

## A CRITICAL UNDERSTANDING OF NUTRACEUTICAL ASPECTS OF CURD IN AYURVEDA

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**Abstract:** *Background:* Curd is a popular milk product prepared indigenously in most household and is widely available commercially. It has high nutraceutical values and finds a very prominent position in Indian culture, food habits and religious ethos. Curd by its nature has; *Madhuraamlarasa* (sweetish sour taste), *Amlavipaka* (sour post digestion taste), *Guru* (heavy to digest), *Ushnavirya* (hot in potency) and is *Abhishyandi* (coats over the channels carrying *Dosha*, *Dhatu* and *Mala*). Ayurveda proposes certain rules for its consumption and specify some adjuvant to contradict its ill effects. It is enumerated as etiology for *Kleda* (dampness) predominant diseases. On the other hand it is also useful as *Pathya* (diet) in diseases as well as, an ingredient in medicinal preparations. Research throws light on yogurt, saying it is endowed with large variety of bacteria that provide a number of health benefits such as lowering the low density lipid, hypertension and preventing certain disorders. *Aims:* To critically understand the nutraceutical aspects of curd based on available literature in Ayurveda and biomedical researches. *Settings and Design:* Conceptual critical review. *Methods and Materials:* Literature search of authoritative texts of Ayurveda and probable hypothesis is framed; conclusion is drawn based on current research. *Results:* Available research on yogurt provides evidence of its health benefits based on its calcium content and probiotic value. Some studies have established the medicinal properties of curd, but detrimental consequences which are repeatedly avowed in Ayurveda have not been taken up yet. *Conclusion:* Owing to the nutraceutical value of curd its use has been recommended as diet in chronic disease.

**Keywords:** Ayurveda, Curd, Nutraceutical value of curd.

### Introduction

The science nutraceuticals deals with food or constituents of food that provide medical or health benefits including the prevention and treatment of disease.<sup>[1]</sup> Curd possessing number of medicinal values, holds a primary position in Indian diet and culture, which is also evident in Vedic literature, gives an idea that the techniques of curd preparation and its health benefits were well-known to people.

In present era, curd and yogurt are considered as the best source of probiotic products. In this article an attempt is made to analyze the nutraceutical value of different types of curd based on its source, taste and its usage either in external, internal medicine or purificatory therapy with due respect to researches in contemporary sciences.

Curd by its nature is sweetish sour in taste, hot in potency, sour in post digestive taste and heavy to digest.<sup>[2]</sup> The attributes of curd varies according to type and nature of milk and its inoculation time for fermentation. Attributes of milk like *Snigdha* (unctuousness) varies in accordance with the habitat of animals and time of milking, for instance, milk of low altitude animal or that which is collected during morning is heavy. These specifications are also applicable to curd as it is a byproduct of milk itself. Though both possess similar properties curd is more *Abhishyandi* and *Guru* (heavy), which is proved by gastric emptying time (liquid phase is shorter for milk [35min] than curd [60min]).<sup>[3]</sup>

Curd prepared from boiled milk possesses qualities like relishing, promotes *Dhatu*, digestive power, strength and also pacifies *Vata* and *Pitta*.

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This is re-established by percentage of total nitrogen and ammonia found less in curd prepared out of boiled milk than of unboiled milk<sup>[4]</sup> (**Table 2**). Whereas the curd which is filtered (*Parisrita*) reduces *Vata*, increases *Kapha*, also creates interest in food and produces nourishing action.<sup>[5]</sup>

### Properties based on rate of fermentation

Various types of curd are cited such as *Mandaka* (unfermented curd), *Madhura* (sweet), *Madhura amla* (sweetish sour), *Amla* (sour) and *Atyamla* (sourer). Sweet curd by its hot potency, sweet taste during post digestion and unctuous quality mitigates *Vata*. However it aggravates *Kapha*, *Meda* and *Shukra* by its unctuousness and heaviness qualities.<sup>[6]</sup> Sour curd aggravates *Pitta*, and possesses *Grahi* (water absorbing action) by its hot potency (*Virya*) and sour post digestive effect (*Vipaka*).

A study carried out shows that the nitrogen percentage, dialyzable nitrogen and ammonia respectively increase to 0.144, 0.060 and 9.74% on 7th day of fermentation. When it was compared with buffalo curd on 7th day it showed significantly high values of nitrogen. This proves sourer curd is more detrimental to health in comparison with sweet or sour curd (1st day) (**Table 1 and 2**).<sup>[4]</sup>

**Table 1.** Nitrogen percentage in curd on 1<sup>st</sup> and 7<sup>th</sup> day of fermentation

Product	Total N %	NPN %	Protein %	Dialisable Nitrogen %	Ammonia Nitrogen mg%
Cow milk @	0.56	0.048	0.512	0.017	0.24
Curd 1st day	0.57	0.073	0.497	0.027	9.79
Curd 7th day	0.55	0.144	0.406	0.060	x
Buffalo milk @	0.65	0.038	0.612	0.021	0.16
Curd 1st day	0.65	0.052	0.598	0.22	12.20
Curd 7th day	0.66	0.081	0.579	0.034	9.74
Buffalo milk#	0.64	0.040	0.600	0.023	0.36
Curd 1st day	0.65	0.059	0.591	0.026	13.86
Curd 7th day	0.63	0.057	0.573	0.029	12.45

@- Unboiled #-Boiled, x- not observed

### Usefulness in multiple forms

Action of curd again differs according to its part used, as with cream (*Sara*), curd mitigates *Vata*, increases *Kapha* and *Shukra*, thereby produces *Vrushya* action through increased production and improved ejaculation of semen. However in general the entity which increases *Shukra* is heavy and possesses *Brumhana* action. Whereas curd without cream possesses properties like astringent preceding taste (*Anurasa*), dry, light ; improves taste and digestive fire; performs *Grahi* (absorbs water) and *Vistambikarma* (constipated).

The supernatant layer of curd (*Mastu*) also known as *Manda* is sour, sweet and astringent in taste, clears the channel, produces nourishment, strength, creates interest in food, relishing in nature and breaks the stool. It can be prepared with properly formed curd, whose quality resembles butter milk.<sup>[7]</sup>

### Nutraceutical value based on source

Based on the source of milk there are eight types of curd *viz.* cow, buffalo, goat, camel, sheep, mare, human and she-elephant. Goat curd reduces all three humors and stimulates digestion; being light than cow's curd possesses softer and smaller casein molecules. Hence it helps to overcome the conditions like hemorrhoids, dyspnoea, tuberculosis and cough etc. Moreover several studies proved that, it stimulates the mucosal immune system and improves the defense mechanism against intestinal and respiratory infections in a mouse immune suppression model.<sup>[8,9]</sup> Also some studies established that it is beneficial in producing GABA and ACE-inhibitor to counteract high blood pressure.<sup>[10]</sup>

Buffalo curd is *Snigdhatama*, it increases *Kapha* to a larger extent, and thereby reduces *Vata*. Hence, it is also useful in insomnia which is caused by aggravation of *Vata*. Supportive to this, a study proved that it consists of casein and fat, double the quantity of cow curd (**Table 2**).

Camel's curd is alkali in taste, hot in potency and pungent post digestive taste, but

**Table 2.** Quality of boiled and unboiled buffalo milk curd on 1<sup>st</sup> and 7<sup>th</sup> Day of Fermentation

Product	Sp.gr	Total solid (Protein & Fat)	Acidity	Volatile acid (mk.OIN NaoH *)	Alcohol (% by vol)
Buffalo milk @	0.65	0.038	0.612	0.021	00.16
Curd 1st day	0.65	0.052	0.598	0.220	12.20
Curd 7th day	0.66	0.081	0.579	0.034	09.74
Buffalo milk #	0.64	0.040	0.600	0.023	00.36
Curd 1st day	0.65	0.059	0.591	0.026	13.86
Curd 7th day	0.63	0.057	0.573	0.029	12.45

@- unboiled #-Boiled \* for 100gm

reduces *Vata* thereby overcomes the diseases like piles, skin disease, worm and ascitis. Now a days camel milk is used to treat diabetes (as it contains insulin like molecules) and to strengthen cellular immune response, antimicrobial activity.<sup>[11]</sup> However regarding camel curd no research is evident to prove its beneficial effect.

Sheep curd is sweet in both taste and post digestive effect, accordingly increases all *Dosha*, but is considered as wholesome for diseases like hematological disorders, inflammatory diseases, wound and gouty arthritis. On the other hand it is comprehensively established to contain excess of total solids and major nutrients than the milk of goat and cow.

There are no researches to prove the nutraceutical aspect of other curd, but authoritative texts of Ayurveda provide information regarding their attributes as follows.

Mare's curd is astringent in taste, hot in potency, pungent in post digestive effect, in addition possesses attributes like rough, light and *Abhishyandhi*, thereby it increases *Vata*. Human milk curd is sweet in taste and post digestive effect; heavy thereby reduces *Vata*, *Pitta*, considered best for eyes. Whereas elephant curd is astringent in taste and pungent in post digestive effect, hot in potency, light in quality there by reduces *Kapha*.

Among eight types, cow's curd being common diet and ingredient in medicaments, this article contains explanations regarding nutraceutical value of the same. However yogurt is artificially prepared curd, thus which is used as a substitute in diet and medicine.

### In internal medicaments

In *Antarparimarjanachikitsa* (internal treatment), curd is useful as diet, adjuvant and as ingredient in various therapeutic formulations. It is useful in diseases of vitiated *Vata*, *Amashaya* (pathogenesis involving stomach), *Rasavahasrotos* (channels which carry *Rasa*) and in *Jeerna* or *Pakvaavasta* (chronic) (**Table 3**). If it is used judiciously cures conditions like anorexia, intermittent fever, diarrhoea, emaciation, rhinitis,<sup>[12]</sup> vomiting,<sup>[13]</sup> dry cough,<sup>[14]</sup> irritable bowel syndrome<sup>[15]</sup> and haemorrhoids.<sup>[16]</sup> Further logical interpretation of the curd usage in above illustrated diseases is explained as follows.

Taste enhancing (*Rochishnu*) and saliva promoting (*Praseka* due to *Kaphavruddhi*) property is appreciated with curd, which is comprehensively attributed to its acidic taste, sodium and calcium ions.<sup>[17]</sup>

Curd is indicated in intermittent fever (*Vishamajvara*), caused by *Vata*, *Kapha* or *VataKapha*. Based on its nature of presentation different febrile conditions like typhoid can also be included under *Vishamajvara*. An *in vitro* study claims that, certain probiotic strains present in yogurt can inhibit the growth and adhesion of a range of entero-pathogens like Salmonella.<sup>[18]</sup>

Curd by its hot potency does the digestion of *Ama*,<sup>[19]</sup> there by relieves the condition *Pinasa* (acute and chronic rhinitis). A similar approach is found in naturopathy and other systems of medicine attribute the beneficial effect of decreasing intensity of allergy to increased immunoglobulin. But impact of curd on long term usage is not yet evaluated.

In diseases of gastrointestinal tract like diarrhoea, irritable bowel syndrome and hemorrhoids curd is widely indicated. A study has established its beneficial effect in preventing and treating the acute diarrhoea caused by rotaviruse in children, curd is also useful as a diet in lactose intolerance.<sup>[20]</sup>

Improper functioning of *Medodhatvagni* which is a part of pathogenesis in hypercholesterolemia (*Apacitameda*), curd can be a choice, as it influences *Dhatvagni*.

**Table 3.** Therapeutic usage of curd

Disease	Method of curd usage
<i>Vatikapravahika</i> (dysentery due to <i>Vata</i> )	Curd along with sour pomegranate fruit and ghee ( <i>Bahusneha</i> ).
<i>Sappravahikaatisara</i> (dysentery with diarrhea)	Curd, oil, ghee and milk in equal quantity.
<i>Varchakshaya</i> (decreased stool quantity)	Black gram, barley and sour fruit juice processed with ghee, oil and curd.
<i>Vatajachardhi</i> (vomiting due to <i>Vata</i> )	Coriander decoction is prepared with curd, then with equal part of water or milk.
<i>Vatajahidroga</i> (heart disease due to <i>Vata</i> )	Oil prepared with <i>Rasna</i> , <i>Jeevaka</i> etc. with four parts of curd.
<i>Katina pureeshayuktaarshas</i> (hard stool in hemorrhoids)	Ghee and oil processed with asafoetida and mixed with upper layer of curd.
<i>Urusthambha</i> (stiffness of thigh)	Liquid portion of curd is used as adjuvant for <i>Gunja</i> , <i>Madana</i> , <i>Danti</i> .
<i>Pureeshajakrimi</i> (worms)	Liquid portion of curd with <i>Trapu</i> .
<i>Raktapitta</i> (bleeding disorder)	<i>Karanjabeeja</i> and salt with liquid portion of curd.
<i>Raktatisara</i> (blood mixed diarrhea)	<i>Bastamamsa</i> with curd or gruel prepared with curd or creamy curd with honey.
<i>Rajayakshma</i> (tuberculosis)	Creamy curd along with pomegranate juice and large amount of ghee.
<i>Udara</i> (ascitis associated with constipation)	<i>Narayanachurna</i> with liquid portion of curd.
<i>Arshas</i> (haemorrhoids)	Curd with cream.
<i>Vatajaasrugdhara</i> (menorrhagia due to <i>Vata</i> )	Curd with honey or sugar.
<i>Vatapradhanakasa</i> (dry cough )	Curd.
<i>Shvasa</i> (bronchial asthma )	Ghee prepared out of liquid portion of curd and <i>Dashamoola</i> .

A research study illustrates that, the healthy bacteria present in yogurt (*L. acidophilus*) assimilates cholesterol by enzymatic de-conjugation, consequently decreases the low density lipid.<sup>[21]</sup>

In individuals who are lean by nature (*Sahaja*) or emaciated due to chronic disease, curd improves metabolic process. It is proved to be beneficial in protein energy malnutrition. The above mentioned explanations have been proposed and proved by Ayurveda and other science.

However in addition to this, advanced studies prove yogurt (with *Lactobacillus acidophilus*) as effective in decreasing candidal colonization on daily ingestion of eight ounce,<sup>[22]</sup> thereby prevents bacterial vaginosis.<sup>[23]</sup>

Curd is found effective in relieving hypertension as it shows antioxidative effect by inhibiting angiotensin.<sup>[24]</sup>

### In Rasayana and Vajeekarana

Curd is attributed with rejuvenating property, hence used in preparations as ingredient and adjuvant. However it is also considered as *Apathya* (unwholesome) during administration of *Lashuna* (*Allium sativum*). As curd is known for action of enhancing taste and adds flavor to food, also a good aphrodisiac, thus it is useful in preparations of *Vajeekarana*.

### In external medicaments

Curd is useful in *Bahirparimarjana chikitsa* (external treatment) as adjuvant for *Lepa* (external application),<sup>[25]</sup> *Seka* (pouring)<sup>[26]</sup> and *Prakshalana* (washing)<sup>[27]</sup> in diseases like gouty arthritis, *Urusthamba* etc.

The main reason for its usage may be as a base for preparations and also provides coolness.

### In Panchakarma

In *Panchakarma* (five purificatory therapy) various medicated curd preparations are mentioned for conducting emesis and purgation like *Jeemutakalpa*,<sup>[28]</sup> *Iksvakukalpa*,<sup>[29]</sup> *Aragwadakalpa*,<sup>[30]</sup> *Tilvakakalpa*,<sup>[31]</sup> *Saptalashankhinikalpa*,<sup>[32]</sup> *Sudhakalpa*<sup>[33]</sup> and *Dantidravantikalpa*.<sup>[34]</sup> It is also used as a processing agent for *Madana*<sup>[35]</sup> (*Randia dumetorum*). It is one of the ingredients for enema preparation in both *Niruha* (decoction enema) like *Prasrutayougika basti*<sup>[36]</sup> and *Anuvasana* (oil enema).

Supernatant portion of curd possesses *Vidbeda* and *Vatanulomana* property; hence it is useful in most of purgative formulation. Similarly useful in the formulations of emesis as it increases *Kapha* by its *Abhishyanda*, *Guru* and *Snigdha* properties.

### As an ingredient in various formulations

Curd is used in various preparations like *Cangerighrita*,<sup>[37]</sup> *Pancagavyaghrita*,<sup>[38]</sup> *Dashamoolaghrita*,<sup>[39]</sup> *Mulakadyataila*,<sup>[40]</sup> *Agurvaditaila*,<sup>[41]</sup> *Balataila*<sup>[42]</sup> and *Takrarista*.<sup>[43]</sup>

In many of the oil/ghee preparations, the combination of curd and milk used is an exception to *Viruddha*, as it aims at relieving the disease by acting against the *Dosha*.

### Harmful effects of curd

Though curd is found beneficial in many ways, still it should not be consumed daily (*Nitya asevanadravya*),<sup>[44]</sup> as it alters the digestion and leads to different ailments like herpes, bleeding disorder, skin disease, anemia, giddiness, jaundice,<sup>[45]</sup> edema and diabetes.<sup>[46]</sup> It is also contraindicated in diseases like gouty arthritis<sup>[47]</sup> and disorders of oral cavity. Hence there are specifications for addition of adjuvant to curd like ghee, honey, sugar, Indian gooseberry, green gram soup as a diet and medicine, which supports *Aghrutasharkaraihi* (without adjuvant curd should not be consumed). However there is no scientific research data to support the same.

### Conclusion

Historical review reveals that curd has been used as a diet. Its usage was popularized when there was need for preserving milk in different forms for obtaining certain therapeutic values which were originally absent in milk. Curd which is sweet in taste and prepared out of boiled cow's milk is considered best as compared to its other varieties. It is useful as diet, medicine, adjuvant and processing agent in many disorders, if administered judiciously.

**Key Message:** Curd is a common dietary supplement used habitually by people across the world. It endows wide spectrum of application in preparing medicaments and treating ailments.

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