

## **Best use of whey protein for the below poverty line children**

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### **ABSTRACT**

Day by day there is increase in the temperature, over the past two decades India has seen a rise in temperature in the range of 0.8-1°C with the number of hot days increasing on a yearly basis, there are numerous deaths reported all over the country due to heat wave. The main reason for this is dehydration and water seldom seems to quench the thirst. Whey is highly nutritious and has many therapeutic and health benefits, cheese whey and paneer whey have similar nutritional composition therefore paneer whey which is an industrial waste was used, it had almost 2 g of protein, 5.5 g of lactose and a minimal amount of fat and had abundant minerals when compared to cheese whey. Whey being a by-product of milk it is highly perishable and hence shelf life is a major concern. Since proteins are heat labile, a product with low processing temperature was formulated viz. Frozen whey popsicle in which there was minimal heat treatment as well as maintained at low temperatures which arrested the growth and multiplication of microbes thereby increasing the shelf life of the product. Shelf life was conducted via organoleptic test after 15 days and microbial tests were performed on daily basis for 15 days. There was negligible change in taste and no growth of microorganisms was observed. Therefore the formulated product was seen to have a shelf life of 15 days without any change in organoleptic parameters. Due to low processing temperatures all nutrients of whey were seen to be present even after formulation of product. Frozen whey popsicle has abundant minerals which help in retention of water in the body there by keeping the body hydrated and presence of lactose works as a genuine thirst quencher. Therefore it's effective as a thirst quencher and as an electrolytic drink to combat heat. The current study showed that a healthy alternative can be provided to kids and people by the utilization of the industrial waste. Whey is a highly nutritious drink which goes as industrial waste. Maximum utilization must be done and there should be no waste that is what everyone talks about 0% waste and in this case the waste is very nutritious and has many health benefits hence many product formulations can be done using paneer whey. There are many sources of milk such as cow, buffalo, goat, camel, donkey, human etc. which have different composition of nutrients and have various and varied health benefits and better digestibility than cow's milk if we can combine these milk in various proportions and then coagulate the milk by acid coagulation then it will result in highly nutritious and healthy whey which can be used to cure many diseases such as hepatic diseases and even cancer. Addition of whey powder in the frozen whey popsicle can increase the protein content by ten folds which can be used to eradicate protein malnutrition from the children of rural areas. Paneer whey or sour whey as an egg replacer in cake and other bakery products to find out the emulsifying properties of paneer whey.

**Key Words :** Elderly, Food intake, Nutrient intake, Haemoglobin, Anaemia

### **INTRODUCTION**

Indian dairy industry achieved outstanding growth during the 12th five year plan, achieving an annual output of over 146.3 million tons of milk. This places the industry first in the world. Most importantly, dairying has become an important secondary source of income for millions of

rural families. Dairy farming is an important source of subsidiary income to small farmers and agricultural laborers. They play a very important role in milk production of the population of the country. In India three-fourth of the population lives in rural areas and about 38% of them are poor. Dairy farming is very important in rural area for reducing poverty and unemployment.

**How to cite this Article:** Rathod, Gita and Gandhim Kruti N. (2020). Best use of whey protein for the below poverty line children. *Internat. J. Appl. Home Sci.*, 7 (3 - 6) : 85-89.

(Patil *et al.*, 2016) In India the real pace of dairy development started with the establishment of a milk plant at Anand in 1955, which was flourished under dynamic leadership of Dr. V. Kurien. It is known as Anand pattern of dairy cooperatives. In due course Anand is recognized as the famous AMUL brand throughout the world. (Sarma, 2016) About 45% of milk production is consumed as fluid milk. About 35% is processed into butter or ghee about 7% is processed into Paneer (cottage cheese) and other cheese, about 4% is converted into milk powder and the balance is used for other products such as dahi and sweet meats, there has been an increasing ice cream production as foreign companies have invested in India. Paneer production is increasing annually from 2% in 2000 to 7% in 2015 this shows that there is a very vast consumption of paneer and the demand for paneer production is increasing continually therefore more production of whey bi-product of paneer production, as this whey has low pH, it is disposed into rivers, ponds or sent to waste water treatment plants which lead to extra cost for the industry, even worse it affects the environment as the whey is composed of macromolecules like carbohydrates and proteins and micro-molecules like vitamins and minerals; all these components act as substrate for the growth of micro-organisms. If whey is eluted directly in river bodies it increases the BOD of water and there by increases the microbial load in water body, there by polluting the water body. If the whey is disposed on land it results in.

The main objective of this study was to formulate a product which has high nutritional value and as this product is more popular in the rural areas therefore the targeted consumers were children in rural area, there is hardly any protein portion in the food that they eat therefore this frozen whey popsicle can assist in little protein intake though it does not meet RDA but there is little amount of protein intake and abundant intake of minerals.

## METHODOLOGY

Chemicals and Reagents alkaline cupric tartrate TS, Lanthanum chloride heptahydrate, hydrochloric acid, calcium carbonate, potassium dichromate, chromium, nitric acid, copper foil, sodium citrate, perchloric acid, sodium fluoride, Sodium acetate solution, 0.1 N sodium hydroxide, 0.05 M sodium sulfuric acid, ammonium molybdate, hydroquinone, USP Sodium Fluoride RS, sodium bisulfite, monobasic potassium phosphate,

potassium chloride, ammonium chloride, metallic selenium, ammonium hydroxide, edetate disodium, hydroxylamine hydrochloride. Perchloric acid, zinc oxide, dipotassium sulphate, copper sulphate, sodium hydroxide, methyl red mixed solution, Bicarbonate, bromine, iodide, Collection of Sample: Milk sample were collected from local supermarket, Chennai, Tamil Nadu, India. A sample of 100 ml of milk was used to prepare paneer whey.

### Fruit:

Freshly ripen orange fruits were collected and purchased from market Chennai, Tamil Nadu, India. Each fruit was thoroughly checked for its quality, washed and dried at room temperature and securely packed accordingly.

### Extraction of juice:

Juice was extracted after removing the peel of orange only the pulp is used and it is ground using little whey and concentrated by heating.

### Analysis of frozen whey popsicle:

1. Proximate analysis
  - Qualitative Analysis of Carbohydrates (Lactose).
  - Protein Analysis -Kjeldahl Method
  - Analysis of Lipids v Total Solid Content.
  - The Determination of the Mineral Content.
2. Shelf Life study
  - Organoleptic Test- (after shelf life of 15 days)
  - Total Aerobic Microbial Count/ Bacterial Count.
  - Tests For Specified Micro-Organisms.

### Sensory analysis:

The sensory evaluation of the frozen whey popsicle were prepared. The sensory panel consisted of 30 semi trained panel members. The sample were rated on five-point hedonic scale for their appearance, colour, taste, texture, flavor/aroma and overall acceptability in the following order.

- Excellent
- Very Good
- Good
- Fair
- Poor

## RESULTS AND DISCUSSION

### Sensory analysis:

Sensory analysis is defined as a scientific method

used to evoke, analyze, measure and interpret those responses to the product as perceived through senses of light, smell, touch, taste and hearing. Sensory tests, of course, have been conducted for as long as there have been human beings evaluating the goodness and badness of food, water, everything that can be used and consumed. A comparative analysis was done between the market sample and the formulated frozen whey popsicle of two flavors orange and coconut the sensory analysis was conducted for all three samples and the panelists were given a sheet to enter their scores out of five for each sample and for each organoleptic parameter. The individual scores of the panelists were added and average values by mean and standard deviation of each organoleptic parameter was recorded and tabulated in table 4. Based on which a bar diagram was plotted which showed that both orange and coconut flavored candies excelled in all organoleptic parameters compared to market sample. Orange flavored whey frozen candy had excellent scores in all organoleptic parameters and ranked first out of all three closely followed by coconut flavored whey candy which got second highest scores in all parameters. This shows that the panelists preferred frozen whey popsicle over the market sample in all aspects which are as follows appearance, color, taste, flavor and aroma and overall acceptability. Orange flavored frozen whey popsicle got score above 4.0 in each organoleptic parameter and comments by the panelists were very positive some panelist commented "The product took us back to childhood memories"

#### **Shelf life testing:**

Organoleptic parameters after 15 days : Shelf life study was done using two methods which are as follows: organoleptic parameters were tested after 15 days of formulation of product which would determine that whether there was change in any organoleptic property of product after 15 days and microbial testing of the product on each day up-to 15 days this was performed to check for presence or absence of any pathogenic micro-organisms, Shelf life study was done by sensory evaluation the panel list selected were the same and the product was scored for organoleptic parameters there was no change in market sample but there was minimal deterioration in the frozen whey popsicles but they were not rejected by the panelists but rather they just felt slight difference in sensory parameters

There was very minimal difference in the

organoleptic properties of market sample after 15 days as it is composed of water and synthetic flavor only so there is no much difference even after 15 days.

The product's organoleptic properties did deteriorate after 15 days but there was minimal deterioration especially in taste which went down from 3.98 to 3.7 and flavor from 4.13 to 4 due to which there was difference in overall acceptability but not much change in appearance and color. Even though there was decrease in taste but there was no development of off-flavor or off-taste but just the intensity of flavor and taste were reduced.

The product's organoleptic properties did deteriorate after 15 days but there was minimal deterioration in all the organoleptic property. Even though there was decrease in organoleptic properties but there was no development of off-flavor or off-taste but just the intensity of flavor and taste were reduced. Orange flavor was preferred more over coconut by the panelists.

#### **Microbial analysis:**

To conduct shelf life study the second step was to check if the frozen whey popsicle had any growth of microbes or not, tests for microbial contamination and several pathogenic microbes was performed. Micro-organisms like pseudomonas, E-coli, Salmonella presence or absence was tested for a period of 15 days. As per the results there was no growth of any pathogenic bacteria nor any spores were found even MBRT test confirmed that there was no growth of pathogenic E-coli, All the microbiological tests came negative there by the inference was the product was microbiologically and organoleptically safe for consumption for a period of 15 days.

#### **Conclusion:**

Day by day there is increase in the temperature, over the past two decades India has seen a rise in temperature in the range of 0.8-1°C with the number of hot days increasing on a yearly basis, there are numerous deaths reported all over the country due to heat wave. The main reason for this is dehydration and water seldom seems to quench the thirst. Whey is highly nutritious and has many therapeutic and health benefits, cheese whey and paneer whey have similar nutritional composition therefore paneer whey which is an industrial waste was used, it had almost 2 g of protein, 5.5 g of lactose and a minimal amount of fat and had abundant minerals when

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#### Future prospects:

- Whey is a highly nutritious drink which goes as industrial waste. Maximum utilization must be done and there should be no waste that is what everyone talks about 0% waste and in this case the waste is very nutritious and has many health benefits hence many product formulations can be done using paneer whey.

- There are many sources of milk such as cow, buffalo, goat, camel, donkey, human etc. which have different composition of nutrients and have various and varied health benefits and better digestibility than cow's milk if we can combine these milk in various proportions and then coagulate the milk by acid coagulation then it will result in highly nutritious and healthy whey which can be used to cure many diseases such as hepatic diseases and even cancer.

- Addition of whey powder in the frozen whey popsicle can increase the protein content by ten folds which can be used to eradicate protein malnutrition from the children of rural areas

- Paneer whey or sour whey as an egg replacer in cake and other bakery products to find out the emulsifying properties of paneer whey.

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