properties. It has a property to reduce the risk of high blood pressure, stroke, heart disease and some type of cancer (Bakhru, 1993). Carrot pomace is a byproduct obtained during carrot juice processing. The juice yield in carrots is only 60-70%, and even up to 80% of carotene may be lost with left over carrot pomace (Bohm et al., 1999). As the fiber-rich pomace is available in large quantity during juice production, it is worth exploiting the carrot insoluble fiber-rich fractions (IFRF) as a promising hypo cholesterolemic ingredient to fulfill the increasing demand of functional ingredients in developing fiber-rich food products with a good residual amount of all the vitamins, minerals and dietary fibre.

MATERIALS & METHODS

2.1 MATERIALS

The materials used in the study include refined Wheat flour (Maida), Soya flour, Eggs and carrots which were procured from the local market.

2.2 METHOD OF PROCESSING NOODLES

2.2.1 Processing of Control Sample (T)

Refined wheat flour (250 gm) was mixed with liquid egg (55 gm) and salt dissolved water (1.5 gm in 90 ml) to obtain crumbly dough. Egg gives the required

firmness to the dough. The dough is then rested for 20 min and then passed through a pair of smooth rolls of the noodle making machine to obtain a sheet of 2 mm thickness .The sheet is then passed through a pair of corrugated rolls for slitting into noodles of 1.75 mm thickness. The noodles are the steamed for about 30 min. Dried in a hot air oven at 50 ^{o}C for 4.5 hrs up to 12-13 % moisture.

2.2.2 Processing of Carrot Powder

Fresh carrot was washed thoroughly blanched at 80 ^{o}C for 2 min and water drained out. The carrots were grated and dehydrated in a fluidized bed drier for 1hr at 55 ^{o}C. It was then made into powder in a mixer grinder and sieved though 300 mics mesh to get a fine powder.

2.2.3 Processing of Soya flour

Mechanically Extracted Soy Flour: This is made by grinding the low-fat press cake from soybeans that have been crushed, steamed, and hydraulic –or expeller pressed to extract their oil.Containing typically 5-8% fat ,it is no longer widely produced in most industrialized countries.

2.2.4 Processing of Formulations supplemented with Soya flour and Carrot powder

Carrot powder was added at the rate of 10 % to the formulations having soya flour at the rate of 5 %, 10 %, 15 % respectively

Table 2.1 Noodle formulations supplemented with various proportions of soya flour and carrot powder

Sample	Maida(gm)	Carrot (%)	Soya flour (%)
T	250	-	-
A	250	10	5
B	250	10	10
C	250	10	15

T: Control; A: 5 % soya flour + 10 % carrot powder; B: 10 % soya flour + 10 % carrot powder; C: 15 % soya flour + 10 % carrot powder.

Carrot powder and soya flour were added to Maida in the proportions as mentioned in the **Table 2.1**

RESULTS AND DISCUSSIONS

3.1 Proximate analysis of various noodle formulations

The results obtained after the proximate analysis of various noodle formulations is compiled in table 3.1

Table 3.1 Proximate Analysis of constituents for

Samples	Protein %	Fat %	Moisture%	CHO %	Ash %	Crude fiber %
T	11.26	3.21	11.6	40.2	1.02	7
A	16.93	3.64	12.6	51.8	1.10	7.61
B	17.41	3.72	12	52.6	1.19	8.08
C	19.11	3.88	11.4	55.3	1.27	8.97

various noodles formulations

T: Contol; A:5 % soya flour + 10 % carrot powder; B: 10 % soya flour + 10 % carrot powder; C: 15 % soya flour + 10 % carrot powder;

3.1.1 Protein Content

The protein content is contributed by wheat flour, egg and soya flour. The protein content was highest (19.11 %) in sample C due to increased soya flour even though the egg content and wheat content of were kept constant.

3.1.2 Fat Content

The fat content was highest (3.88 %) in sample C (15% + 10 % carrot powder) compared to control (T).

3.1.3 Moisture Content

Even though noodles from all the formulations were subjected to a constant drying time of 4.5 hr in hot air oven there was very slight difference in the moisture contents of the formulations .It could be due to the difference in the quantity of water used for dough making which again is influenced by increasing proportions of dry ingredients i.e., soya flour and carrot powder. Moisture Content was highest in sample A (5 % soya flour + 10 % carrot powder).

3.1.4 Carbohydates

The carbohydrate content was found to be the highest (55.36 %) in formulation C. It could be due to the increased content of the soya flour and carrot powder in formulation (C) as both soya flour and carrot are rich in carbohydrates.

3.1.5 Ash Content

The mineral content was found to be highest (1.27 %) in sample C followed by sample B.

3.1.6 Crude Fiber

Fiber content increased in all the supplemented samples compared to control (T) due to soya flour and carrot powder. Crude fiber content is highest (8.97 %) in the formulation C with 15 % soya flour + 10 % carrot powder followed by formulation B with 10 % soya flour + 10 % carrot powder.

3.2 Microbial analysis of various noodle formulations

The results obtained after the Microbial analysis of various noodle formulations are compiled in the tables 3.2 and 3.3 respectively.

3.2.1 Bacterial Count test

The tests were conducted for dry noodles. The cfu/gm considerably increased due to increased nutrient composition in the supplemented formulations due to increased soya flour and carrot powder.

Table 3.2 Bacterial Count test

SAMPLES	NO.OF COLONIES OF BACTERIA					cfu/g
	A1	A2	A3	A4	AVERAGE	
T	2	2	3	4	3	30
A	3	3	3	2	3	30
B	3	2	3	3	3	30
C	3	4	6	5	4	40

3.2.2 Fungal limit test

There were more cfu's in the samples C (40 cfu/gm) due to increased nutrient content in terms of carbohydrates, proteins, vitamins and minerals in the formulations due to increased levels of soya flour and carrot powder.

Table 3.3 Fungal limit test

SAMPLES	NO.OF COLONIES OF FUNGAL					
	A1	A2	A3	A4	Average	cfu/g
T	2	2	3	2	3	30
A	3	4	3	3	3	30
B	3	4	4	3	3	30
C	5	4	6	3	4	40

3.3 Sensory Characteristics of noodles supplemented with soya flour and carrot powder

The three formulations were subjected to sensory evaluation. The sensory scores suggested that C (15 % soya flour+ 10 % carrot powder) had maximum acceptability.

Table 3.4 Sensory score of supplemented formulations

Samples	Appearance	Colour	Flavour	Taste	Texture	Overall acceptability
T	7.2	6.8	6.6	6.8	6.4	6.4
A	6.8	6.4	6.5	6.4	6.6	6.5
B	6.4	6.6	6.6	6.6	6.8	6.6
C	7	7.2	6.8	7	7	7

T:Contol; A:5 % soya flour + 10 % carrot powder; B: 10 % soya flour + 10 % carrot powder; C: 15 % soya flour + 10 % carrot powder.

According to the study soya flour supplementation was highly accepted at 15 % level. In the present study the increased acceptability could be attributed to added carrot powder which added variety and flavour.

SUMMARY AND CONCLUSION

Noodles supplemented with carrot powder and soya flour were developed and assessed for their nutritional and sensory parameters. Total three formulations were prepared. A control was prepared with Wheat flour, Salt & Egg. Nutrients like carbohydrate, Protein, fat and crude fiber were also assessed. Sensory evaluation was carried out using 9 point hedonic scale for attributes like appearance, colour, texture, taste and flavour.

The highest value of moisture content was observed for the formulation at the level of 10 % carrot powder with 5 % soya flour and lowest was seen at the level of 10 % carrot and 15 % soya flour. Protein and Fat content were highest in the formulation with 15 % soya flour & 10 % carrot powder (C). Fiber, Ash, were highest for the formulation with 15 % soya and 10 % Carrot powder(C).Sensory scores were highest for the formulation with 15 % soya flour and 10 % carrot powder making it the most acceptable formulation.

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