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Development of Grape Seed Powder Incorporated Noodles for Health Benefits

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ABSTRACT: The study was designed to develop grape seed powder incorporated noodles. Efforts was made to the prepare, in the noodles having the different combination of whole wheat flour (WWF), and for mixing the different propositions, the grape seed powder was prepared *viz*.,T0-100% WWF, T_1-98%+2%, T_2-96%+4%, T_3-94%+6%, T_4-92%+8%, T_5-90%+10%. The prepared grape seed noodles were subjected to organoleptic and nutritional quality analysis. The results revealed that noodles with 6% incorporation of grape seed powder (T3) was organoleptically colour, taste secured maximum score flavor and overall accessibility compared to all other samples and found to contain moisture (1.62%), ash (1.12%), protein (6.2%), fat (0.48%), crude fiber (3.32%) and carbohydrate (64.21%). Therefore T_3 was more accessibility productso for that it is the optimized treatment than others.

Keywords: Grape seed, noodles, chemical properties, whole wheat flour.

INTRODUCTION

Noodles was popularly consumed throughout the world, and it is a fast-growing sector because noodles are convenient, low cost, and its having the long shelf life and easy to cook. Noodles belongs to China as early as 5000 BC, and then spread to other Asian countries such as Japan, Thailand, Korea and Malaysia, and now days it has become one of the fastest budding sectors in the world with the compound annual growth rate (CAGR) reaching 4%. Worldwide, China ranks first in the consumption of noodles followed by Indonesia, Japan, and Vietnam. Noodles are one of the favorite food products that are well loved by many people of all ages. Refined wheat flour which is usually used to make noodles are rich in carbohydrates however they lack nutrients like dietary fiber, protein, minerals and vitamins.

Consumers all around the world, nowadays, are more at the risk of many diseases such as cardiovascular diseases and diabetes due to high cholesterol, obesity, high blood pressure and irregular blood sugar levels. These risk factors are because of the diet which is low in dietary fiber, antioxidants and phytochemicals. Foods that are excess in antioxidants and low in Glycemic Index (GI) can decrease the risk of increased postprandial oxidative stress, which is responsible for chronic diseases (Zou *et al.*, 2019).

Grape seeds are the industrial byproduct of the wine process. Grape seeds are treated as waste if extracts are not made and it is estimated that about 10–12 kg of grape seeds in 100 kg of wet residues are produced by the industry (Kulkarni *et al.*, 2008).

Therefore, the objective of this study was to develop noodles using grape seed flour made from whole wheat flour, incorporated by grape seed powder, a waste obtained in excess amounts from grape processing.

MATERIALS AND METHODS

Procurement of Raw materials: grape seed powder, whole wheat flour, was used in this study. Whole wheat flour was used as based materials for the preparation of the noodles. Fresh, uniformly ripened and disease free grape fruits were purchased in a single slot from local

market in Madurai to avoid differences in varieties. Whole wheat, xanthan gum and salt were purchased from the departmental stores at Madurai.

Preparation of grape seed powder: The purchased grape seed were cleaned thoroughly in water to remove dust and dirt. The grape seeds and edible part were separated manually. Then, grape seeds were dried in oven at 60°C temperature for 8 hours till complete drying. The dried seeds were milled in electric churner to make fine powder and sieved using (BS 60 mesh). The prepared grape seed powder was packed and stored in airtight container.

Preparation of whole wheat flour: Wheat grains were cleaned thoroughly to remove dust and dirt. The cleaned grains were ground in the electric grinder to make fine flour and sieved by 60 mesh sieve. The flour sample was kept in air tight container before use.

Standardization of grape seed powder incorporated noodles: Grape seed powder incorporated noodles was prepared by replacing the base material refined wheat flour with flour were used for preparation of noodles and the grape seed powder was incorporated in refined wheat flour at different proportions (Chen *et al.,* 2021).

Table 1: Standardization of grape seed flour incorporated noodles.

Composition	Control	Level of incorporation (%)				
	C	T_1-2%	T_2-4%	T_3-6%	T_4-8%	T_5-10%
Refined Wheat flour(g)	100	98	96	94	92	90
Grape seed flour(g)	-	2	4	6	8	10
Salt(g)	30	30	30	30	30	30
Water(ml)	2	2	2	2	2	2

Preparation of grape seed flour incorporated Noodles. For the preparation of noodles weighed the ingredients and sieve of BS 60 mesh size. The flour was steamed for 15 minutes and steamed dough mixed in the mixing compartment of the noodle making machine. During the mixing of the flour salt and water was added. The homogenized flour was filled in the feeder section of single screw extruder. After extrusion excluded noodles was steamed for 10minutes. The noodles was dried a cabinet dried at 60°C for six hours. Noodles were cooled up to ambient temperature. After preparation of noodles used different packaging materials like stand up pouches and high density polypropylene packages (Zheng *et al.,* 2020).

Proximate analysis of noodles. Moisture, crude fiber and ash were determined according to AOAC (1995). Crude protein was estimated by using micro-kjeldahl method, AOAC (1995) using the factor 6.25 for converting nitrogen content into crude protein. For fat content of noodles, 5 g sample was placed in Soxhlet extraction apparatus and subjected to extraction for 6 h using petroleum ether as solvent and percent fat content of noodle samples were calculated on a weight basis. Amount of carbohydrates was calculated from the sum of moisture, crude protein, crude fat, ash and crude fiber and lastly subtracting it from 100 (Lee *et al.,* 2008).

Sensory evaluation of noodles:

Acceptance was tested by sensory evaluation using 9-point hedonic scale at Food Science and Nutrition Department, community Science College, TNAU, Madurai. Product with different treatments was coded with three-digit number and is analyzed by different subjects in our college faculty and students. They were provided with standard evaluation sheets and asked to score the product based on nine-point hedonic scale for texture, colour, taste, flavour, appearance and overall acceptability. To avoid overlapping of taste of other treatments they were provided with water to rinse mouth and scored from 1-9 with 1 being I dislike extremely *i.e.*, very bad and 9 being I like extremely *i.e.*, the product is excellent in that particular attribute (Boian, 2019).

RESULTS AND DISCUSSION

The grape seed incorporated noodles were evaluated organoleptically. The T_3 that is 6% incorporation of grape seed powder was best according to flavour, taste and overall acceptability.

The sensory score of grape seed flour incorporated noodles is given in Table 2. The grape seed flour was incorporated with refined wheat flour at different concentrations such as T_0 - 100 % Refined Wheat flour, T_1-2% grape seed flour + 98% Refined Wheat flour, T_2 - 4% grape seed flour+ 96% Refined Wheat flour, T_3 - 6% grape seed flour+ 94% Refined Wheat flour, T_4 -8% grape seed flour+ 92% whole wheat flour and 10% grape seed flour+ 90% whole wheat flour The noodles were standardized by sensory evaluation using 9-point hedonic scale by 15 semi-trained panels. The control noodles (T_0) got the highest sensory score followed by T_3(8.5), T_1 (7.9) and T_2(7.7) (Gadei *et al.,* 2012). The nutritional composition of tamarind seed flour (TSF) is given in Table 3. The protein, carbohydrate, moisture, fiber, fat, and Ash were about 1.62 g, 6.52g, 6.20g and 27.02g, 3.25g, 1.12g per 100g respectively. The control product moisture, carbohydrate, protein, fat, fiber and Ash were about 2.45g, 66.23g, 5.65g, 26.36g, 0.95g, 0.65g, per 100g.

Table 2: Sensory evaluation of grape seed powder incorporated noodles.

Treatments	Appearance	Color	Taste	Texture	Overall Acceptability
TO	8.5	8.4	8.6	8.3	8.5
T1	8.0	7.9	7.8	7.9	7.9
T2	7.8	7.7	7.7	7.6	7.7
T3	8.5	8	8.4	8.3	8.5
T4	7.5	7.9	7.0	8.0	7.5
T5	8.0	7.5	7.5	7.4	7.5
SED	0.1330	0.1009	0.1196	0.0741	0.1199
CD (0.05)	0.2898**	0.2198**	0.2607**	0.1614**	0.2613**
CD (0.01)	0.4063	0.3082	0.3655	0.2262	0.3663

Table 3: Chemical composition of grape seed powder incorporated noodles.

Chemical parameter	T0	T3
Moisture (%)	2.45	1.62
Carbohydrates (%)	66.23	67.52
Protein (g)	5.65	6.29
Fat (g)	26.36	27.02
Fiber (g)	0.95	3.25
Ash (g)	0.65	1.12

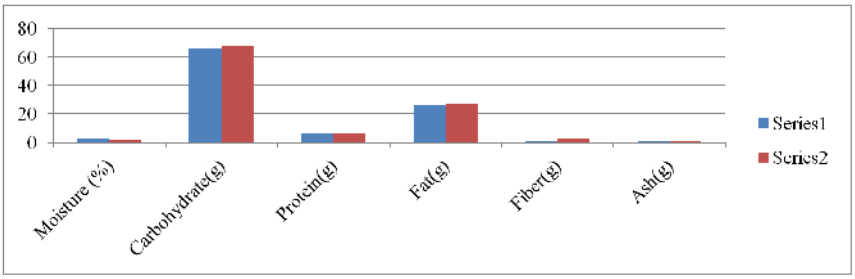

Table 4: Physical Properties of Noodles.

Treatments	Cooking time (minutes)	Cooking loss (%)	Initial weight(g)	Cooked weight(g)	Percent rehydration
T_0	11.10	5.42	24	45.33	94.76
T_1	11.59	5.36	24	46.73	92.36
T_2	11.18	5.22	24	48.25	91.00
T_3	12.06	4.64	24	49.65	102.54
T_4	11.04	5.22	24	48.52	94.32
T_5	12.08	5.12	24	48.56	92.42
SED	0.1694	0.0477	0.2294	0.4920	1.2414
CD (0.05)	0.369**	0.1039**	0.4998^{NS}	1.0720**	2.7048**
CD (0.01)	0.5176	0.1457	0.7008	1.5030	3.7921

Cooking time. The cooking time for T_0 noodles was 10.13 minutes and that of T_1 noodles at 2%, 4%, 6%, 8% and 10% was 11.59 minutes, 11.18 minutes, 12.06 minutes, 11.04 minutes, and 12.08 minutes respectively (Ritthiruangdej *et al.*, 2011) reported the cooking time of noodles fortified with unripe banana flour at the incorporation rate of 0% , 10%, 20%, 30%, 40%, 50% was 12.0 minutes, 12.5 minutes, 13.0 minutes, 13.5 minutes, 14.0 minutes and 14.5 minutes respectively. Statistically, the cooking time was highly significant at 95% level of significance (Lupşa and Gaceu 2010).

Cooking loss. The cooking loss of T_0, T_1, T_2, T_3, T_4 and $T_5$was noted as 5.42 %, 5.36 %, 5.22 %, 4.64%, and 5.22%, and 5.12% respectively. It was observed the cooking loss was decreased with the increasing incorporation of grape seed flour which confirms the statistical analysis which reported that at 95% level of significance, the cooking loss was highly significant. Mahmoud (2012) stated that the cooking loss of noodles fortified with lupin sources (0%, 5%, 10%, 15%, 20% and 25%) had a cooking loss of 5.42%, 5.36%, 5.22%, 5.64%, 5.22% and 5.12% respectively (Zirui Zhang, 2020).

Percent rehydration. The percentage of rehydration in noodles was highest in T_3 (102.54 %), followed by T_2 (91%) and T_1 with 92.0% which was followed by

control (90.0%). The percent rehydration was highly significant at 94% level of significance. The grape seed flour has the tendency to absorb more water which validates the increasing trend of percent rehydration with the increased incorporation of grape seed flour. Ahmed *et al.*, (2015) stated that percent rehydration of wheat noodles with broken rice 0%, 20%, 40%, 60% 80% and 100% was 170±5.46%, 194± 6.03%, 205 ± 21.70%, 234 ± 13.19%, 277 ± 3.31% and 282 ± 1.1% respectively (Anonymous, 2016).

CONCLUSION

In this study concluded that grape seed powder incorporated noodles had a significant effect on chemical and sensory properties of the noodles. Increasing the level of grape seed powder in the noodles formation resulted in noodles with higher crude fiber ash content. 6% grape seed incorporated noodles was blended up to acceptable for the preparation of the best noodles. Development of grape seed products also advantageous for consumer seeking alternative products containing healthy ingredients (Gaceu and Lepadatescu, 2013).

Conflict of Interest. None.

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