Study of Quality Parameters of Chocolate Milk Marketed in Karachi, Pakistan

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Abstract

Chocolate milk has frequently been utilized in Pakistan. It contains up to twice as much sugar as white milk which is basic reason of total caloric and sugar intake. In the present study chocolate milk of three well renowned dairy industries marketed in Karachi Pakistan, was evaluated for it quality parameters. Standard methods were applied for sensory analysis and physicochemical (proximate) analysis. Among the various types of samples, the chocolate milk samples of dairy industry B were found to be better for its nutritional quality and sensory evaluation. However, the chocolate samples of all three dairy industries have been found highly acceptable according to sensory evaluation. The composition and better sensory scores might have made all of the product acceptable. The pH, ash, protein, fat, carbohydrates and total solids of sample selected on the bases of organoleptic properties were found to be 6.53, 7.43%, 32.97%, 17.33%, 84.33% and 142.07% respectively, indicating an appropriate quality of raw materials. Plate count value was found to be less than detection limit for all three type of chocolate milk sample, indicating that the chocolate milk analyzed in the current study have been produced in hygenic condition and cab happily be consumed. This study chocolate milk marketed in Karachi were found to be acceptable for use. The study suggests that if specific composition, strict hygienic measures and appropriate manufacturing techniques will help in maintaining and improving the quality of chocolate milk marketed in Karachi. In this regards, proper check and balance should be maintained in the largest populated city of Pakistan, where limited resources are available for the prevention and controlling of the food supply.

Keywords: UHT treated milk, chocolate milk, quality of milk

Introduction

Chocolate milk has frequently been utilized in Pakistan. Chocolate milk contains up to twice as much sugar as white milk which is basic reason of total caloric and sugar intake. Milk is added with cocoa powder and sweetener to produce bronze colored chocolate milk. Generally chocolate milk is produced by full cream, low fat and UHT treated milk (Mann 1978).

The calorific and nutritive status of chocolate milk is comparable to the whole milk, that contains all required nutrient and minerals required by the human body to function normally. It contains fat, protein, carbohydrates, water, water & fat soluble vitamins and most of the essential minerals. Addition of sucrose as sweetener also improves the energy value from growing children. The high calorific value of chocolate milk is due to the added sugar (De 1980).

Keeping in view the excessive use and to monitor the quality of the of chocolate milk marketed in the city of Karachi, Pakistan, this study was aimed to evaluate the quality of chocolate milk purchased from local market of the city. The study was first ever of its kind conducted in Karachi, Pakistan. This study will help in maintaining proper check and balance of the quality of chocolate milk available in the largest populated city of Pakistan, where limited resources are available for the prevention and controlling of the food supply.

Materials and Methods

Chemicals and Glassware

Analytical grade chemicals were used for analysis. All glassware was pre-rinsed with 10% HCl followed by de-ionized water.

Sample Collection

27 samples of three different industries of chocolate milk were purchased from various super markets located at different areas of Karachi. The samples were kept at −20°C until analyzed. The samples were scrutinized and analyzed in triplicate.

Organoleptic Evaluation

Standard 9-point hedonic scale procedure was used to carry out the sensory (organoleptic) evaluation of the finally produced toffees (Amerine, Pangborn *et al.* 1965). The mean score of each quality parameter such as overall acceptability, colour, texture, flavor and taste was recorded which was analyzed by 10 trained/and semi trained panelist.

Physico-Chemical and Microbial Analysis

Standard methods of analysis were used to carry out pH, ash, protein, fat, carbohydrates total solids and microbial analysis of all three types of chocolate milk samples (Helrich 1990).

Statistical Analysis

Standard deviation was estimated by using one-way analysis of variance (ANOVA) according to the AOAC guidelines. The calibration curves and linear regression curve showed r^2 values above 0.999 for each mycotoxin indicating good linearity (Steel and Torrie 1980).

Results and Discussion

Sensory Analysis of Chocolate Milk

The sensory analysts recommended the sample B, which showed an acceptability score above average (Table-1). Chocolate milk samples produced by various dairy industries had almost the same taste, texture and mouth feel, but sample B has shown the highest acceptability score. The color of sample B of final product was observed to be 8.3. The scores for texture, flavour and taste for sample B were found to be 7.66, 7.83 and 8.3 respectively.

Table 1: Sensory score of chocolate milk

Parameters	Sample1	Sample2	Sample3
Taste	7.66 ± 1.03	8.3 ± 0.81	7.83 ± 0.98
Colour	7.66 ± 1.50	8 ±1.26	7.3 ±1.211
Flavour	8 ± 1.09	7.83 ±1.16	8 ±1.26
Texture	7.5 ± 1.04	7.66 ± 0.81	8 ± 1.09
Organoleptic acceptability score*	7.7 ± 0.88	7.95 ± 0.65	7.79 ± 0.96
Remarks	Not Selected	**Selected**	Not Selected

All three sample of chocolate milk, were found to be acceptable. The composition might have made all of the product acceptable. Several factors affect the organoleptic properties, such as raw material quality and intensity and period of heating etc. The results of present studies are comparable with the studies carried out earlier (Gedam, Prasad *et al.* 2007, Carrillo-Lopez, Garcia-Galicia *et al.* 2021, Sabbir, Habib *et al.* 2015).

Proximate Analysis of Chocolate Milk

Proximate analysis of various samples of chocolate milk have been summarized in Table-2. The results indicate that physico-chemical properties of chocolate milk such as the pH, ash, protein, fat, carbohydrates and total solids of the sample B (selected on the bases of organoleptic properties), were found to be 6.53, 7.43%, 32.97%, 17.33%, 84.33% and 142.07% respectively. Plate count value was found to be less than detection limit for all three type of chocolate milk sample. pH value was found to be highest for sample C and lowest for sample A. The variation in pH value is may be due to total solid (TS) and quality of raw materials. It was observed that the average value of TS of chocolate milk C was significantly high, and that of A was significantly lower. The results are comparable to the results reported earlier (De 1980).

Results (Table-2) indicate a wide variation in fat contents of different samples milk chocolate produced by dairy industry. The highest fat content was found in sample C of chocolate milk and the lowest was found in sample A. It may be due to the skimmed milk used as raw material for dairy industry A. The results of current study are found to be higher than the results reported earlier (Mann 1978, Salama 1994). Solid not fat and protein content of all three samples of chocolate milk are found to be similar. The results of protein contents of current studies are comparable to the results reported earlier (Sabbir, Habib *et al.* 2015, Abd El-Salam and El-Shibiny 2017, Nagarajappa, Upadhyay *et al.* 2019), indicating an appropriate quality of raw materials. A very high amount of carbohydrate was found in all three samples and the highest amount was observed in sample B. The results of carbohydrate contents of current studies are comparable to the results reported earlier (Salama 1994). The sample C was found to contain the highest amount of ash content whereas sample B contains the lowest. It is mainly because cocoa powder is a plant source which could be the reason of higher value.

Table 2: Proximate Analysis of Different types of chocolate milk

Chemical parameter	Dairy Industry samples			LSD value
	A (Mean ±SD)	B (Mean ±SD)	C (Mean ±SD)	
pH	6.53±0.02	6.53±0.03	6.54±0.02	-
Fat (g/kg)	7.00±0.51	17.33±0.58	20.67±1.15	1.824
SNF (g/kg)	123.73±0.55	124.73±0.59	123.20±0.70	-
Protein (g/kg)	32.37±0.15	32.97±0.15	32.57±0.21	0.346
Carbohydrate (g/kg)	83.50±0.60	84.33±0.58	82.500.50	1.052
Ash (g/kg)	7.87±0.25	7.43±0.12	8.13±0.12	0.275
TS (g/kg)	130.73±1.52	142.07±0.67	143.87±1.11	1.824
Microbial Analysis				
Standard Plate Count	< LOD	< LOD	< LOD	

The ash content in all of the samples are found to be in acceptable limits, which make the product acceptable. Plate count value was found to be less than the detection limit, indicating that the chocolate milk analyzed in the current study have been produced in hygenic condition and cab happily be consumed.

Conclusion

Chocolate milk has frequently been utilized in Pakistan. It contains up to twice as much sugar as white milk which is basic reason of total caloric and sugar intake. In the present study chocolate milk of three well renowned dairy industries marketed in Karachi Pakistan, was evaluated for it quality parameters. Standard methods were applied for sensory analysis and physicochemical (proximate) analysis. Among the various types of samples, the chocolate milk samples of dairy industry B were found to be better for its nutritional quality and sensory evaluation. However, the chocolate samples of all three dairy industries have been found highly acceptable according to sensory evaluation. The composition and better sensory scores might have made all of the product acceptable. The pH, ash, protein, fat, carbohydrates and total solids of sample selected on the bases of organoleptic properties were found to be 6.53, 7.43%, 32.97%, 17.33%, 84.33% and 142.07% respectively, indicating an appropriate quality of raw materials. Plate count value was found to be less than detection limit for all three type of chocolate milk sample, indicating that the chocolate milk analyzed in the current study have been produced in hygenic condition and cab happily be consumed. This study chocolate milk marketed in Karachi were found to be acceptable for use. The study suggests that if specific composition, strict hygienic measures and appropriate manufacturing techniques will help in maintaining and improving the quality of chocolate milk marketed in Karachi. In this regards, proper check and balance should be maintained in the largest populated city of Pakistan, where limited resources are available for the prevention and controlling of the food supply.

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