Clinical significance of cervical vertebrae –A review article

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ABSTRACT:-

A forward head posture has become identity of computer users. The laptops or computer has become essential for most the people. Computers are used for both communication and entertainment purposes, such as messages, music, media, internet access, photos, and games. Since last decade, there has been a rapid increase in the use of computer and mobile phones for communication. Long bending of Neck, forward bending and sitting for long periods in front of computers more prone to degenerative changes in cervical spine. So there is need to focus on the maintenance of health of cervical spine and for that purpose its very essential to know normal anatomy of cervical vertebra, its degenerative changes& clinical significance. The aim & objectives of this study is to compare the literature study and emphasis on the importance of good health of cervical spine. All the relevant material was compiled from Brihatrayi and available commentaries on it. Research articles are also searched from various websites. All the references were collected & analyzed & finally conclusion was drawn. Conclusion of this study is cervical vertebrae play an important role in the maintain posture and if proper precaution not taken it will lead to degenerative changes & forming an ailment.

KEY WORDS: - Cervical vertebrae, Griva, Manyastambha, Neck Pain

INTRODUCTION:-

In Ayurveda, Sharir term tells that anatomical nomenclature of each structure is concern with its function. There is very brief description of vertebrae in AyurvedicSamhitas also the diseases of vertebral column have not described separately ,some terms like “Manyastamba” or “Manyagraha” are used as symptoms of other diseases.1,5 MadhukoshVyakhya, AcharyaMadhavNidan says that Diwaswap (afternoon sleep), uncomfortable sitting ,continuous upward movement of neck are the causative factors for Manyastambha.9 Manyastambha is one of such lifestyle disorder which is originated from Excessive use of vehicle ,excessive
travelling on two wheelers, continuous sitting an hours on computers, jobs that requires heavy lifting or a lot of bending and twisting, lack of exercise, unhealthy food habits and suppression of natural urges.

Acharya Sushruta has paid a little attention by saying “GrivayaNav.” Also he has mentioned vertebra as Prushthasthi and stated its number as 30, while Acharya Haranchandra has mentioned there are 34 Prushthasthi in Sharir.6,7 Now a days , the complex life style of human being with excessive use of computers, mobile phone and advanced technology leads to many vertebral diseases specially at cervical region because cervical vertebrae perform very important role as a vital mobile bridge between the head and trunk.

Computers or desktop users frequently adopt prolonged forward head posture while looking towards the screens of computers, almost all individuals had the neck flexed forward and did not support their arms.10 This causes static muscular load in the neck and shoulders. The term ‘text neck’, or another phrase ‘turtle neck posture’, can be described as a repeated stress injury and pain sustained from excessive watching or texting on mobile phones for long periods of time.11 Moreover, the maintenance of a head-forward posture decreases cervical lordosis of the lower cervical vertebrae and creates a posterior curve in the upper thoracic vertebrae to maintain balance; this is known as the forward head posture.12

Aim & objectives:

1) To collect the references from different Ayurvedic texts regarding the concept of Griva Manya.
2) To collect the references from different modern texts regarding the Cervical spine and its clinical significance.
3) To compare the literature study and emphasis on the importance of good health of cervical spine.

Material & Methods:-

This is conceptual type of study, all sort of references has been collected and compiled from various available Ayurvedic classics text like Sushrut Samhita, Charak Samhita, Vagbhat Samhita and available commentaries on it. Literature is also compiled from modern text books. Research article is also searched from various website related to Griva , Manya and cervical vertebra. All Matter is analyzed and attempt has been made to draw best possible conclusion.

REVIEW OF LITERATURE:-

Ayurved Review-

In MadhavaNidanam, the Lakshana’s of Manyastambha is explained same as of Sushruta. SharangadharaSamhita in his PrathamaKhanda also mentions the Disease Manyastambha As Antara by Vagbhata.5

Aacharya Charaka, in CharakaSamhita , Sutrasthan 20th chapter, named Maharogadhyaya 8th Sloka says Manya is the Pratyanga of Greeva and in 11th Sloka quotes both the terms Manyastambha and GreevaStamba under the 80 NanatmajaVikara’s Of VataDosha . In CharakaSiddhiSthana, 2nd chapter 22nd Sloka, we find the definition of GreevaRoga which is defined as, the disease occurs in Greeva or neck region. In ChikitsaSthana, 28th chapter of CharakaSamhita the disease GreevaHundana and in 22nd SlokaGreevaStamba its Laksana or
symptoms are given. In *IndriyaSthana*, the term *Greevavamarda* or *Greevapida* is described in the concept of *AristaLaksanaBheda* i.e. the signs of imminent death. *AacharyaSushruta* quotes the term *Manyastambha* for the pain and stiffness occurring in neck. Region found in *VatavyadhiChikitsa* of *NidanaSthana* which is said to be due to *Vata* vitiation associated with *KapahaDosa*. Apart from *SamanyaVatavyadhiChikitsa*, specific *Nidana*, *Samprapti* and *Chikitsa* for the disease is also given. *AshtangaHradayakaraVagbhata* calls *Manyastambha* or the neck pain as *Antarayama*.

**Krukatika Marma :-**

Fourteen *Marmas* are present in the neck region, *Krukatika*are two among them, located at the junction of *Shiras* (head) and *Greeva* (neck) constituted by *Sandhi* (joints) and measures only 1 cm (half *Angula*) dimension.,

*Krukatika Marma* is one which is situated at *Shirogreevasandhane* i.e. at cranio cervical joint on the neck so it is *Sandhimarma*, mainly Atlanto-occipital joint with ligaments &membranes of atlanto occipital joint it’s lateral ligament are the vital points or structures to be considered. Injury to this gives rise to *Chalamurdhata* (loss of stability of head), therefore this is included under *Vaikalykara* (deformity) category.

Categories in which the *Krukatika Marma* is included 1,2

I. *Urdhwajatrugat Marma* (*Shiro* = Head, *Greeva* = Neck)

II. *Sandhi Marma* – *Krukatika Marma* is predominantly made up of *Sandhi* i.e. bony joints.

III. The other elements namely *Snaya* (ligaments), *Siraa* (blood vessels, veins), *Asthi* (bones) and *Mamsa* (muscles) are also present but in a lesserproportion.

IV. *Vaikalyakara Marma* – (*Vaikalyakara* – deformity forming) *Krukatikakarma*

**MODERN ANATOMY OF CERVICAL VERTEBRAE**

The vertebral column is a segmental set of 33 bones and associated soft tissues that comprise the subcranial portion of the axial skeleton. It subdivides into five regions based on curvature and morphology: the cervical, thoracic, and lumbar spine, the sacrum, and the coccyx. The cervical spine, consist of seven cervical vertebrae C1 to C7, is divided into two major segments: the craniocervical junction (CCJ) and the subaxial spine. The CCJ includes the occiput and the two most cranial cervical vertebrae known as the atlas (C1) and the axis (C2). The subaxial spine includes the five most caudal cervical vertebrae (C3-C7). As a whole, the cervical spine is responsible for supporting the weight of the cranium and allowing motion of the head and neck.

**Typical Features of the Cervical Spine**

The main function of the cervical spine is to support and help to perform the movement of the head and neck. Large vertebral bodies are not necessary considering the relatively small weight-bearing load at this level. Thus, an increased range of motion takes priority over vertebral size and rigidity. However, the additional motion and flexibility may carry an increased risk for injury of the spinal cord and its associated neurovascular structures. All cervical vertebrae have a transverse foramen in
their transverse processes, where a pair of vertebral arteries passes cranially towards the foramen magnum to form basilar artery. The spinous processes of the C2 to C6 vertebrae are bifid, C1 has a posterior tubercle instead of a spinous process, and C7 has a vertebra prominens, large spinous process.\textsuperscript{13,14}

The Axis (C1) and the Atlas (C2)

The main function of the atlas, or C1 is to support and mount the base of the occiput at the atlanto-occipital articulation. It has no body, no transverse processes and no spinous process like remaining cervical vertebra. The atlas has prominent concave and medially facing articular facets which articulate the convex occipital condyles. This morphology helps the joint contribute roughly fifty percent of flexion-extension of the neck but limit lateral displacement of the occiput. These joints receive further stabilization from strong soft tissue ligaments that promote tight adherence to the occiput.\textsuperscript{16}

The axis, or C2, also has unique anatomical features. Whereas the atlas is responsible for accommodating the occiput, the axis is the primary weight-bearing bone of the upper cervical region. Its odontoid process, is a bony projection that extends cranially from the vertebral body. It’s from the body of the atlas and serves as the principal attachment point for the soft tissues that stabilize the atlanto-axial junction. In contrast to the atlanto-occipital joint, the atlanto-axial junction is causative for about fifty percent of the rotational motion of the cervical spine.\textsuperscript{8,17}

The junction has three articulations: a midline atlanto-odontoid join and a pair of atlanto-axial facet joints. The atlanto-odontoid joint permits the anterior arch of the atlas to pivot on the odontoid process. The lateral facet joints mean the inferior facets and the superior facets of the axis with atlas which allows for significant motion.\textsuperscript{13,14,16}

The transverse foramen of C7 is smaller in diameter in comparison to the rest of the region and typically do not pass the vertebral arteries. Instead, the vertebral arteries cross anteriorly to the transverse processes of C7 before proceeding cranially through the transverse foramina of C6. It has a spinous process and inferior facets that resemble thoracic vertebrae. The vertebra also has a somewhat larger vertebral body.\textsuperscript{16} Despite the presence of seven cervical vertebrae, there are eight pairs of cervical nerves, termed C1 to C8. C1 through C7 exit the spine cranially to its associated vertebrae, while C8 exits caudally to C7.\textsuperscript{20}

**DISCUSSION:**

As mentioned above in Ayurveda Manyashool, Manyagraha, Manyastambha are described as a Vatadoshaj nanatmak vyadhi, chronicity of disease manifest into Anatomical changes in cervical Spine. Sign & symptoms of Manyastambha can be correlated with cervical spondylosis of modern science.\textsuperscript{9}

Acharya Sushruta in Sushrutasamhita dealt Manyastambha as the prodromal symptom of Apatanaka, in Vatavyadhi.\textsuperscript{8} Acharya Sushruta has described that, the Vata Dosha along with Kapha Dosha gets vitiated and take Ashraya at Manya Pradesh affecting the Manyasiras causing Ruja and Stambha of the neck.\textsuperscript{5,8} Every structure included in the musculoskeletal framework of the back of neck can be a potential cause of Manyastambha. Degree of deformity, number of levels affected, individual pain generating capacity, individual strain threshold are some of the factors with
respect to structural damage, which can decide the presentation of Manyastambha. Here we can correlate Manyastambha with severe to chronic neck pain i.e. cervical spondylosis, as well if injury happens to cervical region patient has to be examine for Ayurvediya Samanya Marmaghat Lakshane with specific KrikatikaViddhhaLakshane.7

If we see clinical significance of cervical spine, we can say anatomical curvature of cervical spine plays important role to prevent injury as well we have to maintain it.

Cervical Spondylosis - Injury to intervertebral discs, ligaments or degenerative changes of old age may rupture the thin lateral parts of the annulus fibrosus resulting in prolapsed of the nucleus pulposus. This is known as disc prolapse or spondylosis commonly occur in lower cervical region which causes radiating pain along the distribution of the cervical nerve. Cervical degenerative changes arise from conditions as spondylosis, stenosis of intervertebral discs, and the formation of osteophytes.21

Cervical Lordosis is the normal inward lordotic curvature of the lumbar and cervical regions of the human spine. The discs are thicker anteriorly and therefore contribute to normal cervicallordosis. Loss of Cervical lordosis is more common in adults, the condition can present in children. Both men and women are affected equally, having no significant predisposition to race or ethnicity. The condition is known to be the result of years of poor posture and muscle spasms of the neck. Poor posture is commonly seen in individuals who work on a computer for long hours, which leads to neck strain i.e. neck muscles that causes them to pull on the cervical spine, which they are attached to. Over time, poor posture can lead to the misalignment of the cervical spine.21 22

CONCLUSION:-
As a whole, the cervical spine is responsible for supporting the weight of the cranium and allowing motion of the head and neck. The main function of the cervical spine is to support and help to perform the movement of the head and neck.

The studied literature shows neck pain can be classified on the basis of duration into acute, subacute, or chronic and mechanically into mechanical, neuropathic, or referred. Acute neck pain often causes from trauma or sports injury. Krikatika Marma is the site of atlantooccipital joint along with c2, so in case of acute neck pain it should be noticed. Subacute and chronic neck pain also share diverse etiology like Manyastambh, Manyagraha etc symptoms can be considered neck pain related to degenerative changes of cervical vertebra. Vatapradhan Prakriti people are found to be much more prone to cervical vertebra diseases specialy cervical spondylosis. Arthritis of cervical facet joints is a common cause of mechanical neck pain. Meanwhile, nerve root compression, intervertebral disc herniation, and spinal stenosis are the most frequent cause of peripheral neuropathic neck pain.

Ayurved’s regimen i.e Dincharya and Rutucharya is definitely helpful to decrease the percentage of neck pain for e.g. avoide Vatprakopaka Aharvihar Yoga and meditation. Be mindful of your posture, it is suggested to sit and stand with your shoulders back and make sure that you’re not pushing your head forward, and your ears should line up upright with

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your shoulders. Optimize your workplace it is suggested to raise your monitor about three inches above eye level as looking down on your screen can cause muscular spasm with neck pain.

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