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## Optimization and preparation of whey based diabetic cookies by incorporation of sucralose

**Rashmi KG and Sniya Varghese**

### Abstract

Cookies are the baked or cooked food used as snacks by every age group. The less protein and high sugar content makes it less acceptable to health conscious consumers. The present study was designed to utilize the byproduct whey to enhance the nutritional value of cookies. The preliminary trials were conducted by preparing cookies with addition of whey at different levels i.e. at the rate of 10, 15 and 25 percentage of flour mix. Based on sensory evaluation the 25 percentage of whey addition was selected and optimized. Sucralose is a zero calorie artificial sweetener which is safe for use in baked foods. Hence, for the preparation of low calorie products for diabetic people the sugar in cookies can be replaced by sucralose. The whey based diabetic cookies were prepared by addition of different levels of sucralose at 0.01, 0.05, 0.07 and 0.1 percentage of flour mix to the above selected whey. Based on sensory evaluation the addition of 0.07 percentage of sucralose was selected and optimized. Sensory evaluation of the products was done by using a Nine point Hedonic scales on the basis of flavour, colour and appearance, body and texture and overall acceptability. The product whey diabetic cookies can be prepared by incorporation of 25% whey and 0.07% sucralose into the cookie dough. The prepared cookie has light brown colour, acceptable taste and overall acceptability.

**Keywords:** Whey, cookies, sucralose, preparation, diabetic whey cookies, sensory evaluation

### Introduction

Whey is a byproduct obtained from dairy industry during the preparation of paneer, channa, cheese etc. In India, the major source of whey is from the production of chhanna and paneer. In cheese or casein production, approximately 80% to 90% of raw milk will produce whey as a by-product, which contains approximately 50% of the milk components (Jayaprakasha, 1992)<sup>[1]</sup>. The greenish translucent liquid whey retains about 45-55% of the milk nutrients comprising serum proteins, lactose, minerals and vitamins which makes it highly nutritious product Apart from being nutritious, milk proteins are highly functional and exhibit properties like solubility, gelation, water binding, viscosity and emulsifying action. Whey proteins are recognized as physiologically functional food ingredients. Most bakery products can easily be enriched and fortified at low cost with proteins, vitamins and minerals to meet the specific needs of the target groups and vulnerable sections of the population, who are undernourished and malnourished. Whey can be incorporated advantageously into various food formulations, including cookies, breads, cake, crackers, and pasta.

Cookies came from word 'koekie' that means small cake. Cookies are convenient snack products made from unleavened dough and dried to very low moisture content. It usually contains flour, sugar, eggs and some type of oil, fat or butter. They are the baked products that represent the largest category of snacks items for children and adults throughout the world. Owing to their popularity among the people of all age groups they can be components of one's diet that provide nutrients (Shika *et al.*, 2018)<sup>[5]</sup>.

Sucralose is a no-calorie sweetener which is 600 times sweeter than sugar. Sucralose is exceptionally stable, so foods and beverages sweetened with sucralose stay sweet under a wide range of conditions. Sucralose with its sugar-like taste and stability provides a great opportunity for the baking industry by providing consumers with a new generation of great tasting, healthy, reduced-calorie food products (Savitha *et al.*, 2008)<sup>[4]</sup>.

The less protein and high sugar content of cookies makes it less acceptable to health conscious consumers. Thus if cookies are modified they are probably the best vehicles to carry the nutrients to meet the nutritional demand of common consumers. As people are demanding a greater variety of low-calorie products, Sucralose can be incorporated in cookies to prepare whey diabetic cookies.

Thus the present study is aimed to develop whey diabetic cookies by incorporation of whey and sucralose. The added whey improves the protein content of cookies and sucralose act as a low caloric sweetener so that the developed cookies can be consumed by diabetic people.

## 2. Materials and Methods

The raw materials required for preparation of cookies i.e: Wheat flour, Butter, Sugar, Baking Powder and Vanilla Essence were procured from local market. The Sucralose was procured from ShaNarendra & Sons, Chennai and paneer whey was procured from University Dairy Plant, Mannuthy. The quantity of ingredients required for preparation of cookies include wheat flour (50g), butter (30g), sugar (25g), baking powder (0.5g), water (5 ml) and vanilla essence(0.5 ml).

### 2.1 Preparation of Whey Cookies

The dry ingredients (Wheat flour with baking powder) were weighed accurately and then sieved. Then creaming of butter and sugar was done with a hand mixer, and vanilla essence was added to it. The flour was added to the creamy mass and mixed for 3 minutes at medium speed.

**2.1.1 Addition of whey:** Whey Cookies were prepared by addition of whey in place of water to respective mix. Whey was added at different levels i.e. 10%, 15% and 25% of the above flour mix. The control sample was prepared by addition of 5% water. Then the dough was kneaded. The dough was then rested for 30 minutes followed by cutting the dough with cookie cutter to give a desired shape of uniform thickness. Then, a tray was taken and greased with butter. The cookies were placed on baking trays leaving 25 mm space in between and baked at 160°C for 20- 30 minutes in the baking oven. Following baking, the cookies were cooled to ambient temperature, packed in low density polyethylene bags and kept in airtight containers. The cookies were selected on the basis of sensory evaluation done by trained panels and the

quantity of whey to be added was determined.

### 2.2 Preparation of whey incorporated diabetic cookies

**2.2.1 Addition of Sucralose:** The ingredient sucralose intended to be added into whey for preparation of whey incorporated diabetic cookies were screened at different levels. The diabetic whey cookies were prepared by addition of different levels of sucralose instead of sugar at 0.01, 0.05, 0.07 and 0.1% of flour mix to the above selected whey, and mixed properly. The cookies were prepared in the same manner as given above. The resultant products were compared with control T<sub>0</sub> (with sugar). The whey incorporated diabetic cookies were selected on the basis of sensory evaluation done by trained panels and the quantity of sucralose to be added was determined.

### 2.3 Sensory Evaluation

The cookies were evaluated organoleptically for quality attributes like flavour, colour and appearance, body and texture and overall acceptability by a selected panel of judges. A 9 - point hedonic scale score card was used for evaluation.

## 3. Results and Discussions

### 3.1 Optimization of levels of whey in the preparation of whey-based cookies

The Whey Cookies were prepared by addition of whey at different rates i.e. 10%, 15% and 25% of the respective flour mix in place of water. The resultant products were compared with control T<sub>0</sub> (5% water addition) for sensory attributes. The product thus prepared was subjected for sensory evaluation for its flavour, colour and appearance, body and texture and overall acceptability by a panel comprising of five trained assessors. The sensory score were analyzed and level of whey to be added was optimized. The average score given by the panelist on the effect of different levels of whey addition on sensory attributes of whey incorporated cookies is summarized in Table 1.

**Table 1:** Sensory evaluation of whey cookies prepared by addition of different amount of whey

Treatments	Flavour	Colour and appearance	Body and texture	Overall acceptability
T <sub>0</sub> Control (5% water)	8.41±0.491	8.5±0.835	8.16± 0.756	9±0
T <sub>1</sub> (10% whey)	7.16±0.681	7.25±0.612	7±0.83	7.08±0.668
T <sub>2</sub> (15% whey)	7.91±0.491	7.75±0.415	7.83±0.408	7.91±0.491
T <sub>3</sub> (25% whey)	8.5±0.445	8.25±0.412	8.33±0.403	8.5±0.835

Data are expressed as mean ± standard deviation of four trials.

The sensory attributes flavor and overall acceptability score varied from 7 to 9. Based on analysis, 25% of whey concentration (T<sub>3</sub>) scored highest in terms of sensory characteristics like flavor(8.5), colour and appearance(8.25), body and texture(8.33) and overall acceptability(8.5) when compared to control. Hence, 25% of whey was selected for preparation of whey cookies. According to Munaza *et al.* (2012), biscuits prepared using different proportions of whey protein concentrate 4%, 7% and 10% to wheat flour, the 10% addition was best in terms of sensory characteristics colour and appearance, taste and flavour, body and texture, and general acceptability of the product. According to Parate *et al.* (2011) [3], the addition of maximum 25% whey protein

concentrate to biscuits improves their protein content.

### 3.2 Optimization of levels of sucralose in the preparation of whey incorporated diabetic cookies

The diabetic whey cookies were prepared by addition of different levels of sucralose at 0.01, 0.05, 0.07 and 0.1% of flour mix. The resultant products were compared with control T<sub>0</sub> (with sugar). The product thus prepared was subjected for sensory evaluation for its flavour, colour and appearance, body and texture and overall acceptability by a group of trained panellist. The average score of panelist on the effect of different levels of sucralose addition on sensory attributes of diabetic whey cookies is summarized in Table 2.

**Table 2:** Sensory evaluations of cookies prepared by incorporation of sucralose

Treatments	Flavour	Colour and appearance	Body and texture	Overall acceptability
T <sub>0</sub> (Control) (with sugar)	8.75±0.275	8±0.540	8.58±0.205	9±0
T <sub>1</sub> (0.01% sucralose)	6.08±0.201	6.25±0.415	6.41±0.491	6.33±0.403
T <sub>2</sub> (0.05% sucralose)	6.58±0.205	6.66±0.266	6.75±0.275	6.91±0.201
T <sub>3</sub> (0.07% sucralose)	8±0	8.08±0.208	8.16±0.254	8.66±0.406
T <sub>4</sub> (0.1% sucralose)	5.83±0.403	6.16±0.401	6.33±0.513	6.08±0.208

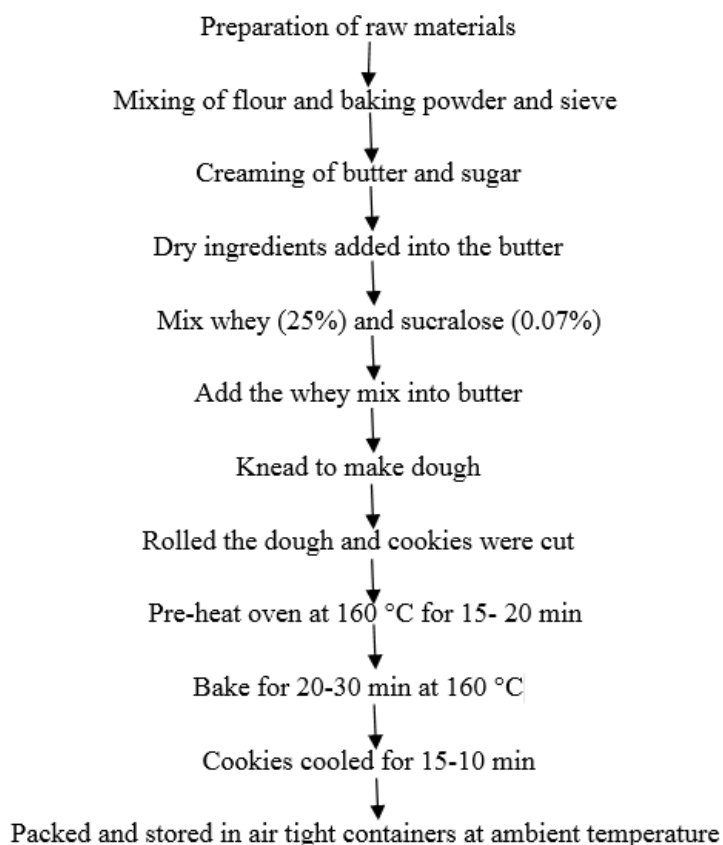
Data are expressed as mean ± standard deviation of four trials.

Sensory evaluation was done by using 9-point hedonic scale with selected panel of judges. Sucralose at a concentration of 0.07% was found to score high in terms of sensory attributes like flavor (8), colour and appearance (8.08), body and texture (8.16) and overall acceptability (8.66). As the amount of sucralose is increased the taste of bitterness appeared. The results were comparable to control and hence 0.07% of sucralose was selected for the preparation of whey incorporated diabetic cookies. Kim *et al.*, (2006) [2] reported that as the level of sucralose substitution increased there was increase in the hardness, breakage and bitterness in sugar

biscuits containing sucralose.

### 3.3 Whey incorporated diabetic cookies

The Whey incorporated diabetic cookies were prepared by addition of 25% whey and 0.07% sucralose. The addition of whey in cookies improved the flavour, colour & appearance, body & texture and overall acceptability of the product. Sucralose provide sweetness to the cookies. The front and back view of optimized whey diabetic cookies is shown in Figure 1 and the flowchart for preparation is shown in Figure 2.

**Fig 1:** Whey diabetic cookies**Fig 2:** Flow chart for preparation of whey incorporated Diabetic Cookies.

#### 4. Conclusion

It is concluded that whey and sucralose could be successfully utilized for preparation of whey diabetic cookies. For incorporation in cookies the optimum level of whey and sucralose is found to be 25% and 0.07% respectively on the basis of weight of flour. Addition of whey and sucralose in cookies mix improved sensory quality and acceptability of the product.

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#### 6. References

1. Jayaprakasha HM. Membrane processing application for production of whey protein concentrates (Doctoral dissertation, Ph.D thesis, National Dairy Institute, Deemed University, Karnal, India), 1992.
2. Kim MY, Lee YM, Kim Y, Suh DS, Chung SJ, Kim KO. Relative sweetness of sucralose in a cookie system and physicochemical and sensory properties of low calorie cookies containing sucralose. *Korean Journal of Food Science and Technology*. 2006;38(4):501-5.
3. Parate VR, Kawadkar DK, Sonawane SS. Study of whey protein concentrate fortification in cookies variety biscuits. *International journal of food engineering*, 2011, 7(2).
4. Savitha YS, Indrani D, Prakash J. Effect of replacement of sugar with sucralose and maltodextrin on rheological characteristics of wheat flour dough and quality of soft dough biscuits. *Journal of Texture Studies*. 2008;39(6):605-16.
5. Shikha RS, Yadav MP. Effects of whey supplementation on physico-chemical evaluation of developed cookies. *International Journal of Home Science*. 2018;4(2):130-2.