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Nutrient evaluation and comparison of fresh milk in formulated recipes and its consumer acceptability

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Abstract

Milk is a basic food for all people at different life style. It has high nutritive value. It is essential for child growth and development, body maintenance and protection from both infectious and non-communicable diseases (NCDs).The consumption of milk is growing day by day in developing countries as it is the source of nutrients such as calcium, magnesium, selenium, riboflavin, vitamin B12 and pantothenic acid (vitamin B5).In the present study, three standardized recipes such as bread, papad and vegetable soup were selected and supplemented with three types of milk namely Cow milk, buffalo milk and goat milk separately and the acceptability of the consumer was assessed. The developed recipe were evaluated for using four point hedonic scale rating in selected subjects to assess or identify the appearance, colour, flavour and taste of the standard and fresh milk incorporated recipes. Among the formulated recipes, vegetable soup was accepted by the consumers when compared to bread and papad, incorporated with three types of milk. Though the nutritive value of the entire nutrient was higher in buffalo milk incorporated vegetable soup than cow milk and goat milk but the cow milk incorporated vegetable soup was accepted by most of the consumers due to its taste and flavour.

Key words: Milk, standardization, incorporation, consumer acceptability

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INTRODUCTION

Milk is an opaque white liquid, which have major amounts of saturated fat, protein, calcium and Vitamin-C. The mammary gland of mammals produce milk. Milk is the first nutrition we get in our lifetime. It is the natural food for the new born as well as for grown ups. It is a basic food usually gets easily digested. It is considered as complete food providing various types of nutrition. The term milk refers to a heterogeneous mixture secreted by healthy mammary glands which contains fat, proteins and carbohydrate along with minerals and vitamins. Milk is a complex mixture consisting of an emulsion of fat and a colloidal dispersion of protein together with milk sugar (lactose) in true solution. Milk is the creamy yellow liquid formed by all female mammals for feeding their young. The milk of different animals are very similar to one another and contain the same nutrient but with slight difference in composition and proportions. Milk is the fresh and clean lacteal secretion practically free from colostrums and obtained by complete milking. (Kailasapathy, 2015)

Quality milk is one that has been produced, processed and distributed under rigid sanitary conditions so that it has a relatively low bacterial count free of disease – producing organisms and has good flavour and appearance with nutritive value and satisfactory keeping quality. Various controls and treatment for milk have been instituted to ensure quality in this product. The responsibility for a safe milk supply does not rest slowly with the dairy industry; however it must be shared by public health officials and the consumer. Cow's milk is a key part of most healthy diets for adults and children. **(**Park, *et.al*., 2007)

Cow's milk is the only food of young calf it must necessarily contain all the food of the ingredients needed for its life and growth while not for human beings. However cow milk is never the less of the very greatest value at all stages of human life and particularly to children ,adolescents ,expectant and nursing mothers invalids and old people. (Mohan, 1989)

Buffalo's milk is a totally natural product that can be consumed like any other milk. Buffalo milk is more commonly preferred than the cows, goats and artificial milks. It is significantly lower in cholesterol and higher in calcium than cow's, sheep's or goat milk. And unlike the array of industrially produced soya and other cereal milks it is totally free of additives and chemical formulations. Goat's milk is so highly nutritious which can actually serve as a substitute for a meal. It is known to be highly compatible and nourishing natural foods. (Sahai, 1996)

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Milk contains a broad selection of completely available minerals ranging from the familiar calcium and phosphorus down to trace elements. The functions of some are yet to be studied. Milk is poor sources of iron, copper, manganese, Nicotinic acid, vitamin-C and vitamin-D. Lower cholesterol content of buffalo milk is 0.65mg / g as compared to the corresponding value of 3.14 mg / g for cow's milk. Goat milk is a very good source of riboflavin, Vitamin-B, important for energy production. It plays at least two important roles in the body's energy production. (Chandan, *et.al.,* 1992).

Riboflavin attaches to protein enzyme called flavo proteins that allows oxygen based energy production. It plays at least two important roles in the body's energy production. Goat milk is a good source of potassium and minerals essential for maintaining blood pressure. Goat milk is a very good source of calcium. It is widely recognized for its role in maintaining the strength and density of bones. Calcium and phosphorus combined to calcium phosphate which is a major component of the mineral complex is called hydroxy apatite that gives structure and strength to bones. Adequate consumption of milk and dairy from early childhood and throughout life can help to prevent diseases like osteoporosis, menopausal symptoms, colon and breast cancer. (Mahmood, 2010)

Cow's milk contains iodine in rich quantity, which is an integral compound of the triodothyronine and thyroxine. Milk being rich in calcium and potassium, prevents the formation of kidney stones. Goat's milk helps to prevent the colon cells from cancer causing chemicals. It prevents the osteoporosis that can occur as a result of menopause of certain condition such as rheumatoid arthritis. It also prevents the migraine.Goat's milk does not suppress the immune system. Goat's milk is easier to digest than cow's milk. (Getaneh, *et.al,* 2016). Goat's milk is a rich source of selenium a necessary nutrient to immune modulation and antioxidant properties. Some diseases are also cured by the goat milk such as asthma, eczema. recurrent ear infections, arthritis, irritable bowel syndrome, stomach ulcer, malabsorption syndrome and gout. Milk has been used for human consumption for thousands of years. Today cow's milk is still one of the most popular animal milk consumed by humans. (Srinath Reddy, 2004) The present article deals with the effect of three different types of milk supplemented with recipes such as bread, papad and vegetable soup.

MATERIALS AND METHODS

Selection, collection and preparation of standardized recipes

Selection of ingredients were procured from the local market and the fresh milks such as cow, buffalo milk and goats milk were directly collected from the milk vendors. Samples were collected through purposive sampling method. Milk was collected from Ullikkottai. 100ml of each milk was collected in sterilized plastic bottles. The milk was boiled immediately and added in bread, papad and vegetable soup.

Standardization of recipes through Incorporation:

A total of three recipes (Recipe I bread, Recipe II papad and Recipe III vegetable soup) were selected and standardized to with 100 ml of each milk (cow, buffalo and goat milk) which was incorporated in to each recipes.

Assessing the consumer acceptability of standard and fresh milk incorporated recipes

When the quality of food product was assessed by means of human sensory organs, the evaluation is said to be sensory or subjective or organoleptic. Every time food was eaten and the judgment was described (Srilakshmi,2015) The developed recipes were evaluated for four point hedonic scale rating

Very Good	-	4
Good	-	3
Fair	-	2
Poor	-	1 by 30 consumers.

The hedonic rating test was used to measure the consumer acceptability of food products and one to three samples were served to the panelist at one session.

Estimation of nutrient content of the standard and most acceptable fresh milk incorporated recipes

The nutrient of the standard and most acceptable fresh milk incorporated recipes were analysed for both macro and micro nutrient content by following methods: Carbohydrate (Anthrone method), protein (Lowry's method), fat (soxhlet method), calcium (Atomic absorption), phosphorus (spectrophotometry), vitamin A(Qualitative method).All the results were tabulated in Table-X

Table.1. Ingredients and Procedure for the Preparation of Standard Vegetable Soup

S.No.	Ingredients	Quantity (g)
1	Carrot	20
2	Beans	15
3	Peas	15
4	Onion	10
5	Tomato	15
6	Pepper	2
7	Salt	to taste

Preparation of vegetable soup

The vegetables were washed and cut in to small pieces. Tomatoes were blanched. They were cooked with ingredients and served hot. (Thangam, 2000)

Table.2. Ingredients and procedure for the preparation of cow milk (M1), buffalo milk (M2) and Goat (M3) milk incorporated vegetable Soup (100ml)

S. No.	M1		M2		M3	
	Ingre-dients	Quantity (g)	Ingre-dients	Quantity (g)	Ingre-dients	Quantity (g)
1	Carrot	20	Carrot	20	Carrot	20
2	Beans	15	Beans	15	Beans	15
3	Peas	15	Peas	15	Peas	15
4	Onion	10	Onion	10	Onion	10
5	Tomato	15	Tomato	15	Tomato	15
6	Pepper	2	Pepper	2	Pepper	2
7	Salt	to taste	Salt	to taste	Salt	to taste
8	Water	100ml	Water	100ml	Water	100ml
9	Cow's Milk	100ml	Buffalo's Milk	100ml	Goat's Milk	100ml

Procedure

The sample of vegetable soup were developed by incorporating with of M1, M2,& M3 at 100ml. The normal Vegetable soup procedure were followed.

(M1,M2,& M3(cow milk , buffalo milk and Goat milk)

RESULTS AND DISCUSSION

The recipes such as bread, papad and vegetable soup were selected for standardization.

Table.3. Methods of preparation and timings involved in the standardization of recipes through incorporation

Name of the recipe	Prepration involved	Time in minutes
Bread	Mixing, Baking	60
Papad	Mixing, Deep fat frying	4320 (2 to 3 days)
Vegetable soup	Boiling	30

The standardization of bread, papad and vegetable soup were followed by baking, mixing, deep fat frying and boiling methods respectively involved in the preparation of making recipes. The time taken for the preparation of bread was 60 minutes, papad for the 4320 minutes (2 to 3 days) and time taken for the preparation of vegetable soup was 30 minutes.

Table.4. Mean Score of Standard Bread, Papad and Vegetable Soup (n=30)

Name of the Recipes	Over all acceptability
Bread	18.06
Papad	17.88
Vegetable soup	16.52

It is evident that the mean score of consumer acceptability of standard bread, papad and vegetable soup is 18.06, 17.88 and16.52 respectively.

Table.5. Comparative view on consumer acceptability of M1, M2 and M3 incorporated in bread (100ml)

Criteria	Appearance	Colour	Flavour	Taste	Texture	Over all acceptability
M1 incorporated Bread	3.8	3.8	2.7	3.9	3.8	18.02
M2 incorporated Bread	3.9	2.9	3.9	3.8	2.8	17.38
M3 incorporated bread	3.5	3.4	3.6	3.5	3.5	17.5

The mean score of appearance of the 100 ml of cow milk, buffalo milk, and goat milk incorporated bread was 3.8, 3.9 and 3.48 respectively. The mean score of colour of the 100 ml of cow milk, buffalo milk, and goat milk incorporated bread was 3.76, 2.9 and 3.4 respectively. The mean score of Flavour of the 100 ml of the cow milk, buffalo milk, and goat milk incorporated bread was 2.7, 3.9 and 3.6 respectively. The mean score of taste of the 100 ml of cow milk, buffalo milk, and goat milk incorporated bread 3.9, 3.8 and 3.5 respectively. The mean score of texture of the cow milk, buffalo milk, and goat milk incorporated bread was 3.8, 2.8, and 3.5 respectively. The mean score of overall acceptability of cow milk, buffalo milk, and goat milk bread at 100 ml was 18.02, 17.38 and 17.5.

Table.6. Comparative view and consumer acceptability of M1,M2 and M3 incorporated vegetable soup (100ml)

Criteria	Appearance	Colour	Flavour	Taste	Texture	Over all acceptability
M 1 incorporated Vegetable soup	3.9	3.9	2.8	3.9	3.9	18.32
M 2 incorporated Vegetable soup	3.4	3.5	3.7	3.4	3.4	17.32
M 3 incorporated Vegetable soup	3.4	3.5	3.5	3.5	3.5	17.4

The developed fresh milk incorporated (Cow milk, Buffalo milk and Goat milk) vegetable soup was most favorably accepted with 100 ml of incorporation than the Bread & Papad. The nutrient content was analyzed for 100 ml incorporated vegetable soup and standard Vegetable soup.

Table.7. Nutrient content of the standard and most acceptable M1 incorporated vegetable soup (100ml)

Criteria	Energy (kcal)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Calcium (mg)	Vitamin- A(mg)	Phosphorous (mg)
Standard vegetable soup	269.5	4.2	2.3	61	102	26	59
M1 incorporated vegetable soup	272.1	4.1	3.4	61.8	110	27	89

The above table reveals that M1 incorporated vegetable soup nutrients is the energy content of 272.1 calories, protein content was 4.1 gm, fat content was 3.4, carbohydrate content 61.8 g, calcium content 110 g, vitamin-A content 27 mg and phosphorus content was 89 mg compared to standard vegetable soup.

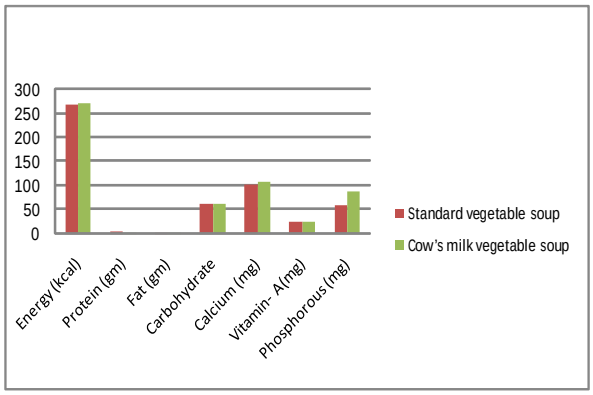

Fig.1.Nutrient content of the standard and M1 incorporated Vegetable soup

Table.8. Nutrient content of the standard and most acceptable M2 incorporated vegetable soup (100ml)

Criteria	Energy (kcal)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Calcium (mg)	Vitamin- A (mg)	Phosphorous (mg)
Standard vegetable soup	270	4.2	2.3	61	102	26	59
M2 incorporated vegetable soup	342	4.4	3.8	78	114	30	97

The above table reveals that M2 incorporated vegetable soup energy content was 341.6 calories, protein 4.4 g, fat 3.8g, carbohydrate 78 g, calcium 114 mg ,vitamin – A and phosphorus content is 97 mg compared to standard vegetable soup.

Table.9. Nutrient content of the standard and most acceptable M3 incorporated vegetable soup (100ml)

Criteria	Energy (kcal)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Calcium (mg)	Vitamin-A(mg)	Phosphorous (mg)
Standard vegetable soup	270	4.2	2.3	61	102	26	59
M3 incorporated vegetable soup	271	4.4	3.2	61	110	29	90

The above table indicates that M3 Incorporated Vegetable Soup energy content was 270.8 calories. The protein content 4.4 g, the fat 3.2g, calcium is 110 mg, The vitamin A is 29 mg and phosphorus 90 mg compared to standard vegetable soup.

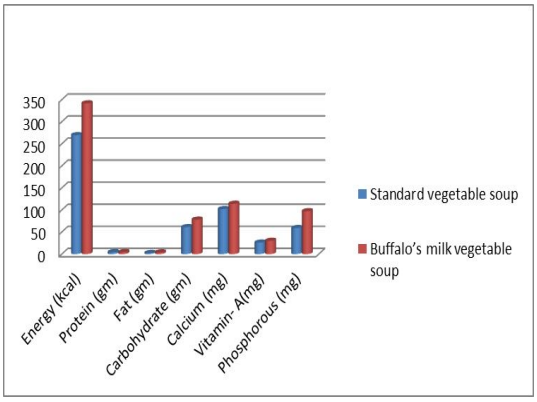

Fig.2. Nutrient content of the standard and most acceptable M2 incorporated Vegetable Soup (100 ml)

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The above table reveals that all the nutrients are rich in M2 incorporate vegetable soup compared to M1and M3 incorporated vegetable

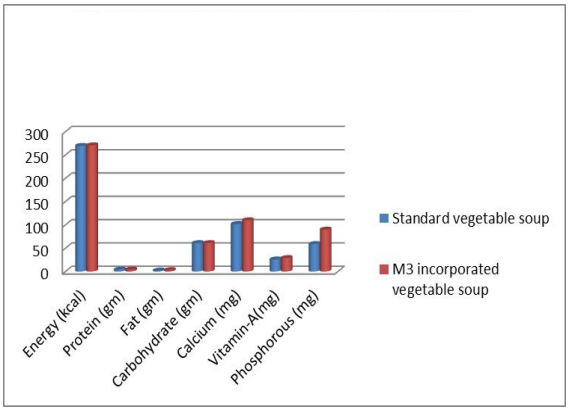

Fig.3. Nutrient content of the standard and most acceptable M3 incorporated Vegetable Soup (100 ML)

Table.10. Comparative view on nutrient content of fresh milk (M1,M2& M3) incorporated Vegetable Soup (100ml)

Criteria	Energy (kcal)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Calcium (mg)	Vitamin- A(mg)	Phosphorous (mg)
M1 incorporated vegetable soup	272	4.1	3.4	100	62	27	89
M2 incorporated Vegetable soup	342	4.5	3.8	114	78	30	97
M3 incorporated Vegetable soup	271	4.4	3.2	110	61	29	90

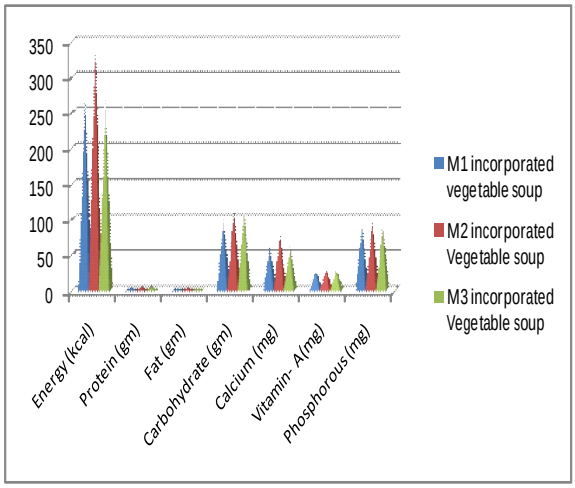

Fig.4. Comparative view on nutrient content of fresh milk (M1, M2 & M3) incorporated Vegetable Soup (100 ml)

CONCLUSION

Milk and dairy products play a key role in nutrition throughout life. Milk has different taste, colour, texture and flavour. It has high nutritive value and it is a rich source of protein, calcium and protein help in repairing body tissue producing enzymes, transporting nutrient etc., Likewise calcium helps to prevent the risk of osteoporosis, bone deformities, hypertension etc., It is available in low cost and it can be included in the diet of all income groups.Among the formulated recipes, vegetable soup was accepted by the consumers when compared to bread and papad, incorporated with cow, buffalo and goat milks. Though the nutritive value of the entire nutrient was higher in buffalo milk incorporated vegetable soup than cow milk and goat milk. Whereas in the cow milk incorporated vegetable soup was accepted by most of the consumers due to its taste and flavor. Thus it is evident that the incorporated products will definitely change the demands for macro and micro nutrients.

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