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Swarnima Dey
Research Scholar, WCDT, Sam Higginbottom University of Agriculture, Technology and Sciences. Allahabad, Uttar Pradesh, India

John David
Professor, WCDT, Sam Higginbottom University of Agriculture, Technology and Sciences. Allahabad, Uttar Pradesh, India

Bhole Shankar Rai
Research Scholar, WCDT, Sam Higginbottom University of Agriculture, Technology and Sciences. Allahabad, Uttar Pradesh, India

Kaushal Kishor
Ph.D Scholar, WCDT, Sam Higginbottom University of Agriculture, Technology and Sciences. Allahabad, Uttar Pradesh, India

Correspondence
Swarnima Dey
Research Scholar, WCDT, Sam Higginbottom University of Agriculture, Technology and Sciences. Allahabad, Uttar Pradesh, India

Studies on sensory attributes of cereal based fermented functional milk

Swarnima Dey, John David, Bhole Shankar Rai and Kaushal Kishor

Abstract
Malnutrition or malnourishment is the problem which is most prevalent in today's society and causes lots of health problems. Malnutrition is most severely found in the weaker sections of the society but can also be found in the upper sections of the society. Under nutrition, extreme starvation might result in permanent problems with physical and mental development, may have symptoms that include: a short height, thin body, very poor energy levels, and swollen legs and abdomen. People might also suffer from diseases due to lack of immunity due to under nutrition. Cereal based functional fermented milk fulfils the nutrient requirements of an under nutrition person as it provides proper energy, protein, vitamins and minerals. Also it is seen that milk is not consumed by many due to many factors like lactose intolerance or due to dislikes, one can supplement milk by cereal based fermented milk products which will be a new nutritious product. The ingredients used in the present study "cereal based functional fermented milk product" includes whole barley flour, flax seed powder, date syrup and milk which supplements the nutrients required for an undernourished. The research included four treatments which differs in the amount of flax seed powder in which (T_1) had 0.5% flax seed powder, (T_2) had 1%, (T_3) had 2% and (T_4) had 3% flax seed powder. On the basis of the findings it is concluded that through organoleptic evaluation, cereal based milk product with composition of flax seed powder (0.5%) i.e. treatment (T_1) was found to be more acceptable in terms of sensory quality followed by (T_2), (T_3) and (T_4). But as per nutrient value, treatment (T_4) was found to be more nutritious followed by (T_3), (T_2) and (T_1).

Keywords: Malnutrition, undernutrition, extreme starvation, lactose intolerance, flax seed, date syrup, fermented milk product

Introduction

Milk and milk-derived products have constituted a significant part of the diet of all groups at all ages. Amongst those milk products, fermented milks are of great importance worldwide because of their nutritional, organoleptic and shelf-life properties that are significantly improved when compared with its raw material i.e. milk. Fermented milks are developed as a means of preserving nutrients of milk. Fermented milks including dahi, yogurts are considered as an ideal vehicle for the delivery of many beneficial microorganisms' viz. probiotics and prebiotics in addition to the microflora of human gastrointestinal tract (Gadhiya *et al* 2015) [6]. Therefore, fermented milk is the most popular group of functional food.

Lactic Acid Bacteria (LAB) been widely used as starter culture for the manufacturing of various fermented dairy products such as dahi, lassi and whey beverages. LAB and their food products are thought to confer a variety of important nutritional and therapeutic benefits and have many documented health promoting or probiotic effects in humans such as inhibition of pathogenic organism, antimutagenic and reduction of blood cholesterol (Shiby and Mishra, 2013) [11].

Consumption of fermented milks has increased and various popular ingredients of functional significance are being incorporated into cultured dairy products to enhance their market value and thus with specific health benefits (Tamime, 2002) [12, 14]. Fermented milk products have been reported to have therapeutic properties like anti-cholesterolemic and anti-carcinogenic.

The choice of cereal-based substrate for the development of probiotic foods is motivated by increase in consumer vegetarianism, lactose intolerance, cholesterol content, and economic reasons that are associated with dairy products (Prado *et al*., 2008; Gobbetti *et al*., 2010). Cereals also have the potentials to offer consumer prebiotic and whole grain benefits (Lamsal and Faubion 2009). Cereal grains are very good substrates for fermentation globally and the predominant microorganisms are lactic acid, bacteria, and yeasts (Blandino *et al*., 2003; Franz *et al*. 2014) [3]. Cereal grains constitute a major source of dietary nutrients and addition of cereals into milk enriches its mineral value supplementing fibre (Das *et al*., 2012) [5]. Fermentation further enhances the nutritive value, palatability and functionality of cereals by reducing the ant nutritional factors.

Cereal based functional fermented milk fulfils the nutrient requirements of an under nutrition person as it provides proper energy, protein, vitamins and minerals. The ingredient of the cereal based functional fermented milk includes whole barley flour, flax seed, date syrup and milk which supplements the nutrients required for an undernourished. The barley supplements with protein, dietary fiber, the B vitamins, niacin and several dietary minerals like manganese and phosphorous. Also flax seed provides omega 3 fatty acid which protect against heart disease, lower triglycerides, decreased risk with higher blood levels, inflammation etc. Omega-3 fatty acids are important for normal metabolism. Mammals are unable to synthesize omega-3 fatty acids, but can obtain the shorter-chain omega-3 fatty acid ALA (18 carbons and 3 double bonds) through diet and use it to form the more important long-chain omega-3 fatty acids. It is known that animal food is a good source of omega 3 fatty acids but vegetarian diet lacks.

Material and Methods

The experiment was carried out in the research laboratory of department of Dairy Technology, Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad. Milk, Skim milk, Flaxseed powder, Whole Barley Flour, Date Syrup were obtained from the local market of Allahabad. Cultures were procured from Student's Training Dairy SHUATS, Allahabad. The experimental product was prepared by using toned milk with fat-3.0% and SNF-8.5%. The milk was homogenised and heated to 90°C for 2 min. then the milk was cooled at 30-32°C. After cooling, 5% of skim milk powder was added while continuous stirring to increase the SNF to 11%. Barley flour with 4% was then mixed with the milk. After this addition of flax seed powder was done in variation with T_1 having 0.5%, T_2 having 1%, T_3 having 2% and T_4 having 3%. 10% Date syrup is mixed with the ingredients and is properly mixed with an electrical mixer. Finally 2% bacterial culture was added and the mix was then packed in air tight containers/ polystyrene cups which were capped and incubated at 37°C for 8 hours. The fermented milk product prepared was cooled and stored in refrigerator under 5°C.

The treatment combination used is as follows

T_1- Toned milk- 100ml, Skim milk powder- 5%, Whole barley flour-4%, Date syrup- 10%, Flaxseed powder- 0.5%.
T_2- Toned milk- 100ml, Skim milk powder- 5%, Whole barley flour-4%, Date syrup- 10%, Flaxseed powder-1%.
T_3- Toned milk- 100ml, Skim milk powder- 5%, Whole barley flour-4%, Date syrup- 10%, Flaxseed powder-2%.
T_4- Toned milk- 100ml, Skim milk powder- 5%, Whole barley flour-4%, Date syrup- 10%, Flaxseed powder-3%.
The present study was undertaken for manufacturing of cereal based fermented milk product. The present investigation was carried out to see the possibility of incorporating barley flour, flax seed powder, and date syrup into the indigenous milk product dahi and the results obtained from the analysis were subjected to sensory characteristics of cereal based fermented milk product.

Result and Discussions

The average of data obtained on organoleptic analysis in four replication and cereal based fermented milk product.

Parameter	T_1	T_2	T_3	T_4
Organoleptic scores (9 point hedonic scale)				
Colour & Apparence	8.00	7.80	7.77	7.40
Texture & Consistency	8.55	8.31	8.26	8.04
Flavour & Taste	8.65	8.22	7.72	7.50
Overall Acceptability	8.39	8.11	7.91	7.63

Colour and Appearance

The highest average for colour and appearance (8.00) was recorded in T_1 sample containing 0.5% of flaxseed flour, followed by T_2 (7.80), T_3 (7.77), T_4 (7.40).

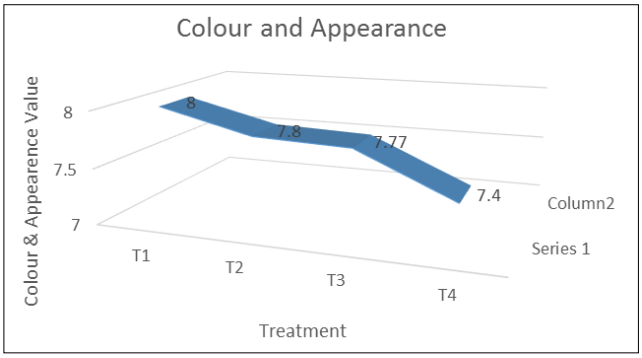

Fig 1: The graph indicating Colour and Appearance percentage for cereal based fermented milk product

Texture and Contest

The highest texture & consistency (8.55) was recorded in T_1 sample containing 0.5% of flaxseed flour, followed by T_2 (8.31), T_3 (8.26), T_4 (8.04).

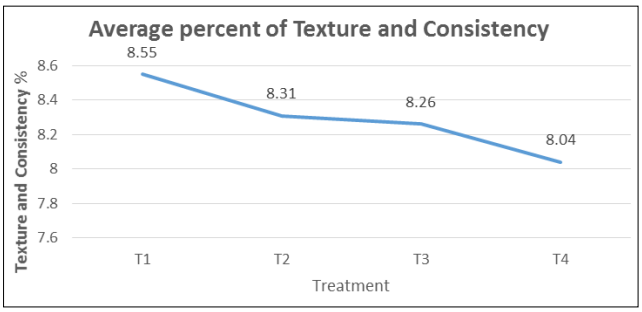

Fig 2: The graph indicating Texture and Consistency percentage for cereal based fermented milk product

Taste and Flavour

The highest average for taste & flavour (8.65) was recorded in T_1 sample containing 0.5% of flaxseed flour, followed by T_2 (8.22), T_3 (7.72), T_4 (7.50).

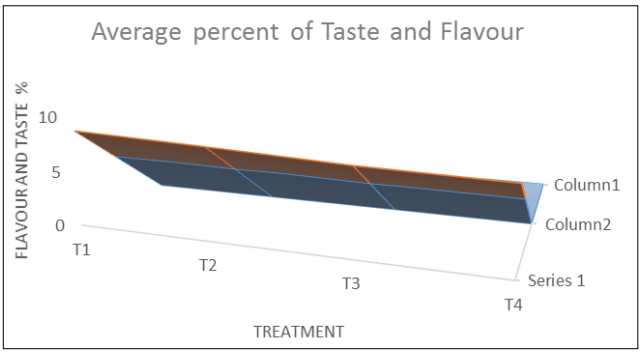

Fig 3: The graph indicating Taste and Flavour percentage for cereal based fermented milk product

Overall Acceptability

The highest average for overall acceptability (8.39) was recorded in T_1 sample containing 0.5% of flaxseed flour, followed by T_2 (8.11), T_3 (7.91), T_4 (7.63).

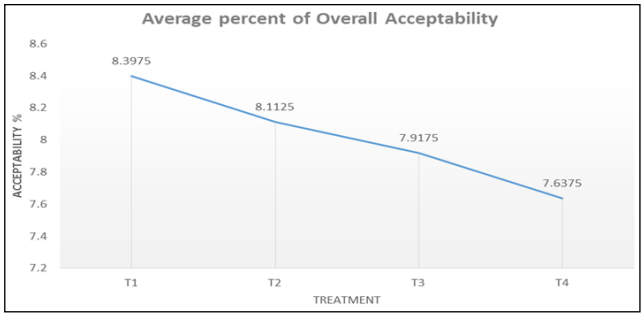

Fig 4: The graph indicating Overall Acceptability for cereal based fermented milk product

Conclusion

On the basis of the results obtained during the study it is concluded that flax seed flour and barley flour along with date syrup can be successfully employed for the preparation of cereal based milk product. The data obtained on various parameters were statistically analysed. Organoleptic evaluation showed that cereal based milk product by using flax seed flour (0.5%) that is treatment (T_1) was found to be more acceptable in terms of sensory quality followed by (T_2), (T_3) and (T_4). But as per nutrient value treatment (T_4) was found to be more nutritious followed by (T_3), (T_2) and (T_1).

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