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Effectiveness of Theragun and Ergonomic Advice in Patients with Low Back Pain among Bus Drivers - A Randomized Controlled Trial

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Abstract: ***Background: Low back pain (LBP) is a major health issue affecting millions of people world-wide (Pope et al., 2002a) and common disorder involving the muscles, nerves, and bones of the back. The goal of ergonomics is to ensure a good fit between the workers and their job, thereby maximizing worker comfort, safety and health, productivity and efficiency. Due to vibration, blood circulation is improved to have a thermal effect. Aim: The aim of this study was to determine the effect of Theragun in low back pain and ergonomics advice among bus drivers. Study Design: Randomized Controlled Trail. Method: The study population consisted of thirty participants who had undergone low back pain. The subjects were randomly allocated into two groups: An Experimental Group (n-15) and A Control Group (n-15). The participants who allocated to an experimental group was completed fifteen sessions of classic PT for 3 weeks (5 sessions per week) Study setting in OPD, Nootan College of Physiotherapy at Sankalchandpatel University. Outcome Measure: NPRS (numeric pain rating scale), Oswestry low back pain disability. Result: In group A Experimental (Thergun and ergonomic advice) and group B Control, all data was expressed as mean ± SD and was statistically analyzed using paired 't' test and independent 't' test to determine the statistical difference among the parameters at 0.5% level of significance. Statistical data of NPRS & Oswestry low back pain disability scores showing that, the Theragun showed more significant effect in the low back pain subjects, with the significant value of $p < 0.01$ for the post treatment data. Conclusion: In this study we conclude that Theragun machine and ergonomic advice to give greater improvement in pain and functional performance in low back pain among bus drivers***

Keywords: Theragun, low back pain, Bus drivers

1. Introduction

Low back pain (LBP) is a major health issue affecting millions of people world-wide (Pope et al., 2002a) and common disorder involving the muscles, nerves, and bones of the back.[1]Pain can vary from a dull ache to a sudden sharp feeling.[1]Low back pain may be classified by duration as acute (pain lasting less than 6 weeks), sub-chronic (6 to 12 weeks), or chronic (more than 12 weeks).[2]The condition may be further classified by the underlying cause as either mechanical, non-mechanical, or referred pain.[3]The majority of LBP does not have a clear cause[4]but is believed to be the result of non-serious muscle or skeletal issues such as sprains or strains.[5]Obesity, smoking, weight gain during pregnancy, stress, poor physical condition, poor posture and poor sleeping position, occupational may also taking part to produce low back pain.[5]Spinal causes may include osteoarthritis, degeneration of the discs between the vertebrae or a spinal disc herniation, broken vertebra(e) (such as from osteoporosis) or, rarely, an infection or tumor of the spine.[6]According to guidelines the concept of low back pain is refers to non-specific low back pain, defined as low back pain without a specified physical cause - for example, nerve root compression, trauma, infection, or tumour.[7]The prevalence is LBP is related to the type of occupations such as driving, manual handling and occupations that involve a lot of improper body movements.[8]Occupational drivers such as bus drivers are one group of workers that have been reported widely as being at an increased risk for LBP.[9] Low back pain has a significant impact on functional capacity, as pain restricts occupational activities and is a major cause of malingering. Its economic burden is represented directly by the high costs of health care spending and indirectly by decreased productivity [10-12]The most commonly known physical factors are prolonged sitting, whole-body vibration, ergonomic mismatch, i.e., disparity between anthropometric sizes of the drivers and their physical environment including driving mechanisms (automatic or manual, etc.). Individual factors such as age, gender, weight, height, body mass index, and general health status are also associated with work-related ailments of drivers.[13]The frequency of spinal disorders (i.e., back and neck pain) is observed in professional drivers. Such disorders can result in diseases and early retirement [14-15].Drivers suffering from lot of medical issues such as cramping, muscle fatigue, spinal ache, depression, stiffness, aches, numbness in spine and other musculoskeletal issues that are even chronic. In India the ergonomics of the driver is given least importance and the drivers end up using pillows, towels and other materials to provide the cushioning and make their drive little comfortable.[16]Ergonomics deals with the purpose of information about human behavior, capabilities and limitations to the design of systems, machines, tools, tasks or jobs and environments for productive, safe and effective human use (Chapanis, 1985). The goal of ergonomics is to ensure a good fit between the workers and their job, thereby maximizing worker comfort, safety and health, productivity and efficiency.[17]Vibration therapy improves muscular strength, power improvement and kinesthetic awareness[18],

improves flexibility and reduces pain. Vibrations diminish the perception of pain through the mechanism of pain gait theory.[19]Due to vibration, blood circulation is improved to have a thermal effect.[20]

2. Methodology

Method: Type of study - Randomized Control Trial
Sample design - Simple Random Sampling
Study population - Bus drivers with low back pain
Sample size - 30 Participants [group a – 15 , group b – 15]
Study setting - Nootan College of Physiotherapy OPD, Visnagar, Gujarat.
Study duration - 6 months
Treatment duration - 3 weeks
Sampling criteria for selection:

Inclusion Criteria :-Participants age group 21 to 60[21]**,** Low back pain (sub acute)**,** Bus drivers

Exclusion criteria:-Participants with Disc herniation or any traumatic injury, Participants with any arthritic changes like Rheumatoid arthritis, ankylosing spondylosis**,** Participants with Spinal tumor and infections**,** Participants with Sciatica and Other neurological signs**,** Participants with neurological and psychological conditions

Materials required:-
- Theragun machine
- Chair
- Pen
- Paper
- Plinth

Procedures of Data Collection
The research was approved by ethical committee of Nootan College of Physiotherapy, Sankalchand Patel University, Visnagar. The CTRI registration number is ***CTRI/2021/02/031229.***Study population was Bus drivers with low back pain. The study population consisted of 30 participants who had undergone low back pain. All subjects were educated about the study processes and the patients were asked to give their written consent and permit participation in this study. All subjects following low back pain were divided by simple random sampling. Group-A was Experimental and Group-B was the control group. Participants were selected on the basis of inclusion and exclusion criteria. After dividing them into the groups history, assessment and baseline data of the subjects were taken. Pre assessment was done with NPRS and Oswestry low back disability questionnaire. Oswestry low back disability questionnaire and NPRS scale were taken for all participants before and after the treatment. After the completion of all measurement Experimental group A received 15 sessions of classic PT for 3 weeks (5 sessions / week).. Control group wasn't received any treatment by us. Outcomes measures of both groups were collected after 3 weeks.

Photograph - Treatment of participants with Theragun

Intervention:
Duration: 3 weeks (15 sessions – 5 sessions / week) Educate the participants about the study and demonstrate the whole procedure of the treatment on me, willingly the participants was participate.

Theragun:
- Mode: Theragun
- Duration: 10 minutes and 5 session/week, for 3 weeks
- Intensity: 1st week – level 1 and 2
  2nd week – level 3 and 4
  3rd week – level 5 and 6

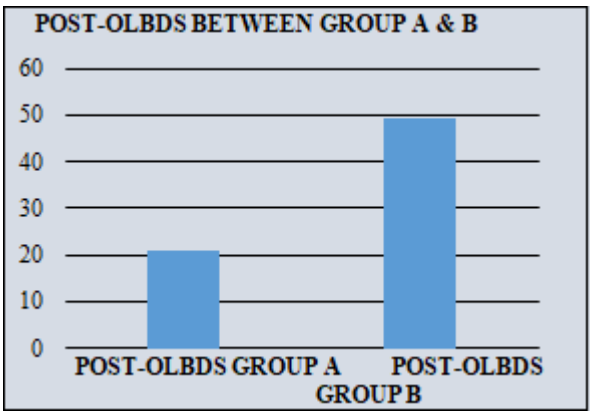
Ergonomic advice:
- While driving, push the seat forwards to raise knees and decrease lordosis and sit close to steering
- Place the pillow behind the back
- Neck stability
- Use the rear-view mirror frequently and do not turn back to see the vehicle
- Keep the knees bent

3. Result

Pre and post-treatment data of the participants of both groups were noted. All statistical analysis was done using SPSS 26 software for windows. Descriptive analysis was obtained by using mean & standard deviation. The intergroup comparison between Group A and B of post-treatment of NPRS, Oswestry Low Back Pain Disability Questionnaire was done by paired t-test. The intragroup comparison of pre-treatment and post-treatment of NPRS, Oswestry Low Back Pain Disability Questionnaire within Group A and Group B was done by unpaired t-test.

Table 1: Inter Group Comparison of Post-Treatment OLBDS

N=30	Group A Mean±SD	Group B Mean±SD	T Value	P Value
OLBDS	48.00±16.549	49.40±16.079	-2.246	.041

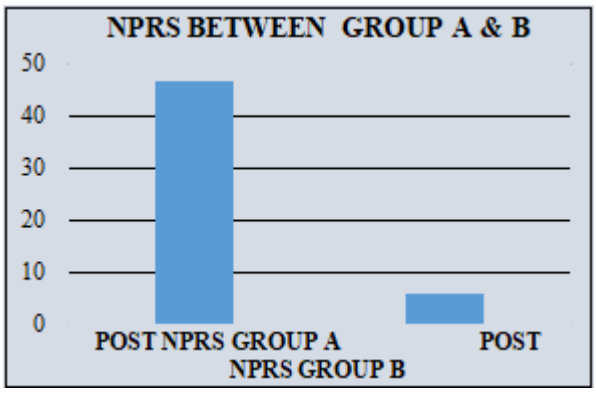


Graph 1: Inter Group Comparison of Post-Treatment OLBDS

Interpretation: Statistical significant improvement was seen in Group A when compared to Group B

Table 2: Inter Group Comparison of Pretreatment NPRS

N=30	Group A Mean±SD	Group B Mean±SD	T Value	P Value
NPRS	47±.640	5.67±1.175	-15.051	.004



Graph 2: Inter Group Comparison of Post-Treatment NPRS

Interpretation: Statistical significant improvement was seen in Group A when compared to Group B

The results found in this study disclosed that after a three-week treatment programme, Group A, who received Theragun machine and ergonomic advice; was seen statistically greater significant improvement as compared to Group B (p value < 0.05).

4. Discussion

The aim of the study was to find out the effectiveness of Theragunto improve the Functional activity. Thirty participants were selected as per the inclusion and exclusion criteria and divided into 2 groups. After that demographic data, participants' examination and investigation, patients were assessed. Group A (the experimental group) received the treatment with Theragun and ergonomic advice for 3 weeks, five days/week and Group B (the control group) didn't received treatment by us. The result of the present study demonstrated that improvement in Functional activity with that decrease in pain intensity was also noted with NPRS and after the treatment NPRS score was decreased but there was no significant improvement in group-B. Also, there was a significant improvement in daily living activities of the participants of Group A than group B after the end of the training period. So, the experimental hypothesis is accepted here.

This study is unique and gives the introduction of Theragun but very few researches are in evidence of Theragun

According to study done by, Dr. Roshni Patel and Dr. Atit Patel et al. They conducted a study on a subject for improvement of back flexibility and concluded that the Theragun is effective for improvement in the back flexibility may also improve horse riding performance. They also added that Theragun is more effective in reducing pain.[19]

5. Conclusion

In this study we conclude that Theragun machine and ergonomic advice give greater improvement in pain and functional performance in low back pain among bus drivers.

6. Limitations

1) The study was not concluded on a large scale and study sample was considerably less.
2) There was no exercise therapy included in the intervention program.
3) Psychological and environmental factors were not taken into consideration.
4) Only bus drivers were included as subjects in the study.

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