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Myths about bovine milk and their counteracting: A review

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Abstract

Several myths prevalent about bovine milk have been discussed to counteract them with scientific support. Milk has long been recognized as the most complete single food available in nature and unfounded and misleading beliefs have been propagated about the cow and buffalo milk, though the balanced quantity of milk in balanced diet is always beneficial for the improvement of health and avoiding cardiovascular diseases, diabetes, colon cancer, obesity and osteoporosis etc.

Keywords: Counteracting, Scientific supports, Myths, osteoporotic fractures, bovine milk, artery clogging- saturated fat, lactose intolerance, hypolactasia, serum cholesterol, Coronary Heart Disease

Introduction

Nowadays people are facing various health problems due to changing lifestyle and food habits, which leads to cardiovascular disease, obesity, osteoporosis, diabetes, cancer etc. Since time immemorial, it has been cultural to consume bovine milk in all such diseases to restore the health and utilize the functional and medicinal values of bovine milk but at present several myths have been generated about bovine milk. The myths have to be counteracted to prove the myths as unfounded and misleading health beliefs with scientific research works and proven practical and facts data. Some of the myths are discussed here to counteract those with scientific supports. The aims of this discussion are just to provide scientific data for effects of milk components that are of particular interest for human health and counteracting the myths.

Literature Review and Discussions

Myth 1: It is against the belief of Milk building strong bones. It has been claimed that the calcium is depleted from bones and it increases the fracture risk. It has been claimed that an assortment of detrimental health effects is directly linked to milk consumption. The matter is worst when it is claimed that calcium from bones is lost after consumption of milk. What an Irony is this! Myth claims that milk and dairy products actually fail to protect bones from fractures.

This myth has been spread against the belief that a cup of milk contains calcium around 300 mg and is good for overall health and bone health in particular at any age because the calcium concentration in bovine milk is about 1 g/l. The role of milk and milk products is important in securing daily calcium intake which provides healthy bones and teeth. Apart from these, hypertension is prevented, chances of getting colon or breast cancer are decreased, weight control is improved. It helps to reduce the risk of developing kidney stones (Insel *et al.*, 2004)^[16]. It is to be noted that there is less variation in calcium concentration throughout lactation of bovine animals. Most of the calcium is in the aqueous compartment and it is primarily (65%) associated with casein. Milk content of magnesium and zinc also show only small variations (Neville *et al.*, 1995)^[23]. The ratio of calcium and potassium to magnesium and sodium in milk resembles very closely to the ratio of same elements in the body of human. Milk and its products are important source of calcium which is essential in building the body Skelton as well as affecting muscle action including that of heart.

Dairy products intake in diet has a central role in securing calcium intake. Half of the calcium intake in the typical American diet is from Dairy products (Feskanich *et al.*, 1997)^[9]. Apart from this, bovine milk contains about 32 g protein/l, which is good source of body building essential amino acids. Caseins, which is about 80% of milk proteins, has a function of carrying calcium and phosphate to form a clot in the stomach for efficient digestion.

Apart from caseins, milk whey proteins and several bioactive proteins and peptides derived from milk proteins are potential modulators of various regulatory processes along with amino acids for building bones and mineral binding functions. It was concluded that there was no convincing evidence that the A1 beta casein of cow milk has any adverse effect in humans (Truswell, 2005)^[32]. Essential amino acids are shown to be more important than non-essential amino acids in muscle protein synthesis (Wolfe, 2002)^[36] and the branched chain leucine in particular triggers muscle protein synthesis. Milk contains many minerals, vitamins and antioxidants, which have role in prevention of oxidation of milk and also has a central role in securing calcium intake to avoid fractures in bones. Getting enough calcium in the diet will give healthy bones and teeth (Feskanich *et al.*, 1997)^[9]. Selenium is about 11 micro gram /litre in Norwegian bovine milk and about 37 microgram /l in US milk, which has a role in immune and antioxidant system and in DNA synthesis and DNA repair. It would help in fracture repairing due to DNA repairs (Dodig *et al.*, 2004)^[5]. Recommended daily intake of selenium is 55 microgram and optimum selenium concentration in bovine milk is about 50-100 microgram selenium /l which will be good selenium source. Milk is a good source of magnesium i.e. about 100 mg/l. Magnesium deficiency has been linked to atherosclerosis and has many functions in absorption of calcium and building of bones. Similarly, zinc has several functions in DNA repair, cell growth and replication, gene expression, protein and lipid metabolism, immune function, hormone activity etc.

Myth 2: It is against the belief that Milk is heart healthy. Milk and other dairy products are the top sources of artery – clogging saturated fat in the human diet such as cholesterol. Diets high in fat, saturated fat and cholesterol increase the risk of heart disease, which remains American's top killer.

This criticism has arisen especially because milk fat contains a high fraction of saturated fatty acids assumed to contribute to heart diseases, weight gain and obesity (Insel *et al.*, 2004)^[16]. Several studies have shown that diets containing low-fat dairy products have been associated with favourable changes in serum cholesterol (Sandstrom *et al.*, 1992; Marckmann *et al.*, 1994; Seidel *et al.*, 2005)^[26, 20, 27]. Milk fat consumption has been shown to have less pronounced effects on serum lipids than could be expected from fat content (Bosaeus 1991; Eichholzer *et al.*, 1993)^[3, 6].

On the contrary, several studies have found a lack of association between milk consumption and Coronary Heart Disease (CHD) (Stähelin, 1992; Willett *et al.*, 1993; Fehily *et al.*, 1993; Ness *et al.*, 2000)^[31, 35, 8, 22]. Two Swedish studies have shown that cardiovascular risk factors were negatively associated with intake of milk fat (Smedman *et al.*, 1999 and Warensjo *et al.*, 2004)^[29,34]. It was also reported in a Norwegian study that consumption of dairy fat or some other dairy products which is reflected by C15:0 as marker in adipose tissue will protect persons at increased risk from having a first myocardial infarction (MI), and that the causal effects may rely on other factors than serum cholesterol (Bionget *et al.*, 2006)^[1]. It has been shown that 34 grams dairy fat per day gives no negative effect on odds ratio for myocardial infarction (Biong 2007)^[2]. As reported by Sjogren *et al.*, (2004)^[28], fatty acids typically found in milk products were associated with a more favourable LDL profile in healthy men (i.e., fewer small, dense LDL particles), and they concluded that men with high intakes of milk products

had an apparently beneficial and reduced distribution of the harmful small, dense LDL particles (Sjogren *et al.*, 2004)^[28]. In regard of unsaturated fatty acids, oleic acid is considered to be favourable for health, as diets with high amounts of monounsaturated fatty acid will lower both plasma cholesterol, LDL-cholesterol and triacylglycerol concentrations (Kris-Etherton *et al.*, 1999)^[18], and replacement of saturated fatty acids with cis-unsaturated fatty acids reduces risk for coronary artery disease (Mensink *et al.*, 2003)^[21].

Myth 3: It is belief against that drinking milk can help you lose weight. While advertisers would like you to believe that drinking milk slim you down, studies consistently show that dairy products offer zero benefits for weight control.

Scientific Supports against the Myth

It has been reported that the essential amino acids and branched chain amino acids present in bovine milk have unique roles in human metabolism; in addition to provide substrates for protein synthesis; they suppress protein catabolism and serve as substrates for gluconeogenesis. They also trigger muscle protein synthesis and promote protein synthesis (Layman 2003; Etzel 2004)^[19, 7]. A combination of milk with a meal with high glycaemic load (rapidly digested and absorbed carbohydrates) may stimulate insulin release and reduce the postprandial blood glucose concentration (Frid, 2005)^[12]. A reduction in postprandial blood glucose is favourable, and it is epidemiological evidence suggesting that milk may lower risk of diseases related to insulin resistance syndrome (Pereira *et al.*, 2002)^[24]. Insel *et al.*, (2004)^[16] discussed that bovine milk may also improve weight control.

Myth 4: It is against the belief that the Milk is a nature's perfect food. Cow's milk might be ideal for growing baby cows i.e. calves, but it is far from a perfect food for humans, which can lead to uncomfortable symptoms like cramping, diarrhea, and bloating. There is a myth that more than 60 per cent of people are lactose intolerant, who suffer cramping, diarrhea and bloating

Scientific Supports against the Myth

The lactose concentration in bovine milk is about 53 g/l (USDA, 2007)^[33]. People often confuse a milk allergy with lactose intolerance, but they are not the same thing. Deficiency of intestinal lactase enzyme (hypolactasia) in few adults has been observed. It is not necessary to avoid all lactose but can usually ingest limited amounts of milk without having annoying symptoms or the lactase enzyme may be substituted as per requirement. Individual differences in gut micro flora may be one reason for large variations in amounts of milk that is tolerated. The other ways are to ingest milk with a meal and instead of drinking regular milk; fermented milk may be an option. The fermented milk contains less lactose than fresh milk because fermented milk provides bacterial lactase that may be activated when the fermented milk reaches the gut (Kolars *et al.*, 1984)^[17].

Myth 5: It is against the belief that the Kids need milk to be healthy. The babies do not need any type of milk to be healthy when they are weaned from breast milk or formula

Scientific Supports against the Myth

What an irony to this myth is! Kids need milk to be healthy with reference to following healthy requirements:

Folate Requirement and availability: The bioavailability of folate varies. Folate-binding proteins occur in unprocessed milk, pasteurized milk, spray-dried skim milk powder and whey (Forssen *et al.*, 2000) ^[11]. Adding these products in the diet enhance food folate bioavailability, and it is shown that inclusion of cow milk in the diet enhanced the bioavailability of food folate (Picciano *et al.*, 2004) ^[25]. Bovine milk contains 50 ug folate/l (USDA, 2007) ^[33]. It is reported that 5-methyl-tetrahydrofolate is the major folate formed in milk (Forssen *et al.*, 2000) ^[11]. Recommended intake of folate is 400 ug/day for adults (Insel *et al.*, 2004) ^[16]. Many scientists believe that folate deficiency is the most prevalent of all vitamin deficiencies (Insel *et al.*, 2004) ^[16]. The risk of neural tube defects before conception and during the first weeks of pregnancy reduces with the folate supplementation @ of 400 ug/day. A recent study has shown that higher total folate intake was associated with a decreased risk of incident hypertension, particularly in younger women (Forman *et al.*, 2005; Staff *et al.*, 2005) ^[10, 30]. In addition, folates may have a protective role to play against coronary heart disease and certain forms of cancer, but sufficient evidence is not yet available (Feskanich *et al.*, 1997) ^[9].

Vitamin E availability: Observational studies indicate that high dietary intake of vitamin E are associated with decreased risk for cancer and coronary heart disease, and that vitamin E can stimulate T-cells and increase the immune defense system. Milk seems to be a food item favouring absorption and transportation of vitamin E from ingested food into the chylomicrons (Hayes *et al.*, 2001) ^[15].

Zinc requirement and availability

Zinc is an essential part of several enzymes and metalloproteins. Zinc has several functions in the body, in DNA repair, cell growth and replication, gene expression, protein and lipid metabolism, immune function, hormone activity, etc (Insel *et al.*, 2004) ^[16]. Milk is a good zinc source; containing about 4 mg/l (USDA, 2007) ^[33]. Recommended intake is 8 and 11 mg/day for adult female and male (Insel *et al.*, 2004) ^[16]. The bioavailability of zinc is better from milk than from vegetable food (Insel *et al.*, 2004) ^[16], and inclusion of milk in the diet may improve total bioavailability of zinc (Hansen *et al.*, 1996) ^[14].

Magnesium requirement and availability

Milk is a good source of magnesium, containing about 100 mg/l milk (USDA, 2007) ^[33]. However, recommended intake for men is 400 mg/day and for women, it is 310 mg/day (Insel *et al.*, 2004) ^[16]. For babies milk containing calcium is very necessary which has many functions in the body and magnesium participates in more than 300 reactions for performing many functions and maintaining health of babies. A study has shown that deficiency may give oxidative stress because Magnesium deficiency has been linked to atherosclerosis (Hans *et al.*, 2002) ^[13]. Asthma also can be reduced by Magnesium and several experimental studies of persons with asthma have suggested that infusion of magnesium may have a place in the acute treatment of asthma (Cheuk *et al.*, 2005) ^[4]. Deficiency of magnesium may occur following kidney diseases and also after use of some diuretic drugs. In elderly people, Magnesium deficiency has been observed, which may be a result of poor appetite or unbalanced diet.

Conclusion

In contradiction of first myth, it is presented milk and milk products are good source of calcium and it is responsible for good health of bones and teeth and taking the milk from young age will assure the persons with minimum risk of fractures in bones. It is not only the calcium but also the protein with essential amino acids working as building block of human Skelton. Muscle synthesis is stimulated by amino acids especially which is present in milk, and also few proteins and peptides in milk have positive health effect e.g. on blood pressure, inflammation, oxidation and tissue development. It has been observed that a moderate intake of milk fat has no negative health effects. On the contrary, many milk fat components have important roles in the body. In regard of unsaturated fatty acids, oleic acid is considered to be favorable for health, as diets with high amounts of monounsaturated fatty acid will lower both plasma cholesterol, LDL-cholesterol and triacylglycerol concentrations and replacement of saturated fatty acids with cis-unsaturated fatty acids reduces risk for coronary artery disease. The bovine milk may also improve weight control to make the body slim instead of bulky.

Fermented milk has special health-promoting properties, e.g. stimulation of immune response and protection against cancer, virus and allergy. The fermented milk and full-fat milk may also delay gastric emptying from the stomach and possibly will have an effect on appetite regulation. For some individuals, milk proteins, fat or milk sugar may cause health problems. To meet the requirement of milk components and minor elements for fulfilling various health requirements, kids need milk even after weaning from breast milk. Milk is a good zinc source and the bioavailability of zinc is better from milk than from vegetable food, and inclusion of milk in the diet may improve total bioavailability of zinc. Milk containing zinc will do many functions in the body such as DNA repair, cell growth and replication, gene expression, protein and lipid metabolism, immune function, hormone activity for the growth of babies and also fulfilling the requirement of adults and pregnant women.

Milk has long been recognized as the most complete single food available in nature and unfounded and misleading beliefs have been propagated about the cow and buffalo milk, though the balanced quantity of milk in balanced diet is always beneficial for the improvement of health and avoiding cardiovascular diseases, diabetes, colon cancer, obesity and osteoporosis etc. Zinc has several functions in the body such as DNA repair, cell growth and replication, gene expression, protein and lipid metabolism, immune function, hormone activity, etc.

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