

## Original Research

# Changes At Cervical Spine Due To Carrying Of Head Load Over Long Time

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### ABSTRACT

**Background: Aim and Objective:** The aim of the study was to compare the changes at cervical spine seen on lateral view of cervical spine radiograph in group of people {head load carrying coolies} carrying head load more than ten kgs for over five years or more. **Materials and Method:** Twenty coolies from Chiplum railway station were included in the study, all under forty years of age. Other group consisted of staff members from our medical college who had not carried head load ever. This group also had twenty individuals and they were also under forty years of age. They were made to answer a questionnaire which comprised of symptoms related to cervical spine. Lateral view of cervical spine was obtained in all of the participants. **Results:** First group of individuals {college staff}, out of twenty- five complained of neck pain and headache {16.6%}. None complained of tingling at upper limb {0%}. None had any obvious changes at cervical spine. Second group of individuals {railway station coolies}, out of twenty – all complained of neck pain {100%} while ten complained of tingling at the upper limb {50%}. Eighteen {90%} showed one of change at cervical spine degeneration on radiograph. **Conclusion:** The findings concluded that carrying excess head load over long term does cause changes at cervical spine in majority of individuals. The changes depend on varied factors with how much weight they carried and for how long.

**Keywords:** Cervical spine pain, Tingling numbness, Osteophyte.

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### INTRODUCTION

The cervical spine is one of the most mobile part of human spine. It not only carries the weight of the head but also it helps the movement of the head in around 180 degrees in horizontal plane and more than 100 degrees in vertical plane. With age there is degeneration of the cervical spine seen and it starts at around 45 years even in normal individuals. However putting stress on the cervical spine by carrying heavy head load over prolog time causes these changes in early age too. Various symptoms like headache, neck pain, pain and weakness at the upper limbs, anxiety, depression, inability to concentrate, lack of sleep, etc are seen. Pain at the cervical spine being the most common symptom. Hence study was carried out in individuals who carry excess head load {coolies on railway station} and the changes were compared with the staff of our medical who didn't carry any head load.

### MATERIALS AND METHODS

Twenty staff members of our Medical College were taken as control group of participants of the study. Twenty coolies from Chiplum Railway station were considered as group to be studied. Thus forty participants were included in the study. All of subjects were males. Cut-off age was forty years. It was seen  
If yes specify -

that the control group members {medical college staff} hadn't carried any head load in last five years. The study group members {coolies} were chosen who carried at least ten kgs of head load in form of passenger luggage atleast 10 times in one week for more than ten minutes each for more than five years. Those having diagnosed medical condition like diabetes, hypertension, heart element or known neck element were excluded from the study group. Consent was obtained from all. Lateral radiograph was obtained on three hundred mA machine. The radiograph was studied to see for changes like:

-loss of cervical lordosis,-marginal osteophytes,-vertebral body height reduction,-reduced disc space,-lysis or listhesis

Questionnaire –

Name was masked. Age –

Do you carry head load – If yes how many kgs approximately and for how many days a week.

How long have you been working as a coolie at the railway station.

Do you have any symptoms like neck pain/ pain or tingling at the upper limb.

If yes since when –

Do you have any diagnosed medical condition like diabetes, hypertension or any disease related to heart or neck –

**Table1:SymptomsinGroup 1**

<b>Neckpain</b>	<b>20 {100%}</b>
Tinglingatupperlimb	10 {50%}

**Table:2–Symptomsingroup 2**

<b>Neckpain</b>	<b>2 {10%}</b>
Tinglingatupperlimb	0 {0%}

**Table3:RadiologicalfindingsinGroup 1**

<b>lossofnormalcervicallordosis</b>	<b>18{90%}</b>
Marginalosteophytes	18 {90%}
Reduceddiscspaces	10 {50%}
<i>Lysisorlisthesis</i>	<b>0 {0%}</b>

**Table4:Agegroups**

<b>Age</b>	<b>GroupI</b>	<b>GroupII</b>
30to35 years	10	10
35to40 years	10	10



**Image 1: {Group 1 individual} – Degenerative changes are seen in form of loss of normal lordosis, osteophytes and reduced C5/6 and C6/7 disc spaces.**



**Image2:{Group2individual}–Unremarkablecervicalspineradiograph.**

## DISCUSSION

The aim of the study was to prove that excess {more than 5 years} carrying head load for more than 5 years lead to changes of spondylosis in young adults with changes confirmed on lateral radiograph of cervical spine. As I was using lateral radiograph of cervical spine I limited the symptoms to neck region. The most common symptom observed in individuals {coolies} was neck pain. It was seen in 20 individuals out of twenty. Tingling at upper limb was seen in ten individuals. Ninety percent individuals of the first group showed changes on cervical spine radiograph. The most common radiological finding was loss of normal cervical lordosis which meant that the muscles of the neck had been in spasm due to excess use over long term. In group two {who did not carry head load} only 5 individuals complained of neck pain. None of them showed any radiological changes. Carrying a load on the head has been shown to have detrimental effects on the cervical spine.<sup>1</sup> However, the railway porters, continue to carry loads on their heads as an integral part of their job. There is, no specific notification exists against carrying weights on the head. There is a lack of awareness, as well as scientific evidence, about the detrimental effects of head loading on the cervical spine. In contrast, several studies have shown that carrying a load on the head causes the least deviation from normal gait as compared with carrying on the shoulder or hand.<sup>2</sup> A thorough understanding of the biomechanics of the cervical spine and the effect of head loading on these biomechanics and any attendant degenerative process would enable us to understand the true effects of repeated axial loading of the spine. The spine is a complex structure that functions to protect the spinal cord and support loads in numerous postures and positions. The normal cervical

spine motion exhibits an anterior–posterior translation during flexion and extension. The motion segments of the cervical spine are complex joints. Each joint consists of three compartments— the disc and two facets—along with multiple ligamentous structures. The kinematic and load support capacities of the motion segment vary significantly as a function of the spinal level, the direction of motion, the direction of load applied, and temporal exposure characteristics. These biomechanical properties of the spine may be altered by trauma and degeneration.<sup>3</sup> Acute trauma is understood as a single force that exceeds the tolerance limit of the tissue. Another mechanism of tissue damage is the repeated cumulative loading of the tissues. Repeated loading by moderate force can cause the tissue to strengthen and adapt to the load. However, repetitive loading without proper rest time can cause tissue degeneration, leading to a weakening of the structure and its failure at lower levels of trauma. In his study, Levy<sup>4</sup> observed that cervical spine injuries in porters' necks were more likely to involve the upper cervical spine rather than the lower cervical spine, as is the usual trend in trauma. To understand the reasons behind such a deviation in injury pattern, Levy<sup>4</sup> subjected seven randomly selected porters to radiographic examination with a load on their heads. He observed that, when loaded, the vertebral bodies and intervertebral discs assumed a vertical position, which would relieve some of the stress on the ligaments and intrinsic muscles. However, the disc was compressed, and forward tilting of the vertebral body on diseased discs reduced the amount of overriding of corresponding facet joints, thereby predisposing the spine to injury. Joosabet *al.*<sup>5</sup> studied the cervical radiographs of loaders and non-loaders. They observed a major decrease in the angle of lordosis in loaders with no

significant difference in spinal canal diameter. A decrease in disc height was observed with age, which was most remarkable at the 5th intervertebral disc. Although the loader group exhibited no such correlation with age, loading appeared to cause a redistribution of changes in disc height, with the 1st intervertebral disc showing changes similar to those seen in the 5th intervertebral disc. Jager *et al.*<sup>1</sup> evaluated the relationship between load carrying on the head and development of degenerative changes in the cervical spine. They observed a higher prevalence of degenerative changes in loaders as compared with non-loaders, with the highest prevalence at C5/6, followed by C4/5 and C6/7. Joosabet *al.*<sup>5</sup> found no major difference in canal diameter, whereas the studies of both Taitz<sup>6</sup> and Echarri and Forriol<sup>7</sup> demonstrated a narrow medullary canal with degenerative changes in head loaders. Echarri and Forriol<sup>7</sup> observed degenerative changes in 13.9% of wood bearers in cranial vertebrae as compared with only 2.3% in controls. They also observed listhesis in 20.8% of wood bearers as compared with 2.3% of controls, with C4 involvement in more than half the cases. In my study loss of cervical lordosis was most common finding noted on cervical radiograph. Thus, carrying a load on the head markedly accelerates the degenerative process in the cervical spine, thereby making these loaders vulnerable to consequences of cervical spondylosis, including neurological compromise at an early age, as well as increased susceptibility to cervical spine injuries. Since the study involved human subjects, the number of subjects and the loads carried on their heads were limited by the recommended safety limits of the region and the institutional ethical committee. This study, however, was able to convincingly document the accelerated degenerative changes of the cervical spine in loaders, as well as the effects of acute loading. However, it would have been more useful if long-term changes induced by carrying loads were documented, which

would go beyond the scope of this research.

## CONCLUSIONS

Carrying a load on the head leads to a loss of cervical spine lordosis, reduction in disc height, remarkable translation of vertebrae, and redistribution of degenerative changes to the upper cervical spine, accelerating the cervical spine degenerative process and decreasing the threshold of injury in head loaders. Cervical spine degenerative disorders in appropriate settings may be considered as an occupational disease. Since carrying a load on the head is detrimental to the cervical spine, it is recommended to use alternative methods of carrying loads. No potential conflict of interest relevant to this article was reported.

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