

Development of Mucilaginous Spongy Dessert-A Herbal Rassogolla Prepared from Cow Milk

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Abstract- This study deals with the development of "Spongy Dessert" by incorporating the "mucilage" powder extracted from the seeds of psyllium (*Plantago ovata*). The mucilage powder was incorporated at 3.0, 3.5, 4.0 & 4.5 % level in the Chhena (milk solid) prepared from the low fat cow milk. On the basis of results obtained through organoleptic evaluation, the Spongy Dessert prepared by incorporating 4% mucilage was selected and analyzed for nutrients. The developed product namely herbal rassogolla prepared by incorporating 4.0 % mucilage powder was a good source of protein (13.8 g/100g) and dietary fibre (1.5), low in carbohydrates (18.8 g/100g), saturated fat (0.8 g/100g) & energy (141.2 Kcal) and free from trans fat. This mucilaginous spongy dessert has the properties to provide relief from constipation and acidity.

Index Terms- constipation, herbal rassogolla, psyllium, spongy dessert

I. INTRODUCTION

Psyllium (*Isabgol*) is the name that is often used to describe a plant called Plantago. It is an annual species that has originated from arid and semi arid zone and is used in traditional and industrial pharmacology (1) Isabgol has been used as a laxative for centuries, especially in India to treat constipation. Isabgol (Psyllium), the common name in India for *Plantago ovata*, comes from the Persian words "isap" and "ghol" that mean horse ear, which is descriptive of the shape of the seed. It is indigenous to Mediterranean region and West Asia extending up to Sindh and Sindh in West Pakistan, also distributed from Canary Islands across Southern Spain, North Africa, Middle East and North-Western Asia. In India the use of isabgol is as old as the Ayurveda System of Medicine. It is commercially cultivated in North Gujarat, Western Rajasthan, Punjab, Hariyana and Uttar Pradesh (2). Psyllium is a high source of fiber and it acts as a bulk-forming laxative. In other words, it helps in increasing the volume of fecal matter, which stimulates a reflex contraction of the bowel walls that helps the stool to pass smoothly. Since Psyllium is known to help soften stool, it is an effective way to reduce the pain and discomfort associated with hemorrhoids. In a study by Marlett et al (2000), they proposed that the unfermented gel isolated from psyllium containing stools functions as an emollient and lubricant. Studies suggest that the various constituents of psyllium (such as soluble fibers, linoleic

acid, and alkaloids) can help lower blood sugar levels. The high levels of soluble fiber and linoleic acid in Psyllium stimulate the production of cholesterol-lowering bile acids and reduce the amount of cholesterol absorption by the body (3). Psyllium causes a feeling of fullness, which can reduce our sensation of hunger. Short term placebo-controlled studies showed that consumption of 7-10 g psyllium/day lowers serum total cholesterol concentrations 4-11% and serum LDL cholesterol concentrations 6-18% below placebo control concentrations (4, 5, 6, 7, 8, 9, 10, 11, 12, 13). Psyllium was shown to stimulate bile acid synthesis (7 alpha hydroxylase activity) in animal models (14, 15) and in humans (9), which leads to reduction of serum cholesterol. Additional mechanisms, such as inhibition of hepatic cholesterol synthesis by propionate (16) and secondary effects of slowing glucose absorption (17) may also play a role.

It is mainly used as a dietary fiber and produced for its mucilage content. The term *mucilage* describes a group of clear, colorless, gelling agents derived from plants. It is a thick, gluey substance produced by nearly all plants and some microorganisms. It is a polar glycoprotein and an exopolysaccharide. The mucilage obtained from psyllium comes from the seed coat.

II. MATERIALS AND METHODS

Materials

Local variety of Psyllium (*Isabgol*) seeds (*Plantago ovata*), cow milk, sugar, citric acid, rose water were procured from local market of Jaipur, Rajasthan, India. Chemicals used for estimation were of analytical grade.

Extraction of mucilage

Preliminary trials were carried out to standardize the amount of deionized water, NaOH & HCl and time along with temperature for extraction of mucilage.

50 gm Psyllium (*Plantago ovata*) seeds were dispersed in 500 ml deionized water at room temperature and kept in water bath for 2 hrs at 40°C with discontinuous stirring and allowed it to cool at room temperature followed by 24 hrs soaking. 0.25 M NaOH was prepared in deionized water and added to separate the sticky mucilage from the seeds for 30 minutes continuous stirring at 180 rpm. The resulting sticky mucilage strained through the muslin cloth collected in a sterilized beaker and washed with 0.25 M HCl and deionized water.

The separated mucilage was dried overnight in an oven at 40°C, the dried mucilage was then grinded in a mortar pestle and sieved through 70 mesh size.

Production of spongy dessert

The Chhena making process includes the boiling of cow milk followed by addition of 0.3-0.5% citric acid solution (25 ml per liter of milk). Further the milk was gently stirred and cold water was added which results in the precipitation of the milk. After completion of precipitation it was collected in a muslin cloth and the whey was drained off by squeezing the lump (milk solid) as much as possible. The lumps of Chhena were softened uniformly by mashing.

Four different percentage of 'mucilage powder' was incorporated at 3, 3.5, and 4.5 % by mass into the Chhena and mixed properly followed by preparation of Chhena balls. The ready balls were then cooked in the boiling sugar solution (30% w/v) for 15 minutes. All the three incorporation levels (3, 3.5 and 4 % by mass) of mucilage powder into Chhena resulted in successful formation of spongy dessert where as percentage level of 4.5 % by mass resulted in the breakage of chhena balls while cooking them in sugar solution. The successfully cooked balls were then collected from the deep pan and placed in the freshly prepared sugar syrup in which 4-5 drops of purified rose water were sprinkled.

Organoleptic evaluation

The developed product was evaluated for various parameters like appearance, color, texture, flavor and taste, after taste and overall acceptability through 9 point hedonic scale by semi trained panel members. Sensory evaluation, a scientific discipline used to evoke, measure, analyze and interpret reactions to those characteristics of foods and materials as they are perceived by the senses of sight, smell, taste and touch (18). Sensory evaluation consists of judging the quality of food by a panel of judges. The sensory qualities affect the choice of food very much.

For sensory evaluation, following points were followed.

1. Testing area was quiet and a comfortable environment.
2. Testing area was centrally located and members of the panel easily reached to it.
3. Cosmetic odours were avoided from food testing area.
4. Each sample was given code and evaluation was carried out in a separate room and interaction among judges was avoided to prevent the biasness.

The panel members were having Good health, Average sensitivity, High degree of personal integrity, Intellectual curiosity, Availability and willingness to spend time in evaluation and periodic tests for acquit. Selection of panel members involved the screening of 30 semi trained panel members. All the semi trained panel members were subjected to triangle difference test. 20 panel members having sharp discrimination, discretion and communication skills were selected and then preceded for 9 point hedonic evaluations. This method has nine points and these points are given word

descriptions ranging from "dislike extremely" to "like extremely" (19). This test explores consumer likings or preference levels of the developed food products.

Nutritional analysis

On the basis of highest scores obtained through 9 point hedonic method, the Spongy Dessert containing 4% by mass mucilage powder was analyzed for various nutrients like protein (IS:721-1973[R-2005]), total fat (IS:4079-1967[R-2009]), saturated & trans fat (AOAC 996.06), cholesterol (AOAC 976.26), sodium & potassium (AAS), energy (IS:8220-1976[R-2005]), crude fibre (AOAC 978.10), total dietary fibre (AOAC 985.29), total carbohydrates (IS:1656-2007) & sugar (IS:1162-1958 Reaffirmed - 2009).

Statistical analysis

Student's 't' test was used for analysis of data.

III. RESULTS & DISCUSSION

Organoleptic evaluation

Organoleptic evaluation of Spongy Dessert showed that standard was the most acceptable in (8.86) in terms of appearance. It was followed by sample A (8.33), B (8.26) and C (7.60). Color wise, standard was the most acceptable (8.80). Sample C (8.40) was placed after this. It was followed by sample B (8.06) and A (7.30) (Figure 1).

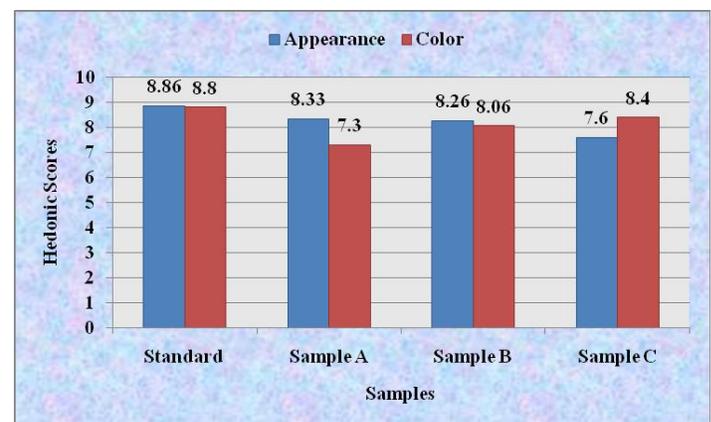


Fig.1: Appearance & Color scores of Spongy Dessert through 9 point hedonic method

S – Standard (without incorporation of mucilage powder), A – Spongy Dessert (With incorporation of 3 % mucilage powder by mass), B - Spongy Dessert (With incorporation of 3.5 % mucilage powder by mass), C - Spongy Dessert (With incorporation of 4 % mucilage powder by mass)

In terms of texture, sample C (8.66) stood out. Standard (8.06) got place after this. Sample A and B were equally accepted (8.00). Taste of sample C was found the best (8.70). While sample A (8.60), B (8.50) and standard (8.10) were next to it respectively (Figure 2).

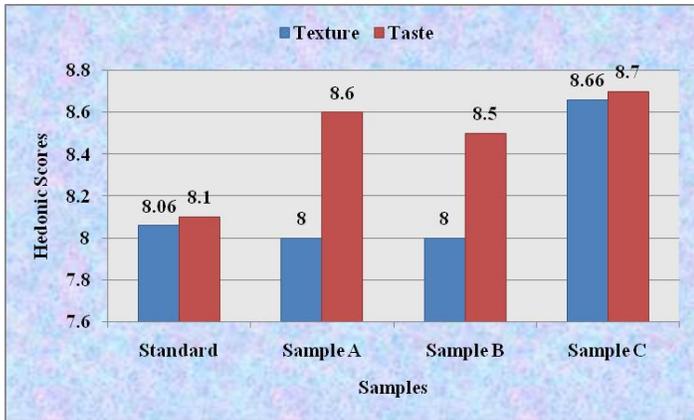


Fig.2: Texture & Taste scores of Spongy Dessert through 9 point hedonic method

S – Standard (without incorporation of mucilage powder), A – Spongy Dessert (With incorporation of 3 % mucilage powder by mass), B - Spongy Dessert (With incorporation of 3.5 % mucilage powder by mass), C - Spongy Dessert (With incorporation of 4 % mucilage powder by mass)

Flavor of sample A and C were the most acceptable (8.80). Sample B was placed next (8.70). Flavor of standard was the least acceptable among all (8.10).

In over all acceptability, sample C (8.43) was the most preferred and sample A (8.18) the least. Standard was the second choice and sample B, the third with values 8.38 and 8.30 respectively in terms of over all acceptability (Figure 3). Soymilk was used in preparation of rasgulla (20).

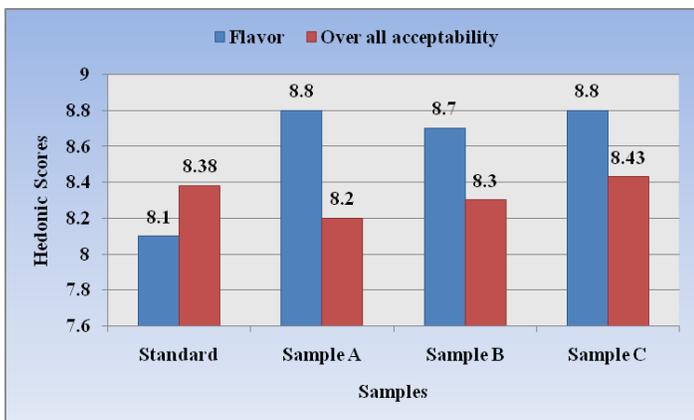


Fig.3: Flavor & Over all acceptability scores of Spongy Dessert through 9 point hedonic method

S – Standard (without incorporation of mucilage powder), A – Spongy Dessert (With incorporation of 3 % mucilage powder by mass), B - Spongy Dessert (With incorporation of 3.5 % mucilage powder by mass), C - Spongy Dessert (With incorporation of 4 % mucilage powder by mass)

Nutritional analysis

The study of nutritional values revealed that the Spongy Dessert found more nutritive as compared to control available in the market. It was observed that carbohydrate content (18.8 g/100g) of this product was lesser than the control (61.0 g/100g). Protein content (13.8g/100g) of the developed product was higher as compared to control one (6g/100g) (Table 1). Low-carbohydrate diets have specific cardiovascular benefits (21). Low-carbohydrate, high-protein diets typically produce a 2- to 3-kg weight loss (22). This diet appears to improve satiety through their action on measures of adiposity and gut peptides that influence appetite and caloric intake (23). The effect of higher-carbohydrate diets, particularly those enriched in refined carbohydrates, coupled with the rising incidence of overweight and obesity, creates a metabolic state that can favor a worsening of the atherogenic dyslipidemia that is characterized by elevated triglycerides, reduced HDL cholesterol, and increased concentrations of small, dense LDL particles (24, 25).

Table 1: Nutritional analysis of standard and Spongy Dessert

Nutrients	Control	Spongy Dessert
Total carbohydrates (% by mass)	61.0	18.8
Sugar (% by mass)	36.0	17.4
Protein (% by mass)	6.0	13.8
Total fat (% by mass)	1.0	1.2
Saturated fat (% by mass)	1.0	0.8
Trans fat (% by mass)	Nil	Nil
Sodium (mg/100g)	27	28
Potassium (mg/100g)	7.4	4.1
Energy (Kcal/100g)	276	141.2
Total dietary fibre (% by mass)	0.0	1.5

A slight increase of fat content (1.2g/100g) was reported in Spongy Dessert as compared to control (1.0g/100g) but the saturated fat was found lesser (0.8g/100g) than the control (1.0g/100g) which was beneficial for health. Saturated fat intake has been linked to an increased risk of cardiovascular disease (CVD), and this effect is thought to be mediated primarily by increased concentrations of LDL cholesterol (26). Both control and Spongy Dessert were found free from trans fat. Trans fats adversely affect multiple cardiovascular risk factors and contribute significantly to increased risk of CHD events. They may also worsen insulin sensitivity, particularly among individuals predisposed to insulin resistance; possible effects on weight gain and diabetes incidence (27). Negligible difference was observed in sodium content of control and Spongy Dessert. It plays a major role in maintaining blood volume and blood pressure by attracting and holding water. Sodium is also important in cellular osmotic pressure (the passage of fluids in and out of the cells) and in transmitting nerve impulses.

Potassium content (4.1 mg/100g) was also found in Spongy Dessert which may reduce systolic and diastolic blood pressure, risk of cardiovascular disease, stroke and coronary heart disease. WHO also suggested a potassium intake of at least 90 mol/day (3510 mg/day) for adults (28). Energy value of control and Spongy Dessert was found as 276.00 & 141.20 Kcal/100g respectively (Table 1). Spongy Dessert consists dietary fiber which upon absorption of fluids converts into a laxative and helps in smooth bowel movement. Total fibre content was absent in control product whereas in Spongy Dessert it was estimated as 1.5 g/100g. Increasing the intake of high-fiber foods or fiber supplements improves serum lipoprotein values, lowers blood pressure, improves blood glucose control for diabetic individuals, aids weight loss, and improves regularity (29).

IV. CONCLUSION

The developed product namely mucilaginous spongy dessert is a low calorie, low fat, high protein and fibrous product which is having the potential to relieve the constipation, controlling the acidity and diabetes mellitus along with lowering the high blood pressure.

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