

ROLE OF AYURVEDIC PRINCIPLES IN REHABILITATION

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DOI: <https://doi.org/10.5281/zenodo.18091956>



How to cite this Article: Dr. Lata Srivastava^{*1}, Dr. Sarla². (2026). ROLE OF AYURVEDIC PRINCIPLES IN REHABILITATION. World Journal of Pharmaceutical and Medical Research, 12(1), 284–289.
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Article Received on 04/12/2025

Article Revised on 24/12/2025

Article Published on 01/01/2026

ABSTRACT

Ayurveda is not only for treating a disease but it also maintains the health of those who are not diseased and have a role in the complications that come after treatment which is taken under the rehabilitation. The whole system of ayurveda approach to health-address the Physical, Structural, Emotional, Mental and spiritual aspect of a person. Rehabilitation is a process or care or the action of restoring one's health or capabilities that has been affected to it's former condition. In ayurveda a lot of procedures included under the rehabilitation such as *Panchkarma*, *Shirodhara*, *Rasayana sevan*, *Aachar rasayana*, *Sadvritta paalan*, *Yoga Councelling* etc.

INTRODUCTION

Ayurvedic rehabilitation is a process aimed at enabling them to reach and maintain their optimal physical, sensory, intellectual, psychological and social functional levels.

Ayurveda serves as a holistic system of rehabilitation that focuses on restoring balance, strength, and well-being after illness, injury, or surgery, integrating therapies like *Panchakarma*, *yoga*, personalized diet, and lifestyle modifications to enhance physical, mental, and emotional recovery. By addressing the root causes of imbalances, Ayurvedic rehabilitation aims to restore organ functions, improve circulation, reduce inflammation, and strengthen the body's natural healing mechanisms, ultimately helping patients regain independence and improve their quality of life.

In Ayurveda, the three doshas—*Vata*, *Pitta*, and *Kapha*—are the vital energies that govern all physical and mental processes, forming a person's unique constitution or *Prakriti*.

Health is achieved through a balance of these *doshas*, while imbalance leads to disease. Understanding your dominant dosha helps personalize diet, lifestyle, and herbal to maintain equilibrium and prevent illness.

विकारो धातुवैषम्यं साम्यं प्रकृतिरुच्यते।
सुखसञ्ज्ञकमारोग्यं, विकारो दुःखमेव च॥ (ch.su.9/4)^[1]

FUNDAMENTALS OF AYURVEDA

5 Element of Panch mahabhoot (Aakash, Vayu, Agni, jal, Prithavi)

Aakash+Vayu= Circulation, respiration, elimination, musculoskeletal movements, cavities, cold, dry.

Agni+Jal= Metabolism, digestion, production of hormones and enzymes, conversion, sharp, hot, damp.

Jal+Prithavi= Structure, fluids, mass, organs, musculoskeletal system, tissue.

UPADRAV IN AYURVEDA

In Ayurveda *UPADRAVAS* are described whose meaning is compared with complications in modern aspect.

‘उपद्रवस्तु खलु रोगोत्तरकालजो रोगाश्रयो रोग एव स्थूलोऽनुर्वा, रोगात् पश्चाज्जायत इत्युपद्रवसंज्ञः । तत्र प्रधानो व्याधिः व्याधेरुणभूत’ उपद्रवः, तस्य प्रायः प्रधानप्रशमे प्रशमो भवति । स तु पीडाकरतरो भवति पश्चादुत्पद्यमानो व्याधिपरिकल्पितश्चरीरत्वात् तस्मादुपद्रवं त्वरमाणोऽभिवाधेत (ch.chi.21/40)^[2]

WHAT IS UPADRAV?

An *Upadrav* is that which occurs after the occurrence of a disease. That which is dependent on the disease is called *Upadrav*. It may be small or big, but because it occurs after the disease, it is called a *Upadrav*. The disease is the main symptom and the *upadrav* is the minor symptom of the disease. When the main disease subsides, the minor *upadrav* gets cured automatically. These *upadrav* causes more pain in the body, because it occurs after the body becomes weak due to the main disease. Whatever *upadrav* occurs when the body is

weak, it is definitely painful. Therefore, the *upadravas* should be treated immediately.

Some of such Upadravas recover on their own while others need to be treated otherwise such Upadravas hamper the normal daily activities of the person. Therefore to treat such Upadravas our Acharayas have described several treatment methods like *Panchakarma*, *Shirodhara*, *Yoga*, *Pranayam*, *Rasayana sevan*, *Sadvritta palan* etc.

Upadravas (Complications) of certain diseases are mentioned below-

Raktapitta^[3]

Complications- *Daurbalya*, *Aarochaka*, *Avipaka*, *swas*, *kaas*, *Jwara*, *Atisara* etc.

Prameha^[4]

Complications- *Atisara*, *Daah*, *Daurbalaya*, *Aarochaka*, *Aavipaka*, *Pootimansa*, *alaji*, *pidika*.

Kustha^[5]

Complications: *Prasravana*, *Angabheda*, *Angavayva patan*, *Daurbalaya*, *Aarochaka*, *Aavipaka* etc.

MODERN REVIEW OF REHABILITATION

W.H.O define rehabilitation as “The combines and coordinated use of medical, social, educational and vocational measures for training the individuals to the highest level of functional ability”

PRINCIPLE OF REHABILITATION

- Rehabilitation should begin during the initial complain with patient.
- The emphasis of rehabilitation is to restore the patient in independence or pre illness or pre injuries level of function in a short time as possible.
- He must be an active participant.
- Motivates the patient and help him to attain social independence.
- Focus is on need of group of people with specific condition.
- Every patient has rights to the rehabilitation services.

TYPES OF REHABILITATION

- **MEDICAL REHABILITATION-** Help a person better in all his daily physical and mental activities. related to increasing the potential capabilities and correction of deformities restoration or function.
- **SOCIAL REHABILITATION-** Implies social life; restoration of family, social interaction or relationship.
- **PSYCHOLOGICAL REHABILITATION-** Include psychological restoration of personal dignity and confidence of the disabled.

- **VOCATIONAL REHABILITATION-** Help those patient who find it difficulty to get employment.

BASED ON TREATMENT TYPES

- Cardiopulmonary rehabilitation
- Physical rehabilitation
- Speech rehabilitation
- Occupational rehabilitation
- Psychological rehabilitation.

Rehabilitation is usually required in condition like

- Post stroke, post trauma, post brain injury, post surgical stiffness.
- General stiffness after removal cast in fracture
- Muscular dystrophy
- Cerebral atrophy
- Multiple sclerosis.
- Parkinsonism
- Parkinson's disease and other conditions.

AYURVEDIC REVIEW OF REHABILITATION

An ayurvedic rehabilitation approach uses holistic method such as *Panchkarma* (detoxification and purification) and *marma therapy*, *Shirodhara*, *Rasayana*, *Aachar rasayana*, *Sadvritta palan*, *Yoga*, *Councelling* etc to restore balance after injury or illness. it involves *chikitsa chatuspaad* (*vaidya*, *aushadha*, *paricharaka*, and *rogi*)^[6] and forming a treatment team, emphasizing patient-specific, integrated interventions for overall healing of physical, mental and spiritual aspects.

CORE PRINCIPLES

Holistic approach

Ayurveda focuses on treating the whole person (mind, body, and spirit) rather than just symptoms.

Balance (Doshic harmony)

Rehabilitation aims to restore the balance of the body's doshas (vata, pitta, kapha).

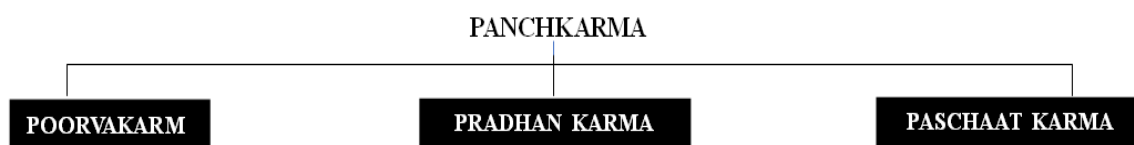
Patient specific treatment

Tailored interventions are developed based on the individual's constitution and the nature of the disease.

KEY THERAPIES

PANCHKARMA CHIKITSA

Panchkarma is a set of five (*pancha*) purification(*karma*) procedure used to eliminate toxins from the body.



Before and after panchakarma, poorvakarma and paschaat karma are performed respectively.

POORVAKARMA

- *Langhan*
- *Paachan*
- *Snehan*
- *Swedana*

PRADHAN KARMA

- *Vaman*
- *Virechana*
- *Basti (niruha and anuvasana)*
- *Sirovirechana*
- *Raktamokshana*.

PASCHAT KARMA

- *Samsarjana krama*
- *Rasayanaadi prayog*
- *Shamana chikitsa*.

POORVAKARMA LANGHANA

यत् किञ्चिल्लाघवकरं देहे तल्लङ्घनं स्मृतम् || (ch.su.22/9)^[7]

The substance or method which produces levity (*laghuta*) in the body

It is prescribed to make a person who has less strength of doshas do *langhana*. by doing *langhana*, *agni* is lit and *vayu* increases due to which the minor doshas dry up in the same way as a little water in the reservoir dries up due to intensity of air and sunlight.

As in skin diseases, *atisnigddha*, *abhishyanda*, obese person etc.

PACHANA

The substances which digest the “*Aam*” present in the body are called *pachana*

For example; *Nagkesar*, *bhallataka*, *jeera*, *samudra lavana*, *kutaki*.

If the strength of the doshas is of medium level then it is prescribed that he should do light skipping and do the digestion exercise.

SNEHANA

स्नेहनं स्नेहविष्यन्दमार्दवक्लेदकारकम् || (ch.su.22/10)^[8]

The process which brings about lubrication in the body, removes impurities and produces softness and moisture in the body called *snehana*.

USE OF SNEHANA

Kshatcheen

Ayush vriddhi hetu

Bal, varna and swara vriddhi hetu

Unmaad, Apasmaar

Nadivrana (ropan)

Kroor kostha and krimi kosth

Bhrasthayoni, yonishool, karnashool

Bhagna (fracture)

Vish pedit, Vataja roga etc.

There are two types of *snehana*

-*Bahya snehana*

-*Abhyantara snehana*

SWEDANA

स्तम्भगौरवशीतघ्नं स्वेदनं स्वेदकारकम् || (ch.su.22/11)^[9]

The process by which sweat is produced in the body and stiffness, heaviness and coldness in the body is called “*swedana*”

USE OF SWEDANA KARMA

Stambha naash

Gaurav naash

Mal sodhana

Agni pradeepan

Atitandra and tandra naash

Vaayu niyaman

Shrotoshodhana etc.

PRADHAN KARMA

VAMAN

तत्र दोषहरणमूर्ध्वभागं वमनसञ्ज्ञकम् || (ch.ka.1/4)^[10]

The removal of impurities through the *urdhva marg* (mouth) is called *vaman*

Specially in *kapha* related diseases the method of inducing *vaman* has been described.

MADANPHAL has been said to be the best *vaamak dravya*.

VAMAN YOGYA^[11]

Navjwara

Kustha

Kaash, swaas

Unmaad, apasmar

Aruchi, avipaka, apachi, atisaar

Hridrog, medorog, chitta vibhram, visarpa

Kaphaja vyadhi etc.

VIRECHANA

अधोभागं विरेचनसञ्ज्ञकम् || (ch.ka.1/4)^[12]

Removal of impurities through the “*adho marg*” (*guda marg* or anus) is called *virechana*.

Virechana is said to be the best treatment for *pitta* dominant diseases.

VIRECHANA YOGYA^[13]

Kustha, Meha, Urdhwag raktapitta

Udara roga, Bhagandara, Arsha, Bradhna,
Gulma, Arbud, Galganda, Granthi, Visuchika, Alasak
All pittaj vyadhi.... etc

BASTI

नाभिप्रदेशं कटिपार्श्वकुक्षिं गत्वा शकृदोषचयं विलोडय |
संस्नेह्य कायं सपुत्रीषदोषः सम्यक् सुखेनैति च यः स बस्तिः
|| (ch.si.1/40-41)^[14]

The process of introducing medicated decoction, oil, milk
etc into the body through the *guda marg* with the help of
vasti yantra is described as *basti*

Basti is considered to be the best treatment for *vata*
related diseases.

तस्माच्चिकित्सार्धमिति ब्रुवन्ति.....(ch.si.1/40)^[15]

There are two types of *basti*

-*Niruha basti* (*Kwath pradhan*)

-*Anuvasana basti* (*Sneha pradhan*)

BASTI YOGYA^[16]

Sarvaang, Ekaan, kukshi roga

Vaat_Varcha_Mal_mutra_Shukra sanga.

Parvabheda, Atisara, Gulma, Hridroga

Unmaad, shirashool, karnashool, bhagandara

Hridya_parshva_pristha_Kati Graha

And vaat related diseases.....etc.

SIROVIRECHANA (NASYA)

The introduction of medicine in to the body through the
nostrils is called *Nasya*. *Nasya* is said to be the best
treatment for diseases of *Urdhwajatrugat roga*.

RAKTAMOKSHSNA

Removal of vitiated blood from the body is called
raktamokshana.

Acharya Shusruta and Vagabhatta have counted it in
Panchakarma.

according to doshas, different method of *raktamokshana*
karma have been described such as-

Shringa, Alaabu, Ghati yantra, Jalauka etc. it has been
described as the best treatment for Raktapradoshaj
vikaar.

PASCHAAT KARMA (POST TREATMENT CARE)

SAMSARJAN KRAM

After the purification of the body by the *panchakarma*
such as *vamana and virechana*, the state of *agnimandya*
arises. therefore to increase the strength of *agni* the
patient is given the *laghu aahara* and gradually brought
on the *prakrita aahara*.

SHAMANA CHIKITSA

After doing *panchkarma and samsarjana kram* for the
purpose of treatment of the disease for which patient is
purify the patient should use palliative medicine
(*shamana aushadha*) to cure the disease that has
occurred.

RASYANA SEVAN

दीर्घमायुः स्मृतिं मेधामारोग्यं तरुणं वयः | प्रभावर्णस्वरौदार्यं देहेन्द्रियबलं
परम् ||

वाक्सिद्धिं प्रणतिं कान्तिं लभते ना रसायनात् | लाभोपायो हि शस्तानां
रसादीनां रसायनम् || (ch.chi1/7-8)^[17]

By proper use of *rasayana*, one gets longevity, good
retention power, good health, youthful state, lusture,
good complexion and voice, strength, speech, beauty etc.
all these best qualities are attained by the proper using of
Rasayana.

USE OF RASAYANA IN MENTAL ILLNESS

Rasayana aushadhi especially *MEDHYA RASAYANA*^[18]
prove to be very beneficial in mental illness due to their
brain sedative (anti anxiety) properties and anti stress
and adaptogenic effect. *Medhya rasayana* produce brain
sedative effect (tranquility) by reducing the amount of
catecholamines in the brain. Hence they are used as
transequiliser and anti anxiety medicine and
thesemedicine prove to be beneficial in these conditions.

AACHAR RASAYANA AND SADVRITTA ACT AS COUNCELLING

Whatever has been said in *Aachar rasayana* and *Sadvritta*
palan, in modern science it is called as counselling.

Under this, all those things have been said which if a
person adopt in his life, then his life will remain simple
and free from depression.

A psychologist tells a person suffering from depression
or other mental illness to stay positive because your body
release hormones in the same way as you think.

AACHAR RASAYANA

सत्यवादिनमक्रोधं निवृत्तं मद्यमैथुनात् |

अहिंसकमनायासं प्रशान्तं प्रियवादिनम् ||

जपशौचपरं धीरं दाननित्यं तपस्विनम् |

देवगोब्राह्मणाचार्यगुरुवृद्धाने रतम् ||

आनृशंस्यपरं नित्यं नित्यं करुणवेदिनम् |

समजागरणस्वप्नं नित्यं क्षीरघृताशिनम् ||Z

.....|(ch.chi.1/4/30-35)^[19]

SADVRITTA PALAN^[20]

Dev-go-brahmin-guru-vriddha-aachrayaan-archyyet

Agnimupcharyet

Aushadhi prasastha dharyet

Dau-kaalaupspraschet

Tri -pakshasya-kesh-samaashru-loma-nakhaan-

samhaaryet

Nityam anuphatavasah-sumnah-sugandhi-syat.

Saadhuvesh, prasiddhakesh

Murdha-shrota-ghraan-paad-tail nitya.

Vinay-buddhi-vidya abhijana-vayovriddha-siddha-

aacharyanaam upasita.....etc.

SHIRODHARA

Genrally it is also known as '*Shir Sek*'. In this process,
medicinal decoction, *Siddha Sneh* or *Ksheer* etc. is
dropped on the head (forehead) in the form of a regular

stream with the help of a special vessel (*Dharapatra*), hence it is called '*Dhara Kalp*' or '*Shirodhara*' or '*Shir Sek*'

In ayurveda samhita there is indication to pour a stream of medicinal decoction, milk, and oil etc on the forehead which is a form of *shro sek* or *shirodhara*.

SHIRODHARA SADDHYA ROG

Shiroroga

Anidra

Chitta udvega

Manoavsad

Unmaad

Vaatvyadhi

Hridyarg

Vepathu (treamor)

Twaka vikara

Maanas roga-Apasmaar, atattvaabhinivesh, madattya

YOGA ASANA

Both kinetic and static movement are traditionally used in the treatment of physical injury after the acute stage has been treated.

ABHYANGA

Herbal medicated oils are administered locally and systemically for reduction of vitiation, blockage or inflammation.

COMMON AYURVEDIC HERBS USED FOR PAIN

Boswellia (boswellia serrata)^[21]

Research suggests that it maybe particularly effective at reducing inflammation by preventing the release of inflammation-causing compounds known as leukotrienes-often used in place of NSAIDS.

Triphla (three fruits)^[22]

- *Amalaki (Emblica officinalis or indian gooseberry)*
- *Bibhitaki (Terminalia bellerica)*
- *Haritaki (Terminalia chebula)*

It functions as a natural laxative reducing constipation abdominal pain and flatulence while improving the frequency and consistency of bowel movements in people with gut disorders-recommended for better absorption of anti-inflammatories in patient with sluggish digestion or obesity.

Turmeric (Curcumin)^[23]

Turmeric is a powerful antioxidant and inflammatory properties. test tube research shows that it maybe equally or even more effective than some anti-inflammatory drugs-caution to limit dosage to 1000mg/day as it can be healing and cause systemic inflammation in excess.

MATERIAL AND METHODS

To study the topic "Role of ayurvedic principles for rehabilitation" collected and analysed from Ayurvedic samhitas (Brihatrayi, Laghutrayi and teekas) other

Samgrah granth of Ayurveda along with modern literature and some review articles, journals, pubmed search engine.

To conduct this study the mentioned literatures has been collected from the library of State Ayurvedic College and Hospital, Lucknow & other sources, as well as previously published works of other Researchers.

DISCUSSION

There are many diseases which are even after being treated leaves the patient with certain complications. In ayurveda, such complications are known as *Upadravas*.

In the Ayurvedic samhitas our acharyas have mentioned several Upadravas of the different diseases along with their respective Nidana, Purvaroop, Roop etc. Some of such Upadravas recover on their own while others need to be treated otherwise such Upadravas hamper the normal daily activities of the person. Therefore to treat such Upadravas our Acharayas have described several treatment methods like *Panchakarma*, *Shirodhara*, *Yoga*, *Pranayam*, *Rasayana sevan*, *Sadvritta palan* etc.

Several Ayurvedic rehabilitation centres have been established across the country to carry out such procedures where along with physical, mental, emotional, spiritual, social well being of the patient's life is also restored.

CONCLUSION

After reviewing a number of scholarly articles on ayurvedic rehabilitation such as in the management of abhigataj pakshaghat, Arbuda, Bhagna etc. we can conclude that Ayurvedic therapies like Shirodhara, Yoga, Pranayam, Sthanik Abhyang, Sthanik Nadi Sweda, Niruha and Anuvasana basti (Panchkarma) etc are significantly useful for restoring the normal lifestyle of a patient.

Thus the panchakarmaadi therapies described in the Ayurvedic samhitas are useful for rehabilitation.

REFERENCES

1. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Sutra Sthan, Chapter 9 verse 4, Chaukhabha bharti Academy, Varanasi, 2019; 169.
2. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Chikitsa Sthan, Chapter 21 verse 40, Chaukhabha bharti Academy, Varanasi, 2019; 539.
3. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Nidana Sthan, Chapter 2 verse 7, Chaukhabha bharti Academy, Varanasi, 2019, 546.
4. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Nidana Sthan, Chapter 4 verse 48, Chaukhabha bharti Academy, Varanasi, 2019; 565.

5. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Nidana Sthan, Chapter 5 verse 11, Chaukhabha bharti Academy, Varanasi, 2019; 572.
6. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Sutra sthan, Chapter 9 verse 3, Chaukhabha bharti Academy, Varanasi, 2019; 169.
7. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Sutra sthan, Chapter 22 verse 9, Chaukhabha bharti Academy, Varanasi, 2019; 369.
8. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Sutra sthan, Chapter 22 verse 10, Chaukhabha bharti Academy, Varanasi, 2019; 370.
9. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Sutra sthan, Chapter 22 verse 11, Chaukhabha bharti Academy, Varanasi, 2019; 370.
10. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Kalpa sthan, Chapter 1 verse 4, Chaukhabha bharti Academy, Varanasi, 2019; 815.
11. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Siddhi sthan, Chapter 2 verse 10, Chaukhabha bharti Academy, Varanasi, 2019; 901.
12. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Kalpa sthan, Chapter 1 verse 4, Chaukhabha bharti Academy, Varanasi, 2019; 815.
13. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Siddhi sthan, Chapter 2 verse 13, Chaukhabha bharti Academy, Varanasi, 2019; 902.
14. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Siddhi sthan, Chapter 1 verse 40-41, Chaukhabha bharti Academy, Varanasi, 2019; 893-894.
15. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Siddhi sthan, Chapter 1 verse 40, Chaukhabha bharti Academy, Varanasi, 2019; 893.
16. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Kalpa sthan, Chapter 2 verse 16/19, Chaukhabha bharti Academy, Varanasi, 2019; 904/905.
17. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Chikitsa sthan, Chapter 1 pada 1 verse 7-8, Chaukhabha bharti Academy, Varanasi, 2019; 6.
18. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Chikitsa sthan, Chapter 1 pada 3 verse 30-31, Chaukhabha bharti Academy, Varanasi, 2019; 36.
19. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Chikitsa sthan, Chapter 1 pada 4 verse 30-35, Chaukhabha bharti Academy, Varanasi, 2019; 53.
20. Kashinath Shastri, Gorakha nath chaturvedi, Charaka samhita with Elaborated Hindi Commentry, Sutra sthan, Chapter 8 verse 18, Chaukhabha bharti Academy, Varanasi, 2019; 161.
21. <http://pubmed.ncbi.nlm.gov/27117114/>
22. <http://www.ncbi.nlm.gov/pmc/article/PMC3193686>
23. <http://pubmed.ncbi.nlm.nih.gov/19594223/>