



## CORRELATION BETWEEN NECK PROPRIOCEPTION WITH NECK PAIN AND DISABILITY IN PATIENTS WITH MECHANICAL NECK PAIN

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**ABSTRACT** **INTRODUCTION:** Pain located in the neck is a common medical condition. Neck pain can come from a number of disorders and diseases and can involve any of the tissues in the neck. Examples of common conditions causing neck pain are degenerative disc disease, neck strain, osteoarthritis, cervical spondylosis, spinal stenosis, poor posture, neck injuries such as whiplash, a herniated disc, or a pinched nerve (cervical radiculopathy). One of the main problems of patients with neck pain is the impairment of cervical proprioception which leads to the disturbance of cervical sensorimotor control. **METHODS:** An experimental study was conducted on 30 patients having acute, sub acute and chronic neck pain at Dolphin Health centres, Dehradun. The neck proprioception was tested by using (JPE) i.e. Joint Position Error Tool. Descriptive analysis for neck proprioception along with neck pain and disability was done. **RESULTS:** The patients showed significant positive correlation between neck pain, disability and proprioception. **CONCLUSION:** In patients with Mechanical Neck Pain and Disability, the proprioception of neck is positively affected. The result of this study concludes presence of strong relationship between neck proprioception deficit and pain along with disability. Thus, inclusion of rehabilitation or training of neck proprioception should be an integral part of management in patients with neck pain.

**KEYWORDS :** neck pain, cervical proprioception, cervical sensory motor

### Introduction

Neck pain (NP) is a common phenomenon with a point prevalence between 5.9% and 38.5% with a mean prevalence of 7.6%.<sup>1</sup> About two thirds of the population have neck pain at some time in their lives, and prevalence is highest in middle age.<sup>2</sup> Neck pain is a common condition and one of the leading causes of disability worldwide, with mean estimates of 7.6%-point prevalence (range, 5.9–38.7%), 37% annual prevalence (range, 16.7–75%), and 48.5% lifetime prevalence (range, 14.2–71%).<sup>3</sup>

Most patients who present with neck pain have “nonspecific (simple) neck pain,” where symptoms have a postural or mechanical basis. Aetiological factors include poor posture, anxiety, depression, neck strain, and sporting or occupational activities. Neck pain after whiplash injury also fits into this category, provided no bony injury or neurological deficit is present. Although neck pain can be attributed to traumatic (such as whiplash-associated) disorders, metabolic, neoplastic, inflammatory, or infectious diseases, most neck pain has no discernible cause and is considered to be idiopathic.<sup>4,5</sup>

The cervical spine has a very delicate proprioceptive system, which signals the position of the head relative to the trunk, coordinates the vestibular and visual systems and plays a crucial role in controlling posture and balance.<sup>6</sup> One of the main problems of patients with neck pain is the impairment of cervical proprioception which leads to the disturbance of cervical sensorimotor control.<sup>7</sup> Cervical sensorimotor control involves central integration and processing of all the afferent information (i.e., visual, vestibular, and cervical proprioceptive inputs), and execution of the motor program through the cervical muscles, contributing to the maintenance of head posture and balance as well as the stability of cervical joints.<sup>8</sup>

In spite of these known facts, proved by various researches, there is still a dearth of literature to prove any relationship between cervical proprioception and the disability and pain caused in neck pain patients.

### Methodology

An experimental study was conducted to see the Correlation between neck proprioception with neck pain and disability in patients with mechanical neck pain.

The scale used to measure the pain was VAS<sup>9</sup> for disability we used NDI and for proprioception error in patients of neck pain we used JPE (Joint position error tool). Data was collected after the purpose of study was explained to subjects and the consent form was signed.

The patient with neck pain provided a VAS form where the scores were recorded accordingly to their pain.

The NDI is a self-assessment instrument of the specific functional status of subjects with neck pain with 10 elements, including pain, personal care, weight gain, reading, headache, concentration, work, driving, sleeping, and leisure.

The Cervical JPE Test is a measurement tool used to clinically assess an individual's cervicocephalic proprioception ability. Cervicocephalic proprioception describes one's sense of position of their head and neck in space.<sup>10</sup> The Cervical JPE Test measures the ability of a blindfolded patient to accurately relocate their head position back to a predetermined neutral point after cervical joint movement. The test is most commonly performed with head movement in the transverse and sagittal planes.<sup>11</sup>

### Data analysis

The collected data was analyzed using IBM SPSS Statistics 23. Descriptive statistics were computed. Pearson Correlation coefficient was computed to analyse the correlation between the domains of the study. The statistical significance was set at 0.05 with 95% of the confidence interval.

### Result

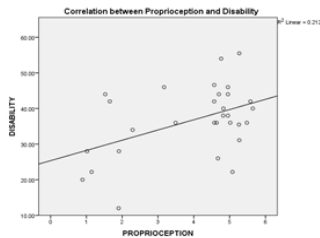
A total of 30 subjects were enrolled for the study with a mean age of 38.10 ± 9.94 years. The average proprioception impairment was 3.95 ± 1.579. Meanwhile, the mean VAS and disability score was 5.63 ± 1.691 and 36.7033 ± 9.845 respectively.

**Table 1 : Descriptive Statistics**

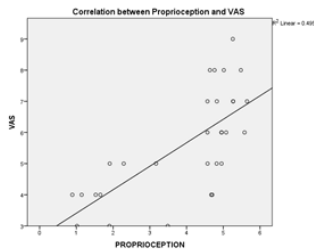
	Mean ± SD
Age	38.10 ± 9.949
Proprioception Impairment (Cervical JPE)	3.95 ± 1.579
VAS	5.63 ± 1.691
NDI Score	36.7033 ± 9.845

The correlation analysis revealed statistically significant positive correlation between age and proprioception impairment, implicating linear relationship between age and proprioception impairment. Similarly, age was found to have statistically significant positive linear relationship with VAS (R=0.4, P=0.029) and disability score (R=0.398, P=0.029). Also, proprioception deficit was found to have

strong statistically positive significant correlation with VAS ( $P=0.704$ ,  $R=<0.01$ ) and disability score ( $P=0.460$ ,  $R=0.010$ ). VAS was also found to be significantly correlated with disability score ( $P=0.408$ ,  $R=0.025$ ).



**Fig 1: Correlation between Disability and Proprioception**



**Fig 2: Correlation between Pain and Proprioception**

### Discussion:

The results demonstrated statistical significant positive correlation between neck pain, disability with proprioception suggestive of positive linear relationship of cervical proprioception error in the population with neck pain as well as disability. This could be as proprioceptive information is transmitted to the central nervous system through an encoding across populations of afferent receptors, the ensemble coding, rather than the discrete units from individual receptors.<sup>12</sup> In physiological conditions, cervical proprioceptive information from cervical muscle spindles and mechanoreceptors of cervical discs and facet joints is integrated and transmitted to the central nervous system to control head position, head orientation, and full-body posture.<sup>13</sup> Any dysfunction of these cervical sensory organs or asymmetry of afferent inputs can lead to a sensory mismatch between abnormal information (e.g., from degenerative discs) and normal information (e.g., from normal spindles).<sup>14</sup>

The cervical sensorimotor control disturbances secondary to neck pain are considered as a protective response to limit further stimulation of the painful tissue. Such disturbances may, in the long run, further cause tissue damage, aggravate pain through peripheral and central nervous system sensitization, and promote dysfunctional motion patterns.<sup>15</sup>

Our study was supported by Ravi Shankar Reddy et al.<sup>16</sup> who concluded that significant positive correlation between neck pain intensity and position sense in subjects with CS. Pain models that were experimentally induced showed a positive influence between pain and proprioception. The substances that are chemically mediated during the pain response might alter free nerve ending discharges due to sensitization and produce abnormal pain afferents (gamma-motor neuron and muscle spindle), thus impairing kinaesthetic input. Although lot of techniques could be used to treat the pain related to proprioception. According to Warikoo et al.<sup>17</sup> progressive Resisted exercise and kinesiotaping of lower trapezius are both significantly effective in reducing the pain and disability of patients with unilateral neck pain. The result of this study depicted the presence of strong relationship between neck proprioception deficit and pain along with disability. Thus, inclusion of rehabilitation or training of neck proprioception should be an integral part of management in patients with neck pain.

### CONCLUSION:

In patients with Mechanical Neck Pain and Disability, the proprioception of neck is positively affected.

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