

A Study to find the Effect of Posterior Anterior Vertebral Mobilization on Blood Pressure and Heart Rate in Prehypertensive Subjects

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How to cite this article:

Md Shadab Khan, Navmita Bhosle Khan, Ravinder Narwal. A Study to find the Effect of Posterior Anterior Vertebral Mobilization on Blood Pressure and Heart Rate in Prehypertensive Subjects. *Physiotherapy and Occupational Therapy Journal*. 2021;14(2):79-85.

Abstract

Aims and Objectives: The aim of research is to compare the effectiveness of thoracic versus cervical mobilization on physiological parameter in prehypertensive subjects. **Methodology:** A sample of 30 prehypertensive subjects were recruited for the study. The subject were randomly divided in to 2 groups Group A (Cervical Mobilization) and Group B (Thoracic mobilization group). Grade III posterior anterior vertebral mobilization, single sitting was given for both the group for 60 sec at each level of spinous process from C2-C7 and T1 to T5. Data collected for pre, post immediate and post 30 min for Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Heart Rate (HR). **Results:** Comparing of SBP of thoracic and cervical group at pre mobilization, post immediate mobilization and post 30 min mobilization is significance. **Discussion:** Results of our study explained that when we compare the systolic blood pressure (SBP) variable for cervical group and thoracic mobilization showed the significant lowering effect. Diastolic blood pressure variable, Heart rate variable did not achieve significant level of mean change between the both groups. **Conclusions:** So it is concluded that thoracic mobilization is much more impressive in decreasing systolic blood pressure (SBP) with significant change as compare to cervical mobilization.

Keywords: SBP, DBP, HR, Thoracic Mobilization and Cervical mobilization.

Introduction

Blood pressure is the force exerted on your artery walls as blood flows through your body. Medical associations has given a term called prehypertension which is defined as chronically elevated high blood pressure with systolic blood pressure (SBP) of 130

mmhg or greater and diastolic blood pressure (DBP) of 80mmhg or greater¹.

Prehypertension on long term may lead to hypertension (HTN) and it is the one of the leading cause of death in world. This can be controlled by exercises, life style modifications and antihypertensive drugs. However, as a result of high cost, multiple adverse results and reduced adherences of antihypertensive drugs, life style modifications and exercises are being of interest for high BP treatment. Some studies have demonstrated that with a single bout of endurance training BP is reduced up to 22 hours of post training^{2,3}.

Physical inactivity is a major risk for cardiovascular disease, and persons who are less active and less fit have a 30% to 50% greater risk for high BP⁸. Laura P svetkey et al. has found the beneficial effects of life style modification as a nonpharmacological treatment for prehypertension⁴.

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Posterior anterior vertebral mobilization reduces BP in patients with mild to moderate essential hypertension and is now recommended to lower BP in such patients. Posterior anterior vertebral mobilization reduces the risk of injury and cardiac complications and makes exercise feasible for most patients. These factors along with the low cost, absence of side effects, and additional cardiovascular benefits, make the use of mobilization to lower BP appealing⁵.

Mobilization is a commonly used passive, skilled, manual therapy technique applied to vertebral joint and related soft tissue at varying speed and amplitude using physiological or accessory motion for therapeutic purpose. The speed and amplitude could range from a small amplitude force at high velocity.

Posterior anterior vertebral mobilization involves passive rhythmic and repetitive movement within a range of motion or against a restrictive barrier and improves physiological motion of joint. Mobilization is technique that is claiming to be used in variety of condition. It is a gentle technique where the force and amplitude can be controlled depending on response of tissue and severity of condition been treated. Passive movement of the vertebral column is used commonly in the management of spinal dysfunction^{6,7}.

High blood pressure is the major risk factor for coronary artery disease. That's why it is so important to control prehypertension and make awareness of the risk of prehypertension and hypertension. Therefore this study is design to provide the importance of health life and will create awareness about the risk of prehypertension⁸.

The purpose to select this study is to find out the effect of posterior anterior vertebral mobilization on blood pressure and heart rate ,and how does it help in reducing it .To find out better treatment regime with low cost, absence of side effects, and additional cardiovascular benefits, make the use of mobilization to lower BP appealing. Result of this will help in formation of a better and different treatment idea in the form of manual therapy protocol for hypertensive subject.

The aim of the study was to compare the effect of cervical and thoracic mobilization on blood pressure in prehypertension subjects. Mobilization treatment regime with low cost, absence of side effects, and will be able to lower BP with additional cardiovascular benefits.

Methodology

Dependent variables of this experimental study were SBP, DBP, HR. Independent variables of this experimental study were thoracic mobilization and cervical mobilization.

Inclusion criteria

- Age group between 20 to 30 years.
- No drug history.
- Hemodynamically stable.
- Male subject with prehypertensive group 120 to 139mmhg and with DBP 80 to 89 mmhg monitored continuous for three days.

Exclusion criteria

Male subject with hypertensive group SBP >140 and DBP > 90 Subject with any musculoskeletal disorder, dizziness on mobilization , individual performing regular exercise, subject who is not co-operative, Subject having pain at spinal level or general body were not included.



Equipments used

Polar heart rate monitor, Model-T 31⁹

Sphygmomanometer, citizen, Accuracy-pressure +/- 3mmhg, Pulse =/-5% of reading.



Procedure

Total 30 subjects as per inclusion criteria out of 200 subjects screened were included for this

experimental study. All subjects were divided into 2 groups, 15 subjects in the Cervical mobilization group A and 15 subjects in the Thoracic mobilization group B. Grade III posterior anterior vertebral mobilization, single sitting was given for both the groups for 60 sec at each level of spinous process from C₂-C₇, and T₁ to T₅. Blood pressure, and heart rate were recorded prior and after mobilization¹⁰.

Data analysis

Data analysis is performed by the SPSS11. The significant level is set at p-value ≤ 0.05 . With confidence level 95%, t-test is used for inter group analysis. One way ANOVA is used for intra group analysis.

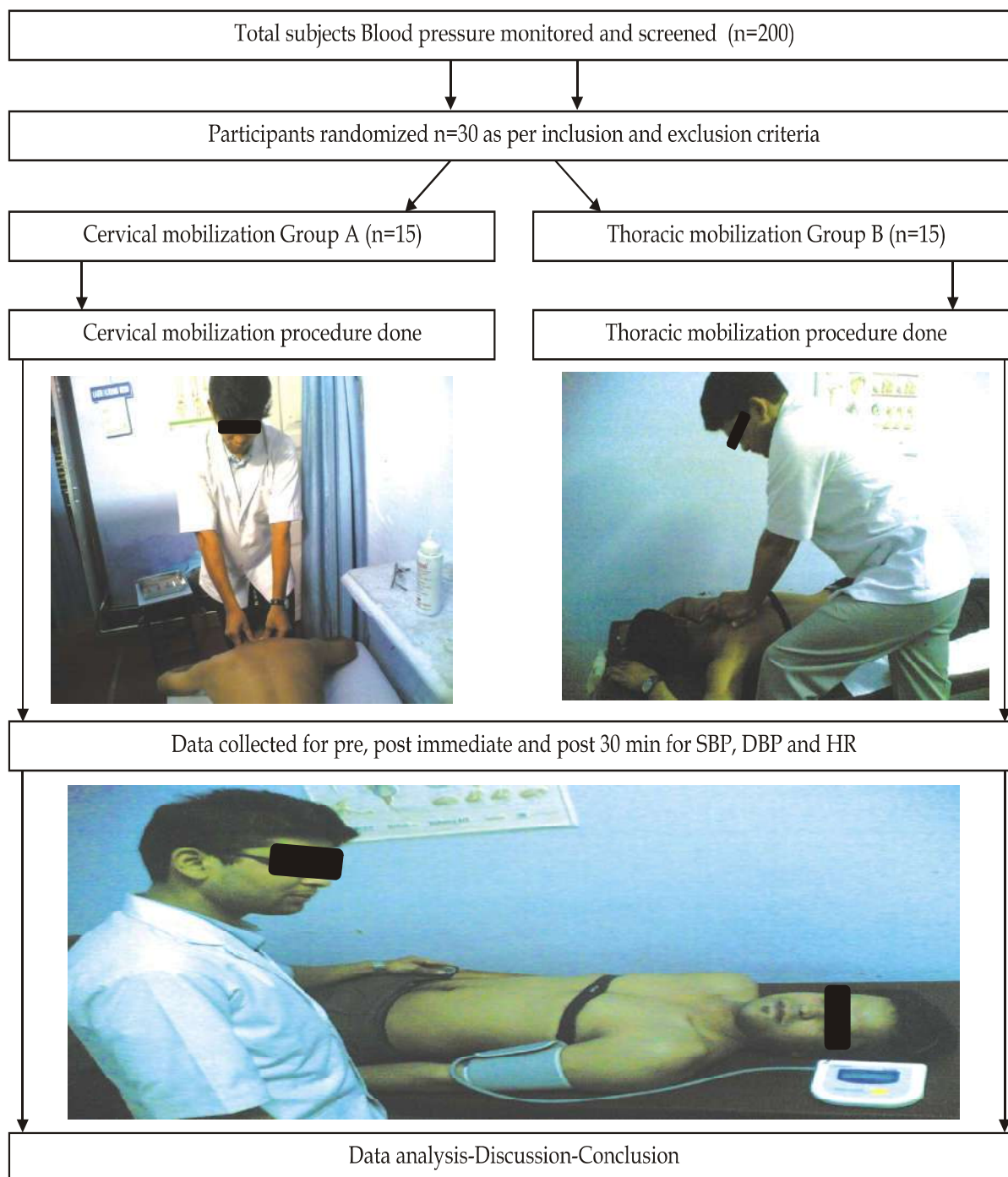


Fig. 1: Procedure Flow chart.

Result

Table 1: Comparing of HR at pre mobilization, post immediate mobilization and post 30 minute mobilization of cervical group A.

Heart Rate	Cervical Group-A		F value	P value
	Mean	SD		
Pre	81.26	4.94		
Post	83.73	5.22	1.083	P > 0.05
Post 30 min	83.33	4.57		

Table 2: Comparing of HR at pre mobilization, post immediate mobilization and post 30 minute mobilization of thoracic group B.

Heart Rate	Thoracic Group B		F value	P value
	Mean	SD		
Pre	80.26	6.30		
Post	81.53	5.11	0.545	P > 0.05
Post 30 min	79.46	4.88		

Table 3: Comparing of DBP at pre mobilization, post immediate mobilization and post 30 minute mobilization of cervical group A.

DBP	Cervical Group		F value	P value
	Mean	SD		
Pre	77.06	5.28		
Post	74.40	4.08	1.799	P > 0.05
Post 30 min	78.33	7.49		

Table 4: Comparing of DBP at pre mobilization, post immediate mobilization and post 30 minute mobilization of thoracic group B.

DBP	Thoracic Group-B		F value	P value
	Mean	SD		
Pre	80.80	4.95		
Post	82.86	4.70	2.116	P > 0.05
Post 30 min.	79.46	3.96		

Table 5: Comparing of SBP at pre mobilization, post immediate mobilization and post 30 minute mobilization of cervical group-A.

SBP	Cervical Group-A		F value	P value
	Mean	SD		
Pre	131.93	3.63		
Post	127.53	5.18	4.090	P > 0.05
Post 30 min.	130.53	3.94		

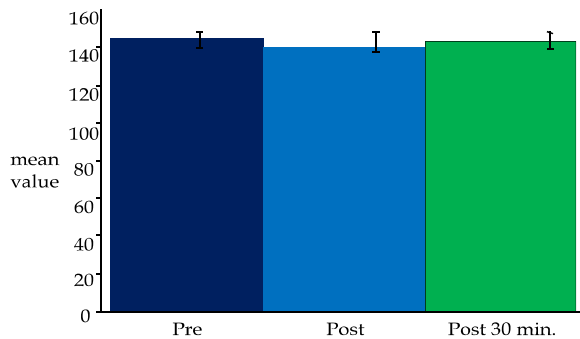


Table 6: Comparing of SBP at pre mobilization, post immediate mobilization and post 30 minute mobilization of thoracic group B.

SBP	Cervical Group-A		F value	P value
	Mean	SD		
Pre	133.66	6.21		
Post	129.73	5.52	5.186	P > 0.05
Post 30 min.	127.00	5.31		

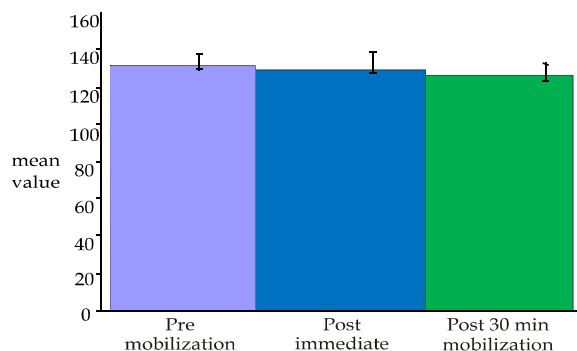


Table-7: Comparing of SBP of thoracic and cervical group at pre mobilization, post immediate mobilization and post 30 min mobilization.

SBP	Thoracic Group B		Cervical Group A		T value	P value
	Mean	SD	Mean	SD		
Pre mobilization	133.66	6.21	131.93	3.63	0.932	P > 0.05
Post immediate mobilization	129.73	5.52	127.53	5.18	1.125	P > 0.05
Post 30 min mobilization	127.00	5.31	130.53	3.94	-2.067	P < 0.05

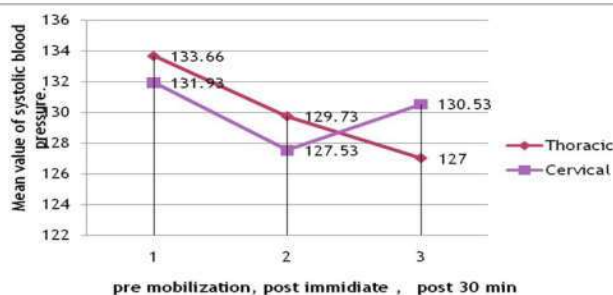


Table 8: Comparing of DBP of thoracic and cervical group at pre mobilization, post immediate mobilization and post 30 min mobilization.

Heart Rate	Thoracic Group B		Cervical Group A		T value	P value
	Mean	SD	Mean	SD		
Pre mobilization	80.26	6.30	81.26	4.94	-0.483	P > 0.05
Post immediate mobilization	81.53	5.11	83.73	5.22	-1.165	P > 0.05
Post 30 min mobilization	79.46	4.88	83.33	4.57	-2.238	P < 0.05

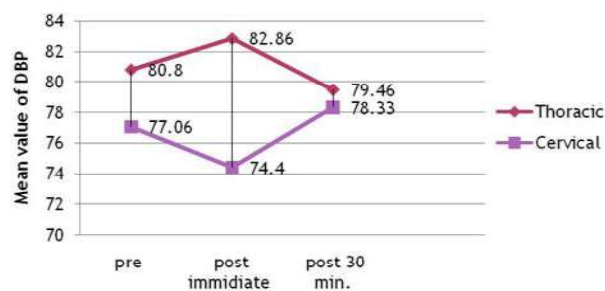
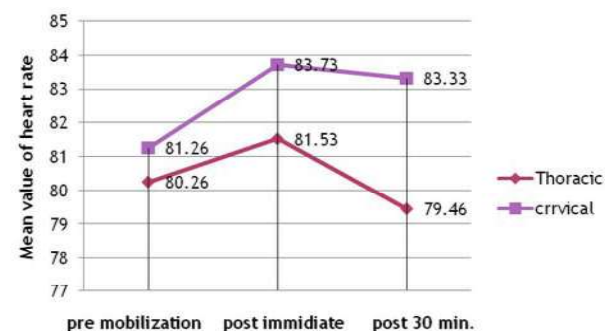


Table-9: Comparing Mean and SD of HR of thoracic and cervical group at pre mobilization, post immediate mobilization and post 30 min mobilization.

DBP	Thoracic Group B		Cervical Group A		T value	P value
	Mean	SD	Mean	SD		
Pre mobilization	80.80	4.95	77.06	5.28	1.995	P>0.05
Post immediate mobilization	82.86	4.70	74.40	4.08	5.264	P>0.05
Post 30 min mobilization	79.46	3.96	78.33	7.49	0.518	P<0.05



Discussion

The first important finding of our study shows that vertebral mobilization on comparing the heart rate variability of thoracic mobilization and cervical mobilization didn't showed significant change although there were very slight changes on pre mobilization to post 30 min mobilization on short

term goal but not significant. McKnight ME et al. and Budgell Bet al. has reported in their study that asymptomatic subjects received mobilization to the cervical and thoracic showed no significant difference between group with respect to heart rate after the mobilization^{6,11}.

Results of our study shows that the comparison of diastolic blood pressure showed not much change at initial state .There was little changes noted which went back to its previous state post 30 min mobilization. Therefore there were no significant changes noted in DBP both in cervical and thoracic mobilization groups. Reis MS etal. has explained in their study that mobilization of cervical, lumbar & thoracic level has its own effect but there was significant changes in thoracic level manipulation like difference in systolic blood pressure however diastolic blood pressure, pulse, heart rate and respiratory rate could not achieved significant value¹².

Next important finding of our study is that thoracic and cervical mobilization found to be impressive in decreasing systolic blood pressure (SBP) with significant change. Fichera AP et al. have also demonstrated that manipulation of the cervical and thoracic vertebrae reduces moderate hypertension. McGee D. et al. Founded that in his case study of a 46-year-old woman's rapid decrease in blood pressure following initial chiropractic adjustment^{13,8}.

Yates RG et al. has also founded that manipulation of the thoracic spine significantly reduces blood pressure in patients with elevated blood pressure. Both systolic and diastolic blood pressure decreased significantly in the adjusted group. No significant changes occurred in the placebo or control groups. Adjustments were delivered to segments T-1 to T-5¹⁴.

Results of our study demonstrated that thoracic mobilization is much more impressive in decreasing systolic blood pressure (SBP) with significant change as compare to cervical mobilization. Tran AT et al. conducted randomized controlled trail on asymptomatic subject for mobilization. There was difference between groups with respect to blood pressure or heart rate after the mobilization¹⁵.

Emmanuel Yung, PT et al. suggested that anterior Posterior spinal pressure caused a statistically significant physiologic response that resulted in a minor drop in vasodepressor and statistically significant reduction in systolic BP after the procedure⁷.

Michel Silva Reis et al. explained that autonomic

imbalance is dominated in prehypertensive subjects. The autonomic imbalance characterized by sympathetic hyperactivity at rest and an inability to appropriately respond to physiological stressors. The mobilization technique significantly reduces pain as well as it was able to improve SBP quantified by an increased vagal activity and cardiac autonomic modulation. One session of Maitland spine mobilization was able to acutely improved the blood pressure regulation and HRV¹⁶.

Results of our study concluded that when we compare the systolic blood pressure (SBP) variable for cervical group and thoracic mobilization showed the significant lowering effect. Diastolic blood pressure variable, Heart rate variable did not achieve significant level of mean change between the both groups. McGuinness J et al. founded in their study that manipulation of the cervical and thoracic vertebrae reduces moderate systolic blood pressure^{17,18}.

In summary our result suggested that thoracic mobilization is important strategy as compare to cervical mobilization for prevention and treatment of prehypertension. Cervical mobilization seems not to be doing any help in treatment strategy for prehypertension subjects. Thoracic mobilization found out to be better, positive and helpful result then cervical mobilization in normalizing prehypertension.

Conclusion

Thoracic and cervical mobilization both reduces systolic blood pressure with significant value but not diastolic blood pressure; even heart rate not achieved significant level. Thoracic mobilization found to be impressive in decreasing SBP with significant change as compared to cervical mobilization.

Result of this study signifies a simple and easy treatment regime for individuals with prehypertension and will help them in preventing hypertension. This result of this study provide a informational for society about the new treatment for autonomic dysfunction correction in prehypertension. Result of this will create a awareness about the risks of high blood pressure and provide a base line indication to promote another's study in prehypertensive treatment field.

Clinical Relevance

Prehypertension is common and has clinical and public health significance in sedentary life style population. Treatment strategies emphasized

nonpharmacological lifestyle interventions in all patients. Our study showed significant changes in blood pressure with cervical and thoracic mobilization. Mobilization will help in prevention of prehypertension to hypertension by effectively lower BP and expected to reduce CVD morbidity and mortality.

Future study

Spinal mobilization appears to be effective in producing a temporary reduction in blood pressure immediately after treatment. The effect of such treatment in reducing blood pressure over a period of days or weeks is unknown and warrant further investigation. This research in future can be extended by taking large sample size and long term treatment goal. The age and gender group can be change to find out effectiveness of the sample protocol normal subjects with precaution.

Conflict of interest: There is no conflict of interest related to this clinical research among all authors.

Acknowledgement: Authors expressing deeply gratefulness to the entire participant subjects specially Dr Rohit. They are also thankful to ethical committee for the research approval.

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