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DEVELOPMENT OF SOYAMILK INCORPORATED KHOA

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Abstract: Khoa is an indigenous form of highly concentrated milk It is a coagulated product in which all the milk proteins by action of heat coagulate into a uniform mass. Generally khoa is prepared from buffalo milk which had high fat content but debit in vitamins and minerals Khoa is also prepared with soya milk but less in cholesterol and had good mineral content. So main theme of our research is to make khoa which is having both the characteristics that are present in khoa of soya milk and buffalo milk Experiments were conducted to develop the khoa using various level of concentration of soyamlk and wholemilk content Viz. 70:30, 50:50 and 30:70. The prepared khoa placed on parchment paper and stored at room temperature to determine the physico-chemical and sensory quality attributes of storage at room temperature (37°C). The maximum overall acceptability score for the fresh product prepared with the amount of soyamilk extract and whole milk level of 50:50was awarded as 8.6(like moderately). It was concluded that khoa prepared with soyamilk extract and whole milk ratio of 50:50was found to be superior to those prepared with other ratio.

Keywords: Soymilk, khoa.

Introduction

Khoa is prepared from buffalo milk which had high fat content but debit in vitamins and minerals. Soya milk that can be used as substitute for buffalo milk which is rich in minerals, vitamins and isoflavones and has no cholesterol, and lactose. Hence in the present investigation we had made an attempt to develop buffalo milk mixed with soya milk. Experiments were conducted to develop the khoa using various level of concentration of soya milk and buffalo milk content. The prepared khoa is placed on parchment paper and stored at room temperature to determine the physic- chemical and sensory attributes of storage at room temperature (37 degree Celsius). From the biochemical analysis as the percentage of soya milk increases, fat content decreases, protein content increases, mineral content increases with the marginal difference. From the present study, it can be concluded that khoa prepared by soya milk and whole milk were more enriched product compared to control. So theme of the research is to make khoa which is having both the characteristics that are present in soya

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milk and buffalo milk. Soya milk contains only vegetable protein that they cause less loss of calcium through kidneys and lower LDL cholesterol, decrease blood clotting which help in reducing cancer and heart attack. The FDA (food and drug administration of us) confirms that soya protein, as part of diet in saturated fat and cholesterol may significantly reduce the risk of coronary heart. The investigation has been taken up with following objectives. To develop formulations with varying proportions of full cream milk and soya milk. To analyze proximate composition and microbial quality. To carry out sensory evaluation of formulated soya milk incorporated khoa to assess the acceptability.

Materials and methods

Sample preparation

Extraction of soymilk

Soymilk was extracted from the soya beans which were soaked for 10-12hrs. Soaked and washed swollen soybeans were fed into soy-cow which consist of steam generator, grinder cum cooker, vaccum deodorizer and filteration unit. Soybean seed along with steam were cooked in the grinder cum cooker with a stirring time of 5 min. The soy slurry was then deodorized in the deodorizer. The milk so obtained is filtered is filtered by using fine mesh contained in mechanical filter press. In this way the soymilk comes out through the press drain pipe and well pressed okara remains in the filter bag.

Preparation of soymilk incorporated khoa

Initially bring the soymilk to boiling temperature and stir the milk at about 100 rpm. This would help for constant evaporation of moisture. Appropriate amount of sugar is added and after few minutes progressive thickening of milk takes place. The thickened mass shows spurting, abrupt change in colorant this stage cardamom powder is added to the above mixture and consistency at this stage also vigorous stirring and desiccation are continued till the viscous product reaches a pasty consistency. At this stage give close attention and reduce the fire so as to lower down the temperature to 80-88°C.The final product is ready when it shows signs of sticking together. After some time remove the soykhoa on parchment paper and make circular pat and note the weight of soykhoa.

Experimental Protocols

Different proportions of soymilk incorporated khoa

In the present study, we have prepared different proportions of **soymilk incorporated khoa** for the proper standardization of the product. Three different proportions of soymilk and whole milk like 70-30%, 50-50%, 30-70%, of soymilk incorporated khoa with respect to the

mix following the above mentioned procedure. The details of formulations are shown in table:

COMPOSITION OF PRODUCT VARIATIONS

SAMPLES	Soymilk	Buffalo milk	Sugar
CONTROL	Nil	1000ml	120gm
SAMPLE A	300ml	700ml	120gm
SAMPLE B	500ml	500ml	120gm
SAMPLE C	700ml	300ml	120gm

MICROORGANISM CULTIVATION

The stock cultures of *E. coli* obtained from the food microbiology laboratory and were streaked on agar plates and incubated at 37 degree Celsius for 48 h. the strain was transferred into the broth and incubated at 37degree celsius for 48h. The initial concentration of *E. coli* was enumerated by serial dilution and plate counting technique.

MICROBIAL ANALYSIS

BACTERIAL LIMIT TEST

Transfer 1ml of diluted neutral sample (1ml in 10ml of sterilised peptone diluent) into sterile petri plates. Transfer 15-20ml of sterilized media into the petriplates. Allow it to solidify and close the lids after the medium solidifies. Incubate the solidified plates in an inverted position in an incubator for 48hrs at 37^0C. After 48hours, count the number of colonies and record the result.

FUNGAL LIMIT TEST

Transfer 15-20ml of sterilized media into the sterilized petriplates and allow it to solidify. Transfer 1ml of diluted neutral sample (1ml in 10ml sterilized peptone diluents) into the petriplates. Close the lids after evenly spreading the sample n the medium. Incubate the solidified plates in an upright position in an incubator for up to 5 days at 23^0C. After 5 days count the colonies and record the result.

Total viable bacterial count, coliform count and psychrotrophic count were done as per standard methods for examination of Dairy products (Bureau of Indian Standards 1479, 1977). For aerobic spore forming bacterial count, the vegetative cells were destroyed by heat treatment at 80oC for 10 min then the sample were plated in standard plate count agar in duplicate using lower dilutions according to the standard procedure (WHO, 1962).

As per the Bureau of Indian Standards 1479 (1977), the enumeration of yeast and mould count was made. Mould colonies from the representative agar plates were picked, isolated and sub cultured on potato dextrose agar slants at a pH of 3.5. These cultures were maintained as slant cultures in the refrigerator and renewed at every 14 days of intervals and different species of *Aspergilli*, *Penicillium*, *Rhizopus*, *Fusarium* and *Mucor* were identified (Smith, 1981). The growth rate and the morphological colony characters such as colony colour, colour changes, colour on reverse side of the colony and texture of the colony on agar surface were studied after 10 days of incubation at 25oC on Czapek Dox agar.

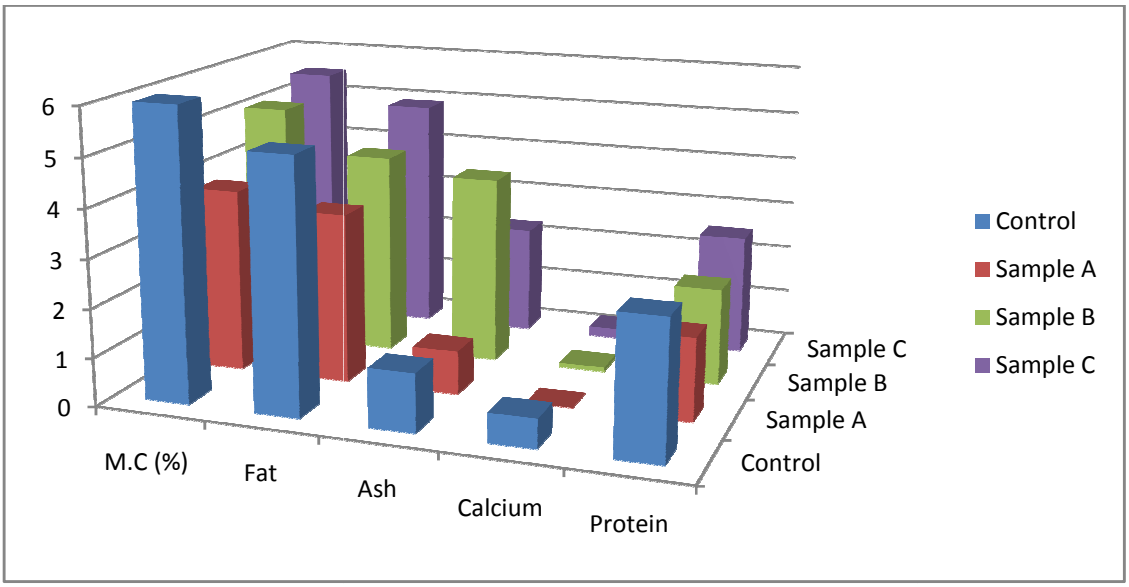
Colony characters of the isolated moulds were examined under the stereomicroscope and the observations were recorded. Mounted preparations of the moulds on slides stained by using Lactophenol cotton blue were examined using stage micrometer for finer details and reproductive structures under the low and high power of the microscope. A total number of colonies of each category of the samples were enumerated and the collected data's were subjected to statistical analysis as per Snedecor and Cochran (1980). The rate of isolates of each mould in the khoa samples and khoa based milk sweets were calculated as a percentage of the total number of the isolates.

Results and discussion

A total of 3 samples of soya milk incorporated khoa and one control sample were taken the resulted bacterial count of the sample. The average SPC of khoa samples made from buffalo's milk and 4,400/g and that of soya milk incorporated khoa is about 6800/ g it has been increased as the percentage of soy milk is increased because of the reason soya milk contains high nutrient content so the number of count increases with the time and temperature.

The acid producers which are known to increase acidity in khoa gave a maximum count of 4,100/g in khoa samples made from buffalo's milk while the maximum count was 5,200/g in khoa samples prepared from soya milk because of the antioxidants present in it.

The yeast and moulds, known to be responsible for discolouration and lipolytic defects in khoa averaged 7.8/g in freshly made samples prepared from soya milk, 10/g for freshly made samples from buffalo's milk. As expected, the soya khoa samples had maximum yeast and mould count mostly as a result of post manufacture contamination.



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Moisture content

The moisture content can be estimated by oven method (ISI0484.1983 specifications)

Take the weight of petri dish. Weight about 10 gm of jack fruit bulbs into the petri dish and spread evenly for uniform drying. Put the petri dish in an oven at 100-105°C with the lid open for about 2 hours. Cool the petri dish in desiccators, with the lid closed for 15 min. Take the weight of with sample

Calculation:

$$\text{Moisture content } (\%) = \frac{Initial\ weight\ of\ the\ sample - Final\ weight\ of\ the\ sample}{Intial\ weight\ of\ the\ sample} \times 100$$

Moisture content is more in control sample then followed by sample C, sample B, and sample A, concentrations of water in the buffalo milk and the soya milk. Generally khoa can keep well for 5-7 days at room temperature. khoa packed in multilayer transparent laminate pouches under modified atmospheric packing of nitrogen and co2 had shelf life of 15 days at room temperature and 30 days at 20°c.

Ash:

Ash is the inorganic residue remaining after the water and organic matter have been removed by heating in presence of oxidizing agents which provides a measure of the total amount of mineral within the food. Remove the moisture content in bulb. Put the sample in a muffle furnace (550-600°C). Water and volatile compounds are vaporized and organic compounds are burned. The minerals are converted in to oxides, phosphates, chlorides or silicates.

The ash content represent the mineral content in the sample which is highest in the sample B followed by sample C, control and sample A because the soya milk contain most of the

minerals the following because of the stability of the minerals to the heat when they are blended gives high percent of mineral content.

Fat estimation

Weigh accurately 4-5 gms of prepared sample into a extraction tube wash slides of the tube with 2ml hot water and mix well. Add 2ml of conc. ammonia and mix. Heat on a water bath for 20minutes at 60°cwith occasional shaking. Add 10ml of alcohol and mix. Transfer mixture to a separating funnel. In a beaker rinse 25ml of ether and 5ml of petroleum ether and add to the funnel. Shake well after each reagent addition for 5 minutes, till a clear upper layer is obtained .transfer ether layer into tared flask. Wash extraction tube with a1:1 mix of solvents and add to the flask. Reextract liquid in aspirating funnel twice 15ml of each solvent each time and collect in a tared flask evaporate the solvents on hot plate at 60°c.dry the residue of fat to constant rate in an oven at 100°c cool and weigh the flask and remove the fat in the flask with15-20ml petroleum ether, dry and weigh the sample.

Fat content is more in control sample followed by sample C, sample B, and sample A, due to milk concentration.

Calcium estimation

Take the ash prepared from estimation of total ash and add 5 ml HCl, boil and add about 50 ml of water and continue heating for few minutes. Transfer to 100 ml volumetricflask , make volume, mix and filter through whattman no 1 filter paper. Take 25 ml of filtrate in a beaker in duplicate, dilute to 50ml with water. Add few drops of methyl red indicator. Make it alkaline by adding dil.NH OH (yellow color). Heat the solution to boil, add 10 ml of ammonium oxalate drop by drop by constant stirring. Complete the precipitation by adding few ml of dilute NHOH. Remove the beaker from hot plate and make it acidic by adding dilHCl (pink color) and leave the beaker for 4 hours to make complete precipitation of calcium oxalate. Filter the contents and wash the beaker and precipitate with hot water until the filtrate is free from oxalate. Warm and titrate immediately against standard 0.1N KMnO4 solution to a pink end point.

The percentage of calcium is more in control sample due to the dairy milk has long established itself as a source of calcium, containing about 300 milligrams of calcium per 8-ounce serving.

Estimation of Protein

Protein estimation of sample was carried out using kjeldhal method (AOAC,1990). The kjeldhal method can conveniently be divided into three steps:1. Digestion, 2. Neutralization,

3. Titrationorganic matter was oxidized and uniform greenish – blue digest was obtained. The digest was cooled volume was made up to 100 ml distilled water. An aliquot of 5 ml was taken for steam distillation in kelpus distillation unit with excess of 40% NaOH solution (10 ml). The liberated ammonic was observed in 100 ml of 2% boric acid containing a few drops of mixed indicator. This was titrated against N/70 HCl. A simultaneous standard (Anhydrous ammonium sulphate) was done to estimate the amount of nitrogen taken up by N/70 HCl. From the nitrogen content of the sample, the protein 0.1g of sample was weighed into a kjeldhal flask 0.2g of the digestion mixture as added and digested in kelplus – kjeldhal digester with 20 ml of conc.H2SO4 until all the n content of different samples was calculated by multiplying by a factor of 6.2 % of nitrogen present in given sample

The percentage of protein is high in control the followed by the sample C, sample B, sample A due to the protein inhibitors are present in soya milk and milk contains lactose sugar which lack lactase enzyme.

Conclusion

soya incorporated khoa was prepared for all age groups which is of high nutritious as rich in protein as well as mineral content useful for muscle building and bone formation for growing children and teenagers.

The protocol followed and results obtained are summarized below:

The product formulated with different ratios of soymilk and buffalo milk (0:100, 30:70, 50:50, 70:30) respectively. Different formulations of khoa were prepared by rapid heating and analysed for proximate analysis and overall acceptability of product. Organoleptic characteristic of soya milk incorporated khoa were evaluated. Keeping in view of its high nutritious values and high protein content, khoa is prepared.

According to microbial analysis sample c(70:30) is good, which contains less growth of microbes. From the sensory evaluation it is concluded that sample A(30:70) has good acceptability to that of other samples in terms of colour, acceptability, flavor, and texture.

From the biochemical analysis sample A(30:70) is good due to high proteins and minerals and less fat content. The cost of production is affordable for almost all class people and is mainly used for direct consumption.

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