

## MANGAMENT OF CERVICAL SPONDYLOSIS REDICULOPATHY IN AYURVED A CASE REPORT

<sup>1</sup>\*Dr. Govind Narayan and <sup>2</sup>Dr. Manoj Kumar Sharma

<sup>1</sup>Assistant Professor Dept. of *Panchakarma*, Kalawati Ayurvedic Medical College and  
Research Centre, Kasganj.

<sup>2</sup>Professor, Dept. of *Dravyguna*, Kalawati Ayurvedic Medical College and Research Centre,  
Kasganj.

Article Received on  
07 Jan. 2020,

Revised on 28 Jan. 2020,  
Accepted on 18 Feb. 2020

DOI: 10.20959/wjpr20203-16939

### \*Corresponding Author

**Dr. Govind Narayan**

Assistant Professor Dept. of  
Panchakarma, Kalawati  
Ayurvedic Medical College  
& Research Centre,  
Kasganj.

### ABSTRACT

Cervical Spondylosis radiculopathy(C.S.R.) can be understand as grey hair of the spine, symptoms often develop insidiously and characterised by stiffness and deep aching pain in neck radiating towards arms and shoulder also characterised numbness. The management available in current era of medicine is not satisfactory since a long time. sHere we present a case of C.S.R., which was treated with a combination of *Panchkarma* procedures and combinations of *Ayurvedic* oral medicine. *Greevastambh* was considered as the Ayurvedic diagnosis for the case treated with *Panchtikta ksheera basti*(enema with medicated milk) for 16 days along with *Shalishastic pind swedana* for 16 day along with oral medicine as *Ashwagandha*

*churna*(*Withania sominifera* Dunal)-2gm+*Shatavari* *churna* (*Asparagus recemosus* Willd) - 2gm +*Gokshur* *churna* (*Tribulus terrestris* L.)-2gm+*Sarpgandha* *churna* (*Rauvolfia serpentine* (L) Benth.Ex Kurz)-2gm+*Shankha bhasma* 500 mg bid with Luke warm water, *Yograj guggulu* -3 tab twice in a day with *Dashmool kwath*(40 ml), *Ashwagandha avleha* 10 gm twice a day with Luke warm water. Patient was asset by various parameters and good improvement was noticed in the case after one month of treatment which was sustained in follow up duration. The case study demonstrate that Cervical spondylosis rediculopathy may be successfully managed with Ayurvedic treatment.

**KEYWORDS:** Ayurveda, Cervical Spondylosis rediculopathy, *Greevastambh*, *Panchkarma*.

## INTRODUCTION

Cervical Spondylosis is considered a medical condition in which degeneration of intervertebral disk occurred due to old age.<sup>[1]</sup> However this condition is commonly caused due to regularly ignoring the ergonomics of our bodies. Spondylotic changes are most common in persons older than 40 years. Half of total population show cervical Spondylosis at the age of 50 years. About 85% of men and 70% of women show radiological finding at the age of 60 years.<sup>[2]</sup> Symptoms and sign of Cervical Spondylosis fall into three main groups. One of them Reticulopathy and second is Myelopathy associated with neurological symptoms and other one is only associated with pain, those due to root compression is cervical Reticulopathy and third is axial joint disorder.<sup>[3]</sup> Compression of nerve root occurs when a disc prolapsed laterally, which may develop acutely or more gradually due to osteophytic encroachment of Intervertebral foramina.<sup>[4]</sup> C4-C5, C5-C6, C6-C7 vertebral level and C5, C6, C7 nerve roots respectively most commonly affected.<sup>[5]</sup> Sensory symptoms more frequent common than motor, most important is pain in cervical Reticulopathy. In cervical Myelopathy, the onset is usually insidious. Patient complaining disability over a periods of months<sup>[6]</sup>, There are no satisfactory conservative and surgical procedure are available in modern medicine for the disease and much limitation and complication also present in these procedures. In Ayurveda these type of manifestations improvement since a long time. Some cases are also reported in PubMed indexed journal.<sup>[7,8,9]</sup> So there are need to develop the effective treatment in alternative medicine. In Ayurveda it can be correlated with *Greevastambh* (~stiffness in neck). The disease come under *Vata- nanatmaka vyadhie* (diseases only due to *Vata dosha*)<sup>[10]</sup> and the symptoms of *Vata vyadies* (~various neurological and musculoskeletal disorders) are *Sankocha*(constrictions of organs), *Parva stambha*(stiffness in joints), *Asthi bheda*(pain in bones), *Padi prastha shiroghraha*(stiffness in lower limbs, back and head) *Spandana* and *gatrastupta*(numbness).<sup>[11]</sup> Here we represent a case of cervical Spondylosis Reticulopathy which was successfully managed by *Ayurvedic* therapy with *Greevastambh* as the *Ayurvedic* diagnosis.

## CASE REPORT

A 50 years old female patient was consulted in out- patient department of Kalawati Ayurved Medical college & Research centre, Kasganj for complaints of gradually progressive pain around the neck region which radiated towards bilateral shoulder joints and both upper limb. Patient also had complaints of stiffness in neck and shoulders regions. Patient had suffered from these problems since 4 years. Patient had complaints of restricted movement in neck

region and shoulder joints from 2 years. This is gradually worsened over past 2 years, after getting trauma. Symptoms aggregated by prolonged sitting and relieved by some rest on laying position. She also had complaints of intermittent numbness and tingling sensations in both upper limbs from 1 year. Patient had undergone neurological and orthopaedic consultation in Indo-western hospital of brain and spine, Lukhnow. Surgical and conservative management was recommended. She did not have complaints of any bowel and bladder changes and her general condition was not good. She was taking some painkiller and corticosteroids for pain management as prescribed by previous consultant.

### Case findings

The case was admitted to female ward of *Panchakarma* department of Kalawati Ayurved Medical college & Research centre, Kasganj on Nov 18, 2018 for the treatment. On physical examination patient had slightly raised blood pressure continuously about 150/100mm of Hg. Pulse was often irregular. She was anxious, appetite was mildly decreased, tongue was coated, micturition are normal and bowel movement was constipated. Patient had *Vatakaphaja prakriti* with *Vataj-vikriti*, *Madhyam samhanan*(medium body built), *Sama pramana*(symmetrical body proportion), *Sarvarasa satmya*(homologation from all taste), *Madhyam satva* (medium mental strength) *Madhyam aaharshakti* and *jaran shakti*(medium food activities and digestive power), *Heen vyayamshakti* (low capability of physical activities). Patient had normal gait. The active movement of range of cervical spine were restricted. Pain presented on movement of neck. On examination flexion of neck were 15<sup>0</sup>c, extension were 10<sup>0</sup>c, lateral flexion to left were 10<sup>0</sup>c, lateral flexion to right side were 10<sup>0</sup>c, lateral rotation to left were 20<sup>0</sup>c, lateral rotation to right side were 25<sup>0</sup>c. Tenderness was examined over c<sub>4</sub>,c<sub>5</sub> c<sub>5</sub>-c<sub>6</sub>, c<sub>6</sub>-c<sub>7</sub> vertebrae, power of biceps and triceps muscles of both upper limb were normal, lumbar spine movement was normal in range. Tenderness was absent, flexion and extension in both knee joints and ankle joints were with- in normal range. Stiffness and oedema were absent. Straight leg raising test in both lower limb were normal. On neurological examination higher functions, consciousness, orientation of time, place, person were normal. Appearance was normal, memory was also normal, patient was right handed, speech was normal, gait was also normal. All cranial nerve were well intact, on sensory examination sensation from touch and temperature were lost in right tip of shoulder joint position sense and joint vibration senses were normal bilaterally. On motor examination nutrition, power and tone and coordination of arms were normal, nutrition, power and tone of lower limbs were normal. Power of both upper limbs and lower limbs were grade- 5 as per

Medical research counselling score. Deep tendon reflexes and superficial -reflexes were normal. Patient had Babinski and Hoffman sign negative bilaterally and Spurling sign positive. All biochemically and laboratory findings were normal except ESR. ESR raised up to 75 mm/hr. Magnetic resonance imaging of cervical spine that was done on 9 February 2014 suggests posterior osteophytes are seen in C<sub>4</sub> to C<sub>6</sub> vertebral bodies and at C<sub>5</sub>-C<sub>6</sub> posterior osteophytic ridges and protruding disc causes moderate spinal canal stenosis with narrowing of left neural foramina with mildly indenting the theca after one year again M.R.I. was done on 15 October 2015 which revealed disc bulge at C<sub>3</sub>-C<sub>4</sub>, C<sub>4</sub>-C<sub>5</sub>, C<sub>5</sub>-C<sub>6</sub> and C<sub>6</sub>-C<sub>7</sub>, cord compression at C<sub>5</sub>-C<sub>6</sub> due to disc bulge – which are suggestive of Cervical Spondylotic Radiculopathy.

### Diagnostic focus and assessment

The patient was known case of Cervical Spondylotic Radiculopathy and it was confirmed by previously done M.R.I. *Greevastambha* was considered as *Ayurvedic* diagnosis which is included in *Nanatamaj Vatavyadhi* and *Urdhajatrugata roga* (disease above the neck region). Hereditary spastic paraplegia, frozen shoulder, primary spinal cord tumour, muscle spasm, amyotrophic lateral sclerosis, cervical sprain and strain, neoplastic brachial plexopathy, spinal cord infraction, spinal sepsis and coast tumours were the differential diagnosis of the case. Diagnosis confirmed of C.S.R. on the basis of M.R.I. finding which should be Compression due to disc bulge and osteophytes. There was absence of Babinski sign and fasciculation's which differentiate it from amyotrophic lateral sclerosis. Frozen shoulder was excluded from differential diagnosis on the basis of physical examination. Muscle spasm, cervical sprain and strain were ruled out by Spurling test. Other conditions were excluded on the basis of M.R.I. finding.

### Treatment plan

*Greevastambha* comes under *Urdhvajatrugat roga*<sup>[12]</sup> and *Nanatmaj vata vyadhi* (~ various musculo skeletal and neurological disorder in Ayurveda so general line of management of *Vatavyadi* and *Urdhajatrugata roga* such as *Abhyang* (massage), *Swedan* (sudation), *Basti* (drug administration through anus) procedure and *Nasya* (drug administration through the nose) were adopted for the patient.<sup>[13]</sup> Considering the patient of *Vatakapha prakriti* (specific body constitution) and *Abhyanga* and *Swedana* in the form of *Shalishastik pind Sweda* and *Ksheera Basti* (medicated milk enema) in form of *Panchtikta Ksheera Basti* were given into the patient after these procedures *Nasya Karma* were given.

### Intervention plan

Various *Panchkarma* interventions were adopted to treat this patient. *Anuloman* (mild anuloman) done with *Panchshakar churna* in dose of 6 gm with luke warm water at previous night before beginning of medical intervention to the patient. From next day *Shalishastik pind swedan* for 16 day along with *Panchtikta ksheera Basti* for 16 days were adopted. After 16 days of these intervention patient recieved *Nasya karma* with kshirbala taila (oil) for 7 days. Along with these *Panchkarma* intervention a combination of oral medicines- *Ashwagandha churna* -2gm+*Shatavari churna* -2gm+ *Shankha bhasma* 500 mg (twice in a day), *Gokshur churna*-2gm+*Sarpagandha churna* -1gm(twice in a day) with luke warm water after meal were given, *Yyograj guggulu* -3 tab twice in a day with *Dashmool kwath*(40 ml) were given before half hour from meal. *Ashwagandhaavleha* 10 gm bid with Luke warm water was given after meal. These oral medicines were continued for next two months.

### Outcome measures and follow up

After completion of *Panchkarma* procedures patient condition was assessed for pain, giddiness, neck stiffness, and active range of motion of neck. Neck stiffness had substantially reduced. Pain had subsided, patient had no giddiness. Neck of motion improved. Flexion of neck had improved to 45<sup>0</sup> and extension to 40<sup>0</sup>. Lateral flexion to left side was improved to 30<sup>0</sup>. Lateral flexion to right side was improved to 30<sup>0</sup>. Lateral rotation to left side was improved to 45<sup>0</sup>. Lateral rotation to right side was improved to 45<sup>0</sup>. **Spurling** sign was negative. Patient was discharged on 24 dec 2018 and Patient condition was also stable after two months of treatment.

### DISCUSSION

Intervertebral discs and their surrounding ligament lose their normal elasticity and hydration with age. These changes lead to cracks and fissures. These lead to collapse of intervertebral discs causing annulus to bulge outward. Annulus fissure and herniation may complicate chronic spondylosis changes. The cross sectional area of the canal is narrowed due to annulus bulges. The uncinat process overridges and hypertrophy compromising the ventro-lateral portion of the foramen to disc degeneration marginal osteophytes start developing changes lead to Radiculopathy. Other condition aggravated the changes by trauma and heavy work.<sup>[14,15]</sup> The disease has resemblance with the *Greevastambh* disease described in *Ayurveda* which is a *Nanatmaj vata vyadhi*. There are two type of pathology in *Vata vyadhi*. First due to the *Kshaya* of *Dhatu*(diminished of body tissue)and second due to

*Margavavrodha*(obstructive pathology).<sup>[16]</sup> In *kshya* type of pathology *Vata Pitta dosha* vitiated so there are *Asthimajja shoshana*(diminished bony tissue and bone marrow) due to *Ruksha guna*( dryness property) of *Vata* and *Asthi ksharan* (osteoporosis) due to *Usna guna* (hot potency) of *Pitta* by which degeneration of vertebrae and discs occurs. Here *Asthi poshan chikitsa* (nutrition to bone tissue) is the main treatment to treat the condition. In *Asthigata roga chikitsa* (treatment of musculoskeletal disease) done by *Panchkarma, Basti* and *Tikta* (bitter taste herbs) *siddha ksheer* and *ghrita* are mainly used.<sup>[17]</sup> According to *Charak, Basti* is best *chikitsa* for *Vata*.<sup>[18]</sup> *Basti* is the half *chikitsa* of *chikitsa*.<sup>[19]</sup> *Arundatta*, a commentator of classics of *Ayurvedic* text say that *Tikta ksheera basti* is the combination of *Snigdha*(unctuous) and *Shoshana* property. So it produces the *Khara guna* (roughness property) it is also present in *Asthi dhatu* (bone tissue) so *Tikta ksheera basti* promote the *Asthi poshana*(proper osteogenesis and nourishment of bone).<sup>[20]</sup> *Tikta rasa* (bitter taste) itself work as *Twak mansa shtirikaro* (increase the durability of muscle and skin) by which it gives strength of muscles and ligament of neck region.<sup>[21]</sup> *Ashwagandha tail* is used in *basti*. *Ashwagandha* is *Balya*(anabolic, provide strength), *Brahniya* (nourishes the bone and muscles) and *Rasayana* (immunomodulator).<sup>[22]</sup> *Panchtikta ghrita* are used for its *Tikta rasa* (taste) and useful in *Asthi dhatu chikitsa* . Here we used *Yapana* manner of *basti* because this is suitable for healthy, patients and old age persons.<sup>[23]</sup> *Shalishastic pind swedan* is mentioned in *Vata vikara*.<sup>[24]</sup> *Bala moola kwath* which was used in *Shalishastic pind swedan* is having *Balya* property (provide strength).<sup>[25]</sup> *Nasya* used in *Urdhajatrugata roga*. *Nasya* enter in head region and pacify the *Dosha*<sup>[26]</sup> *Dashmoola kwath is tridoshara* (alleviating all deranged doshas), *Vedanasthapana*(pain killer) and *Shodhahar* (subside inflammation).<sup>[27]</sup> *Gokshuru* is having *mutrvirechniya*(diuretics) and *Shodhhara* (subside inflammations) property by which *Gokshura* lower down the blood pressure.<sup>[28,29]</sup> *Sarp Gandha* is inducing sleep and lower down the blood pressure.<sup>[30]</sup> *Shatavari* is a promoter of the muscle strengths and health.<sup>[31]</sup> *Ashwagandha* is gives strength to the muscles and ligament and it is also promote the health. *Yograja gugulu* is very effective in *Vata vyadies* and *Asthi –majjagat vata roga*. *Yograja gugulu* increases the *Agni* (digestive power) and *Bala* (strength).<sup>[32]</sup> All these treatment break the pathology of disease either of *Dhatu kshaya* by *Brihana* (provide strength to bone and muscle) property and *Margavrodha* by *Shrotoshodhak* property (clearance of micro channels) and give improvement in the symptoms of disease. Various non-surgical treatments have been in use such as cervical traction, cervical immobilization (collar or neck brace), skull traction and physical therapy (isometric exercise) but with limitations. In this type of case, surgical intervention is necessary. The cervical laminectomy is not appropriate for all

patients. It may lead to neurologic deterioration and attributed to a development of latent instability of the spine with development of kyphotic spinal deformities.<sup>[33]</sup> Hence this case study is important one as this shows the clinical improvement in Cervical Spondylosis Rediculopathy with *Panchakarma* and combinations of *Ayurvedic* medicines. There was no need to use any surgical intervention for this case.

**Table No 1: Panchkarma procedures.**

Panch karma procedures	Drugs	Method of preparation	Method of application	Day of treatment
<i>Shalishastika pind sweda</i>	<i>Shashtika rice</i> (Oryza sativa)+ <i>Balamoola</i> (Sida cardifolia)	300gm of <i>Shashtika</i> rice (Oryza sativa) is cooked with 1.5 litre of milk and decoction of <i>Bala moola</i> (root of Sida cordifolia). Four boluses made by This mixture with the help of four piece of cloth. Another portion of milk and decoction of same quantity was mixed and warming in low temperature to dip the above boluses for heated the <i>pottali</i> .	Massage with <i>Dashmool</i> oil was done over whole body for 15 minutes followed by massage over body for 45 minutes with the help of cotton <i>pottali</i> filled with bolus of processed rice.	16 days.
<i>Panchtikta ksheera basti</i>	<i>Nimb</i> (Azardiracta indica) + <i>Patola</i> (Trichosanthes dioica) + <i>Guduchi</i> (Tinospora cordifolia) + <i>Kantkari</i> (Solanum sursttense) + <i>Vasa</i> (Adhatoda vasica)	25 gm honey and 5 gm <i>Saindhav</i> salt mix properly then 30 ml luke warm <i>Panchtikta ghrita</i> and 50 ml luke warm <i>Ashwagandha tail</i> mix and entire mixture stirred.30 gm <i>Shatpushpa kalka</i> ( Anethum sowa) added in this mixture followed by 400 ml processed with milk decoction of <i>Panchtikta kwath</i> added.	After <i>Abhyang</i> and <i>Swedana</i> over local aria basti was given before the meal.	Continue <i>Kwath basti</i> was given for 16 day <i>Anuvasan</i> basti was not required in milk <i>Basti</i> .
<i>Nasya</i>	<i>Kshirbala oil</i> (Vindhychal drugs <i>Ayurvedic</i> pharmacy)		Massage with <i>Dashmoola</i> oil over face followed by <i>Mridu swedana</i> . 6 drops of <i>Kshirbala</i> oil administered in each nostrils followed by <i>Dhoompan</i> .	7 days

**Table No 2: Oral medications.**

Name of drug	Dose	Anupana	Day
<i>Ashwagandha avleha</i> (procured from Dabur India company)	10 gm twice in a day	Luke warm water	Three months from first day of admission
<i>Yograj guggulu</i>	3 tab twice in a day in crushed form	<i>Dashmool kwath</i> (decoction of ten herbs)	Three months from first day of admission.
<i>Ashwagandha churna</i> (Withania somnifera)(2gm)+ <i>Shatavari churna</i> (Asparagus racemosus)(2gm)+ <i>Shankha bhasma</i> (500mg)	4gm bid(twice in a day)	With Luke warm water	Three months from first day of admission.
<i>Sarpagandha churna</i> (Rauvolfia serpentina) (1gm)+ <i>Gokshur churna</i> (Tribulus terrestris)(2gm)	3gm bid(twice in a day)	With Luke warm water	Three months from first day of admission.

**Table N0 3: Time line.**

Years	Incidence
2013	Patient got trauma followed by neck pain.
09/02/2014	Posterior osteophytes are seen in c <sub>4</sub> to c <sub>6</sub> vertebral bodies and at c <sub>5</sub> -c <sub>6</sub> posterior osteophytic ridges and protruding disc causes moderate spinal canal stenosis with narrowing of left neural foramina with mildly indenting the theca.
2015	Neck pain which radiated towards shoulders and right forearm started.
15/10/2015	Disc bulge at c <sub>3</sub> -c <sub>4</sub> , c <sub>4</sub> .c <sub>5</sub> , c <sub>5</sub> -c <sub>6</sub> and c <sub>6</sub> .c <sub>7</sub> , cord compression at c <sub>5</sub> .c <sub>6</sub> due to disc bulge.
2016	Stiffness in neck region and restricted movement of neck.
2017	Numbness and tingling sensation started in right upper arm and both shoulders
2018	Admitted in Kalawati Ayurved Medical college & Research centre, Kasganj.
18 Nov 2018	<i>Shalishastik pind swedan</i> , <i>Panchtikta ksheera basti</i> and combination of oral medication started
19 Nov 2018	<i>Nasya</i> and combination of oral drugs same as previous.
Dec 2018	Patient had got relief from symptoms as pain, restricted movement, numbness and tingling sensation.
24 dec 2018	Patient had discharged.
March 2019	Patient came with improved symptoms.

## CONCLUSION

The case report shows clinical improvement in a Cervical Spondylotic Radiculopathy with *Panchakarma* and *Ayurvedic* medicinal interventions.

## Consent

Written informed consent was taken from the patient for procedures and article publications.

**REFERENCES**

1. Davidson 'principles and practice of medicine, 20th edition part -2; neurological disease chapter-26; disorder of the spine and spinal cord; cervical spondylosis, 1241.
2. Edward C bezel M.D. Steven R Graffin M.D. and Christopher M Bono M.D. cervical spondylosis; patient history and case, 2013.
3. Voorhees RM. managing the more common cervical disorders. *IM Int Med*, 1996; 17.
4. Davidson's principles and practice of medicine, 20<sup>th</sup> edition part -2; neurological disease chapter-26; disorder of the spine and spinal cord; cervical spondylosis radiculopathy, 1241.
5. Davidson's principles and practice of medicine, 20<sup>th</sup> edition part -2; neurological disease chapter-26; disorder of the spine and spinal cord; cervical spondylosis, 1241.
6. Wu JC, Ko CC, Yen YS, Huang WC, Chen YC, Liu L, et al. Epidemiology of cervical spondylotic myelopathy and its risk of causing spinal cord injury: a national cohort study. *Neurosurg Focus*, Jul, 2013; 35(1): E10.
7. Singh SK, Rajoria K. Ayurvedic approach for management of ankylosing spondylitis: a case report. *JAIM*, 2016; 7: 53e6. [Pub Med].
8. Singh SK, Rajoria K. Ayurvedic approach in the management of spinal cord injury: a case study. *Anc Sci Life*, 2015; 34: 230e4.
9. Singh SK, Rajoria K. Ayurvedic management in cervical spondylotic myelopathy: a case study *JAIM*, 2017; 8: 49-53.
10. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr Gorakhnath chaturvedi part-1, sutra sthan chapter 20, shloka 11, Vidhyotini Vyakhya Choukhambha bharti academy Prakashan, Varanasi Reprinted, 2008; 399.
11. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala, by Dr Gorakhnath chaturvedi part-2 ,chikitsa sthan chapter 28 shloka 23, Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2011; 780.
12. Astang Hridaya of Vagbhata with sarvang sundar commentary by Arundatta and Ayurveda rasayan commentary by Hemadri, edited pt.Harisadashiva shastri paradakara sutra sthan chapter -20, verse no, Choukhambha Surbharati Prakashan Varanasi Reprinted, 2011; 019: 287.
13. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr Gorakhnath chaturvedi part-1, sutra sthan. Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2008; 20(13): 402.

14. Epstein N. Posterior approaches in the management of cervical spondylosis and ossification of the posterior longitudinal ligament. *Surg neurol*, Sep-Oct, 2002, 58(3-4): 194-207; discussion, 207-8.
15. Epstein N. ossification of the posterior longitudinal ligament: a review. *neurosurg focus*, Aug 15, 2002: 13(2): ECP1.
16. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala with Ayurveda Dipika Commentary by chakrapanidatta, edited by Vaidya Yadavaji Trikamji Acharya, Chikitsa sthana capter 28, verse no.59, Choukhambha Surbharati Prakashan Varanasi Reprinted, 2008; 619.
17. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala, by Dr Gorakhnath caturvedi part-1, sutra sthan chapter 28, shloka 27, Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2008; 573.
18. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr Gorakhnath chaturvedi part-1 , sutra sthan chapter 25, shloka 40, Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2008; 468.
19. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr Gorakhnath chaturvedi part-2, siddhi sthan chapter 1, shloka 39, Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2011; 971.
20. Astanga Hridaya by Vagbhatta, with the commentaries 'Sarvangasundara' of Arunadatta and Ayurvedarasayana of Hemadri, Arunadatta on Sutrasthana chapter 11, shloka 31, page no-187, Krishnadas Academy, Varanasi, 2000; 4118.
21. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr Gorakhnath chaturvedi part-1, sutra sthan, chapter 26, shloka, Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanarsi Reprinted, 2008; 42(5): 506.
22. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr. Gorakhnath chaturvedi part-1 sutra sthan chapter 4 shloka 77. Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2008; 17(7).
23. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr Gorakhnath chaturvedi part-2, siddhisthan, chapter 12, shloka 21, 1107, Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2011.
24. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr Gorakhnath chaturvedi part-1, sutra sthan, chapter 14, shloka 25, 286, Vidhyotini Vyakhya Choukhambha bharti acedemy Prakashan Varanasi Reprinted, 2008.

25. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr Gorakhnath chaturvedi part-1 sutra sthan, chapter 25, shloka 40, page no-466, Vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2008.
26. Charaka Samhita of Agnivesha elaborated by Charaka & Drudhabala by Dr.Gorakhnath chaturvedi part-2 Siddhi Sthan chapter 2 shloka 22 page no-986 vidhyotini Vyakhya Choukhambha bharti academy Prakashan Varanasi Reprinted, 2011.
27. Kanjiv Lochan. Bhaisajya Ratnavali of Govinda Dasji Bhisagratna commented upon by Vaidya Shri Ambika Datta Shastri, Volume II, Chapter 29, verse no.37, 2006 edition, Varanasi: Chaukhambha Sanskrit Sansthana, 2006; 335.
28. Al-Ali M, Wahbi S, Twajj H, Al-Badr A, Tribulus terrestris: Preliminary study of its diuretic and contractile effects and comparison with zea mays, j, Ethno pharmacology, Apr, 2003; 85(2-3): 257-60. Pubmed PMID:12639749.
29. Mohd J, Akhtar AJ, Abuzer A, Javed A, Ali M, Ennus T, Pharmacological scientific evidence for the promise of Tribulus terrestris, International Research Journal of Pharmacy, 2012; 3(5): 403-406.
30. Lobay douglas, Rauwolfia in the treatment of hypertension, Integrative medicine, June 2015; 14: 3.
31. Encyclopedia of Herbs and their Uses Deni Bown, Dorling Kindersley, 1995. ISBN:0-7894-0184-3 Yoga of Herbs, Ayurvedic Guide Dr. Vasant Lad and David frawley, Lotus press, 1986. ISBN0941-524248
32. Bhaishjya Ratnavali of Kaviraj Shri Govind das sen elaborated edited with Siddhiprada hindi commentary by Prof. Siddhi Nandan Mishra, volume-1<sup>st</sup> chapter-29, shloka 152-157, page no-608, Chaukhambha Surbharati Prakashan Varansi edition 1<sup>st</sup>, 2005.
33. Mikawa Y, Shikata J, Yamamuro T. Spinal deformity and instability after multilevel cervical laminectomy. Spine (Phila Pa1976), 1987; 12: 6 e11.