Original Article

A comparative study to evaluate symptomatic low back pain relief in taxi drivers using lumbar back support

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Abstract

Purpose: The purpose of the study is to evaluate the low back pain relief in 30 long distance taxi drivers using lumbar back support. Visual analogue score and Oswestry Disability Score used for evaluation. **Result:** For visual analogue scoring system using paired t test gave p value < 0.0001, wt-14.00 and df=29 showing significant result in the pair. According to Oswestry Disability Score mean 56% of moderate disability before using lumbar back support showed change to 6.48% minimal disability after using the back support. **Conclusion:** A lumbar back support gave symptomatic pain relief in car drivers with low back pain.

Keywords: Lumbar lordosis, low back pain, back support, taxi drivers.

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Received Date: 10/03/2016 Revised Date: 23/04/2016 Accepted Date: 12/05/2016

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 20 May 2016

INTRODUCTION

A lumbar back support is a structure that contacts the lower back area of spine during sitting. In automotive seats the lumbar support is not usually integrated into the backrest. The general purpose of the lumbar support is to stabilize the sitter's torso and thereby improve the comfort and postural stability. More specifically a firm seat structure behind the pelvis can resist the rearward rotation of the pelvis that accompanies sitting and reduced flexion (forward bending) of the lumbar spine[1]. Several risk factors exist for the development of low back pain, including prolonged sitting and flexed spinal curvature. The purpose of the current study was to determine whether a lumbar back support, accommodate the bulk of posterior pelvic soft tissue volume, in promoting a neutral spinal posture and improving patients with low back pain.[2] A normal lumbar spine has a lordosis curvature i.e. convex inwards and concave outwards. When the person sits, the pelvis usually rotates rearwards, flexing the lumbar spine. The flexion motion causes the lumbar spine to move from lordosis to flattening and then kyphosis because of the rotation of pelvis. [2] During sitting the spine flattens and there is posterior migration of the nucleus. The main objective of the lumbar support is to decrease the pressure in the intervertebral disc. Since the disc pressure is related to stress in the spine and Para spinal tissues, lordosis posture is more likely to maintain the intervertebral disc pressure [Fig 1].[3,4] The result of the musculoskeletal condition is a reduction in the work attendance and performance. For instance, 19% of those with low back pain (LBP) loose 6.2 hours of work per month and those with severe pain lose 8.2 hours of work per month.[5] Several risk factors have been identified for the development of LBP in individual's who are required to sit throughout the majority of their workday. These include prolonged muscle contraction[5,6], vibration[7], and sustained body postures. Postures outside of neutral are particularly troublesome[5,6-9] as they lead to prolonged level of muscle contraction[6] and changes in the intervertebral disc pressure.[8,10]

How to site this article: Harish B S, Manish D Chatte, Sangeet K Gawhale. A comparative study to evaluate symptomatic low back pain relief in taxi drivers using lumbar back support. *International Journal of Recent Trends in Science and Technology* May 2016; 19(1): 122-125. http://www.statperson.com (accessed 22 May 2016).

MATERIALS AND METHODS

30 male participants between the ages of 30-60 were asked to participate in the study. 23 drivers are between the age of 30-50 and 7 between the ages of (51-60) years. Car drivers with history of LBP for at least 3 consecutive weeks prior to testing were selected.[2] Criteria's for including the drivers in study is participant's should be long distance drivers with minimum duration of 8 hours per day. Participants with pre-existing infection, chronic infections of spine, connective tissue disorders, neuromuscular disorders, scoliosis or any other deformity of spine are excluded from the study. Drivers with age more than 60 years and past history of any spinal surgeries are excluded from the study. Lumbar back support was provided to the patients when the criteria's were met [Fig. 2A, 2B, 3A, 3B]. Participants were evaluated using Oswestry Low Back pain score and Visual Analogue Score. Participants were advised to discontinue the back support if pain increases on using the support. Data's were collected from the participants using Visual Analogue Score and Oswestry Low Back Pain score. To calculate the sample size paired t-test was used. Significance in statistical comparison was set at $p<0.05$.

RESULTS

The mean age for the car drivers were 43.83 years. For visual analogue scoring system (Table-1, Fig-4) using paired t test gave p value of < 0.0001, with t-14.00 and df=29 showing significant result in the pair. The Oswestry Disability Index (ODI) is one of the principal condition-specific outcome measures used in the management of spinal disorders. The ODI is the most commonly outcome measures in patients with low back pain. It has been extensively tested, showed good psychometric properties, and applicable in a wide variety of settings.

Scoring Method

Each of the 10 items is scored from 0 - 5. The maximum score is therefore 50. The obtained score can be multiplied by 2 to produce a percentage score. If the FIRST statement is marked, the section score = 0, If the LAST statement is marked, it = 5 If all ten sections are completed the score is calculated as followed: Example: 10 (total score of the patient), 50 (total possible raw score), 10/50 x 100 = 20%
If one section is missed or not applicable, the score is calculated as followed: Example: 15 (total score of the patient), 45 (total possible score), 15/45 x 100 = 30%

Interpretation

1. 0%-20%: Minimal disability: This group can cope with most living activities. Usually no treatment is indicated, apart from advice on lifting, sitting posture, physical fitness, and diet. In this group some patients have particular difficulty with sitting, and this may be important if their occupation is sedentary, e.g., a typist or truck driver.
2. 20%-40% Moderate disability: This group experiences more pain and problems with sitting, lifting, and standing. Travel and social life are more difficult and they may well be off work. Personal care, sexual activity, and sleeping are not grossly affected, and the back condition can usually be managed by conservative means.
3. 40%-60%: Severe disability: Pain remains the main problem in this group of patients, but travel, personal care, social life, sexual activity, and sleep are also affected. These patients require detailed investigation.
4. 60%-80%: Crippled: Back pain impinges on all aspects of these patients' lives—both at home and at work—and positive intervention is required.
5. 80%-100%: These patients are either bed-bound or exaggerating their symptoms. This can be evaluated by careful observation of the patient during medical examination.
6. In our study the mean 56% of moderate disability taken before using lumbar back support showed a drastic change to 6.48% of minimal disability after using the back support. [Table-2]

Only one participant discontinued the back support as the pain increased after using it.




Figure 1: Lumbar support preventing flattening of the back and maintaining lumbar posture.
Figure 2A: Front view of lumbar support FIGURE 2B: Side view of lumbar support
Figure 2B: Side view of lumbar support
Figure 3: Lumbar back support applied to the car seat

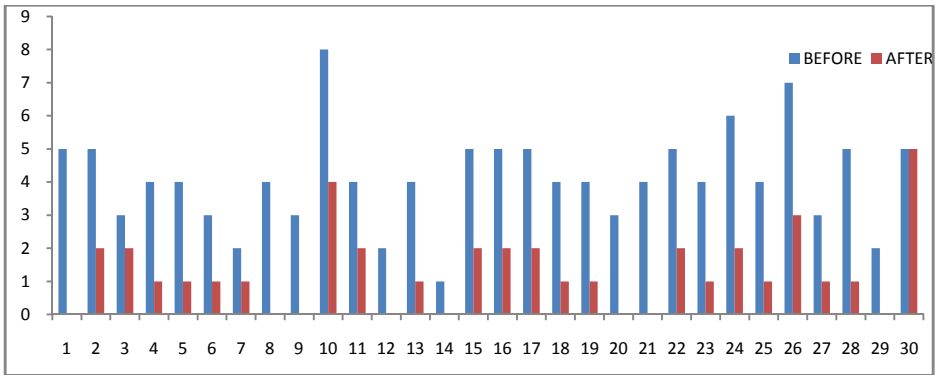

Figure 4: Visual Analogue Score

Table 1: Visual analogue score

Sr. No.	Before	After
1	5.0	0.0
2	5.0	2.0
3	3.0	2.0
4	4.0	1.0
5	4.0	1.0
6	3.0	1.0
7	2.0	1.0
8	4.0	0.0
9	3.0	0.0
10	8.0	4.0
11	4.0	2.0
12	2.0	0.0
13	4.0	1.0
14	1.0	0.0
15	5.0	2.0
16	5.0	2.0
17	5.0	2.0
18	4.0	1.0
19	4.0	1.0
20	3.0	0.0
21	4.0	0.0
22	5.0	2.0
23	4.0	1.0
24	6.0	2.0
25	4.0	1.0
26	7.0	3.0
27	3.0	1.0
28	5.0	1.0
29	2.0	0.0
30	5.0	5.0

Table 2: Oswestry Disability Score

Sr. No	AGE	% BEFORE Back Support	% AFTER Back Support
1	35	36	0
2	40	38	6
3	43	34	12
4	38	28	2
5	47	28	6
6	52	32	18
7	30	22	10
8	51	18	0
9	43	24	0
10	44	22	2
11	49	22	10
12	45	36	2
13	45	26	8
14	35	14	0
15	41	40	4
16	56	34	2
17	52	24	2
18	57	26	2
19	50	32	2
20	40	16	0
21	44	24	0
22	30	26	0
23	40	16	2
24	58	46	2
25	32	22	0
26	36	40	2
27	52	36	0
28	42	18	2
29	44	32	0
	MEAN AGE-43.83	56%	6.48%

DISCUSSION

Almost 50-60% of Indian population is among taxi drivers. The seating design in Indian cars does not include an in-built back support. Most of the long distance car drivers have early morning symptoms as compared to rest of the patients. Sitting has been shown to have a higher lower back ache compressive load than standing[12] and the deviation from neutral position has been linked with increased static muscle effort[5,6]. Efforts have been made to design backrest for promoting support to the bulk of pelvic muscles. The current study has been designed to assess the effect of symptomatic pain relief on using lumbar back support. Similar to previous studies investigating healthy individuals[13,14], the results of the study indicated that a lumbar support pad was better at increasing or preserving the neutral lordosis in sitting in both healthy individual's and patients with LBP. The reverse was seen in lumbar spine, where the neutral

curvature was increased with the lumbar back support, however the seating design in car provided the support required for the thoracic spine. Change in one region of the spine may be compensated by changes in other region along the linked kinetic change[15]. Future studies investigating the effect of different seating systems on patient postures and symptoms ought to include patients with higher pain levels, longer follow-up and female participants, so as to more realistically replicate the range of demographics and development of symptoms in those who work in seated environments. Further studies investigating the effect of lumbar back support on patients posture and symptoms include more number of car drivers with higher pain level, longer follow ups and female drivers as to asses the range of demographic and development of symptoms.

CONCLUSION

The lumbar back support prevents the flattening of the lumbar spine during long term driving. Most common complaints of early morning lower backache are decreased with the use of lumbar back support. Drivers can drive long distance without any added pain or discomfort associated with long-term seating. However the long-term effect of using lumbar back support and needs to be evaluated further.

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Source of Support: None Declared
Conflict of Interest: None Declared