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Standardization, development and sensory evaluation of snacks prepared from *Aesculus indica* flour (*Tatwakhar*)

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Abstract

Deep fried products are convenient food for the human beings especially for children to achieve taste and energy in their eating habit. The processed seed of *Aesculus indica* is called as *tatwakhar*, was used to make fried food products i.e. snacks. The products were developed and standardized viz. doughnut, *chatpate* rings, *pasta* and nibbles. They were compared with the standard or usual recipes prepared from *besan*, *maida*, wheat flour, soya flour and rice flour and evaluated for organoleptic and proximate composition. Overall acceptability of the nibbles prepared from processed flour, was more than the standard one. Highest ash and moisture content was attained by nibbles, fat in *chatpate* rings, protein in *pasta* and doughnut has more carbohydrates as Nitrogen Free Extract(%) were estimated.

Keywords: Snacks, organoleptic, overall acceptability, proximate composition, *tatwakhar*

1. Introduction

Scientifically, Indian horse chestnut is known as *Aesculus indica* and belongs to the *Hippocastanaceae* family. This genus *Aesculus* embraces 20–25 species. It is very large and deciduous tree, distributed at higher altitudes (between 2,000 and 3,000 metres) or temperate regions of Kashmir, Himachal Pradesh and Nepal. In India, the seeds are known as *khanor*, *bankhor* and *hanudun* in various localities (Parmar and Kaushal 1982) [5]. Naturally, seeds are toxic due to presence of saponin or anti nutritional factors. To prepare the flour, the dehulled seeds were crushed and soaked in bamboo basket and changed the water daily to avoid rotting of seeds for five to seven days. The seeds were dried and ground into flour, called as *tatwakhar* (Rajasekaran and Singh, 2009) [6]. Saponin water was used by the villagers to clean the clothes. Uniyal *et al.* (2006) [14] described that the fruits of horse chestnut were used for the preparation of a nutritious recipe called "Sik". It could be given in a pre- and post- pregnancy food for ladies and also used for curing excessive bleeding and pain during menses. Syed *et al.* (2016) [11] also reported that flour made from seeds was used for making *halwa* and sometimes mixed with wheat flour to make *chapatti* and given during the famine by various tribes of North and North-Eastern India. Sood *et al.* (2015) [11] attempted that the processed flour or *tatwakhar* fed to the rats to find out the hypoglycaemic and hypocholesterolic effectiveness of the flour and reported the improved blood lipid profile and lowering the blood glucose level. In the year 2015, Thakur *et al.* [12] stated that Indian horse chestnut is a fairly rich in starch and contained toxic compounds such as saponins which make it a pungent and inappropriate for human consumption. The seeds were pre-treated including conventional techniques and various pretreatments like soaking, blanching, cooking, pressure cooking. Besides it has a food and non-food purposes, it is well known for its medicinal and pharmaceutical importance as well. Singh and Singh in the year 2013 [8] reviewed the therapeutic role of phytomedicines i.e. Aescin or Saponin of *Aesculus turbinata*, other species of *Aesculus* on losing the obesity in human beings. Sirtori (2001) [9] informed that its active constituent *Aescin* was clinically considerable in chronic venous insufficiency (CVI), haemorrhoids, post-operative oedema and therapeutic benefit in anti-oedematous, anti-inflammatory and venotonic properties. Ready to Eat foods or snacks are rapidly growing and trendy in our country. Mostly snack are prepared by deep frying process and specially resemble the crispy texture and distinctive flavor. These snacks eaten lightly vary widely in their form and range from raw to cooked foods. Many snacks are processed by deep-frying as described by Tortoe *et al.* (2014) [13]. Addition of fructo oligosaccharides in fried food products in stuffed form could turns into therapeutic food and improved sensory quality to

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fulfill the consumer demand for health foods by Jain *et al.* (2013) [4]. Although, new technique developed for frying as air medium over traditional method of frying process could add healthy fried foods with fewer changes in physico-chemical properties and organoleptically more acceptable by Shaker (2014) [7]. Hence keeping in view its all properties and nutritional health benefit, there was an endeavor to make some deep fried snacks and determine the quality trait of the fried products cum snacks prepared from processed flour or *tatwakhar* and add variety to the food as well.

2. Materials and Methods

2.1 Standardization and development of snack based recipes of *tatwakhar*

Various recipes were standardized and developed on the basis of customary recipes or by the use of the *maida*, *besan*, wheat flour, soya flour and rice flour. Locally, people used to eat only *halwa* or mixed *chapatti* from the processed flour (*tatwakhar*). An effort was made to develop different type of products from the flour of Indian Horse Chestnut. Recipes were standardized to achieve the desirable colour, flavour, texture, taste, and overall acceptability of the end product.

2.1.1 Doughnuts

For doughnut: Combined Processed flour (125g), Fresh yeast (10g), Milk (120ml), Sugar (45g), Salt (1.5g), Vanilla essence (2.5ml) all the ingredients except the butter in a bowl and kneaded into soft dough. Added the butter (soften) (15g) and kneaded again till the dough became smooth and elastic. Covered with a wet muslin cloth and allowed to stand until it doubled in volume. Pressed the dough lightly in order to remove the air which was done by the action of yeast. Rolled out the dough and cut out into circles with the help of a cookie cutter and then also used a small cookie cutter by creating a hole in the center portion of the circle lifted carefully the doughnut and deep fried in hot oil over a medium flame until both sides get golden brown in color. Drained on absorbent paper and placed on a serving plate.

For topping: Dust the castor sugar (100g) and Cocoa powder (15g) and *Dalchini* powder (2.5g) mixture generously on top of the doughnuts and served immediately.

2.1.2 Pasta

Whisk processed flour (100g) and salt (According to taste) together. Made a hole in the middle, and the olive/ vegetable oil (15ml) and with a help of a fork mixed it together. When the dough was getting viscous kneaded it with your hands until it is smooth. Stand for 1 to 2 hours in room temperature. Rolled out with the help of a *pasta* machine and cut in any shape you desire and deep fried. Served after cool.

2.1.3 Chatpate rings

Combined the processed flour (100g), Chili powder (1.5g), oil (15ml) Sugar (2.5g) and salt (to taste) in a bowl and knead into soft dough added warm water. Kept aside for 5 minutes. Kneaded again using oil till smooth and elastic. Divided the dough into 2 equal portions and rolled out each portion into a 150 mm (6") diameter circle. Divided each circle into 2 equal portions (you will get 4 semi-circles). Placed a semi-circle on

a flat, dry surface and cut it into 1 cm. Thick strips. Repeat with the remaining semi-circles to make more strips. Keep aside. Rolled each strip into a ring and press to seal the edges. Heated the oil in a *kadhai* and deep-fried the rings in batches in oil till they turn golden brown in colour. Drained on absorbent paper. Sprinkled the chat *masala* (5g) and toss well.

2.1.4 Nibbles

Took processed flour (100g) and boiled potato (100g) (without peel) in a bowl and kneaded oil 2 tsp with boiled potato without added water. Added *Chaat* masala (5g), Chili powder (3g), Black pepper powder (3g), *Pudina*/ mint (accordingly), Salt (to taste) all the ingredients and again kneaded it well. Took dough into desired shape and with the help of fork, pressed on it. Heated oil in a frying pan and then fried. Serve with sauce or chutney.

2.2 Sensory evaluation

The prepared snacks were evaluated organoleptically by randomly chosen ten panelists by using the method suggested by Gould (1978) as in Table 1.

2.3 Proximate analysis

Value added products prepared from processed flour were analyzed for the Moisture, Ash, Protein, Fat and Carbohydrate (NFE) by using standard methods of (AOAC, 1990). The factor 6.25 was used to convert nitrogen into crude protein. As the flour is free from fibre and added flour has its own value.

2.4 Experimental design

The experiment was scientifically planned and laid out according to CRD design. In order to reduce the determinate type of error, for each type of parameter, observations were replicated in thrice. By randomly chosen ten panelists, the prepared products were evaluated for its sensory attributes *viz.* colour, appearance, texture, flavor, taste and overall acceptability for all samples. Organoleptic evaluation form consists of 0 to 10 marks. The test sample was given in triplicates with control or usual recipes. Standard sample was prepared by the normal or typical recipes. All samples were coded to avoid any prejudice.

2.5 Statistical analysis:

Statistically, all the collected data on all parameters *viz.*, proximate analysis and sensory evaluation were analyzed. Analysis of variance by completely randomized design (CRD) in which the mean and critical difference (CD) was determined and ascertained their statistical significance.

3. Results and discussion

The present study was mainly based on the standardization and development of value added products namely doughnut, *chatpate* rings, *pasta* and nibbles. The developed products were tested for their organoleptic evaluation for the most acceptable level and the prepared products were analyzed for their nutritional composition as well. The standardized and developed value added products are given in Plates 3.1 under sub heading.

3.1 Plates: Standardization and development of value added products



Plate 1 (a): Doughnut prepared from *maida*



Plate 1 (b): Doughnut prepared from processed flour



Plate 2 (a): *Chatpate* rings prepared from *besan*



Plate 2 (b): *Chatpate* rings prepared from processed flour



Plate 3 (a): *Pasta* prepared from *besan*



Plate 3 (b): *Pasta* prepared from processed flour



Plate 4 (a): Nibbles prepared from wheat flour



Plate 4 (b): Nibbles prepared from processed flour

3.2 Organoleptic Evaluation of Processed flour (Tatwakhar) of Indian Horse Chestnut

Table 2 showed the sensory quality of the doughnut. It is clear that the mean score for the colour parameter for the doughnut prepared from *maida* got 8.40 whereas, the doughnut prepared from processed flour obtained 7.45. Statistically, there was significant difference (0.92) found in the colour attribute between the doughnuts. When the flavor, taste and texture are discussed, little varied values were obtained, by getting all the attributes combined, the overall acceptability for the prepared product was obtained as 7.88 and 7.05 by the control and test product, respectively and hence statistically no significant difference was found in these attributes. From the Figure 1 it is evident that the *chatpate rings* achieved the overall acceptability with all sensory attributes was almost similar, no significant difference was found in both samples. Figure 2 illustrates the organoleptic evaluation and acceptability index of *pasta* prepared from *besan* as control group and prepared from processed flour as test product. The mean score for the colour of the control one was more than the test sample. The flavor, taste and of texture had the slight difference found in control and test sample. But consumer's showed better response towards the *pasta* prepared from processed flour. Statistically, no significant difference was found in the control as well as test one in all the area of the product. The data presented in the Table 3 showed the organoleptic acceptability of nibbles prepared from wheat flour as control one and processed flour as experimental product. The values differed in colour mean score but statistically, no significant difference was found. The mean score of flavor, taste and texture of the nibbles prepared from processed flour were highest than the controlled samples. Overall acceptability of the processed flour prepared nibble was comparatively more than the controlled one. Statistically, significant difference was found between these two products. Nibbles prepared from processed flour were found more acceptable than the wheat flour which might be due to the fine texture of the processed flour.

Table 1: Organoleptic Evaluation Form

Sample: _____ Date: _____

Sample	Perfect										Good										Fair										Poor										Off										Remarks					
	10	9	8	7	6	5	4	3	2	1	0	10	9	8	7	6	5	4	3	2	1	0	10	9	8	7	6	5	4	3	2	1	0	10	9	8	7	6	5	4	3	2	1	0	10	9	8	7	6	5	4	3	2	1	0	

Note: Make check mark in columns corresponding to your rating of sample, when scoring one factor. However, when scoring 2 or more factors, write in the following letter in the corresponding column of columns (C) colour (E) Flavour (T) Texture (S) Consistency

Table 2: Organoleptic evaluation of doughnut

	Doughnut prepared from <i>maida</i>	Doughnut prepared from processed flour	CD (P≤0.05)
Colour	8.40	7.45	0.92
Flavour	7.60	7.05	NS
Taste	7.65	6.70	NS
Texture	7.85	7.00	NS
Overall acceptability	7.88	7.05	0.92

Table 3: Organoleptic evaluation of nibbles

	Nibbles prepared from wheat flour	Nibbles prepared from processed flour	CD (P≤0.05)
Colour	7.65	8.25	NS
Flavour	6.75	7.85	0.80
Taste	7.00	8.05	0.52
Texture	7.30	7.90	0.71
Overall acceptability	7.18	8.01	0.42

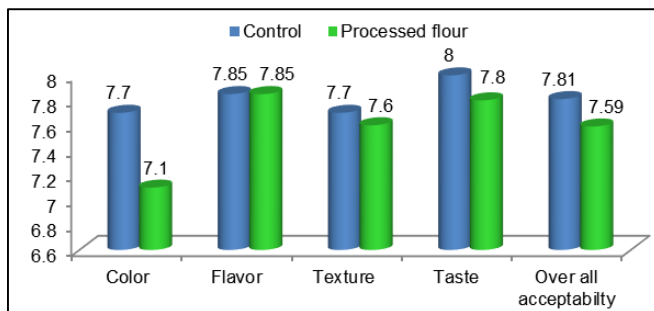


Fig 1: Acceptance index of *Chatpate rings*

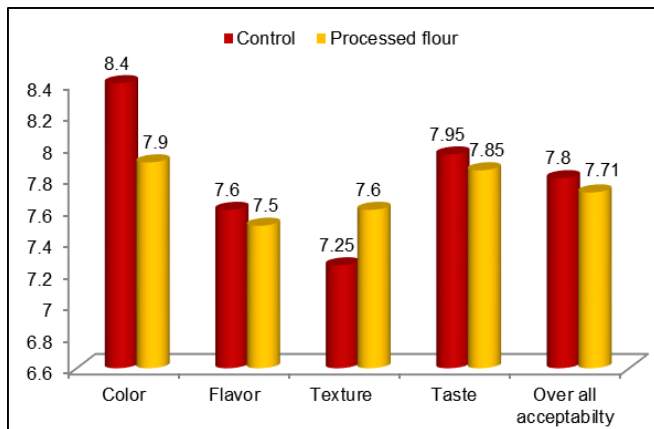


Fig 2: Acceptance index of *Pasta*

3.3 Nutritional evaluation of snacks prepared from processed flour (tatwakhar)

On dry weight basis, Nutritional attributes of prepared snacks is presented in Table 4. It was found that nibbles contain highest per cent (19.20) whereas *chatpate ring* and *pasta* has similar values. The ash content in nibbles was increased up to 6.30 per cent because of the addition of potato in it and followed by *chatpate rings*. Higher fat content in *chatpate rings* was reported as 36.84 per cent due to frying and then go after *pasta* and nibbles. More carbohydrate content was calculated as 76.67 per cent NFE in the doughnut. To the overview of the table 4, it can be a good source of protein and energy. Choe (1993) [2] reported the oil contents of doughnuts as 20% - 25%, the lower value of doughnut prepared from *tatwakhar* absorbs little oil due to gluten and fibre free whereas the refined flour more. No literature or work is available on snacks prepared by the use of this flour. So its employ in our diet can be a good and healthy food for us.

Table 4: Nutritional Evaluation of products prepared from processed flour of Indian Horse Chestnut (*Aesculus indica*)

Parameter	Moisture (%)	Ash (%)	Fat (%)	Protein (%)	Carbohydrate (NFE) (%)
Doughnut	3.85	1.45	7.59	10.44	76.67
Chatpate ring	2.60	5.05	36.84	12.45	43.06
Pasta	2.80	3.20	28.12	19.63	46.25
Nibbles	19.20	6.30	20.86	11.80	41.84

4. Conclusion

Food diversification and value addition is a vital component for food and nutritional security. Indian horse chest nut seeds or *tatwakhar* can be exploited to retain the nutritional and medicinal purposes for human welfare. The flour was utilized to make some deep fried snacks namely doughnut, *chatpate ring*, *pasta* and nibbles. Overall acceptability of the nibbles prepared from *tatwakhar* was best and can be given to all age group people. Rest of the prepared products was acceptability at typical level. Nutritionally, protein and fat contents were enhanced in all snacks but more protein in *pasta*. Hence, these snacks could be use in combating protein-energy malnutrition too. On the other hand, it is also excellent food alternate for celiac disease patients due to gluten and fibre-free flour and could be multipurpose for human benefit.

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