World Journal of Engineering Research and Technology
WJERT
www.wjert.org

NUTRITIONAL IMPACT OF MILK LIPIDS: A BRIEF REVIEW

Saroj[1], Preeti[2], Srobana Sarkar[2], Subha Ganguly[3]*

[1]Assistant Professor, Department of Animal Nutrition, [3]Associate Professor & Head, Department of Veterinary Microbiology, Arawali Veterinary College (Affiliated with Rajasthan University of Veterinary and Animal Sciences, Bikaner), N.H. – 11 Jaipur Road, V.P.O. Bajor, Dist. Sikar, Pin – 332001, Rajasthan, INDIA

[2]M.V.Sc. Research Scholar, Dairy Cattle Nutrition Division, National Dairy Research Institute, Dist. Karnal, Pin - 132001, Haryana, INDIA.

Article Received on 01/07/2015 **Article Revised on 22/07/2015** **Article Accepted on 15/08/2015**

***Correspondence for Author**
Dr. Subha Ganguly
Associate Professor and Head, Department of Veterinary Microbiology, Arawali Veterinary College, Bajor, Sikar- 332001, Rajasthan, India.
ganguly38@gmail.com

ABSTRACT

Milk and milk products obtained from ruminants represent an important source of nutrients in human diet as they provide high quality protein, minerals, vitamins, essential fatty acids and energy. Milk fat being the most important constituent of milk, play a significant role in the economics, nutrition, flavor and physicochemical properties of milk and milk products. Milk fat is regarded as good for enhancing grace, memory power, grasping power and power to control senses. But, due to presence of saturated fatty acids and cholesterol, nutritionists have advised against consumption of milk fat. Nevertheless in the last decade it has been reported that milk described as a functional food because it contain bioactive component like protein, peptides, and fatty acids.

KEYWORDS: Lipids, Milk, Nutritional property.

INTRODUCTION

The presence of milk fatty acids of lipid compounds that exert important biological activities as butyric acid, conjugated linolenic acid (CLA), sphingolipids as constituents of the milk fat globule membrane and liposoluble vitamins. These compounds have commercial application

in the development of functional foods to promote human health and diseases prevention in order to enhance their activity and therefore the positive effects of its consumption is exerted. Many studies are focused to obtain natural enrichment dairy products as well as isolation of these compounds to be used as functional ingredient [1].

Milk fatty acid composition

Component	Name	Formula
Saturated fatty acids (SFAs)	Butyric acid	C4:0
	Lauric acid	C12:0
	Myristic acid	C14:0
	Palmitic acid	C16:0
	Stearic acid	C18:0
Monounsaturated fatty acid(MUFA)	Oleic acid	C18:1 9c (n-9)
Polyunsaturated fatty acid(PUFA)	Linoleic acid	C18:2 9c, 12c (n-6)
	α-linoleic acid	C18:3 9, 12, 15c (n-3)
	Arachidonic acid	C20:4 (n-6)
	Eicosapentaenoic acid (EPA)	C20-5 5,8,11,14,17c (n-3)
	Docosahexaenoic acid (DHA)	C22:6 (n-3)
Trans fatty acids	Vaccenic acid, conjugated linoleic acid(CLA)	C18:1, 11t (n-7t)
	Elaidic acid	C18 :1, 9t
	Rumenic acid	C18 :2 9c, 11t (n-7t)

(Mc Gibbon and Taylor, 2006)

Saturated fatty acids

Saturated fatty acids in ruminant milk account for 60% to 70% of total fatty acids. SFA constitute the primary fat component of human diet. They are stable substances, originating mainly from animal products. Use of fat in the diet has been discouraged due to presence of saturated fatty acids as these are known to elevate plasma cholesterol level especially of animal origin. An excessively high share of SFA in the diet may cause chronic diseases such as atherosclerosis, heart failure, or obesity. General dietary recommendations concerning the reduction of SFA and cholesterol consumption have contributed to an erroneous belief that dairy products, particularly full-fat, may lead to coronary heart disease. Consumption of milk and dairy products would increase the synthesis of LDL and the risk of coronary disease. At present, it is assumed that the increased LDL blood concentration is related to lauric C12:0, myristic C14:0, and palmitic C16:0 acids, while the other saturated fatty acids found in milk neutralise their effect since they increase HDL level [3].

Monounsaturated fatty acids

Ruminent milk contains 20 to 30% MUFA in milk in which oleic acid is highest content. Monounsaturated fatty acids are not harmful for human because these do not accumulate as cholestrol as saturated fat do not turn rancid as readily as polyunsaturated fatty acids. Moreover, they have a positive effect on the concentration of high density lipoproteins (HDL), transporting cholesterolfrom blood vessel walls to the liver which are excreted from the organism. At the same time, MUFA reduce the concentration of low density lipoproteins (LDL), which when circulating over the entire organism are deposited in blood vessels [4].

Polyunsaturared fatty acid

The main pufa present in milk is α-linolenic acid (ALA) from the n-3 family and linoleic acid (LA) from the n-6 family, thus they are also known as essential fatty acids. Long chain polyunsaturated fatty acids (LCPUFA) from n-3 family -eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) may be supplied to the organism with food or synthesized in the organism from ALA are also include as PUFA. Results of clinical studies indicate that increased share of n-3 fatty acids in the diet supports prevention and treatment of cancers, heart diseases, thrombosis, arterial hypertension, hyperlipidaemia, senile dementia, Alzheimer's disease, depression, or rheumatoid arthritis. Moreover, n-3 fatty acids are used in the treatment of skin diseases, *e.g.* psoriasis, acne, and lupus erythematosus [5].

Conjugated linoleic acid (CLA)

The generic name CLA is a collective term embracing all positional and geometric isomers of linoleic acid, which contain a conjugated double bond system which is derived by biohydrogenation of linoleic acid in rumen by bacteria in animals. There are 28 potential CLA isomers of which rumenic acid (C18:2 *cis*-9, *trans*-11) is dominant in milk fat. CLA have following beneficial properties [6].

a) Antioxidant →Anti-carcinogenic activity.
b) Anti-atherogenic activity
c) Immuno-modulation
d) Bone health
e) Anti-adipogenic activity

Trans fatty acids

TFA content in milk fat ranged from 2.5 to 5% of total fatty acids, depending on diet and season. TFAs are the main compounds in all species. TFA in dairy fat are not seen as

bioactive lipids in a positive sense. But, since TFA have come under scrutiny due to their influence on lipid levels and on other risk factors for CVD (Cardio Vascular Disease) [7].

Partial list of bioactive components in milk fat having health implications

Health disorder	Milk fat component
Cancer	Conjugated linoleic acid Vaccenic acid Sphingolipids Butyric acid Ether lipids
Cardiovascular health	Conjugated linoleic acid Oleic acid Omega-3 fatty acids
Immune response	Conjugated linoleic acid
Bone health	Conjugated linoleic acid

(German *et al*., 2009)

CONCLUSION

This review summarizes that use of fat in the diet has been discouraged due to presence of saturated fatty acids as these are known to elevate plasma cholesterol level especially of animal origin. But all fats not bad for human beings and there is need to distinguish between good and bad fat. The prospects for improving the fatty acid profile of milk from ruminant animals represent a growing market for the global livestock sector as a means to support better human health. The diversity of milk fat lipids, the variety of bioactive substances that it contains and their physiological functions remains poorly understood. Therefore, further research is required to establish the contribution of these bioactive components of milk fat in human health.

REFERENCES

1. Parodi, P.W. Milk fat in human nutrition. *Aust. J. Dairy Technol*., 2004; 59: 3-59.
2. Mc Gibbon, Taylor. 2006. In: *Advanced Dairy Chemistry*, Vol. 2, *Lipids*, 3rd Ed, Fox, P.F. y 244 Mc Sweeney Eds., Springer: New York, 2006; pp.1-42.
3. Cunnane, S. Problems with essential fatty acids: time for a new paradigm? *Prog. Lipid Res.,* 2003; 42: 544-568.
4. FAO. 2012. Food outlook—global market analysis, Rome: FAO.
5. German, Gibson, R., Krauss, R., Nestel, P., Lamarche, B., van Staveren, W., Steijns, J., de Groot - L., Lock, A., Destaillats, F. A reappraisal of the impact of dairy foods and milk fat on cardiovascular disease risk. *Eur. J. Nutr.*, 2009; 48: 191-203.

6. Lee, K.W., Lee, H.J., Cho, H.Y., Kim, Y.J. Role of the conjugated linoleic acid in the prevention of cancer. *Crit. Rev. Food Sci. Nutr*., 2005; 45: 135-144.
7. Bauman, D.E., Mather, I.H., Wall, R.J., Lock, A.L. Major advances associated with the biosynthesis of milk. *J. Dairy Sci*., 2006; 89: 1235-1243.