

Periodic Research

Fortified Soymilk Based Beverages: Its Preparation and Intervention on Adolescent Girls.

Abstract

Soymilk is very economical lactose free, highly digestive and nutritious alternative of dairy and meat centred diet. It is cholesterol free product, has a very low content of saturated fats and rich in PUFA. Milk based products have a very short shelf life. The present study focuses on:

1. The incorporation of soymilk in fruit based shakes in various proportions.
2. Organoleptic evaluation of fortified fruit shakes.
3. Determination of shelf life of most acceptable soymilk fortified fruit shakes.
4. Popularization of soymilk fortified food product among adolescent girls.

Keywords: Soymilk, adolescents, Organoleptic evaluation, popularization, vegan

Introduction

People's knowledge institutions and innovations have influenced the evolution of food basket over the last several millennia. New products are being innovated constantly to provide ways for consumers to develop variety and balance in their diets. Milk alternatives have seen an explosive growth in recent years as a result of the increasing awareness of lactose intolerance as well as the rise in veganism and general diet consciousness. This explosive growth is a great benefit among significant population of people who lack the sufficient enzymes to digest regular dairy products. Fortification is the process by which manufacturers add micronutrients such as vitamins and minerals to food. The purpose is to reduce the rate of common deficiencies and diseases that would otherwise occur in the absence of these nutrients. The food vehicle selected for fortification is fruit milk shakes and the fortificant used is soymilk.

Soymilk is very economical lactose free, highly digestible and nutritious alternative of dairy and meat centred diet. It is cholesterol free product, has a very low content and rich in PUFA. (Linder, 2003). Milk based beverages have a very short shelf life so cannot be stored for longer period of time but soymilk is a non dairy product so can be stored for a long period. It is one of the convenient foods for adolescents. Adolescence is a period of significant growth and body changes. The body adjustment to puberty and continued development requires essential vitamins and minerals to develop a healthy individual. (Neumark et. al. 2001)

Research regarding the type of ready to eat nutritious foods for adolescent girls that can be recommended is limited. In addition, research is needed to incorporate soymilk in fruit milk shakes to prove its versatility and improve the nutritional quality of the food products that are recommended especially for adolescent girls. The present study focuses on the importance of food fortification.

Objectives

Realizing the need of adolescent health the present study is focussed on formulation preservation and popularization of value added food products with soymilk with the following objectives:

1. The incorporation of soymilk in fruit based shakes at various proportions.
2. Organoleptic evaluation of fortified fruit shakes to find out the acceptability.
3. Determination of shelf life of most acceptable soymilk fortified fruit shakes.
4. Popularization of soymilk fortified food product among adolescent girls.

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Materials and Methodology:

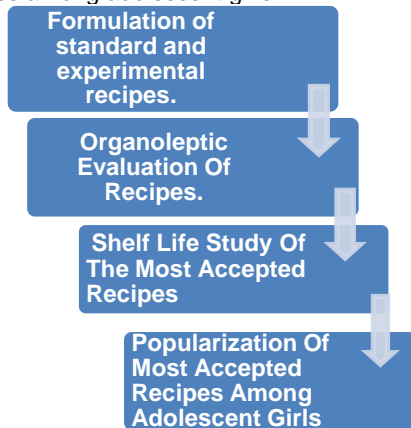
The study was divided into 4 phases:

Phase 1: Preparation of Standard apple, grape and pomegranate milkshakes and simultaneously formulation and preparation of experimental milkshake recipes with different proportions of soymilk.

Phase 2: Organoleptic evaluation of recipes using 9 point hedonic rating scale.

Phase 3: Shelf life study of the most accepted recipes.

Phase 4: Popularization of most accepted recipes among adolescent girls.



Phase 1:

Formulation of Standard and Experimental recipes.

In the Present study, milk shakes were selected to fortify soymilk. These products are easily available and cost effective too. It is also highly preferred by teenage group. Apple, grapes and pomegranate were selected for preparing milk shakes because they go with soymilk blend, and without any curdling, it promotes good texture, taste and flavour. Soymilk was used as an effective fortificant. Fruit milkshakes was prepared by liquefying the whole fruit with minimum amount of water and milk (*Manay, 2000*). Fruit blender and pressing technique was adopted to prepare milkshakes. The standard samples (A, B, C- Apple, Grapes and pomegranate milkshakes respectively) and experimental samples (A₁–A₅, B₁-B₅, C₁- C₅) were prepared using pressing technique which is depicted in Table I and Table II

Table 1: Composition of Standard Samples

Ingredients	Milk (ml)	Sugar (gm)	Fruit (gm)
Apple milkshake	300	75	150
Grapes milkshake	300	75	150
Pomegranate milkshake	300	75	150

Table 2: Composition Of Experimental Samples

Fruit Milk Shakes	Amount of Soymilk Used (MI)	Milk (MI)	Sugar (Gm)	Fruit (Gm)
Apple Milkshake Standard Sample A	-	300	75	150
Exp Sample A ₁	100	200	75	150
Exp Sample A ₂	150	150	75	150
Exp Sample A ₃	200	100	75	150
Exp Sample A ₄	250	50	75	150
Exp Sample A ₅	300	-	75	150
Grape Milkshake Standard Sample B	-	300	75	150
Exp Sample B ₁	100	200	75	150
Exp Sample B ₂	125	175	75	150
Exp Sample B ₃	150	150	75	150
Exp Sample B ₄	175	125	75	150
Exp Sample B ₅	200	100	75	150
Pomegranate Milkshake Standard Sample C	-	300	75	150
Exp Sample C ₁	100	200	75	150
Exp Sample C ₂	120	180	75	150
Exp Sample C ₃	130	170	75	150
Exp Sample C ₄	140	160	75	150
Exp Sample C ₅	150	150	75	150

Phase 2: Organoleptic Evaluation of Recipes

The Organoleptic evaluation was conducted using nine point hedonic rating scale among 50 graduate women, for the standard and experimental samples viz, A, A₁-A₅, B, B₁-B₅ and C, C₁-C₅.

Phase 3: Shelf Life Study of the Most Accepted Recipes

The most accepted recipes of fruit shakes were subjected to shelf life analysis. Shelf life can be defined in terms of safety, nutrition and acceptability. Safety is the most important attribute to consider while measuring shelf life. (*Perchonok, 2002*).

The most accepted soymilk fortified experimental samples of each milkshakes (Apple milkshakes A₁, grape milkshake B₁, Pomegranate milkshake C₁) were analysed for its microbial growth, along with its standard samples. The type of storage, period of storage and the microorganisms were to be analysed.

Since, fruit milkshakes are highly susceptible to bacterial and fungal growth. So, the presence of Salmonella, Entrobacter, Lactobacillus, Clostridium, Botulium, Aspergillus were analysed.

Refrigeration storage

Apple milkshake (A, A₂), Grape milkshake (B, B₂) and pomegranate milkshake (C, C₂) were analysed for its microbial growth for a period of 42 days.

Freezing temperature

Milkshakes samples were frozen for about a period of 4 months.

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Phase 4:

Popularization of Most Accepted Recipes Among Adolescent Girls

The most accepted recipes of soymilk incorporated experimental samples of milk shakes were popularized among 450 adolescent girls. Knowledge regarding the importance of soya, its health benefits and nutritional aspects was imparted using aids like charts, poster and pamphlets.

Results and Discussion

The most acceptable milkshake among experimental apple milkshakes, grapes milkshakes and pomegranate milkshakes were A₂, B₂, C₂ respectively. Milkshakes fortified with 50% soymilk were found to be most acceptable.

Simultaneously the shelf life of the most acceptable samples was found to be better than the standard milkshakes.

Knowledge regarding the importance of soya, its health benefits, nutritional aspects was imparted using aids like charts, poster and pamphlets which was highly appreciated.

Sample	Types of storage	Period of storage	Occurrence of organism
Standard sample A	Refrigerator storage 37 ⁰ - 40 ⁰ F	1-4 days 5-7 days	No growth Mild discoloration with blue green colour
Exp sample A ₂	Refrigerator storage 37 ⁰ - 40 ⁰ F	1-7 days	No growth

Table 3

In standard apple milk shake, mild discoloration with blue green such as Aspergillus was found at the end of 1 week. But no microbial growth was observed in experimental sample A₂.

Sample	Types of storage	Period of storage	Occurrence of organism
Standard sample B	Refrigerator storage 37 ⁰ - 40 ⁰ F	1-4 days 5-7 days	No growth Rhizopus, Camphycobacter
Exp sample B ₂	Refrigerator storage 37 ⁰ - 40 ⁰ F	1-7 days	No growth Rotten, pungent smell occurred and the organism found was Lactobacilli and Shigella species

Table 4

Table 4 shows that in standard grape milk shake, at the end of 1 week, Rhizopus, Camphycobacter was seen in standard sample B. Lactobacilli and Shigella species were found after 7 days in experimental sample B₂.

Sample	Types of storage	Period of storage	Occurrence of organism
Standard sample C	Refrigerator storage 37 ⁰ - 40 ⁰ F	1-7 days	No growth

Exp sample C ₂	Refrigerator storage 37 ⁰ - 40 ⁰ F	1-7 days	No growth
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Table 5

The above table 6 depicts that no microbial growth was observed in both the samples of pomegranate milk shake for a period of 1 week.

Sample	Types of storage	Period of storage	Occurrence of organism
Standard sample A	Freezing 0 ⁰ F	1-20 days	No growth
Exp sample A ₂	Freezing 0 ⁰ F	1-20 days	No growth

Table 6

The above table reveals that there was no microbial growth in both the samples of apple milkshake.

Sample	Types of storage	Period of storage	Occurrence of organism
Standard sample B	Freezing 0 ⁰ F	1-12 days 13 – 20 days	No growth Clostridium perfringes, Enterobacter, pseudomonas
Exp sample B ₂	Freezing 0 ⁰ F	1-20 days	No growth

Table 7

This table depicts that in standard sample B at the end of 20 days Clostridium perfringes, Enterobacter and pseudomonas were determined whereas in case of experimental sample no microbial growth was seen in experimental sample B₂.

Sample	Types of storage	Period of storage	Occurrence of organism
Standard sample C	Freezing 0 ⁰ F	1-12 days 13 – 20 days	No growth Camphylobacter, Staphylococcus Clostridium species
Exp sample C ₂	Freezing 0 ⁰ F	1-20 days	No growth

Table 8

This table depicts that in standard sample C, Camphylobacter, Staphylococcus, Clostridium species were seen after 20 days of storage, whereas in case of experimental sample C₂, no microbial growth was observed.

Conclusion

Hence, the present study revealed that soymilk fortified fruit milkshakes possessed best organoleptic evaluation and it increased the nutrient composition of the recipe too. Microbial analysis results showed that, soymilk fortified fruit milkshakes can be stored for longer duration of time as compared to the standard fruit milkshakes.

Recommendations

1. Further research can be done on the property which is responsible for the increased shelf life of soymilk
2. More innovated recipes can be prepared using soymilk.

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