



## Review Article

## Health benefits of ghee (clarified butter) - A review from ayurvedic perspective

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## ABSTRACT

Ghee is identified as valuable natural source of food which has several health benefits entirely beneficial to the human population. It is one of the popular ingredients in the Indian diet and takes prevalent position in the dairy industry market. The focus of the present review paper is the demonstrated and potential health benefits associated with the consumption of ghee. Consumption of ghee in an adequate amount, imparts various health benefits such as binds toxins, enhances complexion and glow of the face and body, an amazing rejuvenator for the eyes, increases physical and intellectual stamina etc. in addition to imparting sustaining energy.

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## 1. Introduction

Ghee (butter oil) is one of the most popular traditional dairy products in India. Since Vedic era, it has been used for religious rites, cooking, cosmetic, and medicinal purposes.<sup>1</sup> The importance of ghee in Indian diets has been recognized from prehistoric days because of its excessive nutritive value, pleasant aroma, and textural properties. It is made from butter, cream, or milk of numerous animal species.<sup>2</sup> Ghee is viewed as an energy-rich food and rich in essential fatty acids (linolenic acid and arachidonic acid), fat-soluble vitamins, and growth-promoting factors.<sup>1</sup>

Ghee mainly consists of fatty acids, saturated fat, monosaturated fat, poly saturated fat, trans fat, omega fatty acids, cholesterol, vitamin A, B, D, K, E and very less amount of water.<sup>3</sup> Ghee contain essential fatty acids and fat-soluble vitamins which cannot be synthesized in our body, are supplied by ghee.<sup>4</sup> The milk fat components like CLA, sphingomyelin, butyric acid, other lipids having anti-

carcinogenic potential are also supplied by ghee.<sup>5</sup> It contains antioxidants like Vitamin E and beta carotene (600 IU) besides other nutrients like phospholipids, diglycerides and triglycerides.<sup>6</sup>

Cow Ghee is recognized to be digested 96% which is very best as compared to all different vegetable or animal supply fats.<sup>6</sup> Ghee is nutritionally more reliable to other oils/fats due to the fact of its medium chain fatty acids content, which are absorbed directly by the liver and burned to supply energy.<sup>7</sup> It is fairly shelf stable due to low moisture and natural antioxidants contents.<sup>8</sup> Lactose or casein intolerant have no difficulty with ghee because of removal of milk solids and impurities most human.<sup>9</sup> Due to characteristic of short chain fatty acids content, ghee has been accepted universally as best fat to other fats, which are accountable for its better digestibility and anti-cancer properties.<sup>7</sup> Different scientific findings recommend that the characteristic flavor of ghee and a mixture of biofunctional compounds make it appropriate for consumption by individuals of all ages with many health benefits<sup>1</sup>.

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Ghee & Ayurveda has very closed relationship since thousand years. Cow Ghee is excellent for balancing Vata (air) and Pitta (fire) related doshas (humors).<sup>6</sup> It is an excellent base for preparing Ayurvedic medicines, due to the fact ghee has different ability to attain each and every organ, tissue with in short period, which help to transport medicine without any change called as “yogawahi” action in Ayurveda.<sup>3</sup> In Ayurveda, ghee is placed under most sattvic foods and which help to promote positivity, growth and growth of consciousness. Cow ghee is applicable in all internal body mechanisms and considered in ayurveda as ‘amrita’(nectar). It had several health benefits such as slows the aging process, enhances the body immune system, facilitates the bowel movement, improve the health of the teeth & gums, prevent chronic cough issues and also disorders of eyes.<sup>10</sup>

Ghritas are medicated ghee or ayurvedic formulations of lipid based, in which decoction or the paste of the crude drug, boiled with the ghee so that the active components of drugs get transferred into ghritas.<sup>11</sup> In Ayurveda, Ghee is recognised to be the healthiest alternative of edible fat, when the nutritive value is being considered, as it possesses beneficial properties and enable positive effect of herbal drugs added to it in the preparation of medicated ghee.<sup>12</sup> Digestion, absorption and transport to target organ system are crucial in obtaining the maximum benefit from any formulation.<sup>6</sup> Lipophilic nature of Ghee helps entry of formulation into the cell and its delivery to mitochondrion, microsome and nuclear membrane.<sup>13,14</sup> A study that compared different varieties of herbs and herb extracts observed that the efficacy elevated when they had been used with ghee, in contrast to usage in powder or tablet form.<sup>15</sup>

Ghee is heavily utilized in Ayurveda for several medical applications, inclusive of the therapy of hypersensitive reaction skin and respiratory diseases.<sup>6</sup> Consumption of ghee imparts various health benefits such as binds toxins, enhances complexion and glow of the face and body, a great rejuvenator for the eyes, increases physical and intellectual stamina etc. in addition to imparting sustaining energy.<sup>7</sup> The anti oxidant properties of ghee help to forestall neurological diseases & increase HDL level of the blood and reduce LDL level of the blood.<sup>3</sup> CLA isomers are considered as antiobesity, antiatherogenic, anticarcinogenic and antidiabetic components.<sup>16</sup> Butyric acid is a ordinary modulator of gene function.<sup>17</sup> It acts as anticarcinogen by regulating cell growth and inducing cell differentiation in a wide variety of neoplastic cell lines.<sup>18,19</sup>

In spite of its numerous health benefits, over the past few years, ghee has obtained unflavourable publicity due to its high cholesterol content and saturated fatty acid contents.<sup>20</sup> However, it is vital for good health up to some extent, consuming it beyond the limit might also show detrimental health effects. The American coronary

heart affiliation recommends limiting the consumption of saturated fats to less than 7% of energy to reduce the threat of cardiovascular disease.<sup>21</sup>

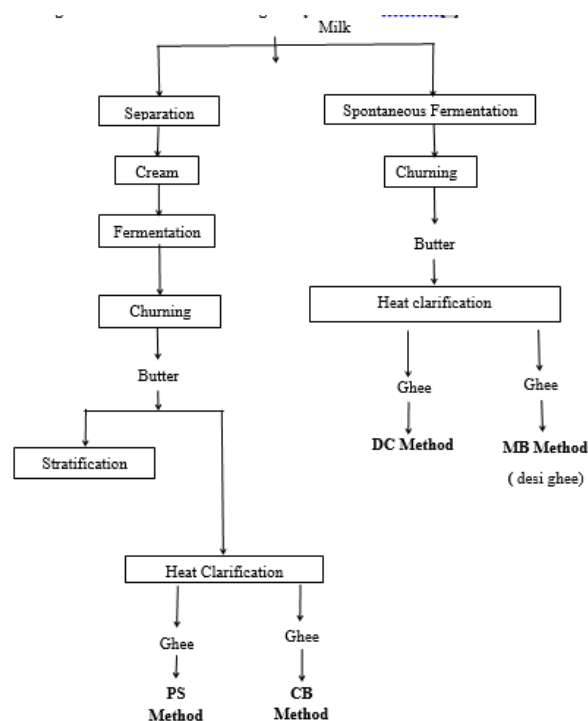


Diagram 1: Flow diagram for the manufacture of ghee by different methods<sup>7</sup>

Table adopted from the works reviewed by Achaya (1997) <sup>9</sup>.

## 2. Nutrient composition of ghee

Ramesh carried out to analyze the chemical and nutritive value of the ghee residues and the entire analysis revealed the moisture, crude protein, crude fibre, ether extract, nitrogen free extract and total ash contents of ghee residue have been 12.10, 19.86, 3.49, 47.12, 25.63 and 3.90 per cent, respectively. Fatty acid profile of ghee residue revealed that the palmitic acid registered the highest (38.88) among saturated fatty acids and the oleic acid accounted for the highest proportion (25.15) among unsaturated fatty acids. Linoleic, linolenic, eicosapentaenoic and decosahexaenoic acid content of ghee residue were 2.02, 0.79, 0.36 and 0.25 per cent respectively. Amino acid profile of ghee residue revealed that the lysine and methionine, content were 0.99 and 0.61 per cent, respectively. Threonine and arginine levels are observed to be at 1.44 and 0.76 per cent, respectively. The glutamic acid recorded the absolute best proportion (5.26), while cystine registered the lowest share (0.35) among amino acids in ghee residue. He concluded that ghee residue is a wealthy source of fats, protein, unsaturated fatty acids and amino acids.<sup>23</sup> Current studies

**Table 1:** Gross Composition of Ghee

Component	Quantity	Buffalo ghee
<b>Cow ghee</b>		
Fat	99.0-99.5%	99.0-99.5%
Saturated fat		46%
cis-monoene		29%
trans-monoene		7%
Diene Polyene		13% 5%
Triglycerides (triacylglycerols)		
SSS	42%	49%
SSU	42%	39%
SUU	14%	11%
UUU	2%	1%
Diglycerides (diacylglycerols)	4%	
Monoglycerides (monoacylglycerols)	1%	
Unsaponifiable matter		
Cholesterol	300 mg	
Lanosterol	9 $\mu\text{g } 100^{-1}$	
Lutein	4 $\mu\text{g } 100^{-1}$	
Squalene	60 $\mu\text{g } 100^{-1}$	
Vitamin A	9 $\mu\text{g } 100^{-1}$	
Vitamin E	28 $\mu\text{g } 100 \text{ g}^{-1}$	

S= saturated, U= unsaturated.

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**Table 2:** Fatty acid composition of differently branded ghee (% weight)<sup>22</sup>.

Fatty acid	Reten.tim (Sec.)	arey Dairy	Gokul Dairy	Nakoda Dairy	Gits	Nova	Dynamix	Home Desi	Loose Desi
<b>Small chain saturated fatty acid (SFA)</b>									
Butyric acid (C4)	3.602	5.95	10.01	8.99	31.35	7.51	10.21	9.72	5.95
Caproic acid (C6)	5.444	2.34	2.87	3.64	11.18	3.75	5.23	2.86	2.34
Caprylic acid (C8)	7.577	1.22	1.15	1.61	4.07	1.56	2.19	-	1.22
Total		9.51	14.03	14.24	46.50	12.82	17.63	12.58	9.51
<b>Medium chain saturated fatty acid (SFA)</b>									
Capric acid (C10)	10.232	2.48	2.98	2.66	5.84	2.51	12.96	7.72	2.48
Myristic acid(C14)	16.903	8.84	11.54	12.18	7.78	11.30	12.33	12.45	0.09
Total		11.32	9.43	14.84	13.62	13.81	25.29	20.17	2.48
<b>Long chain saturated fatty acid (SFA)</b>									
Pentadecanoic acid (C15)	18.370	2.19	1.87	2.80	-	2.83	1.49	-	0.23
Hexadecanoic acid (C16)	20.665	23.70	22.84	27.16	14.78	28.77	29.79	38.70	43.56
Stearic acid(C18)	26.219	9.67	11.37	10.45	1.44	11.17	-	2.32	-
Arachidic acid (C20)	23.036	0.69	0.72	0.95	-	0.79	-	-	0.18
Total		36.23	36.80	41.36	16.22	43.56	31.28	41.02	43.97
Total SFA		57.06	60.26	70.44	76.34	70.19	74.10	73.77	55.96
<b>Monounsaturated fatty acid (MUFA)</b>									
Cis Palmitoleic acid (C16:1)	20.226	2.15	2.75	2.09	0.74	2.46	2.12	2.09	-
Trans Oleic acid (C18:1)	25.481	19.20	22.54	20.65	3.15	18.38	16.22	17.82	47.69
Cis Oleic acid (C18:1)	16.745	0.79	0.93	0.82	0.66	0.76	1.48	-	2.05
Total		22.14	26.22	23.56	4.55	21.50	19.82	19.91	49.74

have published that ghee residue additionally incorporates natural carbonyls, lactones, and FFAs apart from its nutritional and antioxidant properties<sup>20</sup>.

### 2.1. Vitamins

Ghee is an important source of soluble vitamins like vitamin A, D, E & K.<sup>24,25</sup> In that vitamin A and E which are antioxidants. Vitamin A is known to be present in two forms; one is an ester and carotene which is converted into Vitamin A in the body. Vitamin A keeps epithelial tissue of the body intact; keeps the outer lining of the eyeball moist and prevents blindness. The studies carried out on laboratory animals reveal that vitamin E is essential for normal pregnancy, birth and breast milk production. Vitamin D is known to play an important role both in laying down of calcium and phosphorus in the bones and also in the greater absorption of these elements from the diet. Naturally it is of special importance to children and for pregnant women for the development of skeleton of young ones.<sup>26</sup>

Naveed Ahmad utilized the fluorescence spectroscopy for the characterization of buffalo and cow ghee along with the detection of their adulteration. Spectroscopic analysis confirmed the presence of vitamins A, B12, D, E, K and CLA in buffalo and cow ghee. The emission bands at 380 and 390 nm represent spectral signatures of vitamins B12, D and K, at 525 nm characterize beta-carotene, and at 440 and 490 nm depict CLA and vitamin A. The spectral signatures of vitamins revealed that cow ghee contains relatively higher concentration of vitamins B12, D and K as compared to buffalo ghee. Similarly, buffalo ghee has relatively higher concentration of CLA and vitamin A. The presence of vitamin E was confirmed in appreciable concentrations in both ghee types. Consequently, the presence and absence of beta-carotene, CLA and vitamin A can be used as biomarkers to differentiate buffalo and cow ghee. Spectroscopic analysis and PCA model have successfully demonstrated the detection of adulteration of 6 blind samples.<sup>27</sup>

### 2.2. Conjugated linoleic acid (CLA)

CLA is formed as an intermediate during the biohydrogenation of linoleic acid by using linoleic acid isomerase from the rumen bacteria *Butyrivibrio fibrisolvens*<sup>28</sup> or from the endogenous conversion of t-11, C18:1 (vaccenic Acid), some other intermediate of linoleic or linolenic acid biohydrogenation, by  $\Delta^9$  desaturase in the tissues.<sup>29</sup> Milk fat is richest natural source of CLA which comprises of an average 4.5 mg CLA/g of fat.<sup>30</sup> CLA is considered as an integral biologically-active compound of food due to its tested anticarcinogenic, anti-allergic and anti-inflammatory properties.<sup>31,32</sup>

Kathirvelan studied the impact of conjugated linoleic acid enhanced ghee on the antiatherogenic properties and antioxidant enzyme system in Wistar rats. Female Wistar rats of 21 days had been taken and fed with soybean diet as Control, low CLA diet and high CLA ghee diet were given for 35 days for inspecting antioxidative enzymes and sixteen weeks in case of antiatherogenic study. Lesser cholesterol and triglyceride levels were determined in the liver and aorta of high CLA fed rats than in these of the other groups. Therefore, the results showed CLA not only inhibited benign type tumours but malignant tumours as well. Histopathological research of liver verified normal hepatic cords with portal triad in the excessive CLA ghee fed by rats whereas fatty degeneration of hepatocytes containing fat vacuoles was seen in the liver of the other groups and reported the antioxidant and antiatherogenic properties of the high CLA enhanced ghee suggest that high CLA ghee can be used as a potential food for decreasing the chance of cardiovascular diseases.<sup>33</sup>

### 2.3. Wound Healing Properties

Hema Sharma have studied the impact of selected formulated five variants of topical application forms materials (flax seed oil, cow ghee, Amalaki fruit extract, Shorearobusta resin and Yashadabhasma) on functional status of skin and tissue regeneration capacity in wound healing models by measuring collagen estimation, wound contraction and breaking strength of the skin. Which had been chosen primarily based on the leads from Ayurvedic literature and concluded that can be beneficial in wound contraction, enhancement of tensile strength and augmentation in hydroxyproline content or collagen content. These properties together make this combination for anti-aging activities which is particularly good for skin health.<sup>34</sup>

Sathish HS chosen Jathikalpa ghrita; a fortified mixture of drugs chosen to study about the efficacy of this ointment by way of clinical and experimental methods. Innovative combination of drugs having recuperation property was once formulated and assigned name as Jathikalpa ghrita (Medicated ghee). Total 110 patients have been registered in the existing trial. In Group A, out of 75 patients, 8 discontinued and in Group B, 5 patients discontinued out of 35. Most wounds had been of anal region (65.45%) that got operated for Piles, Fissure, Fistula & many others and Adhishtana of vrana was Twaka (97.27%), Mamsa (91.81%) and Marma (62.72%). In Group A, 52.3% cases wound was healed in 16-20 days while in Group B it took 26-30 days (51.72%). Average healing days discovered in Group A was 20.98, whilst in Group B it was 22.43. By Pearson Correlation test (2-tailed), in Group A result indicated a significant correlation (0.01). Complete recuperation was observed in 49.25% of Group A and 47% in Group B, marked healing was seen in 37.71% in Group A and 50% of

Group B. The consequence confirmed proportion of wound contraction of trial drug used to be rather extensive when compared to control group. Jathikalpa ghrita is effective in healing of suddhavrana. jathikalpa ghrita is a strong wound healer drug.<sup>35</sup>

A study on wound healing activity Aegle marmelos leaves and cow ghee confirmed recovery in buffalo. The effects produced by using cow ghee and topical application of a combination of Aegle marmelos leaves extract in wound contraction, wound closure, surface area reduction of wound and tissue regeneration at the wound site have been studied and the wound healing activity was found substantial and was healed completely in 8 days.<sup>36</sup>

Nandanwar et al, consider the cow ghee containing formulation of Aloe vera for wound healing potential, showed that desirable keratinization, epithelization, fibrosis and collagenation indicative of good healing process in histological examinations. The consequences were same with Framycetin sulphate cream (1% w/w) which predominantly shows antimicrobial action. Incision wound for tensile strength, excision wound contraction and histological observations of regenerated tissues had been used to check out the healing potential of the formulation and concluded that the gel promotes recovery of incision and excision wounds rationalizing its usual declare.<sup>37</sup>

#### 2.4. Cow ghee intake and its relation with diabetes

The function of Cow ghee in prevention and treatment of Diabetes as a dietary complement was reviewed by Kumar Ravi. In that overview it suggests that specific components of Cow ghee are inversely associated with Diabetes and its use in applicable quantity may be beneficial in preventing and treating Diabetes and its associated complications. Potential defensive constituents in Cow ghee includes carotenoids, Vitamin A, D, E (antioxidants), Mg and Ca. all these substances have shown antidiabetic activity.<sup>38</sup> Animal studies have verified many helpful result of ghee, inclusive of dose-dependent decreases in serum total cholesterol, low density lipoprotein, very low density lipoprotein, and triglycerides; decreased liver total cholesterol, triglycerides, and cholesterol esters; and a lower level of non-enzymatic induced lipid per oxidation in liver homogenate.<sup>39</sup> Odd chain fatty acids like Pentadecanoic acids and Heptadecanoic acid are synthesized only in the rumen of ruminants. . Inverse association were found from intake of milk products, whereas relationship to HDL cholesterol and apolipoprotein A-I tended to be positive. They have positive effect on cardiovascular system and associated with reduced risk of Diabetes.<sup>40,41</sup>

Cow ghee is a very good source of Conjugated Linoleic Acid (CLA). CLA has proven antidiabetic effect in animal research due to complex regulation of the genes vital in reducing adiposity, improved insulin action and signal transduction in skeletal muscles.<sup>42</sup> Dwivedi et al indicates

that consumption of 10% Cow ghee in diet had a positive effect on serum lipid profile. Cow ghee contains Linoleic acid which decrease inflammatory mediators such as leucotrienes, prostaglandins and interleukins. The potential of ghee to lower the levels of Arachidonic acid metabolites decrease secretion of leukotriene is also recommended in preventing the complications of Diabetes such as CVD, Atherosclerosis etc.<sup>20</sup>

#### 2.5. Ghee helps in digestion

Cow Ghee is recognised to be digested 96% compared to all distinctive vegetable or animal source fats. Dispersion of fat globules in the aqueous phase of milk forming an emulsion is the reason behind the excellent digestibility of milk fat. Other dietary fats have to be emulsified by bile, pancreatic enzymes, and intestinal lipases before they can pass through the intestinal wall but milk fat are absorbed directly. Additionally, milk fat contains short and medium-chain fatty acids, which are absorbed easily than long-chain fatty acids. The short chain fatty acids involving ester bonds are more easily cleaved by lipases. Due to digestibility the milk fat act as a valuable dietary constituent for the treatment of many diseases.<sup>43-45</sup>

Kumar et al, determined unlike other oils ghee contains butyric acid; a short chain fatty acid which gives distinct flavor and help in digestion.<sup>46</sup> Beneficial microorganism in intestinal which convert fiber into butyric acid and use that for source of energy and intestinal wall support.<sup>47</sup> Studies have confirmed that people with unhealthy digestive tracts do not produce butyric acid. Research suggest that the production of killer T cells in the gut get adequate support from production of butyric acid and as a result strong immune system.<sup>48</sup>

#### 2.6. Management of childhood epilepsy (apasmara)

Ramchandra et al reviewed concept of medicated ghee on management of childhood epilepsy. Epilepsy is a disorder of central nervous system in which brain activity becomes abnormal causing seizures by the neurobiologic, cognitive, psychological and social consequences of this condition. Ghee contains vitamin A, D, E and K. Vitamins in which A and E are anti-oxidant and are useful in preventing oxidative damage to the body & brain. He concluded that most of the components have anticonvulsant activity through one or other mechanism.<sup>49</sup> There are number of synthetic drugs available for treatment of Epilepsy/Seizure disorder; but having major disadvantage of their chronic side effects. There are many drug preparations are described in Ayurvedic literature by Acharyas Snehakalpana in the form of Ghee/Oil and the Ghritkalpanain which ghee is boiled with various medicinal plants is one of these.<sup>50,51</sup> Therefore, treatment with the various medicated ghee (Ghritkalpanas) along with the standard synthetic antiepileptic drugs should

be considered a valid therapeutic option for children with seizure disorders/epilepsy (Apsmara).<sup>49</sup>

### 2.7. Cardioprotective Activity

Hari sharma et al investigated the impact of 10% dietary ghee on microsomal lipid peroxidation, as well as serum lipid levels in Fischer inbred rats to investigate the impact of ghee on free radical mediated techniques that are implicated in many chronic illnesses such as cardiovascular disease. Results confirmed that 10% dietary ghee fed for 4 weeks did no longer have any large effect on levels of serum total cholesterol, but triglyceride levels increased in Fischer inbred rats.<sup>52</sup>

Research on Maharishi AmritKalash-4 (MAK-4), an Ayurvedic herbal mixture containing ghee ingested MAK-4 for hyperlipidemic patients up to 18 weeks confirmed no impacting on levels of serum cholesterol, high density lipoprotein, LDL, or triglycerides. MAK-4 forbids the oxidation of LDL in these patients. The facts available in the literature do not support a conclusion of dangerous result of the moderate consumption of ghee in the general population. Due to excessive usage of vanaspati which contains 40% trans fatty acids, insulin resistance, psychosocial stress and altered dietary patterns are the reason for rise of CAD in Asian Indians. Research findings supports commended effects of ghee outlined in the historic ayurvedic texts and the therapeutic use of ghee for hundreds of years in the ayurvedic system of medicine.<sup>53,54</sup>

Bendsenet al. reviewed the association of trans fatty acids and the risk of coronary heart disease concluded that the consumption of ruminant trans fatty acids in between amounts like 0.5 and 1.9 g day<sup>-1</sup> has no significant effect on the risk of coronary disease.<sup>55</sup>

### 2.8. Anticancer Activity

Rita rani and vinod kansal investigated the impact of feeding mixture of cow ghee and soybean oil on 7, 12-dimethylbenz (a)-anthracene (DMBA) induced carcinogenesis and expression of cox-2, and peroxisome proliferators activated receptors- $\gamma$  (PPAR- $\gamma$ ) in rat mammary gland to check anticancer potential of cow ghee. In the DMBA (a carcinogen) treated groups, the animals fed on soybean oil exhibited higher tumor incidence (65.4%), tumor weight (96.18g) and tumor volume (6285 mm<sup>3</sup>) than the rats entirely fed on cow ghee (26.6%, 1.67 g, 1925 mm<sup>3</sup>, respectively). when cow ghee was used as feed as compared to feeding with soybean oil, which exhibited a latency period of 23 weeks. They concluded that dietary cow ghee opposed to soyabean oil attenuates mammary carcinogenesis induced by DMBA; and the impact is mediated by decreased expression of cyclooxygenase -2 and improved expression of cyclooxygenase -2 and increased expression of PPAR- $\gamma$  in the former group.<sup>56</sup>

### 2.9. Hepatoprotective Activity

Achliya et al, investigate the hepatoprotective activity of Panchagavya Ghrita in albino rats to wards CCl<sub>4</sub> brought about hepatotoxicity. With the help of serum marker enzymes the degree of protection was measured. Panchagavyaghrita @150–300 mg/kg/dpo recommended prevention of CCl<sub>4</sub> induced elevation levels of serum glutamate pyruvate transaminase, serum glutamate oxaloacetate transaminase, acid phosphatase, and alkaline phosphatase. The outcomes had been compared with standard drug Silymarin. A histological study compared and verified the hepatoprotective activity of Panchagavya Ghrita of liver from different groups.<sup>57</sup>

### 2.10. Eye Lubricant Activity

Cow ghee is very useful for computer vision syndrome (CVS). The Goghrita contains 98% glycerides and some fatty acids which has lubricating property beneficial for reduction of the symptoms of CVS. It contains vitamin A 3500/100gm. Vitamin A is accountable for the moistening of the outer lining of the eyeball and can prevent blindness. It also contains beta-carotene and Vit E Which has antioxidant activity. So Goghrita eye drops (aschyotan) may become effective treatment for Computer vision syndrome.<sup>58</sup>

### 2.11. Antistress Activity

Antistress activity was evaluated with Panchagavya ghrita, along with ethanolic extract of Aloe babadens using tail suspension model in mice alprazolam as standard. The combination found significant antistress potential as compared with the control and standards which was revealed by GC-MS studies. The combined action of panchagavya ghrita and aloe extract was trait to the increase in the levels of gamma amino butyric acid and decreased plasma corticosterone level and dopamine.<sup>59</sup>

### 2.12. Benefits of ghee in ayurveda

Cow milk ghee is essentially desired for Ayurvedic applications. Cow milk ghee is regarded as good for eyes, light in digestion and strength-giving. It will increases virility and appetite. The medicinal value of ghee also depends on the storage period of ghee. For external utility, old ghee is preferred over new ghee.<sup>60</sup> Ayurvedic literature has reported about 50–60 types of medicated ghee. Only Herbs, pastes or decoction of herbs are added into cow ghee and later given to patients for diagnosing the condition of diseases. All fat-soluble therapeutic components of the herbs are retained in ghee. Different methods of preparation and suitability of distinctive ghee with the specific process have been reviewed by investigators.<sup>61</sup> Selected examples of the medicinal use of herbal ghee are as follows:<sup>60</sup>

1. Amrutprash for anti-aging;
2. Ashokaghrita for leucorrhoea;
3. Kaghritha for leucorrhoea;
4. Kalyanghritha for madness
5. Arjuna Ghrita for heart disease.<sup>62,63</sup>
6. Dhatri is the main ingredient of Dhatriyadi Ghrita.<sup>64</sup> Where ghee acts as the base and is recommended for the treatment of various CNS disorders.<sup>65</sup>
7. Vachadi ghrita and its ingredients are proved to possess Nootropic, Anticonvulsant, Antidepressant, Antiepileptic, Antipsychotic, Antistress, Antioxidant, immunomodulatory, Anticancer, Cardioprotective, Hepatoprotective and many different therapeutic uses which are still to be explored.<sup>66</sup>
8. Ashwagandhaghrita for GI disorder Its manifold uses include treatment of patients suffering from breathing difficulty, Alzheimer's disease, cancer for general strength during and after chemotherapy, immune system problems, insomnia etc.<sup>63</sup>
9. Samhithas ghee has good action on intelligence, memory, digestion, long life, improving vision & complexion, antiinflammatory action, cooling action, detoxification and good supplement for malnutrition.<sup>19</sup>
10. Satavari ghrita is antispasmodic agent and diuretic which helps strengthening the patients to overcome the effects of chemotherapy during the treatment of cancer. It strengthen the immune system - also has many other known health stimulating properties for women and good for AIDS. It is also reported to have immunostimulant, anti-hepatotoxic, antioxytocic activities, antioxidant, and anti-diarrheal activities.<sup>63,67</sup>
11. Brahmi as herbal ghee form is used in Ayurvedic medicine. Brahmi is considering as nervine rejuvenative. Which helps to strengthening the immune system, mental function, nervous disorders, epilepsy etc.<sup>63</sup>

### 3. Conclusion

The present review briefly describes the potential health benefits associated with ghee. Ghee has been considered superior to other fats due to the fact of the presence of characteristic short chain fatty acids, carrier of four fat soluble vitamins A, D, E, K and essential fatty acids such as linolenic acid and arachidonic acid. It is considered as a healthy fat because of Anti-diabetic, Anticancer, Antistress, Eye lubricant activities, Hepatoprotective, Cardioprotective, and Wound healing properties. Cow Ghee is also utilized in Ayurveda for various medical applications. Ayurveda suggests different treatment protocols for different ailments using medicated ghee manufactured with different herbal extracts. Ayurvedic ghee like Amrutprash, Arjuna Ghrita, Ashokaghrita, Ashwagandha ghrita, Kaghritha, Kalyanghritha, Vachadi ghrita etc has got numerous health benefits with great acceptability. Currently, ghee is recommended as a healthy

food by fitness studios, yoga centers and health stores

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None.

### 5. Conflict of Interest

None.

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