



CHEMICAL QUALITY OF MILK SOLD IN JABALPUR

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ABSTRACT

Milk composition is economically important to milk producers and processors and nutritionally important to consumers. It has been known for years that variations in milk composition occur. The aim of the study was to determine the quality of milk produced and marketed in Jabalpur town of Madhya Pradesh, India. A total sixty sample of raw cow's milk were collected from dairy owners from different regions of Jabalpur. All samples were collected through random sampling method. SPSS. 16 version was used to calculate the mean of the samples. This study showed the means of protein, fat, solid but not fat and lactose content was; 3.30 ± 0.225 %, 4.41 ± 1.30 %, 9.084 ± 1.13 %, 4.81 ± 0.43 % respectively. Therefore, it was concluded that the nutritional composition of the cow milk was within recommended limit.

Keywords: Chemical quality, raw cow milk, Jabalpur

INTRODUCTION

We cannot be certain when man started utilizing milk of other animals for his benefit, but the milk has been in existence since Vedic times. The National Dairy Development Board (NDDB) has revealed in an annual report for 2015-16 that India continues to be the largest milk producer. The estimated milk production for 2015-16 is 155 million tones. Country has almost reached 17 % of world milk production (Nirwal *et al.*, 2013) Milk

in its natural form has high food value. It supplies nutrients like proteins, fat, carbohydrates, vitamins and minerals in moderate amounts in an easily digestible form. Milk contains more than 100 substances that are either in solution, suspension or emulsion in water, the important being casein - the major protein of milk, lactose - milk sugar, whey and mineral salts (Ali *et al.*, 2011; Kandpal *et al.*, 2012; Altaf *et al.*, 2007). The casein micelles and fat globules give milk



most of its physical characteristics, and give taste and flavor to it . Due to its nutritive value, milk is significant to young and old people. The composition of milk varies considerably with the breed of cow, stage of lactation, feed, season of the year, and many other factors. The demand of consumers for safe and high quality of milk has placed significant responsibility on dairy producers, retailers and manufacturers to produce and market safe milk and milk products (Adesuin et al.,1995;Hahn, 1996;Mennane et al., 2007). Very few studies have been conducted to determine the chemical composition of raw cow milk. There for objective of this study was to assess the chemical composition of milk produced and sold in Jabalpur.

MATERIALS AND METHODS

Raw Material

Market Milk

Unprocessed cow milk samples were purchased from six dairies of Jabalpur. A total sixty sample, ten samples from each dairy were aseptically collected from the

bulk milk kept in the shop. All the samples were collected using random sampling method in the morning . During collection 300 ml milk was taken from the bulk milk container of sellers and placed into sterile bottle . Bottles were labeled and put into icebox and brought to lab for further analysis.

Equipments/Utensils

The major equipments like hot air oven (Memmert 854, Schawabch W. Germany), analytical balance (Adam, Model No AAA 2502), Gerber centrifuge machine (Funk Gerber, Germany), muffle furnace (Newer Herm Mod; L9/11/8KM, Germany), micro Kjeldhal digestion unit (LABCONCO Model 60300-01), titration kit and cryoscopy were used during the analysis of milk samples.

Experimental Procedure

Present investigation was carried out to evaluate the market milk sold by different intermediaries at the vicinity of Jabalpur. A total of 60 market milk samples collected in sterile milk sample bottles were



examined. As soon as milk samples received at the laboratory, those were screened for chemical quality.

Determination of chemical composition of milk-

Fat Content :

Fat content of milk was determined by Gerber method as described by James (1995). Milk sample (11ml) was mixed with 90% sulphuric acid (10ml) and amyl alcohol (1ml) in butyrometer, and closed with rubber cork. The mixture was mixed and centrifuged in a Gerber machine (5 min) at 1100 r. p. m. The fat percentage was noted on the butyrometer scale.

Protein Content:

Protein content was determined according to the method of British Standards Institution (BSI, 1990). Sample (5g) was digested using micro-Kjeldhal digester in the presence of catalyst (0.2g copper sulphate and 2.0g potassium sulphate) where sulphuric acid (25ml) was used as an oxidizing agent. The digested sample was diluted with distilled water (250ml).

Then 5ml portion of diluted sample was distilled with 40% NaOH (5ml) using micro-Kjeldhal distillation unit where steam was distilled over into 2% boric acid (5ml) containing an indicator for 3 min. The ammonia trapped in boric acid was determined by titration with 0.1N HCl. The nitrogen percentage was calculated using following formula:

$$1.4 (V1-V2) \times \text{normality of HCl}$$

$$N \% = \frac{\text{Wt. of sample taken} \times \text{Wt. of sample used for distillation}}{\text{Wt. of sample taken} \times \text{Wt. of sample used for distillation}} \times 250$$

Where,

Where,

V1 = Titrated value of sample

V2 = Titrated value of blank sample

While protein percentage was determined by conversion of nitrogen percentage to protein, assuming that all the nitrogen in milk was present as protein i.e. Protein percentage = Nitrogen (N) percent \times Conversion factor.

Where conversion factor = $100/N\%$ in protein of dairy products (i.e. 15.66) (James, 1995).

Lactose Content :



The lactose content was determined by subtracting the sum of percent of fat, protein and ash content from that of total solids content of milk.

Solids Not Fat (SNF) Content:

Solids not fat (SNF) content was determined by difference as reported by Harding (1995) using the following formula,

SNF content (%) = TS percent – Fat percent

Statistical Analysis

The data were analyzed through computerized statistical package i.e. spss, Version 16 .

RESULT AND DISCUSSION-

As a result of the chemical analyses of milk samples collected from different dairies, the non-fat solids (SNF) (9.084 ± 1.13 %), fat (4.41 ± 1.30 %), protein (3.30 ± 2.25 %), lactose (4.87 ± 0.43 %), and values were determined

Table -1 - Chemical Quality of Milk

Nutrient	N	Mean
Fat (%)	60	4.41 ± 1.30 %
Protein (%)	60	$3.3 \pm .22$ %
Lactose (%)	60	4.87 ± 0.43 %
SNF (%)	60	9.08 ± 1.13 %

SNF content of milk obtained from the dairy averaged 9.084 ± 1.13 % which is greater than the earlier finding of Mansoon *et al.*(2003) , Janstova *et al.* (2010) and Tekelmichael (2012) who reported SNF content 8.%, 8.96%,8.75 % in their studies . However Fikrineh *et al.* (2012) reported higher SNF content 9.0% for milk sample collected from household rearing local and crossbred cows. According to the Food safety and standard authority of India quality standards for unprocessed whole milk, lactose content should not be less than the 8.0% .Therefore average SNF content reported for the samples were within recommended standard.

Lactose content of milk sold at Jabalpur city is 4.87 ± 0.43 %. The findings of present study regarding the lactose content of market milk are relatively in line with the findings of Khan *et al.* (2005), who observed 4.9% lactose in milk samples. According to the Food softy and standard authority of India quality standards for



unprocessed whole milk, lactose content should not be less than the 4.2% .Therefore average lactose content reported for the samples were within recommended standard.

Protein content of milk found to be $3.3 \pm .22\%$ which is lower than the earlier findings of Abdurrahman *et al.* (2009) who reported a protein content of 3.48 % for milk produced in dairy farms. Correspondingly, Fikrineh *et al.* (2012) reported higher protein content ($3.46 \pm 0.04\%$) for milk sample collected from household rearing local and crossbred cows. However, Mirzadeh *et al.* (2010) and Debebe (2010) reported lower protein content of milk $3.2 \pm 0.22\%$ and $3.2 \pm 0.11\%$ in the dairy farms and milk producers respectively.

Fat content of market milk at Jabalpur was $4.41 \pm 1.30\%$ which was greater than the earlier finding of Mansoon *et al.*(2003) , Janstova *et al.* (2010) and Tekelmichael who reported a fat content of 4.3, $3.79 \pm 0.18\%$ and $3.862 \pm 0.412\%$ respectively for

milk milk produced in dairy farms. On the other hand fat content of raw cow's milk obtained in this study was lower than the findings of Fikrineh *et al.* (2012) who reported fat content of $5.48 \pm 0.19\%$ for milk sample collected from household rearing local and crossbred cows.

CONCLUSION

It is apparent from the analyses that a large number of samples procured did conform to the legal standards prescribed by the Food Safety and Standards Authority of India (FSSAI). These results clearly suggest that chemical composition of milk samples was within recommended limits prescribed by the Food Safety and Standards Authority of India (FSSAI).It would be a great interest if further investigations are to be carried out to examine other microbial quality and safety of cow milk and milk products. The study will create awareness among community in the Jabalpur town.



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