



## A Review on Pharmacognosy Activity Sleep Deprivation and their Herbal Drugs

*Akanksha Raju Adhav\*<sup>1</sup>; Dhanashri T. Jawal<sup>1</sup>, Mrs.Dhanashri T. Jawal<sup>2</sup>*

<sup>1</sup>LNBC. College of Pharmacy,

<sup>2</sup>Assistant Professor, Department of Pharmacology,

LNBC. College of Pharmacy, Electronic Zone Building, MIDC, Hingna Road, Nagpur, (MS) India. 440016

Email: [ghanashrijawal301@gmail.com](mailto:ghanashrijawal301@gmail.com)

### ABSTRACT-

Sleep is much essential for the sustenance of our life. Ayurveda includes Nidra (sleep) as one among Trayopastambha (three subpillars of life). Sleep deprivation or disturbed sleep can produce ill effects in both physical and mental level. The pathological condition of deprived and disturbed sleep can be discussed under Nidranasha in Ayurvedic point of view. During earlier days, the major contributing factors for sleep deprivation or disturbed sleep were said to be old age and physical ailments. Sleep deprivation or sleep disturbances became ubiquitous when the mental stress surmounted the human lives rapidly. At present in this digital era, people are spending their major time in gadgets and other digital platforms. These technological innovations are remarkably helpful for easing and advancing our occupational needs. Conversely, the same digital advancements are being misused by a majority of people to fulfil their needs of trivial importance. Addiction of mobile games, over use of social media platforms, etc. is some examples for the same. Bottom line of overuse and abuse of digital platform is the manifestation of cardinal life style disorders and mental disorders which negatively impinge the quality and quantity of our normal sleep as well. Sleep related problems linked with altered job patterns which are discussed under 'Shift work sleep disorders' are inclusive of insomnia or sleep disturbances.

KEYWORD- sleep deprivation, Ayurveda, nidra, herbal drugs

### 1. INTRODUCTION-

Sleep is defined as a natural periodic state of rest for the mind and body, in which the eyes usually closed and consciousness is partially lost. Sleep normally a period of relaxation and repaired, essential to maintain of physiological homeostasis and psychological balance. Sleep is essential, albeit a much less understood component of life. Current High competitive environment often from a prelude of considering it unwanted and compromisable in order to accomplish the desired worldly tasks. Many consider sleep as a waste of time and hence feel that the time consumed in sleep should better be utilized to increase productivity. This ideology reflects the workaholic aptitude considering sleep as an evil. Considering a marginal population belonging to physiological "short sleeper" or classes, we still have a sizable population requiring good amount of sleep to live normally.

Sleep is aptly called as a "blessing in disguise" and its importance is felt only when we actually lose it. A normal person on average consumes one third of his life in sleeping. Sleep is one most obvious indicator of health-related quality of life. Sleeping better is found to be associated with better perception and productivity the next day on health and disease alike. It has rejuvenative, reparative, and curative effect on the body being offered through various mechanism. Considering its high importance, Ayurveda keeps it under the Trinity (trayopastambha) essential for life, keeping it at par with the other two, namely, ahara (food) and brahmacharya (good conduct).

### 2. Concept of sleep

Sleep is defined as unconsciousness from which the person can be aroused by sensory or other stimuli sleep is normally a period of relaxation and repair essential for the maintenance of physiological homeostasis and psychological balance. It is a biological need that should be fulfilled satisfactorily. Sleeping is often over looked as just a means of rest when we are tired but there is a lot that goes on biologically.

#### 2.1. Nidra: (sleep)

According to Charaka, when the mind gets exhausted or becomes inactive and the sensory, motor organ also become inactive then the individual sleeps. According to Sushruta, sleep occurs when the hridaya (heart) the seat of chetana (life or consciousness) is covered by Tamas (darkness)

## 2.2. Concept of nidra [sleep] in Ayurveda

Nidra : The word is derived from nidikusayam means to abuse, to throw away [5] When the Mana and Indriya [mind including sensory and motor organ] is exhausted and they dissociate themselves from their object, then the individuals sleep [6] When samjnavaha srotamsi become involved with Slesma and dominated by Tama gunas, then sleep is manifested. Satva guna is the cause for waking. Nidra is vaisnavi i.e related to visnu, it is sinful and encroaches upon all living being by nature [7]

\***Synonyms:** Nidra ,Sayanam, Swapa, sushupti, swapna ,

## 2.3. Classification of nidra : Nidra is of the following seven type.

- 1.Tamobhaba [caused by tama]
2. Sleshmasamudhbhaba [caused by kapha]
3. Mono sroma sambhaba [caused by mental exertion]
4. Sharir sroma sambhaba [caused by physical exertion]
5. Agantuka [indicative of bad prognosis leading to imminent death]
- 6.Vyadhanubhartini [complication of other diseases]
- 7.Ratriswabhaba [physiological night sleep]

## 2.4. Mechanism of sleep

Sleep occurs due to the activity of sleep inducing centres in brain. Damage of these sleep centres result in sleeplessness or persistent wakefulness .[4] Nidra has got its origin since the beginning of this universe and is caused and characterized by Tamoguna. As Tamas is more prevalent during night, sleep occurs naturally during night. [5] When Srotases (circulatory channels) are filled with Kapha Dosha and also due to fatigue, Indriyas (sense organs) will withdraw from their respective functions. This leads to the manifestation of sleep in individuals.

## 2.5. Effect of Nidra (sleep)

(1) Happiness, misery, nourishment, emaciation, strength, weakness, virility, Sterility, knowledge, ignorance, life and death – all these occur depending on the proper or improper sleep. Like the night of distractions (Kalratri) untimely and excessive sleep and prolonged vigil take away both happiness and longevity. The same sleep, if properly enjoyed brings about happiness and longevity in human beings or the real knowledge brings about Siddhi (spiritual power) in a Yogin.

(2) Avoidance of sleep and initiation actions like sleeping with a sense of recollection of the nature of his own soul is the way of salvation.

(3) Proper sleep and proper awakening is the part of daily Rasayana.

(4) Avoidance of excessive sleep and awakening is advised in Sadvritta (good conduct) for maintenances of healthy life.

(5) Like proper diet, proper sleep is also essential for the maintenance of the body corpulence and emaciation and specially conditioned by proper or improper sleep and diet.

(6) Regimen of Nidra according to seasons -Sleeping during day is prohibited in all seasons except summer –Good sound sleep at night is advised for all seasons

## 2.6. Indication and contraindication of Nidra:

Nidra depends upon the nature of the individuals and time, seasons. The Night sleep is per excellence. This is known as Bhutadhatri i.e. that nurses all the living beings. This one caused by Tamas, is the cause of all sinful acts. The remaining types are treated as diseases. Sleeping during day is prohibited in all seasons except summer. There are so many conditions and contraindication of day sleep. Day sleep aggravates Kapha-pitta [18] or all Dosas[19]. Those who are habituated to either day sleep or keeping awake at night such sleep and wakefulness do not cause any harm to them.

### 2.7.1. Why Do we sleep?

Sleep is a universal phenomenon occurring in every living individual. Irrespective of their being animal or plant, large small, and simple or complex, sleep is a necessity for everyone. A sleep deprivation is known to cause damage in certain areas in the brain almost instantly. locus coeruleus (LC) is one such area in the brain which is severely affected by sleep deprivation LC is the principal areas of adrenergic secretion in the brain and hence is important for cognitive functions. Memory, stress responses, and emotional reactions. Two important observations deserve a mention in this reference. One is that LC functions are mainly the wakeful state functions, and second is that LC has a substantially high concentration of copper in its neuronal terminal. Incidentally. Copper (Tamra) in ayurvedic is considered a metal having the properties similar to the Sun and is a strong pitta promoter. Both propose for

a wakeful state functioning of LC. Does it propose that a forced wakeful state leads to the overactivation of LC eventually self-destroying it? Surprising similarity with the pharmacological action of copper proposed to have a strong lekhana (scrapping) property which may be considered as an outcome of a pronged wakeful state. Why do we sleep? As a question, this was tried to be explored since antiquity. Ayurvedic propose it in a simple way by saying when the mind (brain, for instance) is tired after an eventful day, it gets transiently disconnected with the outer world (with transient inability of the senses to perceive) and this induces analytics capacity and knowledge, having good memory, not affected by greed, anger, lust, ego, jealousy, and abl to see every one as the creation of God . Charak samhita sharirna sthana

### 2.8.2. How sleep occurs:

According to Ayurvedic Classical literature the mind gets exhausted due to continuous work, pressure, pleasure etc; So mind cannot do its routine functions and hence the coordination between senses and objects is lost partially or fully, involuntarily for few minutes to few hours, Thus person undergoes to sleep.

According to modern science also, the mind including to sensory and motor organs when get tired and retire spontaneously from their objects. The stage is referred as sleep. Further it is important to note that disturbed sleep, untimely sleep and excess sleep will reduce the pleasure and longevity

### 2.9.3. How much sleep Needed To the body In 24 hours

How Much Sleep Do I Need

Age Group		Recommended Hours of Sleep Per Day
Newborn	0–3 months	14–17 hours (National Sleep Foundation) <sup>1</sup> No recommendation (American Academy of Sleep Medicine) <sup>2</sup>
Teen	13–18 years	8–10 hours per 24 hours <sup>2</sup>
Adult	18–60 years	7 or more hours per night <sup>3</sup>
	61–64 years	7–9 hours <sup>1</sup>

### 2.10.4. Effects of Being Awake at Night

Staying awake at night produces dryness in the body<sup>5</sup> along with complications of vitiated vata and pitta doshas,<sup>14</sup> and decreased kapha dosha.<sup>61</sup> Vitiated vata dosha causes giddiness, stiffness all over the body, restlessness, lack of concentration and decision-making power, excessive yawning, headache, etc.,<sup>55</sup> while vitiated pitta dosha mainly causes digestion-related problems.<sup>54</sup> In the Kaiyadeva Nighantu chapter on “Vihara Varga” a detailed explanation states that staying awake at night specifically during the kapha period (6-10 p.m.) will not cause any problems with the normal digestion of food. However, staying awake during the Pitta period (10-2 a.m.), causes delayed digestion where the consumed food is improperly digested initially, and later more completely by vitiated pitta. The last part of the night (2-6 a.m.) is the period of vata dominance, and staying awake during this time completely disturbs the digestion process. It is critical to be asleep before this period begins to avoid major digestive problems.<sup>59</sup> Not sleeping at night causes dryness in the body while, sleeping during the day increases the unctuousness in the body by increasing kapha dosha. But taking a nap during the day in a slightly reclined position or by sitting comfortably neither causes dryness nor unctuousness.<sup>62</sup> Lack of adequate sleep can affect judgment, mood, and the ability to learn and retain information. It may also increase the risk of serious accidents and injury. In the long term, chronic sleep deprivation may lead to a host of health problems including obesity, diabetes, cardiovascular disease, and even early mortality.

## 3. Defining sleep deprivation:

Sleep deprivation in an individual can be due to either insufficient duration of sleep (quantitative sleep deprivation), or a fragmented sleep period (qualitative sleep deprivation), or a combination of both factor.

### 3.1. Sleep Deprivation -

Sleep deprivation is when you aren't sleeping enough, or you aren't getting good, quality sleep. When its severss or happens over an extended period, it can cause very an disruptive symptoms that interfere with even the most routine activities. Long-term sleep deprivation can worsen many major health

condition is usually treatable. Sleep deprivation is now a recognised health problem in this modern era. The prevalence of sleep deprivation, causing excessive daytime sleepiness, is between 9% - 24%, and sleep deprivation is the one of the Major cause for visit to the sleep clinics.

We could be sleep deprived because of multiple factor. Lifestyle factors such as shift work, stress, and the uses of media and electronic devices before sleep have been reported to contribute to the physiological alterations of melatonin secretion, which leads to sleep deprivation. The ageing process also disrupts the physiology of sleep and reduces the total sleep time (10) patient with sleep disorder such us insomnia restless leg syndrome (RIS) periodic limb moment (PLM) and breathing disorders (SBD) are likely to suffer from sleep deprivation.

Long-term sleep deprivation lead to development of physiological and neurobehavioral problem. Major road traffic accidents and occupational related accidents and error are some examples of adverse events related to sleep deprivation. The consequences of sleep deprivation and immense. The development of multiple health risk associated with sleep deprivation leads to a reduction in once quality of life increases morality given the pivotal role that healthy normal sleep play's in health study in the area of sleep deprivation have surmounted in the past few decades numerous publication on sleep related conditions are added new information and explanation to the previously unanswered questions on this topics previous epidemiology and experimental study have reported the association of sleep deprivation and disease albeit study in some area in this topic yeilded in inconclusive and inconsistencies in finding it is timely that an updated review is carried out now to look at update current available on the association between sleep deprivation and it's effect on health. The Focus of this study is to review updated publication available on the association between sleep deprivation and the development of diseases and aimed to feel in the gap of knowledge in this except we also discussed the cascading factor that are involved in the determination of this association. We hope that the results of this review could help to better inform various stakeholders on the updates this topic and provide a platform for discussion on feature research.

We will first review the most updated research article and experimental study on each primacy organ system that is effected by sleep deprivation next we will look into the limitations of this studies Finley we will out time the feature potential research focus area in this except. Offering recommendation to close the gap of knowledge and merging the most valued expertise opinions that are currently available.

### **3.2.Cause of sleep deprivation are follows:**

1.Voluntary behaviour. These are people who engage in voluntary behavior to unintentionally chornic sleep deprivation. Prevalent examples of voluntary behavior are staying up late each evening to watch television or surf the internet. There must be a pattern of restricted sleep is present almost daily for at least 3 months.

2.Personal obligation. For example, a person may lose significant sleep while providing care for an I'll relative.

3.Work hours. Some occupation can produce sleep deprivation. Obviously, OB/GYNs are included in the category.

4.Medical problems. Certain medical conditions, such as sleep apnea, may not allow uninterrupted sleep. The prevalence of sleep apnea is dramatically increasing due to an increase in chronic disease such as hypertension and obesity. Percent 42 millions American adult have sleep apnea

\*Slip deprivation has many many deleterious effect.

1.Increased for stroke. Adults who sleep fever than 6 hours for night have a 4- fold elevated risk of stroke

2.Obesity due to increased production of ghrelin and limited production of Leptin

3.Elevated risk of diabetes due to an increase in insulin resistance

4.Permanent cognitive deficits

5.Mental status changes resembling depression or anxiety

6.Quality of life is reported as worse

7.Osteoporosis

8.The increased risk for colorectal and breast cancer

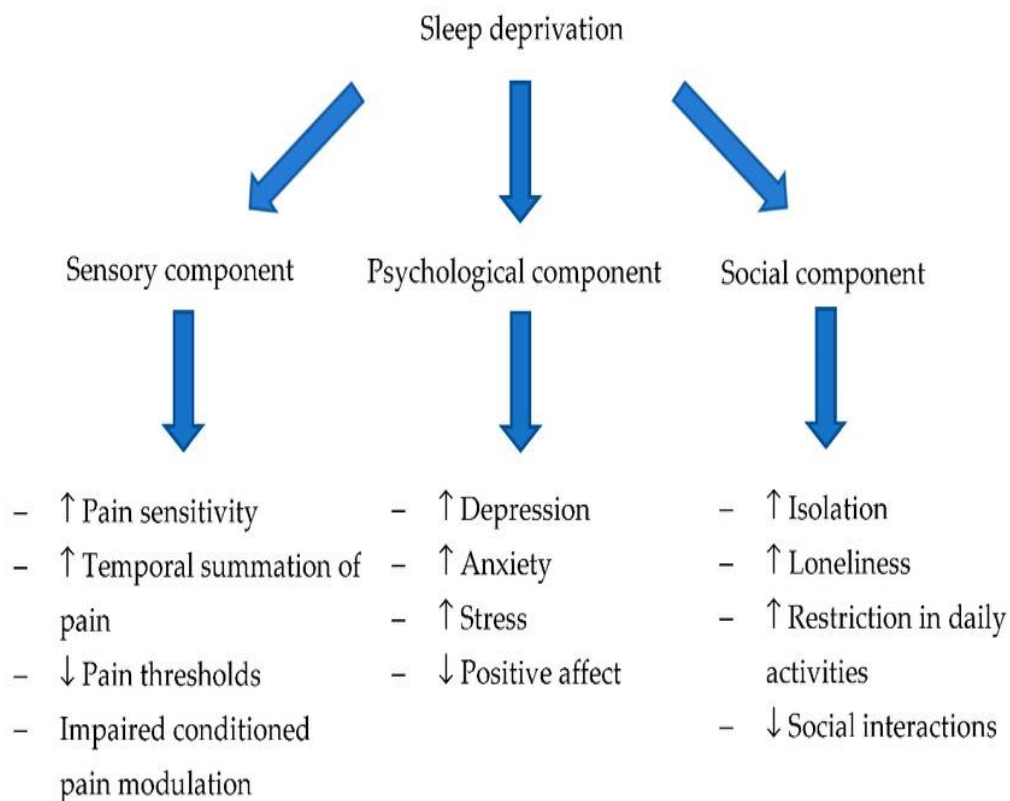
9.A 48% higher Risk of developing cardiovascular disease

10.Increase in mortality during a 14 year study period man who sleep less than 6 hour for night where four time more likely to die during the study period. As one age age sleep deprivation worsens because of an increase in slip disorder and decreased quality of sleep after age 45 years deep stage 3 and 4 level are less which makes it more difficult for older physicians two function after a sleepless night on call when compared their younger colleague. Along with cognitive impairment seen in sleep deprived physician there are considerable emotional effect physician who lack quality sleep how significant increase in depression lack of empathy toward patients, marital discord, and suicide.

### 3.3. Shift work and sleep deprivation

Six percent of American workers consistently work the night shift, and 25% do rotating shift work. Night work is associated with impaired levels of alertness, decreased performance, disturbed sleep, and an increased rate of accidents. Twenty-four hour EEGs have shown that 20% of shift workers fall asleep during a single night shift, compared with none during an afternoon/evening shift. Physicians, nurses, and other health professionals are especially vulnerable to the effects of sleep deprivation, because medical personnel have a tradition of long hours, night schedules, and shift work. Recent studies have suggested that patient safety may be affected. Smith-Coggins and associates [49] showed that the physician's mood, alertness, and time required for intubation (using an intubation mannequin) were significantly worse during night shifts as compared with day shifts, but that performances on the analysis of electrocardiograms did not significantly differ between the two groups. During night shifts, the ability of nurses to remain awake is substantially reduced, and errors in psychometric testing increase. Working a series of five consecutive night shifts results in a substantial decline in cognitive performance in physicians in the emergency department.

### 3.4. EFFECTS OF SLEEP DEPRIVATION



Symptoms of sleep deprivation :

- \* Daytime sleepiness
- \* Fatigue
- \* Irritability
- \* Trouble thinking, focusing and remembering.
- \* Slowed reaction times.
- \* Headaches.

### 3.5. Manage Stress and Emotional Disturbances

Because stress and emotional disturbances are so often a factor in excess sleep, it is imperative that we also support the nervous system and emotional body wherever possible. Ayurveda recommends a number of subtle therapies like meditation, pranayama, and yoga as an effective means of clearing the mind, balancing emotions, and mitigating stress.

### 3.5.1. Meditation

If you do not have a meditation practice, something simple like So Hum Meditation is a great place to start. Even five to ten minutes can be transformative.

### 3.5.2. Abhyanga

- abhyanga means "oil massage" the base oil used for this ayurvedic treatment is sesame oil. The oil may be applied by a practitioner. At the time of application the oil is already mixed with special herbs that target insomnia or the condition the individual aims to treat. Abhyanga may help to settle vata imbalances. And many say it also increases circulation people who experienced the treatment report it relieves stress and relaxes the body.

### 3.5.3. Pranayama

Full Yogic Breath, Nadi Shodhana, Bhastrika, and Kapalabhati are especially invigorating, clarifying and kapha-pacifying pranayamas. Most of them should be practiced on an empty stomach. The early morning is often an ideal time. Even five to fifteen minutes of pranayama daily can have a profound effect on our overall state of mind. Similarly, a few minutes of pranayama in the evening before bed can clear the mind while preventing excessively heavy sleep.

### 3.5.4. Yoga

A challenging and invigorating kapha-pacifying yoga practice will typically be best for countering excess sleep. Morning yoga will help awaken the tissues and the mind, shake off sluggishness, effectively kindle agni, and set the tone for a balanced day. Evening yoga can help to clear the mind, increase lightness in the body, and stimulate the metabolic fire overnight. Either way, yoga elicits improved balance in the mind and body.

---

## 4. Herbal medicines for sleep deprivation.

There are also a number of Ayurvedic herbs that can help to balance excess kapha in support of a more balanced sleep cycle. These herbs work by kindling agni, clearing stagnation, burning ama (toxins), reducing excess kapha throughout the system, and promoting lightness and clarity in the mind and body.

1. Jatiphala. Nutmeg - jatiphala. It is very effective in depression associated sleep problems. Nutmeg powder - 1 gram at night and nutmeg oil 5-6 drop - both are very useful to induce sleep
2. Ashwagandha - is a popular and potent ayurvedic adaptogen that helps your body adapt to stress naturally while calming the mind, supporting deeper sleep, and imparting vitality
3. Jatmansi - It acts as a brain tonic and helps with memory and brain functioning by preventing cell damage due to its high antioxidant property. It also calms down the brain and manages anxiety as well as insomnia.
4. Shankpushpi - *Convolvulus pluricaulis*. It is a very good neuro-protective (soothes and protects nerves, useful in neuropathy, neuro toxicity) A nootropic - Medhya - improves memory and concentration. Useful in amnesia - loss of memory. Anti-oxidant - improves cell health. Anti-convulsant - relieves tremors, improves body co-ordination. With all these benefits, Shankpushpi is very ideal to use in elderly people with sleep problems. It is useful in case of Parkinson's disease as well.
5. Brahmi - also known as bacopa is a great ayurvedic herb that can aid in a good night's sleep. It helps you calm down during periods of emotional turbulence and improves memory and brain functioning.
6. Tagara - practitioners give tagara, also known as valerian *Wallichilli*, for sleep deprivation and other ailments. They report one of its main benefits is helping insomnia. Holistic herbologists report the plant targets the neurological and physiological system they believe this makes it effective in treating insomnia. According to experienced practitioners it's known to pacify the vata and kapha, they also convey it helps to balance the body and also improve well-being.
7. Valerian: Ayurvedic herbs for sleeplessness in Indian valerian, also known as tagar in Hindi, works on the nerve channels by clearing out toxins from the blood, joints, tissues, colon, and nerves. Its basic role is to rejuvenate. However, valerian should not be taken on its own. For, it can have a somewhat dulling effect. It is best used as part of some herbal preparation. If you wish to discuss any specific problem, you can consult an Ayurveda.

---

## Conclusion:

Sleep is thought to have powerful restorative properties. Sleep deprivation in humans is widely believed to impact the health system, and is a well-known risk factor for the development of many diseases. The physical and biochemical changes produced by sleep deprivation that result in the health consequences and largely increase the generation of oxidative free radicals or impaired anti-oxidant defence mechanisms have been implicated in chronic sleep deprivation-induced disturbed homeostasis including immunosuppression, Diabetes mellitus, Acid peptic disorder, Atherosclerosis, cognitive dysfunction etc. Sleep comes under non-suppressive urges. Clinical features for its suppression are too much yawning, malaise, Dizziness, diseases of the head, heaviness of eye

giddiness, indigestion, stupor, and diseases of vata origin also found. sleeplessness (nidranash or aswapna or Anidra) is the causative factor of Atikrisa (emaciation) It is a clinical feature of vata-pitta Jwara, Sannipat Jwara Gulma (In the process of suppurations) Tamak Swas, sannipatik atisar, pittaja Visarpa, Vata-pitta visarpa, Vataja trisna, Aathi majja gata vata, Anidra is the complications of vatarakta, Excess vaman and Excess virachana.

## REFERENCES

1. Anderson ML, Mortins PJ, Almedia VD, Bignotto M, Endocrinological and Catacholomenergic alterations during sleep deprivation and recovery in male rats, J.Sleep Res. 2005 ;14 :83-96.
2. Copinschi Kheirandish and Gozal, Thase, Sleep deprivation and health consequence, New York, 2006.p-1-6.
3. Rechtschaffen A, Bergmann BM, Everson CA, Gulliland MA. Sleep deprivation in the rat :X integration and discussion of the findings. Sleep 2002 ;25 :68-87.
4. Rechtschaffen A, Bergmann BM, Everson CA, Gulliland MA. Sleep deprivation in the rat: X integration and discussion of the findings. Sleep 2002; 25:68-87.
5. Rao SK Ramcharan, Encyclopedia of Indian Medicine (Basic Concept) Popular prokasana, Bombay, 2nd vol, 1987, p-130.
6. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutrasthan, 21th chapter, verse-25, Chaukhambh Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-380.
7. Bhisagratna KL, Susruta Samhita, Sarir Sthan, 4th chapter, verse-33, Chaukhambha Sanskrit Series office, Varanasi, 1st vol, 1981.p-63.
8. Bhisagratna KL, Susruta Samhita, Uttoantra, 5th chapter, verse-55, Chaukhambha Sanskrit Series office, Varanasi, 3rd Edition, 1st vol, 1981.p-67.
9. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutrasthan, 21st chapter, verse-58, Chaukhambh Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-385.
10. Bhisagratna KL, Susruta Samhita, Sarir Sthan, 4th chapter, verse-33, Chaukhambha Sanskrit Series office, Varanasi, 3rd Edition, 1st vol, 1981.p-63
11. Mishra YK, Padartha Vijnana, Chaukhambha Sanskrit Sansthan, Varanasi, 1st Edition, 1st vol, 1912.p-541.
12. Sharma Ram Karan and Dash Bhagawan., Carak Samhita, Sutrasthan, chapter 21st, verse-36-38, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-381.
13. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sarir sthan, 5th chapter, verse-12, Chaukhambha Sanskrit Series Office, Varanasi, Reprin
14. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Chikitsa sthan, 1st chapter, verse-32, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 3rd vol, p-13.
15. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra Sthan, 8th chapter, verse-19, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-173.
16. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra Sthan, 21st chapter, verse-4, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-375.
17. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra Sthan, 21st chapter, verse-42, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-382.
18. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra Sthan, 21st chapter, verse-25, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-379.
19. Murthy.K.R.Srikantha, Susruta Samhita, Sarir Sthan, 4th chapter, verse-33, Chaukhambha Orientalia, Varanasi, Reprint Edition 2010, 1st vol, p-63.
20. Murthy.K.R.Srikantha, Susruta Samhita, Sutra Sthan, 15th chapter, verse-13, Chaukhambha Orientalia, Varanasi, Reprint Edition 2014, 1st vol, p-102.
21. Murthy.K.R.Srikantha, Susruta Samhita, Sutra sthan, 24th chapter, verse-7, Chaukhambha Orientalia, Varanasi, Reprint Edition 2014, 1st vol, p-178.
22. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra sthan, 11st chapter, verse-35, Chaukhambha Orientalia, Varanasi, Reprint 2014, 1st vol, p-219.
23. Murthy.K.R.Srikantha, Susruta Samhita, Sarir sthan, 4th chapter, verse-32-36, Chaukhambha Orientalia, Varanasi, Reprint Edition 2014, 1st vol, p-61-64.
24. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra sthan, 21st chapter, verse-37, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-381.
25. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra Sthan, 21st chapter, verse-55-57, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-383.

- 
26. Murthy.K.R.Srikantha, Susruta Samhita, Sarir Sthan, 4th chapter, verse-52, Chaukhambha Orientalia, Varanasi, Reprint Edition 2014, 1st vol, p-65.
  27. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra Sthan, 21th chapter, verse-52-54, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-382.
  28. Murthy.K.R.Srikantha, Susruta Samhita, Sarir Sthan, 4th chapter 4th, verse-53-56, Chaukhambha Orientalia, Varanasi, Reprint 2014, 1st vol, p-65.
  29. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Chikitsa sthan, 21th chapter, verse-25, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2014, 1st vol, p-379.
  30. Sastri R, Harit Samhita, Sarir Sthan, 3rd part, verse-33-35, Prachya Prokasana, Varanasi, 1st vol, 1st Edition, 1985, p-132.
  31. Sharma Ram Karan and Dash Bhagawan, Carak Samhita, Sutra Sthan, 21th chapter, verse-52-54,