Exploring the Multifaceted Healing Powers of Kalyanaka Ghrita: A Narrative Review of Its Therapeutic Benefits

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Abstract

In Ayurveda, ghrita is considered as a vital lipid medium that helps the active ingredients penetrate the blood-brain barrier, thereby enhancing the effectiveness of medications. The active components of ghrita have demonstrated improved ability to cross the blood-brain barrier, facilitating better drug delivery and boosting their efficacy. Kalyanaka Ghrita is an Ayurvedic polyherbal formulation mentioned by all Aacaaryas in different contexts. It contains a blend of various herbs like Haritaki(Terminalia chebula), Vibhitaki (Terminalia bellirica), Amalaki (Phyllanthus emblica), Vishala (Citrullus colocynthis), Bhadraila (Amomum subulatum), Devadaru (Cedrus deodara), Haridra (Curcuma longa), Manjishta (Rubia cordifolia), Kushtha (Saussurea lappa) etc. It is made by infusing the active phytoconstituents of herbs into *Goghrita* (cow's ghee) following the principles of *Sneha Kalpana*, an ancient Ayurvedic method of herbal fat infusion. Traditionally, it has been used to support various health conditions, balancing doshas and promoting overall well-being.Recent studies have explored the potential of Kalyanaka Ghrita in modern therapeutic contexts, particularly in the realms of cancer treatment, liver health, and psychological support. Emerging research has suggested that Kalyanaka Ghrita may help alleviate the side effects of cancer treatments, protect against liver toxicity, reduce oxidative stress, and enhance psychological well-being. This narrative review aims to summarize the current evidence on the chemoprotective, radioprotective, hepatoprotective, antioxidant, and psychological effects of Kalyanaka Ghrita, providing insights into its potential applications in contemporary healthcare. The data is primarily based on five research dissertations for which the full paper is yet to be published. However, the Abstracts, Titles, and Author details are available in Kerala University of Health Science data base.

Key words: Kalyanaka Ghrita, *Sneha Kalpana,* Chemoprotection, Radioprotection, Hepatoprotection.

Introduction:

Kalyanaka Ghrita is an Ayurvedic polyherbal formulation with *Goghrita* as primary constituent. Literal meaning of the word *Kalyanaka* is "*Auspicious*." With mild differences in the ingredients, Kalyanaka Ghrutha is mentioned by all Aacaaryas in different contexts. It is described by Aacaarya Vaagbhata in Unmaada pratishedha in Ashtaanga Hrdaya Uthara sthaana and Aacaarya Caraka in Caraka samhita Cikitsa sthaana. Aacaarya Susruta has mentioned this yoga in Kalpa sthaana.

Kalyanaka ghrita is prepared by infusing active phytoconstituents of different specified herbs in *Goghrita*, following the principles of *Sneha Kalpana* and it has been traditionally used for various health conditions

Kalyaanaka ghrta is beneficial in warding off evil spirits (graha), insanity (unmaada), cough (kaasa), epilepsy (apasmaara), diseases caused by sin (paapma), anaemia (paandu), itching (kandu), poison (visha), consumption (sosha), delusion (moha), diabetes (prameha), artificial poison (gara), fever (jvara), for persons who have no semen (aretas), for persons with scanty menstruation (alpa rajas) in whom the mind is affected by god (daivopahata cetasi), for those who have no intelligence (amedhasi), whose words are slipping (skalat vaaci), for those who desire good memory (smrti kaama) and who have poor digestive fire (alpa paavaka).

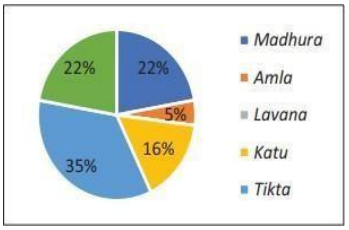
It bestows strength (balya), auspicious (mangalyam), long life (aayushyam), complexion (kaanti), fortune (saubhaagyam) and nourishment (pushti). This formulation is also a best recipe to beget a male progeny (pumsavana).[1]

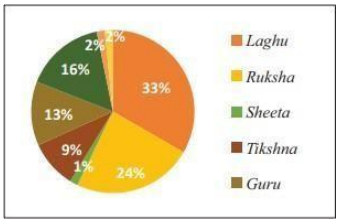
In addition to these benefits, recent studies have investigated its potential to alleviate side effects of cancer treatments, protect against liver toxicity, reduce oxidative stress, and enhance psychological well-being. This scooping review aims to summarize the current evidence on the chemoprotective, radioprotective, hepatoprotective, antioxidant, and psychological effects of Kalyanaka Ghrita

Methods

A thorough literature search was carried out using relevant keywords across scientific databases. Pharmacodynamic attributes of Kalyanaka ghrita & Studies examining the effects of Kalyanaka Ghrita on chemotherapy-induced toxicity, radiation damage, liver toxicity, oxidative stress, and psychological stress were also included. Data extraction and qualitative synthesis were conducted. In this article, five studies are reviewed, all of which used Kalyanaka Ghrita sourced from Arya Vaidya Sala, Kottakkal. Kalyanaka Ghrita has been manufactured in Arya Vaidya Sala, Kottakkal, since its inception.

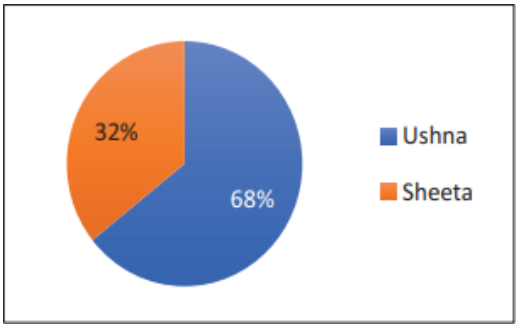
PHARMACODYNAMIC ATTRIBUTES OF KALYANAKA GHRITA

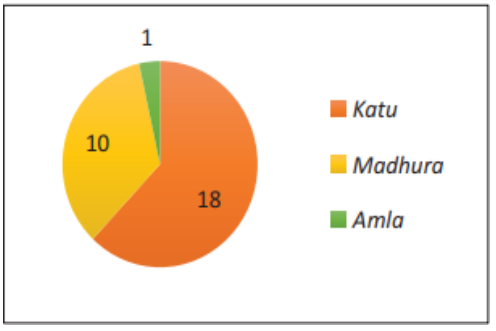




Out of the 28 herbs in KG, there is a notable predominance of Tikta (bitter), Madhura (sweet), Katu (pungent), and Kashaya (astringent) Rasa, while Amla Rasa (sour taste) is present in only a small percentage. Lavana Rasa (salt) is completely absent in all the herbs in KG.

Regarding the Guna (attributes) of these herbs, most are characterized as Laghu (light/easy to digest), Ruksha (dry), Snigdha (unctuous), Tikshna (sharp), and Guru (heavy to digest).





In terms of Veerya (potency), the majority exhibit Ushna Veerya (hot potency). Overall, the dominant Vipaka (biotransformative phase of Rasa) is primarily Katu (pungent) and Madhura (sweet). [2]

Drug Review

Table 1- Ingredients of Kalyanaka Ghrutha [3]

Sl. No	Drug	Botanical name	English name	Part used	proportion
1	Vidangam	Emblica ribes, Burm.F.	Embelin	Seed	1 part
2.	Amalaki	Emblica officinalis, Gaertn.	Emblic myrobalan	Fruit	1 part
3.	Vibhithaki	Terminalia belerica, Roxb.	Belleric myrobalan	Fruit	1 part
4.	Harithaki	Terminalia chebula, Retz.	Chebulic Myrobalan	Fruit	1 part
5.	Dandi	Baliospermum montanum, Arg.	Purging croton	Root	1part
6.	Devadaru	Cedrus deodara, Roxb-Loud.	Himalayan ceder Deodar	Heart wood	1 part
		Piper cubeba,	Tailed pepper		
Sl. No	**Drug**	**Botanical name**	**English name**	**Part used**	**proportion**
7.	Harenu	Linn.		Seed	1 part
8.	Tālēsapathra	Abies webbiana, Lindle.	Silver fur	Leaf	1 part
9.	Manjishta	Rubia cordifolia, Linn	Indian mudder	Root	1 part
10.	Kesaram	Mesua ferra, Benth+Hook.	Cobra`s saffron	Flower	1 part

11.	Ulpalam	Kaempferia rounda	Peacock ginger	Tuber	1 part
12.	Padmakam	Prunus cerasoides, Linn.	Bird cherry	Heart wood	1 part
13.	Dādimum	Punica granatanm, Linn.	Pomegranate	Fruit rim	1 part
14.	Mālathi pushpam	Jasminum grandiflorum, Linn.	Spanish Jasmine	Flower	1 part
15.	Haridra	Curcuma longa, Linn.	Turmeric	Rhizome	1 part
16.	Dāruharidra	Berberis aristata, De	Indian Berbery	Bark	1 part
17.	Sāriba	Hemidesmus indicus, R.Br.	Indian sarsaparilla	Root	1 part
18.	Krishna	Ichnoccarpus frutescens	Black	Root	1 part
19.	Sālaparni	Desmodium gangeticum, D.C	Ticktree	Root	1 part
Sl. No	**Drug**	**Botanical name**	**English name**	**Part used**	**proportion**
20.	Prsniparni	Pseudarthria viscida	-	Root	1 part
21.	Priyangu	Callicarpa macrophylla, Vaul.	Beauty berry	flower	1 part
22.	Thagaram	Valerian wallichi, Dc.	Indian Valerian	Root	1 part

23.	Kushtam	Sassurea lappa,	Costus root	Root	1 part
24.	Bruhathi	Solanum indicum, Linn.	Large egg plant	Root	1 part
25.	Kantakāri	Solanum xanthocarpum,	Yellow berried night shade	Root	1 part
26.	Elavālukam	Prunus cerasus Linn.	Cherry plum tree	Flower	1 part
27.	Chandanam	Santalam alba, Linn	Sandal wood	Heart wood	1 part
28.	Gavākshi	Citrullus colocynthis, Schrad	Bitter apple	Root	1 part

1. Radioprotective effect of Kalyanaka ghrita

Exposure to radiation is an unavoidable aspect of life, occurring in various forms and conditions, and these different types of radiation can elicit harmful responses in the human body. They can induce changes at the molecular level, leading to diseases in acute, subacute, or chronic forms. While radiation can be used as a treatment for certain diseases, such as cancer, it can also lead to additional health issues.

The global burden of cancer continues to rise, largely due to increasing prevalence of cancer-causing behaviors. Complete removal of the cancer without damage to the rest of the body is the goal of treatment for most cancers. Various treatment options exist, including

chemotherapy, radiation therapy, surgery, immunotherapy, and monoclonal antibody therapy. However, each of these cancer treatments carries the potential for toxicity. Among these, Radiation therapy remains a mainstay in cancer management but it is a double-edged sword. Along with cancer cells it damages normal cells also and causes both acute and chronic side effects .

Ionizing radiation can damage organs and tissues when exposure is excessive. This type of radiation causes ionizations that directly affect cellular components, resulting in the formation of free radicals. These radicals can interact with molecules, leading to DNA breakage, which may cause mutations, chromosomal aberrations, or even cell death. Because of these effects, radiation hazards can be viewed as a form of artificial poison.

In the view of Āyurveda, it can be considered as gara[4] .Searching for a cure for radiation induced toxicity in Āyurvedic scriptures, formulation with specific antitoxic indications is more beneficial. Among them lipid soluble fractions are suggested to be better to work at the molecular level. In Āyurveda, there are numerous medicines available to treat Visha, among which the ghrutha preparation “Kalyanaka Ghrutha” holds significant importance, as it is mentioned in all three Samhitas in various contexts. In the Susrutha Samhitha, it is specifically highlighted in the section of Visha Chikitsa. This widely used preparation is known for its effectiveness in addressing toxicity. Previous studies have indicated that many of its ingredients possess radioprotective and anticancer properties, as well as antioxidant effects. It is well-established that ghrutha can repair cell damage, protect against toxicity, and mitigate harmful effects.

Shitha. N.R et al conducted a study on the radioprotective properties of Kalyanaka Ghrutha in male Swiss albino mice. Their findings aim to support the medical community in using this formulation more widely for radioprotection and to enhance cancer treatment approaches in a healthier manner. Experimental study design has been adopted here with 3 objectives

Acute toxicity study of Kalyanaka ghrutha in Wistar rats	Oral administration of Kalyanaka Ghrutha for 14 days	Change in body weight, Food and water consumption, Hematologicalparameters such as Hb content, total WBC, Liver parameters such as SGOT, SGPT, ALP

		and Renal parameters such as urea and creatinine.
Effect of Kalyanaka Ghrutha administration on hematological parameters after gamma radiation in mice-		Hemoglobin content (Hb), Total WBC count and Differential count
Effect of Kalyanaka Ghrutha administration on antioxidant enzyme levels and bone marrow cellularity after gamma radiation in mice		Liver antioxidant enzyme levels- SOD,Catalase,GSH, Gpx, Mucosal antioxidant enzyme levels –SOD, catalase, GSH and GPx, Bone marrow cellularity and Histopathology of small intestine

Radiation induced toxicity is mainly because of the generation of the free radical by reaction with water and these free radical can produce significant effect on biomolecules such as protein, carbohydrate as well as nucleic acids. It can react with biomembranes as well as nuclear DNA that can produce mutations as well as clastogenecity and carcinogenesis.

According to *āyurvedic* pharmacology, mode of action of a drug is based on its *Rasa, Guna, vērya, Vipaka and Prabhava. As already mentioned* KG contains 28 ingredients, of which 13 of them possess *vishahara* property. On analyzing the property of the ingredients of *Kalyanaka Ghrutha*, the drug is predominantly *thikta kashaya rasa, laghu rooksha guna, ushna vērya, katu vipāka* and *pittakapha samaka* in action. Drugs with reported radioprotective effect of the ingredient of Kalyanaka ghrutha are amalaki, triphala,manjishta,dadimam, haridra,sariba,thagara,haridra, padmakam etc Most of the toxic substances are lipophilic in nature. During detoxification process toxins easily conjugate with lipid molecules and the liver can make it water soluble and eliminate easily. Dēpana and pāchana property of KG may accelerate the elimination process. It was found that administration of Kalyanaka ghrutha along with radiation could significantly **improve the haematological parameters** such as HB, WBC, bone marrow cells in the animals which have been exposed to radiation treatment. Haematoprotective property of Kalyanaka ghrutha may be due to raktavardhaka and

raktadoshahara properties of the ingredients like amlaki,manjishta,kesaram,dadimam, Ulpalam, Sariba, Priyangu, Chandana etc .Moreover Kalyanaka ghrutha respond to **increase the antioxidant status** in the body as seen by the increased antioxidant enzymes such as SOD, GPx, catalase and increased the cellular glutathione levels. Free radical scavenging property has also been proved in drugs of KG. Ingredients of *Triphala* individually and as a combination possesses potent antioxidant, chemoprotective and radioprotective capacity and has been found to be an excellent scavenger of hydroxyl radicals and superoxide radicals whose excessive formation is implicated in oxidative stress. From this it is understood that antioxidant property plays an important role in radioprotection. In histopathological study, tissue damage is reduced considerably after drug administration. The drug is a lipid preparation. Lipids have a major role to maintain and repair the cell membrane. Biochemically cell membrane is composed of complex mixture of lipids, proteins and carbohydrates and *Ghrutha* preparations act as a carrier media to facilitate the transport of active principles across the cell membrane. All these may protect and repair the cells from damage[5].

2. Chemoprotective effect of Kalyanaka Ghrutha

Environmental toxins are more subtle and slow acting. We slowly accumulate ever increasing amounts of toxins and each generation becomes sicker, with more diseases than the prior generation. This toxicity is a reason for increasing prevalence of diseases like cancer, kidney diseases, lung diseases, heart diseases etc to name a few. The vast majority of cancer risk factors are environmental or lifestyle-related. Thus greater than 30% of cancer is preventable via avoiding risk factors. Many management options are existing for cancer including chemotherapy, radiation therapy, surgery, immunotherapy, monoclonal antibody therapy and other methods as discussed in the previous section. Treatment adaptation depends upon the type of cancer, the location and grade of the tumor and stage of the disease, as well as the general state of a person's health. Complete removal of the cancer without damaging the rest of the body is the goal of treatment in most of the cancers.

Chemotherapy is one among the effective and accepted modality in conventional cancer management protocol. Aims of chemotherapy are cure, remission and palliation. But toxicity caused by the drugs are the major limitations because, chemicals employed in the chemotherapy are also toxins. Most commonly, chemotherapy acts by killing cells that divides rapidly. This means that it also harms cells that divide rapidly under normal circumstances. Most common side effects of chemotherapy includes myelosuppression (decreased production

of blood cells, hence also immunosuppression), mucositis (inflammation of the lining of the digestive tract), and alopecia (hair loss). From Ayurvedic point of view, this also can be considered as gara visha. By considering the toxicity caused by chemotherapy, a study has been conducted by M.A.Ajitha et al. with an attempt to explore the vishahara property of the drug Kalyanaka Ghrutha against Cyclophosphamide induced toxicity in male Balb/c mice. Cyclophosphamide is a commonly used drug for chemotherapy in various types of malignancies as well as for immunosuppression in organ transplantation

Previous studies showed that many of the ingredients of KG possess chemoprotective and anticancer property and all of the ingredients have antioxidant properties . It is well known that the ghrutha can repair cell damage and protect them. It can demolish toxicity.

Method – In this experimental study, chemoprotective effect of two doses of Kalyanaka Ghrutha in Cyclophosphamide induced toxicity in male Balb/c mice were evaluated. The **Hematological parameters** – haemoglobin level, total count and differential count, **Biochemical parameters** - AST (Serum aspartate transaminas), ALT (Serum alanine transaminase) and ALP (Alkaline phosphate) of liver, serum urea and creatinin level of kidney, **Antioxidant enzymes** – SOD, Catalase, Gpx, GSH activity, **Oxidative stress marker** - lipid peroxidation, bone marrow cellularity, **Histopathological changes** of liver, kidney and intestine, **changes in body weight and organ weight** were analyzed.

The harmful side effects of cancer chemotherapy are partly due to oxidative stress. The use of cyclophosphamide leads to the accumulation of free radicals, which causes oxidative stress that inactivates membrane-bound enzymes and triggers lipid peroxidation, resulting in damage to normal cells. This increase in lipid peroxidation is associated with a decrease in reduced glutathione levels and a reduction in the activity of antioxidant enzymes, including SOD, CAT, and GPx.

Chemoprotective property of Kalyana ghrita can be considered as the chemoprotective property of the ingredients. Among the ingredients of Kalyanaka Ghrutha, drugs like Jasminum grandiflorum, Curcumin, Punica granatum, Emblica Officinalis possess chemoprotective action. Chemoprotective effect of the constituents act by inhibiting the activity of cytochrome P-450, there by the drug can prevent the further activation of cytochrome P-450.

Research on antioxidant property indicates that all the ingredients have been documented as strong antioxidants[6]. Some of the compounds have demonstrated free radical scavenging

properties. The components of Triphala, both individually and in combination, exhibit significant antioxidant, chemoprotective, and radioprotective effects. They are particularly effective at scavenging hydroxyl and superoxide radicals, which are linked to oxidative stress when present in excessive amounts. From this it is understood that antioxidant property plays an important role in chemoprotection. In Kalyanaka Ghrutha treated group, antioxidant enzyme and GSH level seems to be increased and lipid peroxidation level reduced significantly indicating that drug is highly significant to protect from oxidative stress followed by Cyclophosphamide administration

Analysis shows that Kalyanaka Ghrutha is highly effective in enhancing bone marrow cellularity, which in turn improves hematological parameters such as hemoglobin levels, total leukocyte count, and differential leukocyte count. These findings indicate that Kalyanaka Ghrutha is beneficial in protecting against hematological toxicity and myelosuppression caused by cyclophosphamide. Histopathological reports further suggest that Kalyanaka Ghrutha plays a significant role in safeguarding organs from the toxic effects of cyclophosphamide.

In this study, two different doses of the drug were administered: a lower dose and a higher dose. The higher dose showed significant effects on all parameters except for body weight and organ weight. The lower dose was only significantly effective in terms of SGPT levels. These results indicate that a higher dose is necessary to achieve chemoprotection against the toxicity induced by cyclophosphamide at a dose of 25 mg/kg body weight.[7]

3. Action of Kalyanaka ghrita in Depressive disorders

Depressive disorders are common mental health issues characterized by feelings of sadness, a loss of interest or pleasure, guilt or low self-esteem, disrupted sleep or appetite, fatigue, and difficulty concentrating[8]. In severe cases, these disorders can lead to suicidal thoughts and tendencies[9]. Globally, approximately 300 million people are estimated to suffer from depression, with about 45.7 million cases in India alone[8]. The World Health Organization predicts that by 2030, depression will be the leading cause of disease burden. Additionally, researches indicates that the prevalence, incidence, and risk of morbidity related to depression are generally higher in females than in males[9].

Depression can be categorized as mild, moderate, or severe based on the type and number of symptoms present[10]. Anti-depressants are the prime choice of management in the Depressive disorders. Most commonly used Anti-depressants are Selective serotonin reuptake inhibitors,

Serotonin and norepinephrine reuptake inhibitors, serotonin modulators, tricyclics, and monoamine oxidase inhibitors. In the current scenario antidepressants are effective only in 30 to 40 % of the Depressive patients and are associated with increased remission rates, greater side effects, and severe withdrawal symptoms[11]. In some conditions effective psychotherapy may also be considered as an initial treatment modality for patients with mild to moderate depressive disorder. Thus Depression can be considered as a major contributor of the global burden of disease and affects people in all communities across the world.

In Ayurveda, Studies are correlating depression with Viṣāda. The earlier studies concluded that mild depression can be correlated to Viṣāda which is a Vaata predominant condition whereas, moderate and severe depression can be considered as Kaphaja unmaada. In our Classics Śodhana Cikitsa, is the ideal treatment for Unmaada, especially Vamana for Kaphaja Unmaada and Snehapaana is an important Pūrvakarma of Śodhana Cikitsa. Snehana is an important pre-operative procedure that has to be done before Śodhana and proper Snehana is essential for the attainment of Samyak Śuddhi.

In a comparative clinical study Thasni et al tried to explore the scope of Taila paana in Maanasa roga with primary objective of to assess whether Śodhanaanga Snehapaana with Sahacaraadi Sevya against Kalyaaṇaka gritha have any difference of effect in moderate to severe Depressive disorder. Both groups were administered Vamana with Dhaamaargava yoga after the Snehapaana. The efficacy of both the groups was compared and analyzed based on the data collected using the fixed assessment tools.

Kalyanaka ghrita is a widely used polyherbal formulation which is also used in the management of mental disorders in Ayurveda. While analysing the Rasa panchaka, we can understand that most of the drugs have a Kaphahara property and so it may have excellent results in the treatment of Kaphaja Unmaada[12]. The aqueous soluble drugs which are absorbed in extra cellular spaces, do not diffuse to CSF and other body cavities. The lipid soluble drugs are readily available to intra and extra cellular spaces. The blood brain barrier has lipophilic molecular structure which makes the lipids and lipid soluble drugs pass easily through it. The lipophilic nature of the Sneha facilitates entry of formulations prepared with Sneha into the cell and its delivery to mitochondria and nuclear membrane.[13]

90% of Serotonin, 50% dopamine and 30 other neurotransmitters are produced and co regulated by intestines in the enteric nervous system by cholesterol mechanism. These neurotransmitters regulate mood, memory, ability to learn, stress levels, sleep patterns, mental functioning and

other essential body processes. If the amount of cholesterol is low, it hampers the proper functioning of neurotransmitters. The Unsaturated fatty acids present in Sneha acts on brain tissue and neurological pathways, enhancing serotonin levels in hypothalamus and hippocampus[14].

Though the effect of intervention in both groups were significant in reducing the symptoms of depression, in the domains of sadness, hopelessness, anhedonia, guilt, punishment, worthlessness, loss of energy, insomnia and fatigue, the control group had significant change after Snehapaana followed by Samsarjana. This effect of intervention on the symptoms of affective domain may be attributed to the dominant Kaphahara property of Kalyanaka ghrita.

On analysing the individual drugs of Kalyaaṇakaghritha, the drugs- Prunus cerasus, Curcuma longa , Valeriana wallichii , Cedrus deodara, Elettaria cardamomum , Santalum album Rubia cordifolia , Punica granatum and Embelia ribes have antidepressant activity.

Apart from this, the Kapha hara nature of the ghrita along with its effect on Dhi might have helped in the participants to bring down the scores on **sadness[15].** Ghrita is also Pitta anila hara and good for Rasa and Ojas[16]. These properties can be attributed to the better relief in the loss **of energy, insomnia and fatigue** in the control group. The drugs like Aamalaki and Daaḍima in Kalyaaṇaka Ghrita is studied to have properties of relieving fatigue.The drugs like Aamalaki and Daaḍima in Kalyaaṇaka Ghrita is studied to have properties of relieving fatigue.[17]

In relieving symptoms like **Agitation and Loss of interest in activity,** Percentage of relief regarding is more in trial group after Snehapaana owing to the greater Vaatahara property of Sahacaraadi sevya. But after Vamana and Samsarjana greater relief in the scores seems to be in control group which indicate that the cumulative effect of Śodhana is more in the control group.Harīthaki, Saarivaadya and Ela have deepana and Amadośanaaśaka properties so that it regulates Jatharagni, Dhatvagni and Bhutagni which corrects metabolism at cellular level, results in proper formation of Dhathus and Upadhathus and Srothosodhana by removing Ama. Harīthaki, Amalaka, Vibhītaki, Viśaala and Danti has Sara guṇa and Virechaka action so that they regulate Dośas by Samśodhana karma thereby clearing the srothas and regulates functions of Tridośa[18].

Most of the symptoms **in Cognitive domain** gained better relief in control group which may be attributed to the better action of Kalyanaka ghrita on Medha, Dhi and Indriya paatava

proving that Kalyaaṇaka ghritha have evident action on the cognitive domains which helps to correct the negative cognitive pattern. The study also concluded that Control group had more percentage of relief in improving the quality of life of the participants and Sahacaraadi sevya seems to have more of Samana based action and Kalyaaṇaka ghrita **seems to have Śodhana based action.**[19]

4. Hepatoprotective & Anti-oxidant effect of Kalyanaka ghrita

Liver has an essential role in maintenance of physiologic homeostasis. It is the primary site of biotransformation & detoxification of xenobiotics. Liver also receive blood from systemic circulation & participates in detoxification & elimination of xenobiotics that reached the blood stream through other routes such as inhalation & internal absorption. Many xenobiotics are lipophilic, inert substances which require chemical activation to make sufficiently soluble to be eliminated. Because of its location at the end of portal system & its substantial complement of biotransformation enzymes the liver is especially vulnerable to toxic injuries.[20]Non alcoholic fatty liver is on the rise now a days, which being mainly attributed to the exposure to xenobiotics.

Hepatotoxicity means damage or injury to the liver caused by a drug, chemical or other agents. Certain medicinal agents when taken in overdose, or even when introduced within therapeutic ranges may injure the organ. Liver disorders are now a major contributor to the mortality & morbidity and is one of the world's major health problems and today's medical management is inadequate to prevent the progression of hepatic diseases.

Gara viṣa is an important concept of Āyurveda which may be one of the causes for decreasing health status of the society. Most toxins that come to contact with our day to day life can be correlated to gara viṣa. Drug induced hepatotoxicity also can be considered as Gara. Searching for a cure for hepatotoxicity in Āyurvedic scriptures, formulation with specific hepato protective indications are more beneficial. Among them lipid soluble fractions are better.

The study conducted by Surya et al. to compare hepatoprotective effect of Kalyānaka sarpi against silymarin as standard & Vilwādi on paracetamol induced hepatotoxicity in male Wistar rats aims at establishing the hepatoprotective and antioxidant effect of Kalyānaka sarpi there by to provide better evidencebased drug in the management of hepatotoxicity and for antioxidant effect[22].

Paracetamol is used as a medication to treat pain and fever. It is one of the most powerful hepatotoxin in terms of severity of injury. It depletes the liver's natural antioxidant glutathione and directly damages cells in the liver, leading to liver failure. Silymarin was the standard drug which is the commonly used for hepatoprotection in modern medicine. Silymarin is an herbal drug extracted from the seeds of the plant Silybum marianum (milk thistle). The hepatoprotective and antioxidant property of silymarin is caused by its ability to inhibit the free radicals that are produced from the metabolism of toxic substances such as ethanol, acetaminophen and carbon tetrachloride.[23]

In this study the hepatotoxicity developed due to paracetamol administration is corrected by the use of Kalyānaka sarpi very effectively. Here, Kalyānaka sarpi, a popular antitoxic formulation mentioned in Suśrutha Kalpa 6 th chapter is used. Many ingredients of this formulation have scientifically proved hepatoprotective action and antioxidant property. Hepatotoxins are reported to elicit their deleterious effect by inducing oxidative stress in the body. Administration of antioxidants, which scavenge the free radicals, could reduce hepatic injury.[24] The role of free radicals in causing liver damage is very huge. So to prevent such issues, antioxidants with free radical scavenging capacity can be make use of. Antioxidants that are present in our body is not enough to prevent such damages. So medicines having antioxidant properties are essential to use.[25]

According to Āyurvedic view, Ghṛta is one of the best Viṣaghna dravya as it is having all the qualities exactly opposite to that of Viṣa. Ghrita contains triglycerides, diglycerides, monoglycerides, free fatty acids, phospholipids, vitamin A,D,E,K etc. Vitamin A & E are antioxidants and are helpful in reducing ketone bodies and preventing oxidative injury. In the study, Hepatoprotective effect of Kalyānaka Sarpi in paracetamol induced toxicity was determined by analyzing the values of hepatic parameters. If there is hepatic toxicity, the values of hepatic parameters will be raised. Antioxidant effect of Kalyānaka sarpi was also determined by analyzing the values of antioxidant enzyme level. If there is any hepatotoxic effect the antioxidant enzyme level will definitely reduce. Out of the 28 ingredients, almost 13 ingredients of kalyanaka sarpi have antitoxic properties.

Most of the toxic substances are lipophilic in nature. During detoxification, toxins easily conjugate with lipid molecules and liver can make it water soluble and eliminate easily. Ghṛta also possess yogavāhi property. The sukṣma property of snehana dravyās enhances it to reach even the minute parts of body. Ghṛta is dīpana in action. Toxin which enter the body definitely

alter the digestive power and hence causes agnimāndya and srotorodha. Kalyānaka sarpi possess dīpana property and hence reduces srotorodha and agnimāndya hence the cumulative effect of toxins also get reduced.

Presence of viṣahara dravyās in kalyanaka sarpi may either denature the toxic substance or helps in easy elimination. Drugs which are antitoxic with viṣa hara prabhāva finds its application at cellular level also. The antioxidant and free radical scavenging property of Kalyānaka sarpi may be the reason for increased antioxidant level and decreased lipid peroxidation in the present study. So ultimately Kalyānaka sarpi possess very effective hepatoprotective action. The high levels of antioxidant enzymes also enhances the hepatoprotective action[22].

5. Effect of Kalyanaka Ghrita in the management of stress in infertile couples

Infertility is commonly defined in the biomedical context as the inability to conceive after 12 months of regular unprotected intercourse. A recent global review indicates a 9% prevalence of infertility, with nearly 56 million couples seeking medical treatment for the condition. In India, approximately 30 million couples are affected by infertility, resulting in an incidence rate of about 10%. These statistics highlight that individuals facing infertility represent a significant portion of our society. There is a significant connection between infertility and psychological distress. Various studies characterize the experience of infertility and its impact on individuals and couples as a "crisis" or a prolonged life challenge.

In Ayurveda, it is stated that "Saumanasyam garbhadhaaranaanaam sresht'ham,"[27] emphasizing the importance of a calm and peaceful mind for conception. Additionally, it notes that "daurmanasyam avr' shyaanaam,"[28] meaning that a disturbed and stressed mind is least conducive to fertility. In Ayurveda, breast milk (stanya) and menstrual blood (rajas) are by-products (upadhaatu) of rasa dhatu. When rasa dhatu is depleted, these upadhaatu (stanya and rajas) are also diminished.

Considering the characteristics of all dhatu, notably, many attributes of sukra saara purusha closely resemble those of satva saara purusha, indicating a clear interrelation between satva and sukra. This understanding is applied in treatment as well. Many Ayurvedic formulations for psychological disorders also exhibit pharmacological effects on the reproductive system, and vice versa. This connection may stem from the interplay between satva and s'areera.

Kalyaanaka ghr'ta is one such notable formulation that addresses both physical and psychological dimensions.

Given the significant prevalence of stress among infertile couples and the potentially detrimental impact of infertility on their relationships, a study was conducted by Aparna et al on the effect of Kalyaanaka Ghr`ta with counselling in the management of stress in infertile couples[29]. This represents an initial effort to conduct a study that combines medical intervention with counseling to address stress in infertile couples. The combination works at multiple levels across nearly all bodily systems, particularly having effect upon rasa, rakta, and s'ukra dhatu. It is an effective formulation with established psychological and reproductive benefits.

Gh`rta preparations are ideal for improving intelligence (dhee), memory (smr`ti), cognition (medha), semen (s'ukra), and for those who desire more children (prajaakaanthi).[30]. It is a lipid-based preparation capable of crossing the blood-brain barrier, making it effective in supporting both the hypothalamo-pituitary-ovarian axis and the hypothalamo-pituitary-adrenal axis. Ghee (ghr`ta) is described as 'the best' among lipids due to its quality of inheriting and enhancing the drug potency. It is also used as a carrier media in certain medicines to facilitate the transport of active principles across the cell membrane, which is permeable only to lipid molecules.

Couples experiencing primary infertility, with a marital duration of over 3 years and under 10 years, who engaged in regular unprotected sexual activity, were included in the trial. Participants were instructed to take 15-30 ml of Kalyanaka ghrita on an empty stomach at 6 AM for 30 days, based on their digestive capacity (agnibala). The effects of Kalyanaka ghrita were evaluated using a stress assessment questionnaire and the Ferti QoL questionnaire, with statistical analysis conducted using one-way ANOVA followed by the Tukey Kramer multiple comparison test.

In the study it was observed that almost equal distribution of stress was observed between male and female participants with a mild predominance to female participants. The study also reports that Kalyaanaka ghr'ta with counselling in improving the quality of life of infertile couples in all the domains of the stress assessment questionnaire (interpersonal, intrapersonal, emotional, mind/body, relational, environmental and tolerability domain) is found to be highly statistically significant with $p<0.001$ and in the study, the result obtained after treatment was sustained after the follow up period also.

In the analysis of dosha haratva, Kalyanaka ghrita predominantly exhibits tikta (bitter), madhura (sweet) rasa, and katu (pungent) vipaaka, which helps in pacifying kapha and pitta. Furthermore, its indications reveal potent anabolic and auspicious effects, allowing the formulation to effectively alleviate vata and pitta. Overall, it addresses all three doshas (tridosha), with a primary focus on vata and pitta.

Kalyaanaka ghr`ta corrects rasa dhaatu dusht'i by modifying quality of aahaara rasa as well as controlling the etiological factors like cinta, s'oka, and bhaya. Once the normal functioning of rasa dhaatu ie tusht'i is re-established, psychological infertility get corrected. Well-functioning gametes i.e., s'ukra and aartava are formed as a result of correcting the dhaatvagni.

While analysing individual drugs in the formulation, the antidepressant activity of Curcuma longa and Embelia ribes, antioxidant activity & immune modulatory activity of Emblica officinalis contribute to the efficacy of the formulation. As per API, the individual ingredients also have a spectrum of actions like rejuvenating the tissues (rasaayana), aphrodisiac (vr`shya), semenotropic (s'ukrakara), uterine tonic (garbhasthaapana), regulating menstruation (aartava janaka) which make the formulation to act in both reproductive and psychological domains.

Conclusion

The reviewed studies demonstrate that Kalyanaka Ghrita has chemoprotective, radioprotective, hepatoprotective, antioxidant, and stress-reducing properties. These findings indicate its potential as an adjuvant in cancer therapy and liver disease management, as well as for enhancing psychological well-being. However, additional clinical trials are needed to confirm its efficacy and safety in humans. Moreover, standardization of the formulation and exploration of the underlying mechanisms are essential for further validation.

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Conflict of interest

There is no conflict of interest

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