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Proximate Nutritional Evaluation of Incorporated Pasta with Fortification of Aonla powder

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Abstract: *Pasta is a popular food and its quality can be measured by appearance, flavour and texture. Present study was undertaken to evaluate the quality of pasta supplemented with different quantities of aonla. In the present study four samples (C, C1, C2, and C3) of pasta were prepared by using refined wheat flour and different proportion of aonla powder. Sample C was prepared as control containing only refined wheat flour (100%) while sample C1 (refined wheat flour 99% aonla powder 1%), C2 (refined wheat flour 97% aonla powder 3%) and C3 (refined wheat flour 95% aonla powder 5%) were prepared by changing the concentration of refined wheat flour and aonla powder. All the four samples were evaluated for the physicochemical properties (ash, texture and viscosity analysis), nutritional properties (carbohydrate, protein, fat, and fiber), cooking time and sensory quality. On the basis of results sample C2 (refined wheat flour 97% aonla powder 3%) was found to be better in quality having more nutritional element and higher overall acceptability.*

Key words: *Aonla powder, Refined Wheat Flour, Supplementation, Nutrition,*

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I. Introduction

Emblica officinalis G, commonly known as High Density Aonla, the Indian Gooseberry or Nelli belongs to Euphorbiaceous family. It is an ancient fruit of Indian origin, which is associated with our tradition, culture and medicine as it is used as an ingredient in more than 175 formulations in ayurvedic medicine system. Fruits are commonly used for preserves (murabbas), pickles, candy, jelly, jam etc. The fruits are also used in the treatment of haemorrhages, diarrhoea, dysentery, anaemia, jaundice, dyspepsia and cough. It is also used for the preparation of various health care and personal care products like Chavanprash, hair oil, dye, shampoo, face cream, tooth powder. Aonla is virtually a super fruit. It is full of antioxidants that are effective in reducing cell damage. It reduces the effects of free radicals (which are responsible for damaging protein, DNA, and cell membranes) and thus effectively combats the aging process. High cholesterol is the leading cause of heart disease. By reducing the build up of bad cholesterol, Aonla reduces the risk of heart disease. It also reduces clogging in the arteries by boosting good cholesterol. Studies have also shown its benefits in preventing the thickening of blood vessel walls, the first sign of heart disease cause of its ability to increase the absorption of protein, Indian Gooseberries are a great way to boost your metabolic rate . Your metabolic rate is how fast your body burns calories. Boosting it will lead to faster weight loss, higher energy levels and an overall increase in lean muscle mass. Research has shown that fruits that are rich in polyphenol protect the body from the oxidative nature of high blood sugar. Amla can thus be therapeutic for people afflicted with diabetes. It also assists the body in the proper absorption of insulin, thus reducing blood sugar levels. Because of this, it is invaluable for people afflicted with diabetes and should be a part of their daily diet .High Density Aonla is a hardy plant and can be grown successfully from sandy loan to clay soils. It has great tolerance to salinity and alkalinity of soil. High Density Aonla is a deciduous fruit tree where flower and fruit setting take place in spring in February and soon after the fruits enter dormancy without any growth throughout the summer till monsoon. Therefore, plants do not require irrigation during summer when most crops would require it. With the onset of monsoon, the fruit starts growing and becomes ready for harvest by December. This is an ideal crop for arid conditions. High Density Aonla is a sub tropical plant and thrives well in warm climate having annual rainfall of more than 600 mm with distinct winter and summer. In India it can be grown from sea level to high altitudes up to 1800 metres above MSL (Mean Sea Level). Warm and humid climate is conducive for initiation of floral buds and fruit setting. A mature tree can tolerate a wide range of temperature, up to about 45 0 C. However, Heavy frost during winter is not conducive particularly for young plantations.

II. Material and Method

2.1. Procurements of raw material

Aonla powder flour usually grinded, and wheat flour (*Triticum aestivam*) is used and procured from local market.

2.2. Evaluation of physicochemical properties of raw material

The content of protein was determined as per (IS: 7219:1973): Kjeldhal method, protein content was obtained by using the conversion factor of 6.25, crude fibre was determined by (IS: 11062) and carbohydrate content by difference method, ash and fat content were determined according to AOAC 2000 methods.

2.3. Sample preparation

Four Samples (C, C1, C2, and C3) were prepared using sample C as control containing only refined wheat flour (100%), while sample C1, C2 and C3 were prepared using different concentration of refined wheat flour and aonla powder. Proximate composition and concentration of different raw materials taken in the preparation of control (C) and other samples (C1-C3) is shown in Table 1. All the samples were passed separately through sieve no. 10 thrice to improve the mixing. Prepared samples were stored in an air tight polyethylene bag in cool and dry place for further study.

Moisture (%) = Loss in weight ×100
Weight (g) of sample

4.1.2 Crude Protein

Crude Protein was estimated using micro-kjeldahl method with KELPLUS nitrogen estimation system.

Reagents

i) Digestion mixture. CuSo4 and K2So4 was mixed in ratio 1:8
ii) H2SO4: conc. H2SO4
iii) 0.1N HCl
iv) 4% Boric acid solution
v) 40% NaOH solution

Procedure

Ten ml concentrated H2SO4, 0.2 g sample and three g digestion mixture was taken in digestion tubes. Digestion system was switched on and the initial temperature of 100°C was set by pressing the temperature controller keys. The temperature controller was reset to 420°C. Mixture was heated till digested and proper water flow was regulated to ensure absolute removal of acid fumes. After digestion contents were cooled and distillated in classic-DX (VA). Distillation unit was switched on and green indication was ensured. The hose was connected to the steam release outlet and let it to the drain. Boric acid and alkali were filled in the bottles in required quantity. Sample to be digested was loaded and door was closed before switching on the power in control panel. System was ready for operation after receiving ready indication and the programme was selected by pressing „run" key. Addition of boric acid and alkali was done. The distillate was then titrated with N/10 hydrochloric acid to determine the ammonia absorbed in boric acid.

Crude Protein (%) = 14.01× (S-B) ×N×100
W×1000

Through funnel. Sample was washed back into tall beaker with 200 ml, 1.25 per cent sodium hydroxide, brought to boiling point and boiled exactly for 30 minutes. All insoluble matter was transferred to the sintered crucible by means of boiling water until it became acid free, washed twice with alcohol, three times with acetone, dried at 100°C to constant weight, reweighed and ashed in a muffle furnace at 550°C for 1 h. Crucible was cooled in a desiccator, reweighed and percentage of crude Fiber in the samples was calculated by using the formula:

Crude Fiber (%) = W2 - W3 ×100
W1

Where,

W1 = Weight (g) of sample
W2 = Weight (g) of insoluble matter (weight of crucible + insoluble matter- weight of crucible)
W3 = Weight (g) of Ash (crucible + Ash - wt. of crucible)

4.1.4 Fat
Crude fat was estimated by standard method (AOAC, 2000) using soxhlet extraction apparatus.

Procedure
A weighed amount (2g) of dried sample was transferred to an extraction thimble dried overnight at 60°C temperature. The thimble was placed in a soxhlet extractor fitted with a condensor and flask containing sufficient petroleum ether (BP 60-80°C). After 6 h extraction, thimble was removed from the extraction apparatus and dried in the hot air oven to a constant weight, cooled in a desiccator to room temperature and weighed. Loss of weight of thimble indicated the amount of fat in the sample.
Fat (%) = loss of weight ×100
Sample weight

4.1.5 Ash
Ash in the sample was estimated by employing the standard method of analysis (AOAC, 2000).

Procedure
Five gram of dried sample was taken in a weighed crucible and ignited until no charred particles remained in the crucible and then the crucible was put in muffle furnace (550°C) for 6 h or until a white Ash was obtained. Thereafter, the crucible was cooled in a desiccators and reweighed.
Ash (%) = Weight (g) of Ash ×100
Weight (g) of sample
Wt. of crucible=W1
Wt. of crucible + Ash=W2
Weight (g) of Ash =Wt. of crucible + Ash - wt. of crucible= W2- W1

III. Results and discussion

3.1. Evaluation of chemical composition of raw material

The composition of the raw material is depicted in Table 2

Table.2.Chemical composition of raw materials

Raw material	Carbohydrate	Protein	Fat	Fibre	Ash
Refined wheat flour	70.58±0.02	10.42±0.10	1.12±0.06	0.46±0.12	3.60±0.02
Aonla Powder	15.80±0.012	5.04±0.10	0.26±0.02	2.38±0.0	1.24±0.01

3.2. Nutritional composition of prepared pasta samples

The protein content of C, C1, C2 and C3 pasta samples were found to be 74.00±0.41, 74.15±0.45, 76.15±0.41, and 76.12±0.40 respectively. Fortification of pasta with different level of aonla powder lightly decreases the carbohydrate, protein, fat and ash content of the final products. While fibre content of prepared aonla powder pasta increases in comparison to control pasta, the result agreed with other researchers. The nutritional composition of prepared pasta samples is shown in Table 3.

Table.3. Nutritional composition of prepared pasta samples

Sample	Carbohydrate	Protein	Fat	Fibre	Ash
C	74.00±0.41	8.70±0.22	1.12±0.01	0.42±0.01	2.52±0.05
C1	74.15±0.45	8.40±0.91	1.10±0.02	0.48±0.05	2.42±0.10
C2	76.15±0.41	8.32±0.88	1.08±0.40	0.50±0.06	3.06±0.03
C3	76.12±0.40	8.21±0.58	1.05±0.02	0.52±0.06	3.92±0.07

Note: All value are represented as Mean ± S.E.M. (standard error mean), n=6; data were analyzed by one-way ANOVA (Analysis of variance) employing Dunnett Multiple Comparisons Test using Graph Pad, Instate 3 software. Where C= Control sample, C1= 1% aonla powder flour, C2= 3% aonla powder flour sample, C3= 5%, aonla powder flour sample.

3.3. Cooking time. Cooking time of pasta sample was significantly decreased as compare to the control sample, in each case 50g of each sample was taken and cooked separately for the evaluation of cooking time. The result is shown in Table 4.

Table.4.Cooking time of prepared pasta sample

Sample	Cooking time (minute)
C	5.10±0.04
C1	5.12±0.10
C2	4.48±0.12
C3	4.42±0.15

Note: All value are represented as Mean ± S.E.M. (standard error mean), n=6; data were analyzed by one-way ANOVA (Analysis of variance) employing Dunnett Multiple Comparisons Test using Graph Pad, Instate 3 software, *P<0.05.

3.4. Rapid Visco Analyser (RVA) : Rapid visco analyzer (RVA, Starch Master of Perten, Sweden) was used to determine the pasting properties of raw material of pasta products. The peak viscosity (maximum viscosity of the sample during the heating and holding phase of the procedure) as well as the finfcdgcffgcgggvvcgvcal viscosity (viscosity reading at the end of the test profile) was recorded for all samples. Sample is cooked at 95ºC then cooled to 65ºC, and its viscosity measured, using a RVA. The paste temperature of 65ºC is used to rapidly stabilize viscosity and minimize retro gradation.

Table.5.Viscosity Value of Different Samples

Sample	Peak viscosity	Hold viscosity	Final viscosity
C	2809.62±602.86	2551.00±462.501	2142.52±451.72
C1	2642.28±372.50	1656.52±166.20	2873.00±254.50
C2	2842.18±246.28	1725.30±162.72	3110.32±220.40
C3	3281.00±216.56	2531.30±154.78	4216.32±2006.75

It was found that there was significant difference in the peak viscosity and hold viscosity among different samples (P<0.05).
Note: All value are represented as Mean ± S.E.M. (standard error mean), n=6; data were analyzed by one-way ANOVA (Analysis of variance) employing Dunnett Multiple Comparisons Test using Graph Pad, Instate 3 software, *P<0.01

3.5. Texture analysis : The texture of the samples was analyzed and it was found that the force (in g) required cutting the pasta sample was decreasing with increasing amount of aonla powder flour. The results of the analysis are presented in the table No 6. The cutting force of C, C1, C2 and C3 were 2512.20±0.18, 2492.12±1.05, 2230.18±1.60 and 1893.00±0.86 respectively. The increase in the percentage of aonla powder flour is resulting in the softer texture of the product.

Table.6.Cutting force of the pasta samples

Sample	aonla powder pasta
C	2512.20±0.18
C1	2492.12±1.05
C2	2230.18±1.60
C3	1893.00±0.86

Note: All value are represented as Mean ± S.E.M. (standard error mean), n=6; data were analyzed by one-way ANOVA (Analysis of variance) employing Dunnett Multiple Comparisons Test using Graph Pad, Instate 3 software, *P<0.01.

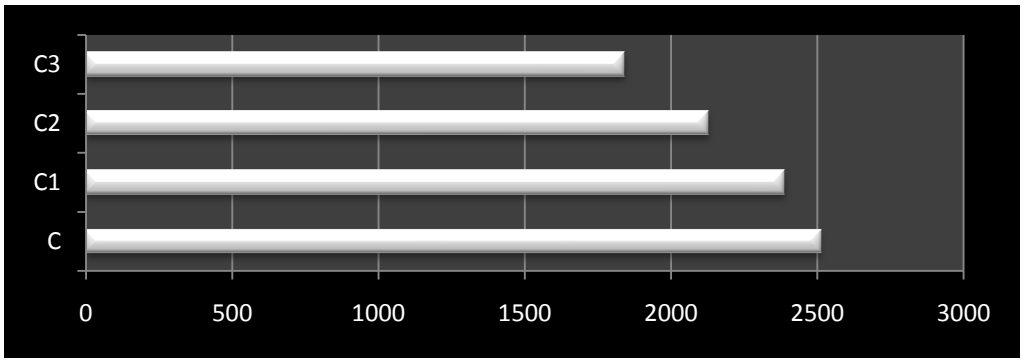

Fig 1 : Graphical Representation of Hardness Of Different (aonla powder) Pasta Sample

3.6. Sensory characteristics

Sensory evaluation of the products was carried out by using 9 point hedonic scale sensory test. The colour score of C, C1, C2 and C3 samples was,7.80±0.62,8.12±0.73,8.41±0.82 and 8.10±0.96 respectively. It was observed that the colour of C2 was found best among all samples. The flavour score of C, C1, C2 and C3 samples was7.60±0.81,8.20±0.82,8.28±0.62 and 8.38±0.74 respectively. The score of C2 was found best in sensory evaluation. The texture, taste and overall acceptability score of C2 was 8.76±1.02, 6.88±0.96 and 7.38±0.48 , respectively. There was improvement in colour and texture of the product. The taste might have some change with increasing concentration of aonla powder pasta. The product with 3 aonla powder sample was found better in comparison to other combinations.

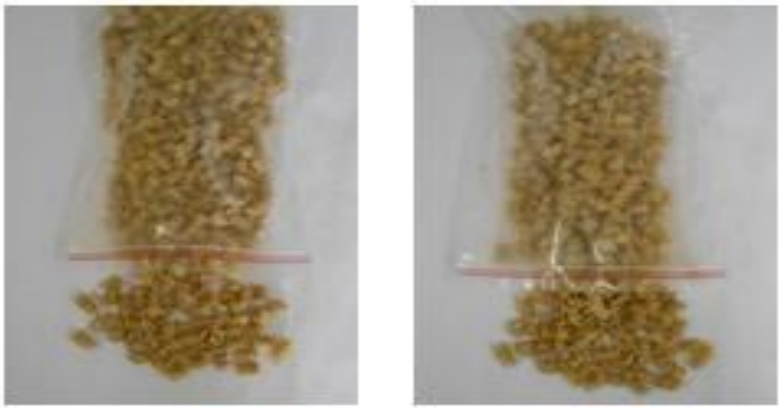

Table 7. Sensory scores of prepared aonla powder pasta samples

Samples	Sensory Parameter				
	Colour	**Flavour**	**Texture**	**Taste**	**Over all Acceptability**
C (control)	7.80±0.62	7.60±0.81	7.88±0.71	8.10±0.71	7.88±0.76
C1	8.12±0.73	8.20±0.82	8.28±0.92	7.60±1.16	7.25±0.41
C2	8.41±0.82	8.28±0.62	8.76±1.02	6.88±0.96	7.38±0.48
C3	8.10±0.96	8.38±0.74	8.10±0.76	7.10±0.76	7.50±0.51

Note: All value are represented as Mean ± S.E.M. (standard error mean), n=6; data were analyzed by one-way ANOVA (Analysis of variance) employing Dunnett Multiple Comparisons Test using Graph Pad, InStat 3 software, *P<0.01, **P<0.05.

It was observed that with the addition of aonla powder for making pasta, cooking time of aonla powder pasta consistently decrease because aonla powder is having mucilaginous characteristics. Therefore the texture of pasta showing consistently decreasing hardness as the aonla powder was giving smoothness to the product. RVA (Rapid Visco Analyzer) measure pasting properties of the flour, high peak viscosity C2 sample with compare to the control (C), it's preferred to the pasta production due to gives better texture of pasta. Over all on the basis of, physic-chemical, nutritional, cooking time, viscosity (pasting properties), and sensory quality of pasta certain sample C2 resulted in better quality having high overall acceptability.

IV. Conclusion

The pasta was prepared with different proportions of aonla powder flour pasta. The results showed that with increase in aonla powder concentration the fibre content increased and the cooking time decreased and the softness of pasta increased more than the control sample. It was found that the final viscosity of the sample was increasing with increase of aonla powder. Fortified pasta was highly acceptable with respect to sensory attribute and cooking time. On the basis of physico-chemical and nutritional properties, cooking time analysis of viscosity and sensory qualities pasta certain 97% refine wheat flour and 3% aonla powder (sample C2) resulted in better quality having more and high overall acceptability. aonla powder prevents different diseases (diabetes, asthma, arthritis and heart diseases etc.). If we include aonla powder pasta in daily life style, it's preventing many diseases.

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Conflict Of Interest

The authors declare no conflict of interest.

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