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Review Article

A CRITICAL ANALYSIS ON ROLE OF MILK IN LIFESTYLE DISEASES

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ABSTRACT

Background*: Ayurveda* is recognized as foremost life science and describes ways to prevent and manage lifestyle disorder. Undoubtedly the world is being attracted towards its potential. *Ayurveda* provides a better solution in the form of proper dietary management, lifestyle advices medicament, rejuvenation therapies. The holistic approach of *Ayurveda* treating the patient as a whole is expanding. One such significant subject is *Ksheera* (milk) which provides a special and unique nutrition that cannot be derived from any other dietary supplement. Unfortunately, the incidence of lifestyle diseases like hypertension, Diabetes Mellitus, dyslipidemia, Obesity associated with Cardio vascular disease is high on rise. CVD continues to be the major cause of mortality representing about 30% of all deaths worldwide. **Aim & Objective**: Keeping the *Ayurvedic* in view and the current scientific studies on milk in mind, the review article aims to shed light on the molecular and multi-axial role of milk in few Lifestyle disorders. **Conclusion:** Milk on its own is a medicine. If taken with other medicines/herbs/foods it serves as a tonic or purifier. A proper use of milk can cure afflictions like obesity, liver problems, kidney diseases, DM.

INTRODUCTION

Ancient *Ayurvedic* authorities have given *Ksheera* (milk) high honors for health-promotion. It is a *Sattvic* food which promotes even temperament, clarity of perception, good judgment, love, compassion and is capable of sustaining life nearly single-handed. It is considered as a wholesome diet. In the present era diet and lifestyle are major factors thought to influence susceptibility to many diseases. Lifestyle of an individual is the combination of his/her Physical capacity and psychological functioning shelled in various forms. Lifestyle disorders such as arthritis, asthma, chronic heart diseases, chronic renal failure, diabetes type II, hypertension, obesity etc are a resultant of the sedentary way of living. They are diseases that appear to increase in frequency as countries become more industrialized and people live longer. The present paper discusses the significance of milk both individually & with reference to a few lifestyle diseases classically & technically.

Lifestyle disorders- from *Ayurvedic* perspective

A particular lifestyle of person is a cumulative product of his/her physical capacity co-ordinate with psychological functioning, displayed in the form of habits, behavior, dietary and living pattern based on his own training sought from childhood, and mimicries he gained from his immediate companions including parents, siblings, peers, etc. Thus, it involves a pure psychological and innate control over the physical and sensory activities. When this initiation, control and co-ordination are disturbed, it leads to the derangement of lifestyle and results in any lifestyle disorder. *Ayurveda* narrated this phenomenon as '*Prajnaparadha*' (intellectual blasphemy) which is one of the three basic causes of any disease. There are ample improper actions as an impact of *Prajnaparadha* which are root causes of various diseases, e.g., habit of suppression of any natural urge is a result of *Prajnaparadha* and enlisted as a cause of nearly 50% of the diseases. Reversal of any neurotransmission or improper removal of the waste products formed during metabolism leading to accumulation of toxins is the basic cause of a disease. Therefore, the habit of suppression of urge in improper lifestyle can be considered as one of the root causes of lifestyle

diseases. Removal of these accumulated waste products is the first line of treatment as described in *Ayurveda* by *Charaka*[1] as well as in Naturopathy by Hippocrates.

In the management of lifestyle diseases, *Ayurveda* offers various regimens including *Dinacharya* (daily regimen), *Ritucharya* (seasonal regimen), *Panchakarma* (five detoxification and bio-purification therapies), and *Rasayana* (rejuvenation) therapies. The *Sadvritta* (ideal routines) and *Aachara Rasayana*[2] (code of conduct) are utmost important to maintain a healthy and happy psychological perspective. The inclusive utilization of all these treatment modalities has a great effect on lifestyle disorders. Moreover, the application of organ-specific *Rasayana* herbs also provides enough scope not only for prevention of disease, but also for the promotion of health and cure of disease too. For example Cardio-vascular disorders are discussed under *Hridroga* in *Ayurveda*. *Hridaya* has been referred to be the site of psyche. Any kind of psychological disturbance will lead to a disturbed patho-physiology of heart. Hence, it has been told to protect the heart from every kind of stressor (*Pariharya Visheshena Manaso Dukkhahetavah*). On the contrary, conventional western medicine deals with the cardio-vascular disorder with single side of somatic disorder. Hence, *Ayurveda* has an upper edge in treating the disease with emphasis on its root cause. The *Ayurvedic* physician concentrates on achieving the objective of *Ayurveda* for promotion of health, prevention and management of disease for a healthy and happy life in the ailing society.

Ksheera in *Ayurveda* Authorities

Ayurveda classics emphasizes that *Ksheera (milk)* can be consumed by all healthy individuals. In fact it further states that everyone should take milk. It is beneficial for healthy individuals, there is no better *Vrshya* (aphrodisiac) than milk; there is no better life-prolonger than milk. A regular intake of milk will pacify all diseases and also slow down the ageing process. Innumerable ways of milk consumption have been emphatically mentioned in the classics. Like, *Acharya Sushrutha*[3]states (Su. XLV.26)—Milk taken from the cow in the morning is heavy, cold, and harder to digest that milk taken in the evening. Evening milking makes the milk cool, eye invigorating, and *Vata* pacifying (from the cow's day-labor, exposure to sun's rays, and exposure to the wind). Cold/ un-boiled milk is heavy and leads to increase slimy secretions in body while boiling prevents both. Fresh mother's milk is wholesome un-boiled. Fresh, warm cow's milk is also wholesome while taken when cool is not. Over-cooked milk is heavy and fat-making. Soured milk, sour or fetid smelling, discolored, etc. is unwholesome and harmful. *Acharya Caraka*[4] states (Su. XXVII.217-224) Cow's milk has ten attributes: sweet, cold, soft, unctuous, viscous, smooth, slimy, heavy, dull, clear. It increases *Ojas* from having similar properties. It is best among vitalizers and rejuvenative (*Rasayanas*). Interestingly *Caraka* describes colostrum and milk from 2nd or 3rd week post-partum as good for sleeplessness and excessive appetite, and are: heavy, saturating, aphrodisiac, bulk-promoting, and *Vata*-alleviating. There are various characteristics attributed to the specific type & state of milk. The following tables highlight these features.

Table 1: Showing the features of milk of the various animals as per Brhatrayee[5, 6, 7]

S.No.	Name of the animals	*Acharya Vagbhatta*	*Acharya Sushrutha*	*Acharya Caraka*
1.	*Goksheera* (cow milk)	*Jeevaniya* (strengthening effect), *Rasayna* (acts as immune-modulator), *Medya* (memory enhancer), *Balya* (boosts the bodily strength, cures dyspnea, dizziness, toxicity, cough, dysuria, bleeding disease.	Increases moistness in the channels and tissue-pores, slightly unctuous, heavy for digestion, rejuvenator, mitigates *Rakta* and *Pitta* aggravation, cures bleeding diseases, cold in potency, sweet in taste, best to mitigate aggravation of *Vata* and *Pitta*.	Sweetness, coldness, softness, unctuousness, dense, smooth, slimness and heaviness, slowness and clarity. Similar to that of *Ojas guna.*
2.	*Mahisha ksheera* (buffalo milk)	Good for those who are suffering from very powerful digestive activity and from loss of sleep, it is not easily digestible and its cold in potency,	Increases moisture in the tissues greatly, sweet in taste, destroys digestive fire, produces sleep, very cold and more unctuous than cow's milk	Heavy, cold, very cold and more unctuous than cow's milk, insomnia and too rapid digestion.
3.	*Ajaksheera* (goat-milk)	Easily digestible cures dyspnea, dizziness, bleeding disease, fever, diarrhea.	Similar in properties with cow's milk, especially suitable for patients of pulmonary TB, kindles	Astringent, sweet in taste, cold, bowel binding, light, useful in *Raktapitta*

			digestion, light for digestion, cures cough, bleeding diseases, dyspnoea. Cures all diseases.	diseases, diarrhea, coughing and fever
4.	*Ustrasksheera* (camel-milk)	Cures *Vata and Kapha* diseases, hemorrhoids, it is hot in potency, increases hunger and easily digestible.	Dry, hot, slightly salty and sweet, light for digestion, cures dropsy, abdominal tumors, enlargement of abdomen, piles, intestinal worms, leprosy and diseases due to poison.	Unctuous, hot, slightly slimy, light and useful in constipation, parasital infection, oedema, ascites, piles, and diseases due to *Vata* and *Kapha*.
5.	*Nariksheera* (woman's-milk)	It subsides *Vata, Pitta, Rakta & Akshivikaras* ; also cures traumatic wounds.	Sweet, astringent in secondary taste, cold in potency, suited for nasal medication and eye fillings, sustains life, light and kindles digestion	Invigorating, nourishing, wholesome and oleating, as an inhalation useful in *Raktapitta*, soothing for pain in the eyes
6.	*Avika ksheera* (ewe milk)	Hot in potency, it cures *Vata* diseases and it is not good to the heart.	Sweet, unctuous, heavy, increases *Pitta*, *Kapha*, beneficial in aggravation of *Vata* only and cough produced by *Vata*	Hot in potency, aggravates hiccup and dyspnea, also alleviates *Pitta* and *Kapha*
7.	*Hasthini ksheera* (she-elephant-milk)	It is strengthening	Sweet, aphrodisiac, astringent in secondary taste, hard for digestion, good for eyes and augments strength, bestows stability, cold in potency	Stabilizing, strength giving and heavy.
8.	*Ekasapha ksheera* (one hoofed animal-milk)	Milk of single hoofed animals is very hot in potency cures *Vata* disorders and it is slightly sour and salty.	Hot in potency, strengthening, mitigates diseases of *Vata* origin in extremities, sweet and sour in taste with salt as secondary taste, dry and light for digestion.	Strength promoting, stabilizing, hot, sour, saline, unctuous, alleviates *Vata* diseases of extremities and light for digestion.

Table 2: Showing the features of milk of the various animals as per *Nighantukara*[8, 9]

S.No.	Name of the animals	***Madanaphala nighantu***	***Dhanvantari nighantu***
1.	*Goksheera* (cow milk)	Sweet in taste, cold in potency, unctuous, *Jeevaniya* (strengthening effect), *Rasayna* (acts as immune-modulator), nourishes the tissues, helps produce milk in the breast, *alleviates Vata pitta* disease.	*Rasayna* (acts as immune-modulator), increases strength, beneficial for the heart functioning, increases the memory power, slightly unctuous, heavy for digestion, rejuvenator, cures bleeding diseases, cold in potency, sweet in taste, best to mitigate aggravation of *Vata* and *Pitta*., mitigates *Rakta* and *Pitta* aggravation
2.	*Mahisha ksheera* (buffalo milk)	Sweet, unctuous, it is not easily digestible, enhances bodily strength, potency and sleep and its cold in potency, reduces the digestive fire.	Slimy in nature, sweet in taste, destroys digestive fire, produces sleep, very cold and more unctuous than cow's milk
3.	*Ajaksheera* (goat-milk)	Similar in properties with cow's milk, helps in constipation, increases the digestive fire, useful in diseases like diarrhea, leucorrhea,	Astringent & sweet in taste, cold in potency, alleviates bleeding diseases, kindles digestive fire, light for digestion, cures cough, bleeding diseases, dyspnea,

		bleeding diseases, fever and very light to digest. Cures almost all diseases in humans.	fever, and cures all diseases.
4.	*Ustrasksheera* (camel-milk)	Sweet in taste, dry in nature, secondary saline taste, light for digestion, increases the digestive fire, cures piles, intestinal worms, leprosy, abdominal diseases and diarrhea.	Dry, hot, slightly salty and sweet, light for digestion, cures dropsy, abdominal tumors, enlargement of abdomen, piles, and intestinal worms.
5.	*Nariksheera* (woman's-milk)	It is light to digest, cold in potency, enhances the digestive fire and subsides *Vata, Pitta, Rakta & Akshivikaras*; also cures oedema and wounds in the eye, beneficial in nasal drops and eye fillings.	Unctuous, stabilizes & strengthens the body, sweet, astringent in secondary taste, cold in potency, suited for nasal medication and eye fillings, sustains life, light and kindles digestion, cures bleedings diseases
6.	*Avikaksheera* (ewe milk)	Sweet, increases the hair volume, unctuous, cures *Vata* and *Kapha* diseases	Sweet, unctuous, hot in potency, heavy, beneficial in aggravation of *Vata* only and cough produced by *Vata*, oedema and gout.
7.	*Hasthini ksheera* (she-elephant-milk)	Sweet in taste, it is strengthening, beneficial for the eye, cold in potency and heavy for digestion	Sweet, aphrodisiac, astringent in secondary taste, hard for digestion, unctuous, good for eyes and augments strength, bestows stability, cold in potency
8.	*Ekasaphaksheera* (one hoofed animal-milk)	Hot in potency, dry in nature, enhances body strength, cures *Vata* and *Kapha* disorders and it is slightly sour and salty, light in digestion and sweet in taste.	Sour taste with salt as secondary taste, increases digestive fire, light for digestion, stabilizes and strengthens the body.

Table 3: Showing the characteristic features of different forms of milk[10, 11, 12, 13]

Sl.no.	Types of milk	Characteristics of milk
1.	*Dharoshna* (milk just sucked from the breasts which is lukewarm)	Very effective, relieves from *Vatavikara, Pandu (anaemia), Kamala* (jaundice), *Pittavikaras* like *Daha (burning sensation over the* body), *Raktavikara,* debility.
2.	Un-boiled milk	Except for cow & buffalos un boiled milk all other are avoided as it increases *Ama* (undigested food).
3.	Boiled milk	Relieves *Vata, Kaphavikara*
4.	Sugar etc when added to milk	*Sita* (sugar candy) enhances the *Shukra* (semen), *Guda* (jiggery) relieves *of Mutrakrchra, Pitta- Kaphavikara.*
5.	Timely effects of milk	Before noon imparts strength, promotes musculature & *Agni;* after noon *Balya, Mutrashmari* (renal calculi), other urinary problems; Night it promotes *Agni improves Shukra* (semen).
6.	Contra Indication	*Navajvara* (acute fever), *Atisara* (diarrhea), *Krimiroga* (at the time of microbial invasion in the body.

Nutritional value of Cow, Goat, Buffalo and Sheep's milk, Human milk and Soy milk. Values may vary depending on processing such as pasteurisation [for dairy milk] and method of production [for soy milk], feed type, including soil quality to produce fodder, or for growing soy beans in the case with producing soy milk.

Table 4: Showing the Nutritional constituency of milk[14, 15]

MILK TYPE		**Cow**	**Goat**	**Buffalo**	Sheep	Human	Soy
NUTRIENT	**UNITS**	**VALUES / 100 gm MILK**					
Proximates							
Water	gm	87.99	87.03	83.39	80	87.5	93.27
Energy	kcal	67	69	117	108	70	33
Protein	gm	3.20	3.56	4.30	5.98	1.03	2.75
Lipids [fat]	gm	4.10	4.14	6.50	7.01	4.38	1.92
Ash	gm	0.72	0.82	0.79	0.96	0.2	0.27

Carbohydrate [lactose/sugars]	gm	4.46	4.45	5.00	5.36	6.89	1.81
Minerals							
Calcium Ca	mg	120	134	210	193	32	4
Iron Fe	mg	0.05	0.05	0.12	0.1	0.03	0.58
Magnesium Mg	mg	23	14	31	18	3	19
Phosphorus P	mg	90	111	130	158	14	49
Potassium K	mg	185	204	178	137	51	141
Sodium Na	mg	73	50	65	44	17	12
Zinc Zn	mg	0.38	0.3	0.22	0.54	0.17	0.23
Copper Cu	mg	0.011	0.046	0.046	0.046	0.052	0.12
Manganese Mn	mg	0.004	0.018	0.018	0.018	0.026	0.17
Selenium Se	mg	2	1.4	1.55	1.7	1.8	1.13
Vitamins							
Vitamin C	mg	1.9	1.3	6.7	4.2	5	0.0
Thiamin	mg	0.038	0.048	0.052	0.065	0.014	0.161
Riboflavin	mg	0.162	0.138	0.135	0.355	0.036	0.070
Niacin	mg	0.084	0.277	0.091	0.417	0.177	0.147
Pantothenic acid	mg	0.314	0.31	0.192	0.407	0.223	0.048
Vitamin B6	mg	0.042	0.046	0.023	0.06	0.011	0.041
Folate [Vit. B9]	mcg	5	1	6	7	5	1.5
Vitamin B12	mcg	0.36	0.07	0.36	0.71	0.05	0.0
Vitamin A [carotene]	IU	126	185	178	147	241	32
Vitamin A [Retinol]	mcg	28	56	53	44	60	-
Vitamin D	IU	52	51	-	-	4	-
Vitamin E	mg_ATE	0.1	0.09	0.13	-	0.9	0.01
Amino Acids							
Tryptophan	gm	0.046	0.044	0.053	0.084	0.017	0.043
Threonine	gm	0.149	0.163	0.182	0.268	0.046	0.113
Isoleucine	gm	0.199	0.207	0.203	0.338	0.056	0.144
Leucine	gm	0.322	0.314	0.366	0.587	0.095	0.241
Lysine	gm	0.261	0.29	0.28	0.513	0.068	0.179
Methionine	gm	0.083	0.08	0.097	0.155	0.021	0.040
Cystine	gm	0.03	0.046	0.048	0.035	0.019	0.047
Phenylalanine	gm	0.159	0.155	0.162	0.284	0.046	0.151
Tyrosine	gm	0.159	0.179	0.183	0.281	0.053	0.112
Valine	gm	0.22	0.24	0.219	0.448	0.063	0.141
Arginine	gm	0.119	0.119	0.114	0.198	0.043	0.214
Histidine	gm	0.089	0.089	0.078	0.167	0.023	0.071
Alanine	gm	0.113	0.118	0.132	0.269	0.036	0.122
Aspartic acid	gm	0.25	0.21	0.309	0.328	0.082	0.341
Glutamic acid	gm	0.689	0.626	0.477	1.019	0.168	0.550
Glycine	gm	0.07	0.05	0.08	0.041	0.026	0.120
Proline	gm	0.319	0.368	0.364	0.58	0.082	0.162
Serine	gm	0.179	0.181	0.227	0.492	0.043	0.144
Lipids [fats]							
Mono-unsaturated	gm	0.965	1.109	1.787	1.724	1.658	-
Poly-unsaturated	gm	0.124	0.149	0.146	0.308	0.497	-
Cholesterol	mg	31	11	6.5	27	14	-
Total saturated	gm	2.079	2.667	4.597	4.603	2.009	-

Table 5: Showing the Nutritional constituency of milk[14, 15]

1 cup	Calories	Total Fat(g)	Chol (mg)	Carbs(g)	Fiber (g)	Sugars (g)	Protein (g)	Calcium(mg)
Skim Milk	90	0	5	13	0	12	8	300
1% Milk	110	2.5	10	13	0	12	8	300
2% Milk	120	3.5	15	12	0	12	8	300
Whole milk	150	8	35	12	0	11	8	300

Like water milk too is invigorating, hence in the classical texts the mention of *Ksheera* is found post the quality of *Jala varga*[16].

Milk & *Hrdroga* (cardiovascular diseases)

Acharya Caraka[17] in the *Chikitsa* of *Hrdroga (CVD)* especially in *Paittika hrdroga* type specifies the *Arjuna Ksheerapaka prayoga (*consists of *Arjuna* bark & milk in 1:4 ratio). *Ksheera* with *Bala Kalka, Ksheera with Laghu panchamoola kalka or Yashtimadhu kalka prayoga. Acharya Yogaratnakara*[18] mentions the same for the treatment of *Pittaja* type of *Hrdroga.* Formulations like *Vallabhadi ghrta & Yashtyadi ghrta* consists of milk as a major constituent. Another perspective to this is that milk is sometimes linked to increased risk of cardiovascular disease as it is often suggested to have high saturated fat content. Consumption of saturated fat is linked to increased LDL cholesterol levels, which in turn are linked to increased risk of atherosclerosis and CVD. Although whole milk has relatively high saturated fat content when compared with certain other foods, lower fat varieties such as semi-skimmed, 1% fat milk and skimmed milks have lower saturated fat content. It is also important to note that different types of saturated fatty acids have differing effects on LDL cholesterol levels. Some saturated fatty acids such as Stearic acid (in milk and dairy products) actually lower total blood cholesterol and LDL cholesterol levels when compared to other long chain saturated fatty acids[19].

In addition it is thought that short and medium chain saturated fatty acids have little effect on elevating blood cholesterol level. Therefore although milk fat contains a comparatively high proportion of saturated fatty acids, its content of Stearic acid and short and medium chain fatty acids is suggested to minimize the expected increase in blood cholesterol compared with other foods. A known fact that milk contains essential nutrients like calcium, potassium and magnesium.

Among these increasing calcium intake has been demonstrated to lower blood total cholesterol and levels of LDL cholesterol. Strong evidence from scientific studies has also shown that a higher consumption of milk is linked to a lower risk of stroke and heart disease in men and women[20].

Milk & *Prameha* (diabetes)

Ksheerasevana is one among the many *Nidana* (etiology) of *Prameha* as it enhances the *Ansha of Kaphadosha* in the *Shareera* (body[21]). But the fact that the consumption of milk as *Anupana* with formulations like *Candraprabha vati; Ashwagandhapaka, Drakshapaka, Pugapak*[22] made solely in milk with other herbal drugs have been mentioned for the treatment of the same cannot be denied. An understanding that the cause leads to solution that can be seen fairly in this case. The alternate research studies prove that the calcium in dairy that helps to reduce the risk of type 2 diabetes, a high calcium intake is associated with lower insulin resistance. In addition to this, people with a high calcium intake have a lower prevalence of obesity. Also an increase in calcium intake in obese individuals may be associated with a decrease in body fat and insulin resistance. It has recently been suggested that low-fat dairy may lower the risk of diabetes by increasing the body's production of a hormone called adiponectin. Adiponectin is a hormone involved in fat and blood sugar metabolism and has been shown to improve the body's response to insulin and reduce the risk of diabetes.

Milk also has a low glycemic index (GI).A low GI leads to improved insulin sensitivity hence lowering diabetes. Besides this Researchers credit a fatty acid found in milk called trans-palmitoleic acid as the possible protective compound which is an extremely strong protective effect against diabetes[23].

Milk & kidney disorders

In *Mutrashmar*[24] (renal calculi) *Ksheera* (milk) has been mentioned as a *Pathya. Shatavari with Ksheera* (milk) *Prayoga in Shukrashmari is specified.* Formulations indicated in *Mutraghata (urine retention), Mutrakrchra* (dysuria) like *Gokshuradighrta, Kshardradhaghrta*, *Citrakadighrta* all consists of milk majorly. In fact adequate consumption of goat's milk is indicated in all kinds of kidney diseases. Milk is a diuretic cleansing the kidneys and urinary tract by prompting urination. Patients with kidney disease are generally required a high-quality and low-amount protein diet, low sodium and low fat. Proteinuria often occurs because glomerular filters do not filter nutrients properly. If people have proteinuria, protein intake should meet the protein loss which will help to correct hypoproteinemia. Milk contains healthy proteins which will supplement the individual needs. In some cases, the kidney disease patients have retained water in their body to cause them swell up in limbs, eyelids, etc. They will need to count the sodium and water they consume each day. Milk has rich water content, so if people take milk the water should be counted into their daily fluid consumption[25].

Table 6: Showing the utility of *Ksheera* (milk) in various diseases as per *Ayurveda* classics[26, 27]

S.No.	*Roga* (Diseases)	*Ksheera* (milk) *prayoga*	Formulations containing *Ksheera*
1.	*Hrdroga* (CVD)	*Arjunaksheerapaka, Laghupanchamulakalka + ksheera, balakalaka + ksheera, Yashtikalka + ksheera*	*Vallabhadighrta, Yashtyadi Ghrta*
2.	*Mutrakrchra* (dysuria)	*Guda + Ksheera, Shilajit + Ksheera, Bala + Hingu + Ksheera, Kutajatwak + gopayasa/Ksheera*	*Manthadi yoga, Drkshadiyoga, Satavaryadi Ghrta*
3.	*Mutraghata* (Urine retention)	*Godhavati + ksheera, Trikantakadi & Nidigdhakadi Ksheerapaka*	*Gokshuradighrta, Kshardrardhaghrta, Citrakadighrta, Svaguptadhya choorna*
4.	*Mutrashmari* (Renal calculi)	*Shatavariswarasa + Ksheera, Kevala Ksheera Pathya*	--
5.	*Prameha* (Diabetes)	*With Candraprabhavati as anupana*	*Drakshapaka, Pugapaka, Salampaka, Ashwagandhapaka*

Milk & obesity

Diet has been identified as a major contributor to the risk of obesity and in particular high saturated fat intake. Calcium and in particular calcium from milk can actually contribute to weight loss by helping to breakdown body fat.

Scientific evidence shows that milk consumption is inversely associated with body mass especially in children. Whey proteins, conjugated linoleic acid (CLA), branched chain amino acids and sphingo-lipids are also thought to contribute.

Some human studies have looked at CLA and body weight/body fat and body composition. Reductions in body weight have been observed in patients with type 2 diabetes. Although some studies in healthy individuals have failed to show a reduction in body weight, other studies have shown that CLA can help reduce body fat in humans. It is seen that a supplement containing CLA and omega 3 in combination improves body composition in young obese individuals, by increasing lean body mass, increasing hormones involved in fat and blood sugar metabolism and maintaining abdominal fat levels. Dairy calcium and whey proteins may also help improve body composition during weight loss by increasing fat loss and retaining lean muscle mass.[28]

Milk & hypertension

Hypertension is a very significant risk factor for **cardiovascular disease**. Several components derived from milk and its products, including bioactive peptides, appear to be important factors in blood pressure management. Hypertension can be prevented, blood pressure lowered, and other CVD risks favorably affected by a healthy diet.

Calcium is posited as one of the main nutrients responsible for the beneficial impact of milk products on blood pressure (BP) control.5 Other minerals in milk, such as magnesium and potassium, may also help regulate BP, but their individual contributions are difficult to isolate as they are often found in foods rich in calcium. The most important factor may relate to the bioactive peptides derived from milk & its products, including cheese. Both casein and **whey protein** contain specific bioactive peptides that have been shown to have an angiotensin-1-converting enzyme (ACE) inhibitory effect, a key process in BP control. Other studies have demonstrated that certain milk-derived peptide combinations also have hypotensive effects via the modulation of endothelin-1 release by endothelial cells.

Milk peptide activities include binding to opioid receptors, inhibition of angiotensin-converting enzyme (ACE), and modification of antithrombotic and immune responses. Phosphopeptides formed from casein may enhance the absorption of minerals, especially calcium, from the digestive tract into the circulation.

These milk peptides are formed from milk proteins by enzymatic breakdown by digestive enzymes or by the proteinases formed by lactobacilli during the fermentation of milk. Several milk peptides have been shown to have antihypertensive effects in animal and in clinical studies. The most studied mechanism underlying the antihypertensive effects of milk peptides is inhibition of angiotensin-converting enzyme. Milk peptides may also have other additional mechanisms to lower blood pressure such as opioid-like activities and mineral-binding and antithrombotic properties.[29, 30, 31]

Table 7: Research work on milk

S.No.	Recent research work on milk
1.	A meta-analysis of prospective studies in 57, 000 adults in nine population-based cohort studies examined the dose response relationship between various types of dairy foods (including total, low-fat and high-fat) and incidence of high blood pressure. The authors found a reduced risk for hypertension in overweight compared to normal weight adults and concluded that low-fat dairy and milk may aid in the prevention of high blood pressure[32]

2.	A number of observational studies have noted an association between milk and dairy intake and lower blood pressure, milk intake predicted systolic blood pressure: in a group with the highest milk intake (around a pint / 586ml of whole milk per day), systolic blood pressure was 10.4 mmHg lower than those who drank little or no milk after a 23-year follow-up. 123 ref no.[33, 34, 35]
3.	The minerals in milk including calcium, potassium and magnesium are also linked to blood pressure regulation. The weight of the evidence to date suggests that milk and dairy foods, particularly low-fat dairy, can help lower blood pressure and contribute to the prevention of **hypertension**. This is important given that high blood pressure is a major risk factor for **cardiovascular disease**, particularly stroke, and even values at the high end of the normal range increase the risk[36, 37, 38]. 14, 20, 21 ref no.
4.	A study published in the December 2010 issue of *Annals of Internal Medicine* followed 3, 736 men for 10 years and found that those who had the highest blood levels of a type of fatty acid from whole-fat (not nonfat) dairy foods had 60% less chance of developing **Type 2 diabetes** than men with the lowest levels[39]
5.	The National Institute of **Diabetes and Digestive and Kidney Diseases** (NIDDK) defines a serving of dairy as 8 ounces of nonfat or low-fat milk[40]
6.	According to data from the latest National Diet and Nutrition Survey (2008/2009) adults aged 19-64 consume 13% of their total fat from dairy and 22% of saturated fat from dairy. 22% of people were found to consume whole milk, 73% consumed semi-skimmed and 16% consumed skimmed milk. In addition to this information it is also important to note that milk and dairy foods are also a provider of many beneficial nutrients including calcium, phosphorous, magnesium, and B vitamins which are essential to good health. The Dairy Council therefore encourages consumers to consume dairy foods everyday as these foods may contribute to **weight loss** but will also provide an array of health promoting nutrients[41]

DISCUSSION

However, as the individualized body size, function and laboratory results differ, the best advice for a diet will be determined after overall condition is evaluated. Moreover the facts about milk should be looked into time & again as they shed light over the molecular involvement with the human body systems.

- Milk proteins include caseins, β-lactoglobulin, α-lactalbumin, immunoglobulins, lactoferrin and serum albumin -- affect not just the immune system, but cardiovascular and nervous system.
- Lactoferrin- Help in regulation of iron homeostasis, host defense range of microbial infections, anti-inflammatory activity and cancer protection.
- Bioactive Peptides found in milk influence health care by risking Obesity & Type-II Diabetes.
- Also, Hydrolysis of Lactalbumin produces peptides with IM effect which stimulates phagocytosis via specific receptors, hence maintaining the immunity in the body.
- Proteins in milk demonstrate a no. of biological effect like anti-carcinogenic activities to different effects on digestive function, acting as an immune modulator.
- Milk proteins contain many Amino acids is alkaline in nature. It aids the stomach during digestion and has the capacity to regulate the circulatory and central nervous system. It also purifies the auto-synchronous human body.

CONCLUSION

Milk on its own is a medicine. If taken with other medicines/herbs/foods it serves as a tonic or purifier. A proper use of milk can cure afflictions like obesity, liver problems, kidney diseases, DM etc. Thereby milk which is *Madhura, Dhatuvardhaka, Vatapittahara, Vrshya, Guru, Shleshmala* and *Sheetala* in our classics is said to be the best dietary supplement. With the recent research works carried on milk, it clearly justifies that it serves as a complete nutritional compound in various lifestyle diseases. Furthermore work could be carried in the same path.

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