To Find an Adulteration Available in Milk

Dadasaheb Navale[1], Shelley Gupta[2]

[1]*Sinhgad Jr. college Vadgaon. Pune.*

[2]*Parvatibai Genba Moze Engineering College Wagholi. Pune.*

***Abstract*: Milk and dairy-based ingredients are used as components of many food products. Their contributions consist of unique flavor, desirable texture, excellent nutritive value, and a widely accepted "natural"image. In many instances, the success of the product in the marketplace is significantly enhanced by incorporation of traditional functional ingredients familiar to the consumer. Thus, dairy ingredients provide a consumer-friendly label on packaged foods.**

Dairy ingredients contribute a number of characteristics critical to a food product. These include the emulsifying and stabilizing ability of *caseinates,* the gelling properties of *whey* protein concentrates and isolates, the water-absorption capacity of high-heat nonfat dry milk, and the browning of *lactose* during heat processing. Furthermore, the crystallization characteristics of lactose and the hydrolytic activity of the enzyme *lactase* are important in confectionery and frozen products. In addition, butter flavor carryover can be achieved with enzyme-modified butterfat and various cheese flavors imparted by enzyme-modified cheeses. Therefore, a food developer can select an appropriate dairy-based ingredient to create certain desirable attributes in foods. An understanding of the functional properties of dairy ingredients allows food technologists to utilize their potential contribution to product characteristics to meet consumer expectations.

Milk may contain some harmful microorganisms like bacteria along with some potentially beneficial microbes. Microbiological analysis of milk is carried out to determine the degree of bacterial contamination in milk and to understand the chemical changes brought in milk as a result of microbial action. Pasteurization is done to destroy such harmful bacteria. If pasteurization of milk is not carried out properly there will be presence of larger count of bacteria in the milk. Methylene blue Reduction test is used to detect the presence of bacteria in milk. This test works on the principle that the methylene blue indicator is present in an oxidized form, but in the presence of bacteria, leads to the reduction of this indicator in a comparatively short span of time.

The blue color developed on addition of the indicator to the milk will change to white color within a short period indicates the presence of bacteria in the milk and thus denotes improper pasteurization. Milk may contain some harmful microorganisms like bacteria along with some potentially beneficial microbes. Microbiological analysis of milk is carried out to determine the degree of bacterial contamination in milk and to understand the chemical changes brought in milk as a result of microbial action. Pasteurization is done to destroy such harmful bacteria. If pasteurization of milk is not carried out properly there will be presence of larger count of bacteria in the milk. Methylene blue Reduction test is used to detect the presence of bacteria in milk. This test works on the principle that the methylene blue indicator is present in an oxidized form, but in the presence of bacteria, leads to the reduction of this indicator in a comparatively short span of time. The blue color developed on addition of the indicator to the milk will change to white color within a short period indicates the presence of bacteria in the milk and thus denotes improper pasteurization. Paper finds various types of adulteration available in the milk.

***Keywords*: Types of adulterations and adulterants etc.**

I. INTRODUCTION

Milk may be defined various ways. Chemically speaking, milk is a complex fluid in which more than 100 separate chemical compounds have been found. Its major components are water, fat, lactose, *casein*, whey proteins, and minerals (or *ash*) in amounts varying with the milk of various species of animals. However, for any given species, the range of values for the constituents of milk is fairly constant.From a physiological standpoint, milk is the secretion of the normally functioning mammary gland of the females of all mammals, which is produced for some time following *parturition* for the nourishment of the young of the species during the initial period of growth.

In terms of physical chemistry, milk is an opaque, whitish fluid of multidisperse phases. The true solution contains lactose, vitamins, acids, enzymes, and some inorganic salts. The *colloidal phase* contains casein, calcium phosphate, and globular proteins. Fat exists in the form of an oil-in-water type of *emulsion*, with fat globules varying from 0.1 to 22 μm in diameter. As a food ingredient or consumed by itself, milk provides an excellent nutritional profile in the human diet. Nutrition experts consider milk an exceptionally complete food because it contains significant levels of required nutrients such as protein, fat, carbohydrates, minerals, and several vitamins. *Low-fat* and *nonfat* milks are increasingly popular in fat-reduced and fat-free food formulations.

Worldwide, milk of the cow is by far of more commercial importance than milk of any other mammal. In the United States, the term "milk" legally refers to cow's milk. Milk from other species is labeled to indicate the type: sheep's milk, goat's milk, etc.

Milk contains many other nutrients and the carbohydrate lactose. An emulsion is a suspension of droplets of one liquid into another liquid. Milk is an emulsion of fat in water. Butter is an emulsion of water in fat. The solute is known as the

dispersed phase and the solvent is known as the continuous phase. Other examples of emulsions include margarine, mayonnaise, cream, and salad dressing. A colloidal solution is when matter exists in a state of division in between a true solution, which is sugar in water, and a suspension, which is chalk in water.

The characteristics of a colloid are small particle size, electrical charge, and affinity of the particles for water molecules. In milk, the whey proteins are in colloidal solution.

Milk contains relatively large amount of fat. Addition of carbohydrate to milk increases its solid content. There by reducing the amount of fat present in the milk. Starch is one such component that is added to adulterate milk. The test to detect starch in milk uses iodine solution, addition of which turns the milk solution to blue black color due to the formation of starch –Iodo complex, in the presence of starch

II. WHAT IS ADULTERATION?

The food adulteration is an act of intentionally debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredient. Food adulteration takes into account not only the intentional addition or substation or abstraction of substances which adversely affect nature, substances and quality of foods, but also their incidental contamination during the period of growth, harvesting storage, processing, transport and distribution.

The term 'Adulterant' means any material which is or could be employed for making the food unsafe or sub-standard or misbranded or containing extraneous matter.

Food is adulterated if its quality is lowered or affected by the addition of substances which are injurious to health or by the removal of substances which are nutritious. It is defined as the act of intentionally debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredient.

Food is declared adulterated if,

1] A substance is added which depreciates or injuriously affects it.

2] Cheaper or inferior substances are substituted wholly or in part.

3] It is an imitation.

4] Any valuable or necessary constituent has been wholly or in part abstracted.

5] It is coloured or otherwise treated, to improve its appearance or if it contains any added substance injurious to health.

6] For whatever reasons its quality is below the standard.

Adulterated food is dangerous because it may be toxic and can affect health and it could deprive nutrients essentional for proper growth and development.

III. MATERIALS AND METHODS

1] DETECTION OF MICROORGANISM IN MILK

Measure out 10ml milk into a test tube and 1 ml of methylene blue indicator is added to it. Mix the contents of the test tube well. A blue color is observed. The test tube is now kept in an incubator at 37^oC for 30 minutes. After incubation, if the color changes from blue to white in a short period of time, indicates the presence of larger count of bacteria in the milk.

2] DETECTION OF TABLE SUGAR

Measure out 10ml milk into a test tube and 5ml of Conc. HCl is added to the test tube with milk. The contents in the test tube are mixed well and 0.1g of resorcinol powder is added to the test tube. Mix the contents in the test tube is gently mixed. Now the test tube is placed in a boiling water bath for 5 minutes. the tube in a boiling water bath for 5 min. After the incubation, if a red color is observed, indicates the presence of table sugar.

3] DETECTION OF FORMALDEHYDE

Formalin (40 percent aqueous solution of formaldehyde) is the most common preservative added to milk. The addition of any kind of preservative to milk is legally prohibited. Yet, market samples of milk are occasionally found adulterated with formaldehyde or hydrogen peroxide. Formalin (formaldehyde) added to milk is detected by Hehner test as follow:

To about 10 ml milk is a test tube. About 5 ml concentrated sulphuric acid containing traces of ferric chloride is added slowly along the side of the test tube so that it forms a layer at the bottom, without mixing with the milk. The development of a violet or blue colour ring at the junction of the two liquids indicates the presence of formaldehyde the test may be combined with the determination of fat nothing whether a violet colour forms on addition of sulphuric acid in the butyro meter.

4] DETECTION OF BENZOIC AND SALICYLIC ACID IN MILK

Take 5 ml of milk in a test tube. Add 3-4 drops of Conc. H_2SO_4 (1:1). Add 2-3 [Ferric Chloride 0.5 % (w/v) in water] drop by drop and mix well. Development of buff colour indicates presence of benzoic acid and violet colour indicates presence of salicylic acid.

5] DETECTION OF BORAX AND BORIC ACID IN MILK

Take 5 ml milk in a test tube. Add 1 ml of Conc. HCl and mix well. Dip the tip of turmeric paper into the acidified milk and dry in a watch glass at 100°C or over a small flame. If the

turmeric paper turns red, it indicates the presence of borax or boric acid. Add a drop of Ammonia solution (1:1) on the turmeric paper and if the red colour changes to green, it confirms the presence of boric acid.

IV. CONCLUSION

Adulterated Milk and Milk Products are dangerous to health of any leaving organism. Leaving organism has must essentional Knowledge of adulteration of Milk.

This study concluded that low income group respondents were least educated, had low awareness about their rights and responsibilities and food adulteration. So this group needs to be armed with lot of information and training on the issues of food adulteration and ways to raise their voice when felt cheated. They had limited income, so they could not reach the standard items of their choice. On seeing such condition of consumer, our government has made sincere efforts to curb the fraudulent practices by enactment of various laws.

It is highly unlikely that more legislation or increasing fines and jail terms alone will help reduce adulteration, particularly given the corruption that exists in the enforcement area and the low conviction rate. Greater consumer vigilance and action alone can help improve the situation. But such efforts are not fruitful unless consumers themselves are aware of their rights and responsibilities. Under these circumstances, consumer literacy is the need of the hour with special attention to low income groups who suffer the most.

REFERENCES

[1]. Bell JD, Margen S, Calloway DH. 1969. Ketosis, weight loss, uric acid, and nitrogen balance in obese women fed single nutrients at low caloric levels. *Metabolism* 18:193–208.

[2]. Benito R, Obrador A, Stiggelbout A, Bosch FX, Mulet M, Muñoz N, Kaldor J. 1990. A population-based case-control study of colorectal cancer in Majorca. I. Dietary factors. *Int J Cancer* 45:69–76.

[3]. Bier DM, Leake RD, Haymond MW, Arnold KJ, Gruenke LD, Sperling MA, Kipnis DM. 1977. Measurement of "true" glucose production rates in infancy and childhood with 6,6-dideuteroglucose. *Diabetes* 26:1016–1023.

[4]. Bloom WL, Azar GJ. 1963. Similarities of carbohydrate deficiency and fasting. I. Weight loss, electrolyte excretion, and fatigue. *Arch Intern Med* 112:333–337. DIETARY CARBOHYDRATES: SUGARS AND STARCHES 325 Bolton-Smith C, Woodward M. 1994a. Coronary heart disease: Prevalence and dietary sugars in Scotland. *J Epidemiol Community Health* 48:119–122.

[5]. Bolton-Smith C, Woodward M. 1994b. Dietary composition and fat to sugar ratios in relation to obesity. *Int J Obes Relat Metab Disord* 18:820–828.

[6]. Bolton-Smith C, Woodward M, Smith WCS, Tunstall-Pedoe H. 1991. Dietary and non-dietary predictors of serum total and HDL-cholesterol in men and women: Results from the Scottish Heart Health Study. *Int J Epidemiol* 20:95–104.

[7]. Bossetti BM, Kocher LM, Moranz JF, Falko JM. 1984. The effects of physiologic amounts of simple sugars on lipoprotein, glucose, and insulin levels in normal subjects. *Diabetes Care* 7:309–312.

[8]. Boushey CJ, Beresford SA, Omenn GS, Motulsky AG. 1995. A quantitative assessment of plasma homocysteine as a risk factor for vascular disease: Probable benefits of increasing folic acid intakes. *J Am Med Assoc* 274:1049–1057.

[9]. Bowman SA. 1999. Diets of individuals based on energy intakes from added sugars. *Fam Econ Nutr Rev* 12:31–38.

[10]. Brand JC, Colagiuri S, Crossman S, Allen A, Roberts DCK, Truswell AS. 1991. Lowglycemic index foods improve long-term glycemic control in NIDDM. *Diabetes Care* 14:95–101.

[11]. Brito MN, Brito NA, Migliorini RH. 1992. Thermogenic capacity of brown adipose tissue is reduced in rats fed a high protein, carbohydrate-free diet. *J Nutr* 122:2081–2086.

[12]. Britten P, Basiotis PP, Davis CA, Anand R. 2000. Is intake of added sugars associated with diet quality? Online. *Nutrition Insights* No 21. USDA Center for Nutrition Policy and Promotion. Available at http://www.usda.gov/cnpp/insights.htm. Accessed June 8, 2001. Brooks GA, Mercier J. 1994. Balance of carbohydrate and lipid utilization during exercise: The "crossover" concept. *J Appl Physiol* 76:2253–2261.

[13]. Brosnan JT. 1999. Comments on metabolic needs for glucose and the role of gluconeogenesis. *Eur J Clin Nutr* 53:S107–S111.

[14]. Bruning PF, Bonfrèr JMG, van Noord PAH, Hart AAM, de Jong-Bakker M, Nooijen WJ. 1992. Insulin resistance and breast-cancer risk. *Int J Cancer* 52:511–516.

[15]. Burley VJ. 1997. Sugar consumption and cancers of the digestive tract. *Eur J Cancer Prev* 6:422–434.

[16]. Burley VJ. 1998. Sugar consumption and human cancer in sites other than the digestive tract. *Eur J Cancer Prev* 7:253–277.

[17]. Albrink MJ, Ullrich IH. 1986. Interaction of dietary sucrose and fiber on serum lipids in healthy young men fed high carbohydrate diets. *Am J Clin Nutr* 43:419–428.

[18]. Allen JC, Keller RP, Archer P, Neville MC. 1991. Studies in human lactation: Milk composition and daily secretion rates of macronutrients in the first year of lactation. *Am J Clin Nutr* 54:69–80.

[19]. Amiel SA, Caprio S, Sherwin RS, Plewe G, Haymond MW, Tamborlane WV. 1991. Insulin resistance of puberty: A defect restricted to peripheral glucose metabolism. *J Clin Endocrinol Metab* 72:277–282.

[20]. Anderson DM, Williams FH, Merkatz RB, Schulman PK, Kerr DS, Pittard WB. 1983. Length of gestation and nutritional composition of human milk. *Am J Clin Nutr* 37:810–814.

[21]. Anderson GH, Atkinson SA, Bryan MH. 1981. Energy and macronutrient content of human milk during early lactation from mothers giving birth prematurely and at term. *Am J Clin Nutr* 34:258–265.

[22]. Archer SL, Liu K, Dyer AR, Ruth KJ, Jacobs DR, Van Horn L, Hilner JE, Savage PJ. 1998. Relationship between changes in dietary sucrose and high density lipoprotein cholesterol: The CARDIA Study. *Ann Epidemiol* 8:433–438.

[23]. Aronow WS, Ahn C. 1998. Risk factors for new coronary events in older African-American men and women. *Am J Cardiol* 82:902–904.

[24]. Arslanian S, Kalhan S. 1992. Effects of growth hormone releasing hormone on insulin action and insulin secretion in a hypopituitary patient evaluated by the clamp technique. *Acta Endocrinol* 127:93–96.

[25]. Assel B, Rossi K, Kalhan S. 1993. Glucose metabolism during fasting through human pregnancy: Comparison of tracer method with respiratory calorimetry. *Am J Physiol* 265:E351–E356.