



Sensory Evaluation of Gluten Free Cake Developed using Extracted Potato Starch and Rice Flour

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ABSTRACT

The fame of the gluten free eating regimen has been expanding fundamentally to improve the health prosperity of the population. Potato and rice are gluten free sources which have an enormous scope creation around the world. This investigation centers around the helpful extraction of starch from potato and flour from rice, and further its usage in planning of gluten free cake. The improvement of cake generally comprised of six formulations with fluctuating measures of potato starch and rice flour. The general agreeableness of the formulations was assessed utilizing sensory evaluation by 20 semi-trained members with the assistance of 9-point hedonic scale led in the Department of Food and Nutrition. The tactile scores were broken down measurably bringing about perhaps the best definition made with 150g of potato starch and 100g of rice flour for readiness of gluten free cake.

Key words: Gluten-free cake, Potato starch, Rice flour, Sensory evaluation

Cereal crops and cereal intake played a major part in recorded human history, but in modern years, gluten intake has been shown to include a substantial amount of health problems. This can be credited to changes in worldwide dietary propensities; numerous nations are encountering a dynamic westernization of diet just as overall dispersion of the Mediterranean eating regimen, which depends on an enormous number of nourishments that consolidate gluten. Specifically, utilization of wheat is continuously supplanting utilization of rice in numerous nations in North Africa, the Middle East, and Asia (Catassi and Cobellis 2007). In this unique circumstance, gluten-related issues have slowly developed as an epidemiologically pertinent marvel and broadly distributed as celiac disease; wheat allergy and non-celiac gluten sensitivity. Surveys led among everyone affirm that expanding quantities of purchasers overall keep away from gluten-containing food, regardless of the nearness of a known ailment or sensitivity (Aziz *et al.* 2014, Tanpowpong *et al.* 2012). The expanded pervasiveness and multifaceted nature of Gluten Related Diseases (GRDs) has definitely

started developing enthusiasm for gluten free diets (GFDs) in both logical and non-mainstream researchers. Changing to a gluten free diet (GFD) is frequently seen as a way of life change as opposed to an appropriate dietary treatment.

Gluten is the principle basic protein complex of wheat with proportionate harmful proteins found in different oats, including rye and grain. The harmful protein portions of gluten incorporate gliadins and glutenins, with gliadins containing monomeric proteins and glutenins containing amassed proteins. Conceivably the presentation of gluten-containing grains, which happened around 10,000 years prior with the approach of farming, spoke to a developmental test that made the conditions for human ailments identified with gluten introduction, the most popular of which are interceded by the versatile insusceptible framework: wheat allergy (WA) and celiac disease (CD). In the two conditions the response to gluten is interceded by T-cell actuation in the gastrointestinal mucosa. In any case, in WA it is the cross-connecting of immunoglobulin (Ig) E by rehash arrangements in gluten peptides (for instance, serine-glutamine-glutamine - glutamine-(glutamine-) proline-proline-phenylalanine) that triggers the arrival of substance go between, for example, histamine, from basophils and mast cells (Tanabe 2008). Interestingly, CD is an immune system issue, as exhibited

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by explicit serologic autoantibodies, most strikingly serum hostile to tissue transglutaminase (tTG) and against endomysial antibodies (EMA). A third kind of indicative reactions to gluten ingestion is the purported Non-Celiac Gluten Sensitivity (NCGS). Patients influenced by NCGS for the most part report a wide scope of intestinal and extra-intestinal indications emerging not long after the ingestion of gluten-containing food without CD or WA (Ludvigsson *et al.* 2013). In spite of the fact that the pathogenetic systems prompting the beginning of Non-Celiac Gluten Sensitivity (NCGS) are a long way from being obviously comprehended, the current assessment is that there is a non-immune system non-unfavorably susceptible procedure (Aziz *et al.* 2014). Until this point, a total conclusive symptomatic flowchart for gluten-related issues still can't seem to be set up.

At the point when nature of food is surveyed by methods for human tactile organs the assessment is supposed to be sensory or organoleptic evaluation. In food science and technology, the sensory quality of food products or recipes is deemed significant as it affects the total product quality. The assessment is focused on the calculation,

examination, and perception of the characteristics of food as they are seen by the faculties of sight, taste, contact, and so forth. The purpose of the sensory test is to depict the product itself. It is the user's opinion. The food analysis usually divides this sensation into four groups: flavour, texture, odour and appearance. Product-centered work employs organoleptic evaluation to assess the effectiveness of product or ingredient variability. The objective of this study was to develop gluten free cakes using the extracted potato starch and rice flour in different formulations.

MATERIALS AND METHODS

The potato was procured from the local vegetable market of rajni khand, Lucknow while considering its basic quality attributes like freshness, firmness, shape and size. White basmati rice was bought from the general store of rajni khand. All chemicals and equipments used for the extraction and analysis were of analytical grade. Ingredients used in the preparation of cakes including powdered sugar, butter, fresh eggs, milk, baking powder were purchased from a local grocery store of rajni khand, Lucknow.

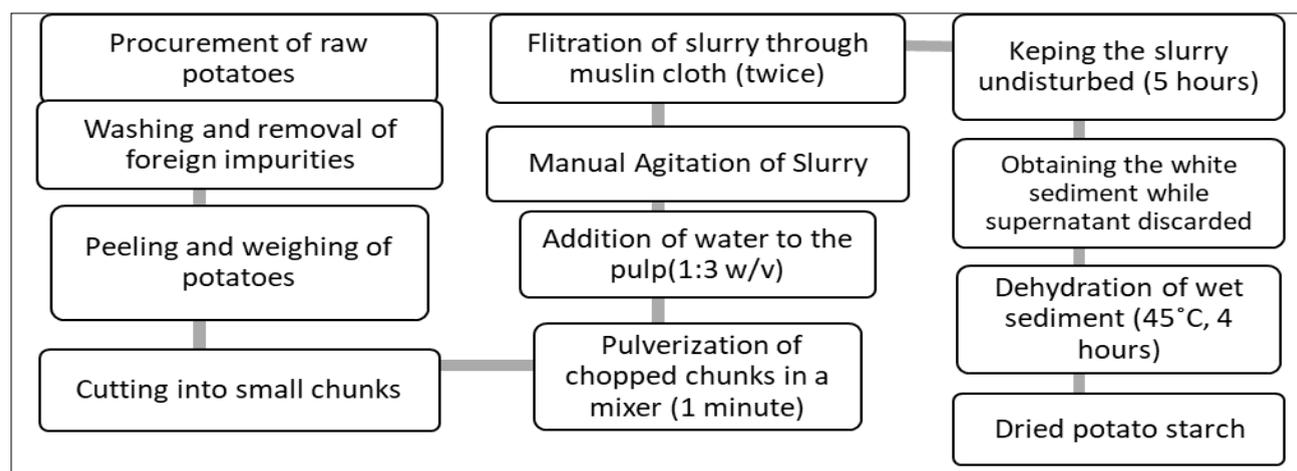


Fig 1 Extraction of potato starch

Extraction: The main ingredients of the cake formulations being the potato starch and rice flour, were extracted prior to its use in the cake. The extraction process of both the ingredients are elaborated in (Fig 1-2) respectively.

The individual weights of the extracts and the raw materials used were measured to assess the extraction yield using the following calculation:

$$\text{Extraction yield \%} = \frac{\text{Weight of extract (g)}}{\text{Weight of the raw material used (g)}} \times 100$$

Preparation of cake: The cakes were prepared immediately after the starch and flour extraction, following a standard procedure, with the six different formulations. (Table 1) shows the cake formulations with the amount ingredients used.

Table 1 Composition of cake formulations

Cake formulations	Potato starch (g)	Rice flour (g)	Powdered sugar (g)	Butter (g)	Milk (ml)	Eggs (pieces)	Baking powder (tsp)
F ₁	250	0	200	125	50	4	2
F ₂	200	50	200	125	50	4	2
F ₃	150	100	200	125	50	4	2
F ₄	100	150	200	125	50	4	2
F ₅	50	200	200	125	50	4	2
F ₆	0	250	200	125	50	4	2

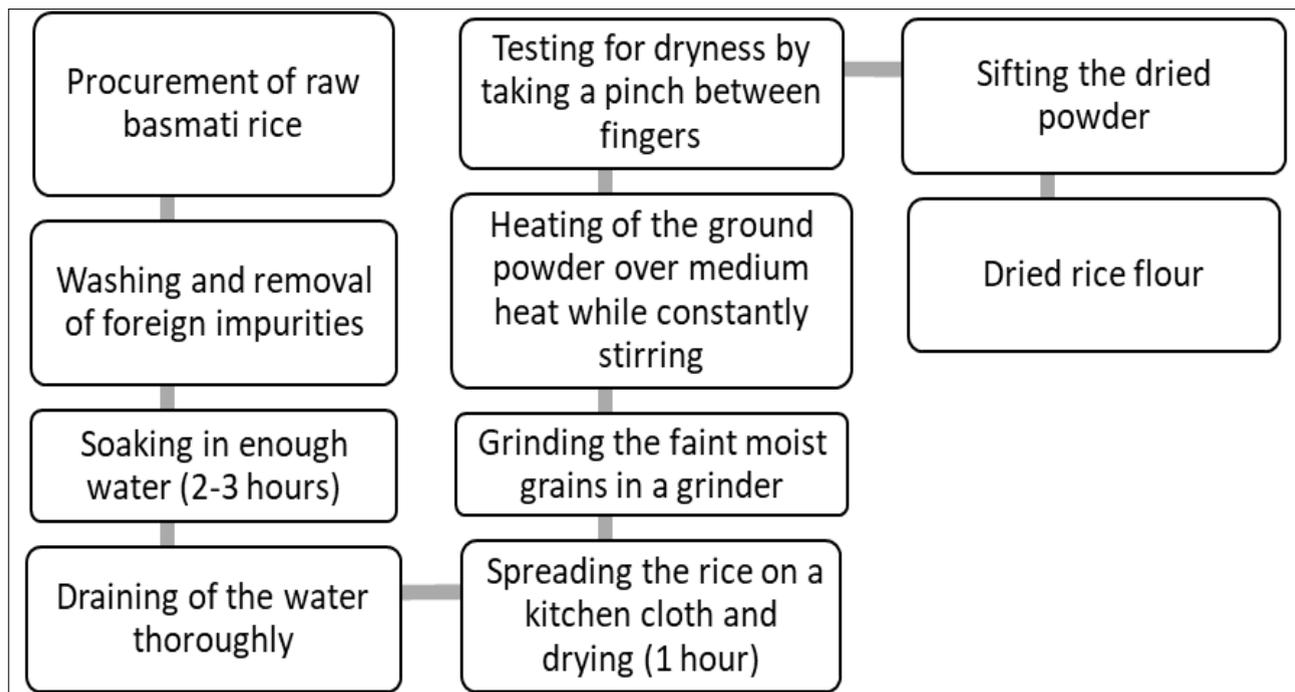


Fig 2 Extraction of rice flour

The oven was preheated to 180°C and the cake pan was greased with butter. A small amount of flour was sprinkled on the grease and set aside. The yolks from the whites were separated. The egg whites were stirred for 10 minutes by a hand blender until they were firm and set aside. All the dry ingredients with egg yolk and milk were mixed thoroughly in a mixing bowl until the dough got delicate. Then the batter was added to the egg whites and rolled tenderly without blending, rolling from base to top. The resultant dough was poured in mold and baked for about 30 minutes. The baked cake was unmold and left to cool down under room temperature. Once the cake had cooled, it was cut and packed in sealed plastic bags until serving to the panelist for sensory evaluation. It is also noted that this cake was served as soon as possible to avoid any deterioration in the product. For sensory purposes, it could not be stored under refrigeration temperatures due to the resultant unpleasant hardening of the texture.

Sensory analysis: In this study to know the consumer acceptability of the developed cakes, sensory evaluation was done in the Department of Food and Nutrition by 20 semi-trained members, and the tool used for sensory evaluation was 9-point Hedonic Scale. Hedonic is defined as the study

of pleasant and unpleasant sensations. When respect to foods, hedonic scaling is the affective rating of liking and disliking. The most well-known and utilized scale to test product acceptance/preference is known as the hedonic 9-point scale. The scale ranges from one through nine with one being “dislike extremely”, five being “neither like nor dislike”, and nine being “like extremely”. Panelists were instructed to rate the sample according to how they feel about the sample and fill the score card. Each of the score cards contained the following six attributes: taste/flavor, texture, mouthfeel, appearance, aroma and overall acceptance. The raw scores were assembled and statistically analyzed.

RESULTS AND DISCUSSION

Extraction yield

The percentage yield of potato starch from raw potatoes was 12% and the rate yield of rice flour was 94%.

Sensory evaluation

The sensory evaluation scores of the cake formulations with different concentration of potato starch and rice flour is elaborated in (Table 2).

Table 2 Mean scores of the cake formulations

Formulations	Taste/Flavor	Texture	Mouthfeel	Aroma	Appearance	Overall acceptance
F ₁	6.65±0.85	6.55±0.80	6.25±0.83	7.65±0.73	6.80±0.87	6.50±0.50
F ₂	7.45±0.49	7.35±0.56	7.45±0.50	7.60±0.58	7.45±0.59	7.40±0.58
F ₃	8.30±0.64	8.45±0.50	8.45±0.50	8.25±0.43	8.50±0.50	8.50±0.59
F ₄	8.40±0.66	8.40±0.66	8.40±0.59	8.20±0.51	8.35±0.48	8.40±0.58
F ₅	7.30±0.55	7.05±0.92	7.35±0.57	7.55±0.59	7.45±0.67	7.40±0.58
F ₆	6.35±0.57	6.55±0.59	6.25±0.77	7.30±0.78	7.10±0.89	6.40±0.48

From the (Table 2) it can be seen that F₄ has the highest scores in terms of the taste parameter among others. The results of other attributes confer that F₃ was preferred by the panelists over the other cake formulations. F₃ constituted 150g of potato starch and 100g of rice flour. The ratio of the potato starch and rice flour attributed to the selection of the best formulation.

It was clear from the study that starch can be isolated from the potatoes in simply straightforward advances. Indeed, even the transformation of crude rice into flour is a streamlined strategy. The investigation likewise profounds the fruitful advancement of cake utilizing the separated potato starch and rice flour. Additionally, the option of

gluten free items in the eating routine will improve the general wellbeing of the populace just as forestall the gluten related sicknesses.

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LITERATURE CITED

- Aziz I, Hadjivassiliou M and Sanders D S. 2014 Self-reported gluten sensitivity: an international concept in need of consensus. *American Journal of Gastroenterology* **109**: 1498-1499.
- Aziz I, Lewis N R, Hadjivassiliou M, Winfield S N, Rugg N, Kelsall A, Newrick L and Sanders D S. 2014. A UK study assessing the population prevalence of self-reported gluten sensitivity and referral characteristics to secondary care. *European Journal of Gastroenterology and Hepatology* **26**: 33-39.
- Catassi C and Cobellis G. 2007. Coeliac disease epidemiology is alive and kicking, especially in the developing world. *Digestive and Liver Disease* **39**(10): 908-910.
- Ludvigsson J F, Leffler D A, Bai J C, Biagi F, Fasano A, Green P H, Hadjivassiliou M, Kaukinen K, Kelly C P, Leonard J N, Lundin K E, Murray J A, Sanders D S, Walker M M, Zingone F and Ciacci C. 2013. The Oslo definitions for coeliac disease and related terms. *Gut* **62**: 43-52.
- Tanabe S. 2008. Analysis of food allergen structures and development of foods for allergic patients. *Bioscience, Biotechnology and Biochemistry* **72**: 649-659.
- Tanpowpong P, Ingham T R, Lampshire P K, Kirchberg F F, Epton M J, Crane J and Camargo C A. 2012. Coeliac disease and gluten avoidance in New Zealand children. *Arch Disease Child* **97**: 12-16.