

Immediate Effectiveness of Percussor Massage Therapy on Pain, Cervical Range of Motion in Forward Head Posture among Janitors: Single Arm Clinical Trial

Dr. Komal Agrawal¹; Dr. Vitrag Sancheti²; Dr. Rutwa Pandya³

^{1,2,3} Dr. D. Y. Patil College of Physiotherapy Pimpri, Pune.

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Abstract:

➤ Background:

Forward Head Posture (FHP) is increasingly prevalent among janitors due to repetitive physical tasks, often resulting in chronic neck pain and limited cervical mobility. This study evaluates the immediate effectiveness of Percussor Massage Therapy (PMT) in alleviating pain and improving cervical range of motion (ROM) in this high-risk occupational group.

➤ Methodology:

An experimental single-arm study was conducted on 12 janitors aged 35–50 years, diagnosed with FHP (craniovertebral angle $>49^\circ$). Participants underwent a single 15-minute PMT session targeting cervical and upper shoulder muscles. Pre- and post-intervention assessments were conducted using the Numerical Pain Rating Scale (NPRS), Neck Pain and Disability Scale (NPAD), and goniometric cervical ROM measurements.

➤ Results:

Statistical analysis using paired t-tests revealed significant reductions in pain scores (NPRS: pre 4.82, post 2.27; $p < 0.001$) and improvements in cervical flexion, extension, and functional scores (NPAD: pre 64.36, post 40.00; $p < 0.001$).

➤ Conclusion:

PMT demonstrated immediate and significant benefits in reducing pain and improving cervical ROM in janitors with FHP. Its non-invasive nature and practicality suggest its utility as an effective ergonomic intervention in occupational settings.

Keywords: Forward Head Posture, Percussor Massage Therapy, Janitors, Cervical Range Of Motion, Neck Pain, Ergonomics.

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I. INTRODUCTION

Forward Head Posture (Forward Head Posture) has become an increasingly common postural condition, particularly prevalent in modern workplaces that demand repetitive and physically strenuous tasks. This condition, defined by the forward displacement of the head in relation to the cervical spine, results in significant spinal misalignment. Over time, this misalignment leads to musculoskeletal imbalances, limited cervical range of motion (ROM), and chronic pain or discomfort. Among various occupational groups, janitors are notably susceptible to developing Forward Head Posture due to the repetitive and physically

taxing nature of their work, which includes activities such as sweeping, bending, lifting, and enduring prolonged physical strain. These daily tasks expose janitors to considerable ergonomic challenges, contributing significantly to the development and progression of Forward Head Posture (1).

The prevalence of Forward Head Posture among janitors is alarming, with studies indicating that over 60% of janitorial staff exhibit signs of this postural deviation. The high prevalence is closely linked to factors such as heavy physical workloads, extended working hours, and higher body mass index (BMI). These ergonomic stressors disrupt the functional efficiency of the cervical spine and shoulder

muscles, leading to a diminished quality of life(2). Forward Head Posture is often accompanied by neck and shoulder pain, restricted ROM, and long-term musculoskeletal complications. Without timely and effective intervention, this condition can result in chronic pain, decreased productivity, and an increased risk of disability. Addressing Forward Head Posture in this high-risk occupational group is therefore crucial, underscoring the need for practical and effective therapeutic solutions that can be readily implemented in their daily routine(3).

Forward Head Posture is characterized by the anterior displacement of the head beyond the body's vertical axis, placing excessive strain on the cervical spine and surrounding musculature, including the upper trapezius and levator scapulae muscles. These compensatory mechanisms exacerbate pain, limit mobility, and compromise functional capacity. The physically demanding and repetitive tasks inherent to janitorial work further intensify these issues, gradually worsening postural abnormalities. If not addressed promptly, Forward Head Posture can lead to long-term problems such as degenerative changes in the spine, persistent pain, and a reduced quality of life(4).

Percussor Massage Therapy (Percussor Massage Therapy) has emerged as a promising intervention for managing Forward Head Posture. This therapy uses mechanical vibrations delivered through handheld devices to target musculoskeletal tension and pain. The high-frequency oscillations generated by these devices penetrate deeply into the muscle layers, promoting relaxation, enhancing circulation, and increasing soft tissue flexibility(5). Percussor Massage Therapy is particularly effective in addressing muscle imbalances, alleviating trigger points, and improving ROM, making it a suitable intervention for conditions like Forward Head Posture. Its capacity to provide immediate relief while supporting long-term recovery positions it as a valuable addition to therapeutic practices(6).

The mechanisms of Percussor Massage Therapy are grounded in the principles of vibration therapy and mechanical percussion, which stimulate soft tissues to enhance blood flow, reduce muscle stiffness, and activate the body's natural pain-relief processes. The rhythmic pulses interrupt nociceptive pain signals through the pain gate mechanism, delivering immediate analgesic effects. Furthermore, Percussor Massage Therapy addresses localized muscle tension and adhesions, improving tissue elasticity and facilitating recovery. The adjustable intensity levels and interchangeable heads of percussor devices enable personalized treatments, ensuring optimal Outcome measures tailored to individual needs(7).

Extensive research supports the efficacy of Percussor Massage Therapy in alleviating pain and improving ROM in individuals with postural disorders like Forward Head Posture. Randomized controlled trials have shown Percussor Massage Therapy outperforms conventional physiotherapy in reducing pain and enhancing ROM. These studies highlight the immediate and measurable benefits of Percussor Massage Therapy, particularly in occupational groups prone to

musculoskeletal strain. Similar positive Outcome measures have been observed in interventions targeting upper cross syndrome (UCS), a postural imbalance that shares similarities with Forward Head Posture (8).

One notable study focusing on non-specific neck pain revealed significant improvements in pain intensity, cervical mobility, and functional independence following Percussor Massage Therapy (9). Participants reported substantial reductions in discomfort during neck flexion, extension, and lateral flexion. These findings align with the objectives of this study, which aims to evaluate the immediate impact of Percussor Massage Therapy on pain and ROM in janitors with Forward Head Posture. By highlighting Percussor Massage Therapy's versatility and efficacy, this research seeks to contribute to the growing body of evidence supporting its use in clinical and occupational health settings(10).

Janitors, due to the repetitive and physically demanding nature of their work, are particularly susceptible to developing Forward Head Posture. The practical application of Percussor Massage Therapy in workplace settings offers several advantages. As a non-invasive therapy, Percussor Massage Therapy is easy to administer and does not require extensive training, making it accessible for use in occupational health programs. Its ability to provide immediate pain relief and improve functional capacity allows workers to maintain productivity without the need for prolonged breaks. By integrating Percussor Massage Therapy into regular workplace wellness routines, employers can address ergonomic issues effectively, reduce absenteeism, and enhance overall employee well-being. The practicality and efficacy of Percussor Massage Therapy in delivering swift results make it an ideal solution for addressing the ergonomic challenges faced by janitors and other similar occupational groups(11). The occupational context of janitors' work further amplifies the need for effective interventions like Percussor Massage Therapy. Janitorial work is inherently physically demanding, involving repetitive movements that place considerable strain on the cervical spine and upper body muscles. This strain not only affects the physical health of janitors but also reduces productivity and job satisfaction. Addressing Forward Head Posture within this occupational group requires targeted interventions that are both effective and practical. Percussor Massage Therapy fulfills these criteria by offering a non-invasive, time-efficient solution for managing pain and restoring musculoskeletal balance.

The integration of Percussor Massage Therapy into workplace wellness programs can yield significant benefits. By providing immediate relief from pain and discomfort, Percussor Massage Therapy enables workers to maintain productivity while addressing their health needs. Its simplicity of application and minimal training requirements make it a viable option for on-site ergonomic interventions. Additionally, Percussor Massage Therapy's ability to improve ROM and correct postural deviations supports long-term musculoskeletal health, reducing the risk of chronic conditions and disability.

This study focuses on evaluating the immediate effects of Percussor Massage Therapy on pain relief, ROM improvement, and postural correction in janitors diagnosed with Forward Head Posture. The research aims to assess the immediate impact of Percussor Massage Therapy on pain levels and cervical ROM, compare the Outcome measures of Percussor Massage Therapy with conventional physiotherapy techniques, and highlight the practicality of Percussor Massage Therapy as a workplace intervention. The results of this study have the potential to inform ergonomic strategies aimed at reducing the prevalence of Forward Head Posture among janitors. By demonstrating the effectiveness of Percussor Massage Therapy, this research could pave the way for its broader adoption in occupational health programs. Integrating Percussor Massage Therapy into routine workplace practices could significantly enhance the physical well-being and productivity of workers, addressing a critical gap in workplace ergonomics.

II. NEED OF STUDY

This study addresses the pressing need to explore innovative and efficient treatment options for Forward Head Posture (Forward Head Posture), a prevalent issue among janitors due to the physically demanding and repetitive nature of their work. Forward Head Posture is characterized by an anterior displacement of the head, leading to misalignment of the cervical spine and associated musculature. This posture deviation can result in chronic pain, restricted cervical range of motion (ROM), and long-term musculoskeletal disorders. Janitors, who regularly engage in tasks like sweeping, bending, lifting, and other physically taxing activities, are particularly susceptible to developing Forward Head Posture. Studies indicate that over 60% of janitors exhibit signs of Forward Head Posture, with a strong correlation to prolonged work hours and higher body mass index (BMI). These findings underscore the critical need for effective therapeutic interventions tailored to this occupational group.

Conventional treatments for Forward Head Posture, including postural correction exercises, manual therapy, and strengthening routines, though beneficial, often require significant time to yield results and may not provide the immediate relief that is necessary for individuals in physically demanding roles. Given the nature of janitorial work, where prolonged absence for rehabilitation is often impractical, there is a heightened need for treatments that offer quick and effective solutions. Percussor Massage Therapy (Percussor Massage Therapy) emerges as a promising alternative due to its capacity to deliver mechanical vibrations that target deep muscle tissues, alleviating tension, improving circulation, and enhancing ROM. The non-invasive, easy-to-apply nature of Percussor Massage Therapy makes it particularly well-suited for integration into workplace health initiatives, offering janitors a practical and immediate way to manage the physical demands of their job.

Despite the potential benefits, there is a notable lack of research specifically focusing on the efficacy of Percussor Massage Therapy in treating Forward Head Posture among janitors. This gap in the literature points to an urgent need for

studies that evaluate not only the immediate effects of Percussor Massage Therapy on pain and ROM but also its practicality and efficiency as a workplace health intervention. Exploring the effectiveness of Percussor Massage Therapy could provide valuable insights and pave the way for its broader adoption in occupational health strategies, particularly for high-risk groups like janitors who often have limited access to continuous healthcare services.

Furthermore, addressing Forward Head Posture in janitors extends beyond merely alleviating pain and improving physical function. It has significant implications for enhancing workplace productivity, reducing absenteeism, and improving overall job satisfaction. Effective management of Forward Head Posture could lead to improved functional capacity, enabling janitors to perform their duties with reduced discomfort and increased efficiency. This study aims to bridge the gap in ergonomic health research by thoroughly examining the immediate impacts of Percussor Massage Therapy on janitors with Forward Head Posture. The results could support the development of cost-effective, time-efficient interventions that enhance the physical well-being and productivity of workers in physically demanding roles, ultimately contributing to their long-term health and quality of life.

III. AIMS AND OBJECTIVES

➤ Aim:

To evaluate the immediate effectiveness of Percussor Massage Therapy on reducing pain and improving the cervical range of motion in janitors with Forward Head Posture.

➤ Objectives:

- To evaluate the immediate effect of Percussor Massage Therapy on reducing pain in janitors with Forward Head Posture.
- To assess the improvement in cervical range of motion immediately after Percussor Massage Therapy in janitors with Forward Head Posture.

IV. MATERIAL AND METHODOLOGY

- Study Design: Experimental study
- Study Setting: Dr.D Y Patil college of physiotherapy OPD
- Sampling Method: Convenient Sampling
- Sampling Size: Sample size was 12, calculated using G power, with an effect size of 5, 95% confidence level, taking into account the prevalence of Forward Head Posture in janitors.
- Sample Population : Janitors with forward head posture

➤ Material Required

- Goniometer
- MB-Ruler
- Thera-gun
- Plinth
- Yoga mat

- Pen
- Diary
- Consent form

➤ *Percussor Massage Therapy: Modality, Applications, and Pathological Changes*

• *Percussor Massage Therapy (Percussor Massage Therapy) Modality:*

Percussor Massage Therapy (Percussor Massage Therapy) is a therapeutic technique that involves the use of a handheld device, known as a percussor, to deliver rapid, repetitive pressure to the muscles and soft tissues. The percussor typically operates at various speeds and intensities, allowing the therapist to adjust the treatment based on the patient's specific needs. This form of therapy is designed to stimulate circulation, promote muscle relaxation, and alleviate pain by targeting deep tissues.

• *Muscle Tightness and Spasms:*

Percussor Massage Therapy helps in relieving muscle tightness and spasms by increasing local blood flow and reducing the buildup of lactic acid in the muscles.

• *Fascial Restrictions:*

The therapy helps in releasing fascial restrictions, which can alleviate pain and restore normal movement patterns.

✓ *Inflammation:*

By improving circulation, Percussor Massage Therapy can help reduce inflammation in the tissues, which is a common factor in many musculoskeletal conditions.

✓ *Adhesion and Scar Tissue Formation:*

The repetitive pressure helps break down adhesions and scar tissue, promoting flexibility and reducing discomfort.

✓ *Poor Circulation:*

Percussor Massage Therapy enhances blood flow to the affected areas, improving oxygenation and nutrient delivery to tissues, which can accelerate healing.



Fig 1 Percussor Massage Device

• *Inclusion Criteria*

- ✓ Participants with the age between 35-50 years.
- ✓ Participants craniovertebral angle > 49 degrees are diagnosed with forward head posture.
- ✓ Participants experiencing mild to moderate neck pain (rated between 3 to 4 on a using NPRS scale)
- ✓ Willingness to participate and provide informed consent.

• *Exclusion Criteria*

- ✓ Individuals with severe spinal deformities, such as scoliosis, or previous spinal surgery.
- ✓ Participants experiencing acute or severe pain that may interfere with the assessment or treatment.
- ✓ Individuals with neurological conditions that affect movement or sensation.
- ✓ Individuals with conditions such as osteoporosis, recent fractures, or skin conditions that contraindicate the use of percussor massage therapy.

➤ *Outcome Measure*

• *(NPRS) Numerical Pain Rating Scale*

The Numerical Pain Rating Scale (NPRS) was used to assess the patient's level of pain. It is considered the gold standard while assessing pain when a patient can communicate it effectively.

Using an 11-point scale ranging from 0 to 10 which is the most frequently used version, patients was asked to rate the intensity of their current pain level.

Zero represents no pain and 10 represents the worst pain imaginable.

Only the numbers themselves offer meaningful information, indicating that there are only 11 possible answers on a scale of 0 to 10, in contrast to the Visual Analog Scale/Graphic Rating Scale.

Since NPRS is easy to administer orally, it can be used in phone interviews. It is accepted that a 20% change in the

NPRS over the course of two assessment periods is clinically significant.^[15]

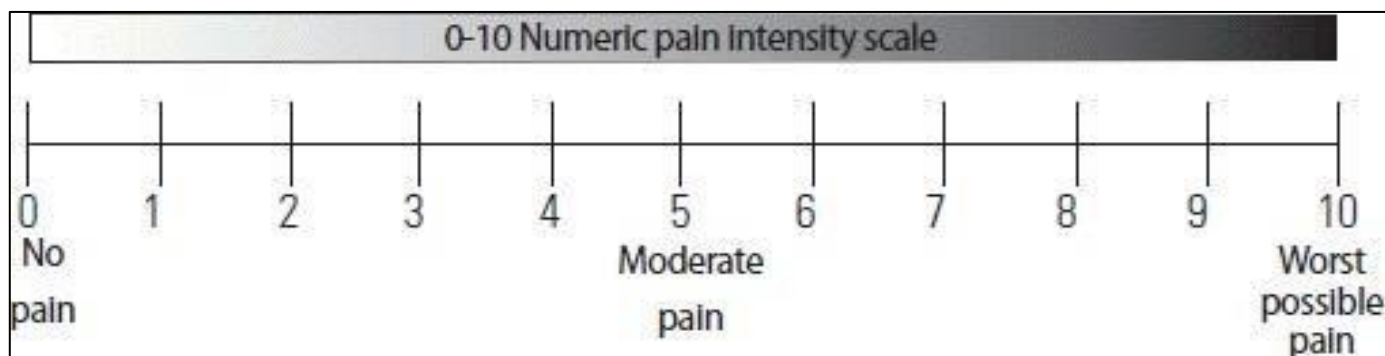


Fig 2 Numerical Pain Rating Scale

• (NPAD) Neck Pain and Disability Scale

Commonly used tool for assessing the severity of neck pain and its impact on daily life.

It measures both pain intensity and functional limitations associated with neck pain.

The NPDS typically consists of a series of questions that ask individuals to rate the intensity of their pain and how it affects their ability to perform various activities.

This includes tasks like lifting objects, driving, and sleeping, among others. A lower score suggests less pain or disability.

A moderate score indicates a moderate impact on daily life. Higher scores indicate significant pain and functional impairment.

Neck Pain and Disability Scale	
Name _____ Date ____/____/____ Last First Middle Initial Month Day Year	
ID Number _____ Chart Number _____ Examiner's Initials _____	
PLEASE MAKE AN "X" ALONG THE LINE TO SHOW HOW FAR FROM NORMAL TOWARD THE WORST POSSIBLE SITUATION YOUR PAIN PROBLEM HAS TAKEN YOU	
1. How bad is your pain today? 0 _____ 5 NO PAIN MOST SEVERE PAIN	12. Does your pain interfere with personal relationships (family, friends, sex, etc.)? 0 _____ 5 NOT AT ALL ALWAYS
2. How bad is your pain on average? 0 _____ 5 NO PAIN MOST SEVERE PAIN	13. How has your pain changed your outlook on life and the future (depression, hopelessness)? 0 _____ 5 NO CHANGE COMPLETELY CHANGED
3. How bad is your pain at its worst? 0 _____ 5 NO PAIN CANNOT TOLERATE	14. Does pain affect your emotions? 0 _____ 5 NOT AT ALL COMPLETELY
4. Does your pain interfere with your sleep? 0 _____ 5 NOT AT ALL CAN'T SLEEP	15. Does your pain affect your ability to think or concentrate? 0 _____ 5 NOT AT ALL COMPLETELY
5. How bad is your pain with standing? 0 _____ 5 NO PAIN MOST SEVERE PAIN	16. How stiff is your neck? 0 _____ 5 NOT STIFF CAN'T MOVE NECK
6. How bad is your pain with walking? 0 _____ 5 NO PAIN MOST SEVERE PAIN	17. How much trouble so you have turning your neck? 0 _____ 5 NO TROUBLE CAN'T MOVE NECK
7. Does your pain interfere with driving or riding in a car? 0 _____ 5 NOT AT ALL CAN'T DRIVE OR RIDE	18. How much trouble do you have looking up and down? 0 _____ 5 NO TROUBLE CAN'T LOOK UP OR DOWN
8. Does your pain interfere with social activities? 0 _____ 5 NOT AT ALL ALWAYS	19. How much trouble do you have working overhead? 0 _____ 5 NO TROUBLE CAN'T WORK OVERHEAD
9. Does your pain interfere with recreational activities? 0 _____ 5 NOT AT ALL ALWAYS	20. How much do pain pills help? 0 _____ 5 COMPLETE RELIEF NO RELIEF
10. Does your pain interfere with work activities? 0 _____ 5 NOT AT ALL CAN'T WORK	TOTAL SCORE _____
11. Does your pain interfere with personal care (eating, dressing, bathing, etc.)? 0 _____ 5 NOT AT ALL ALWAYS	AGE _____ OCCUPATION _____

Fig 3 (NPAD) Neck Pain and Disability Scale

➤ Procedure

- Ethical clearance was obtained from the institute with Ref. no. DYPCPT/ISEC/79/2024 dt.03/09/2024.
 - Participants were recruited from the Dr. D Y Patil college of Physiotherapy building.
 - Interested individuals underwent a screening process that assessed eligibility based on inclusion and exclusion criteria.
 - Written informed consent was obtained from all participants after explaining the study's purpose, procedures, risks, and benefits.
 - Screening procedure was done by Craniovertebral angle (CVA) using photogrammetry to confirm Forward Head Posture (CVA > 49 degrees).
 - Measurement of craniovertebral angle was done with the help of MB Scale Software.
 - Prior to the commencement of the procedure, the following precautions were taken.
- A questionnaire for pre and post measurements were administered to the potential participants based on basic eligibility criteria.
 - Pain was measured using the NPRS. Participants rated their pain on a scale from 0 (no pain) to 10 (worst possible pain).
 - Cervical ROM (flexion, extension, lateral flexion, rotation) was measured using Goniometer. Thoracic spine flexibility was also be assessed.
 - A handheld percussor massage device was used on upper trapezius, levator scapulae, and cervical paraspinal muscles for 10-15 minutes per session.
 - Intensity was adjusted based on participant comfort, starting from low intensity and gradually increasing as tolerated.
 - Pre and post measurements NPRS, and Cervical range of motion were taken.



Fig 4 Measurement of CVA for the Screening Procedure

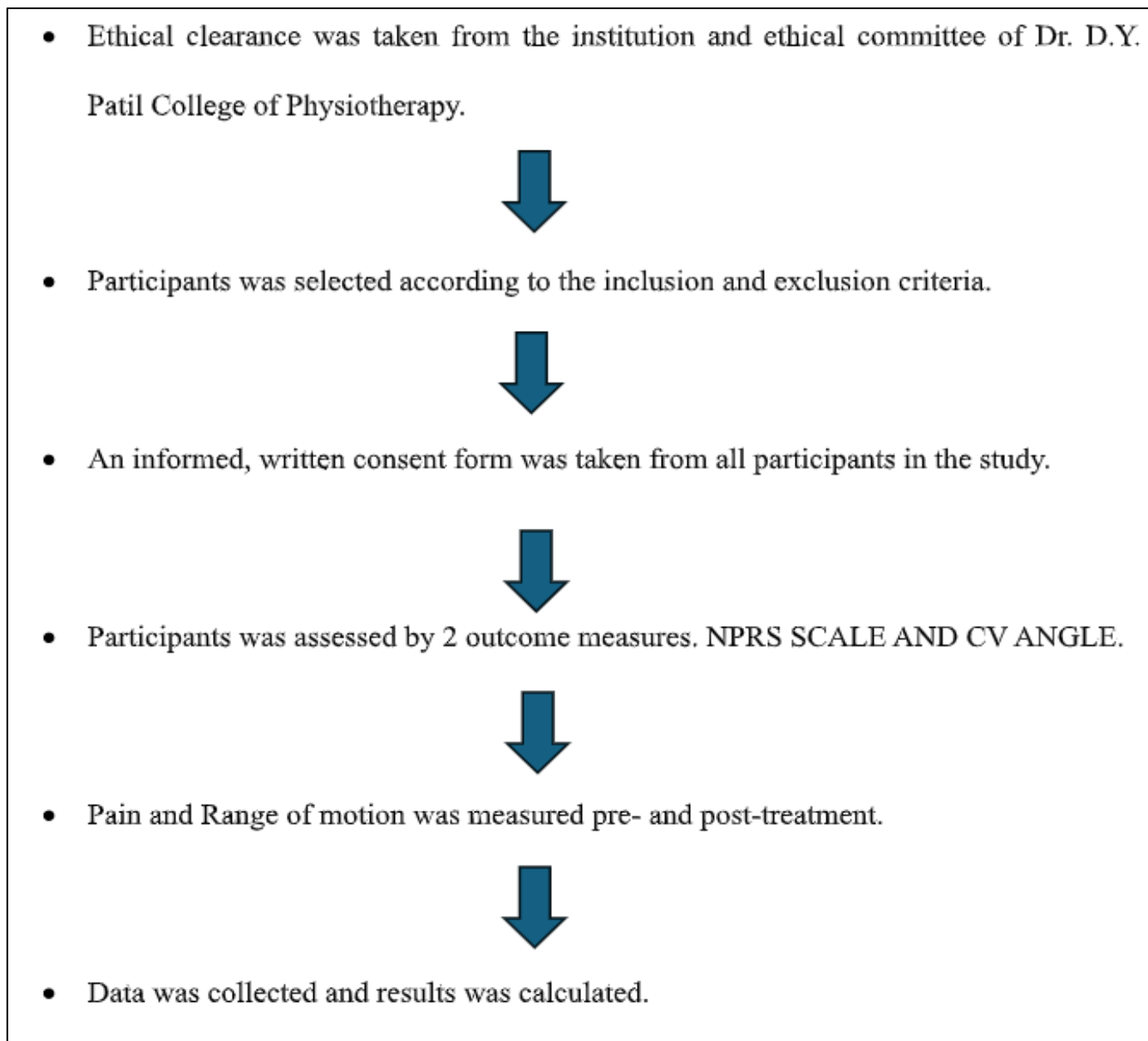


Fig 5 Procedure in Flow Diagram

➤ Data Management

The data collected from the trial was securely stored in a confidential area with restricted access. This ensures that only authorized individuals, such as the biostatistician and the designated researcher in charge, are able to review and analyse the data at a later stage.

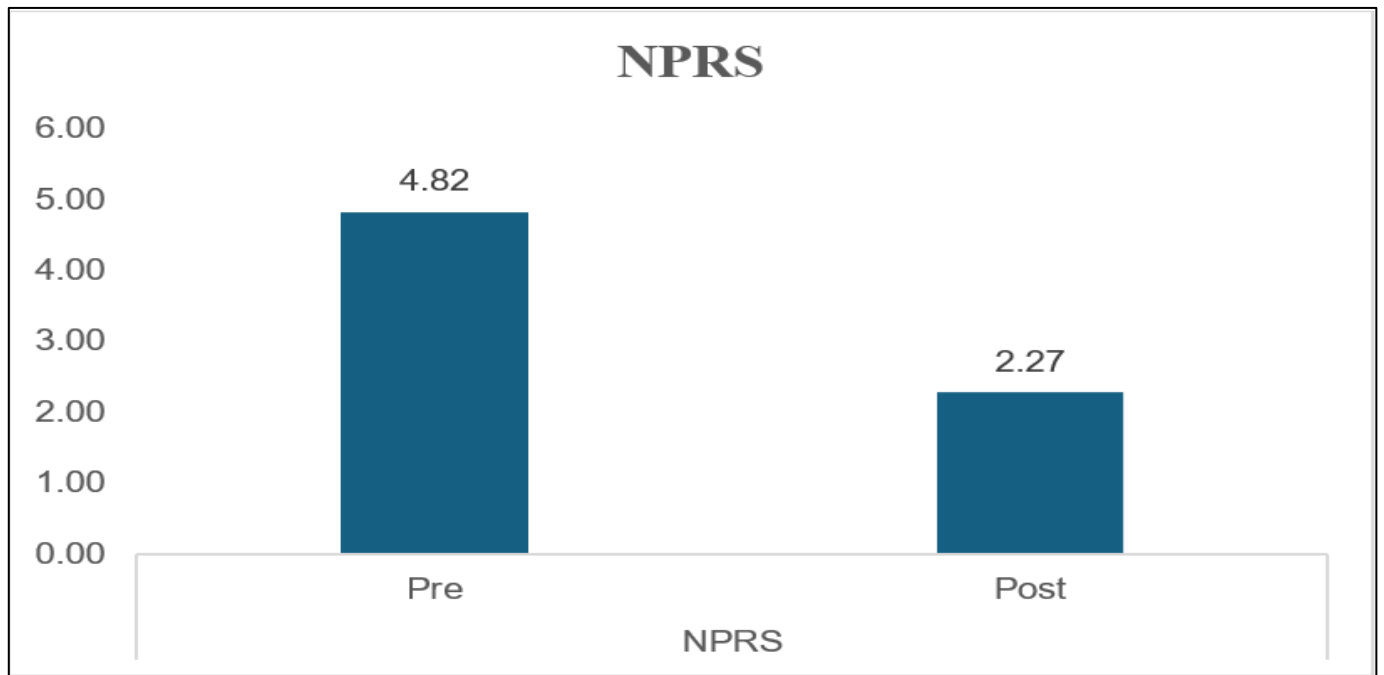
V. RESULT

➤ Statistical Analysis:

Means were calculated using SPSS (Version 25) and this software was used for all the statistics. A paired t-test was used to analyse pre- and post-treatment dependent variables. Later, using the previously derived means, pre and post groups were compared using the paired t-test.

Table 1 Showing a Significant Group Effect -NPTS ($p < 0.001$).

Outcome measure		Mean	Std. Deviation	P Value
NPRS	Pre	4.82	1.40	<0.001
	Post	2.27	1.01	



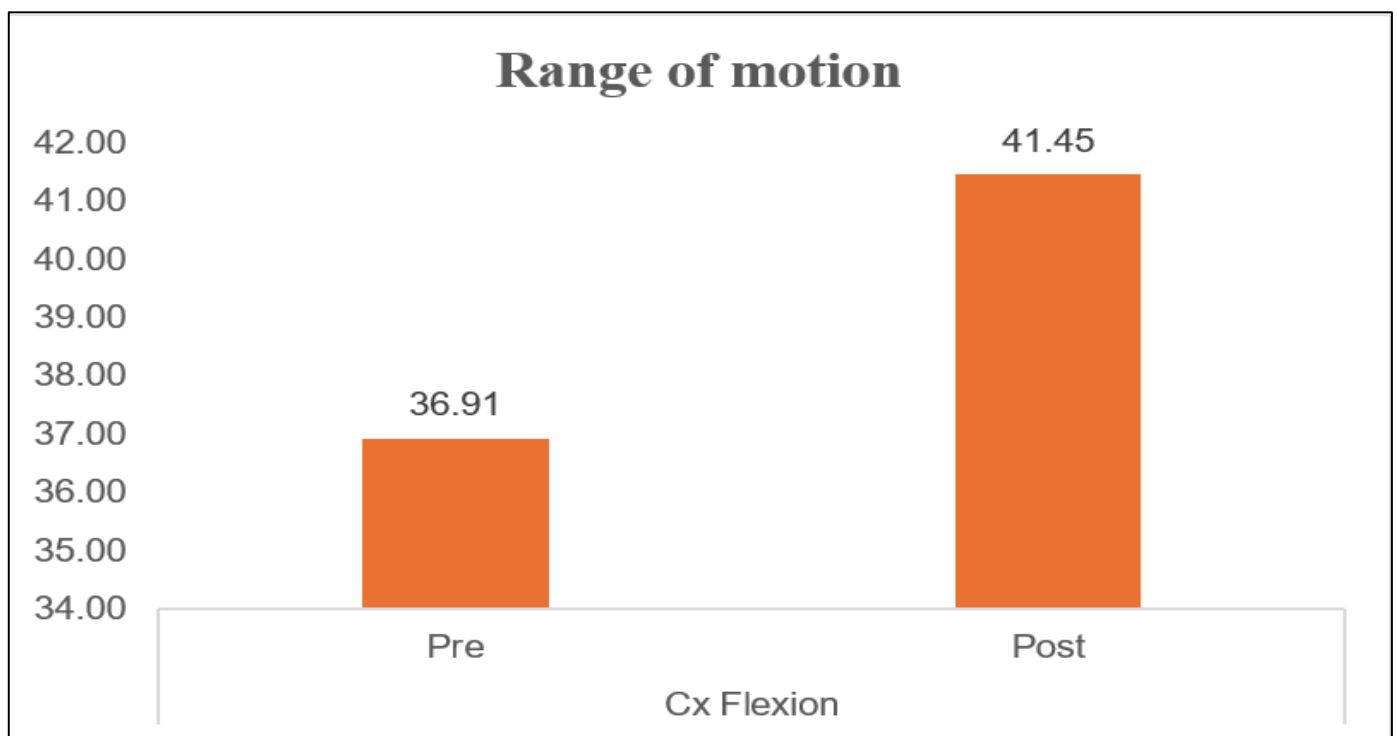
Graph 1 Pre and Post Readings of NPRS Scale

Graph 1 showing pre-treatment pain group reported significantly higher mean pain scores (4.82) compared to those in the Post treatment reported low pain scores (2.27).

The t-test for Pain levels demonstrated a significant group effect ($p < 0.001$). Post-treatment analyses revealed that individuals in the Pre-treatment pain group reported significantly higher mean pain scores (4.82) compared to those in the Post treatment reported low pain scores (2.27).

Table 2 Showing a Significant Group Effect ($p < 0.001$).

Outcome measure		Mean	Std. Deviation	P Value
CervicalFlexion	Pre	36.91	3.81	<0.001
	Post	41.45	3.47	



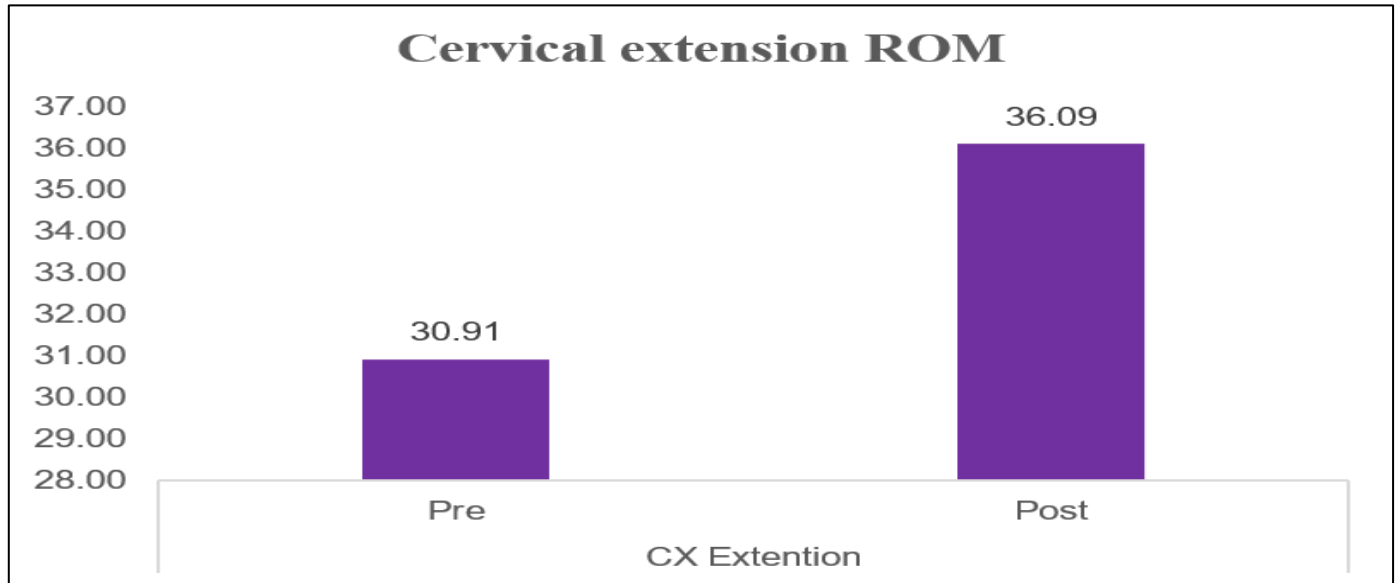
Graph 2 Pre and Post Readings of Range of Motion

Graph 2 showing pre-treatment reported significantly decreased mean degree range of motion scores (36.91) compared to those in the Post treatment reported increased mean degree range of motion scores (41.45).

The t-test for cervical range of motion demonstrated a significant group effect ($p < 0.001$). Post-treatment analyses revealed that individuals in the Pre-treatment reported significantly decreased mean degree range of motion scores (36.91) compared to those in the Post treatment reported increased mean degree range of motion scores (41.45).

Table 3 Showing a Significant Group Effect ($p < 0.001$).

Outcome measure		Mean	Std. Deviation	P Value
CervicalExtension	Pre	30.91	1.64	<0.001
	Post	36.09	2.21	

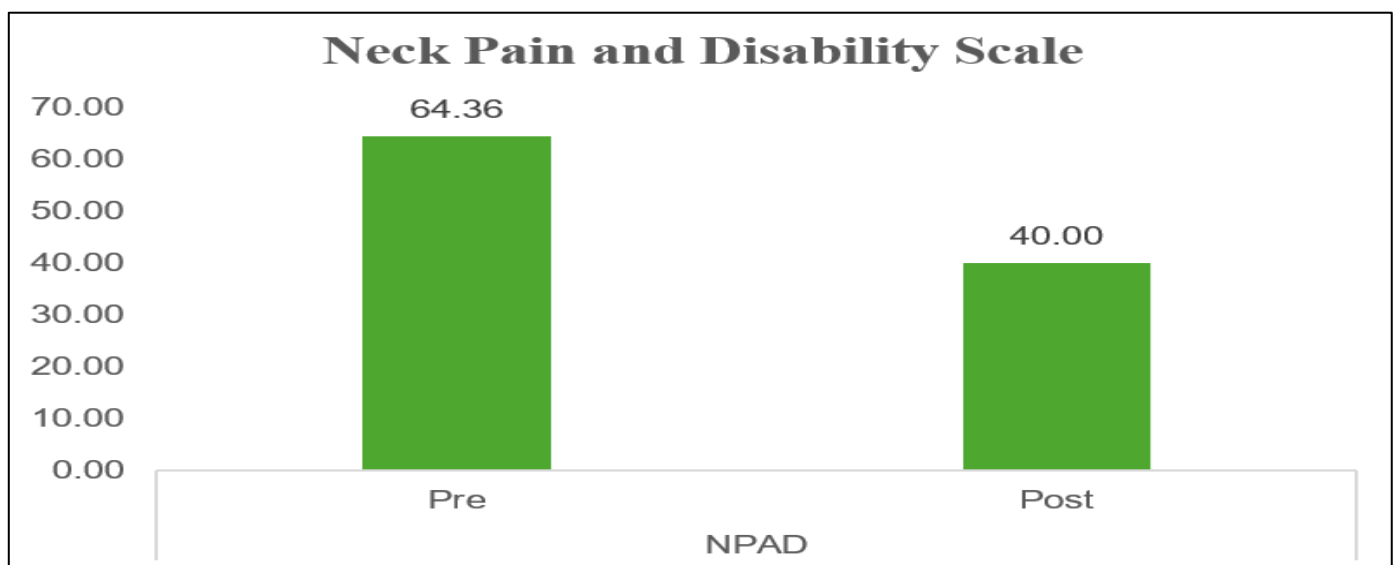


Graph 3 Pre and Post Reading of Cervical Extension ROM

Graph 3 showing pre-treatment reported significantly decreased mean degree range of motion scores (30.91) compared to those in the Post treatment reported increased mean degree range of motion scores (36.06).

Table 4 Showing a Significant Group Effect ($p < 0.001$).

Outcome measure		Mean	Std. Deviation	P Value
NPAD	Pre	64.36	15.49	<0.001
	Post	40.00	11.35	



Graph 4 Pre and Post Readings of NPAD

Graph 4 showing pre-treatment reported significantly decreased mean degree range of motion scores (64.36) compared to those in the Post treatment reported increased mean degree range of motion scores (40.00).

VI. DISCUSSION

The purpose of this study was to examine the effectiveness of a 15-minute each side percussion therapy on pain measured by Numeric Pain Rating Scale (NPRS), and cervical active Range of Motion (ROM) measured by conventional goniometer measurements which were taken before and after the treatment.

In this study, a total of 12 participants. The age group included for this study were janitors from 35 to 50 years of age.

A significant difference was noted in relation to modulation of pain with a mean decrease in NPRS score of 4.82 in pre-treatment as compared to 2.27 in post treatment which was perceived immediately after the treatment session.

The varied responses from participants on the pain scale could be explained by the pain gate theory. According to this theory, sensory stimulation can activate either large and fast non-nociceptive fibres (A β fibres) resulting in a decrease in pain and/or soreness, or smaller nociceptive fibres (A δ and C fibres) resulting in aggravation of pain and soreness, for more than 30 minutes.

The possibility exists that applying additional power for the manipulation of muscle tissues could activate mechanoreceptor nerve endings, increasing the sensation of soreness in the muscles right after the massage gun is applied.

It is also possible that the high frequency used for the thera gun (~53 Hz, according to Konrad et al.) was a contributing factor.

The speed at which the percussion gun compresses the muscle during percussion therapy, when applied to the trapezius, the muscle may be overstimulating due to the non-nociceptive impulses, occluding the nociceptive impulses.

It is believed that when these nociceptive impulses are blocked, there is a relaxing effect that prevents muscular guarding in response to pain or soreness-related sensory input[17].

However, following percussion therapy, the participant with a negative response might have had more discomfort and muscular guarding due to highly sensitive nociceptive fibres that were triggered.

Similarly, the current study found that there was a significant decrease in pain post treatment as compared to pre-treatment. A higher change might be due to the faster rate of compression, tension, torsion, or shear applied to the muscle within the 15-minute of percussion therapy.

Although this is a short timeframe to implement the selected rehabilitation intervention and conclude post-testing, this is also in line with the manufacturers' suggested usage timing, though it's unclear why these recommendations have been made.

Furthermore, it has been observed that vibratory and percussion instruments significantly affect the afferent discharge in muscle spindles and fast-adapting mechanoreceptors (Constantino et al., 2017). This leads to 31 improvements in the pressure pain threshold that are associated with their application (Jonker, 2019). Piñero (2019) evaluated into how percussion therapy affected hamstring pain and found that after a single application, there was a decrease in pain.

However, it is impossible to determine whether percussion therapy alone resulted in the change in pain intensity, or the contribution was to other treatment as the results did not consider any long-term effects of the initial treatment administered 15 days ago. Kalichman L et al. (2005) conducted a review which suggests that biomechanical changes, such as reduced muscle compliance, may account for the increase in range of motion (ROM) after a conventional massage.[19]

Other potential mechanisms include physiological changes, such as increased blood flow, neurological changes, such as reduced pain perception, and psychological changes, which may lead to increased relaxation.

In the current study, there has been an average increase of 36.91-41.45 degrees in cervical flexion range of motion and increase of 6-7 degrees in cervical extension.

Interestingly, the authors did not find any significant difference. Percussive massage applies pressure and friction to the targeted muscle, skin, and fascia.

Less resistance to a movement could result from this having an effect on the fluid's viscosity (Behm, 2018, Behm and Wilke, 2019). Different mechanical forces acting on the tissues, such as compression, tension, torsion, or shear, cause the tissue to mechanically soften and become more pliable.

Comparatively, it has been demonstrated that vibrating foam rollers increase range of motion, which may be related to elevated body temperature and better blood flow (Kasahara K et al. 2022, Romero Moraleda B et al., 2019). Blood volume has been linked to both actively tensed and passively stretched muscles, according to earlier studies.

According to a previously published theoretical model, for instance, a mere 50% increase in passive stretch tension can be caused by slight increases in intramuscular volume (Sleboda DA, Wold ES, Roberts TJ, 2019). Jack H Trainer et al (2022) performed research on posterior shoulder muscles showed an increase in almost internal rotation range of motion increased by almost 4 degrees following percussion therapy.

VII. CONCLUSION

In conclusion, Forward Head Posture presents a significant challenge to the health and productivity of janitors, necessitating effective and accessible interventions. Percussor Massage Therapy offers a practical solution, providing immediate pain relief, improved ROM, and postural correction. This study underscores the value of Percussor Massage Therapy as a key component of occupational health strategies, emphasizing its potential to enhance the quality of life for workers in physically demanding roles. By addressing the root causes of Forward Head Posture, Percussor Massage Therapy not only alleviates symptoms but also supports long-term musculoskeletal health, making it a promising tool for managing work-related postural dysfunctions.

LIMITATIONS OF STUDY

- Small Sample Size
- Long Term Effects Could not be Investigated
- Difficult to Separate the Effects of the Various Modalities when there is no Control Group.

FUTURE SCOPE OF STUDY

- The future scope of percussor massage therapy includes expanding its use to various occupational groups such as office workers and healthcare providers who also face posture-related issues.
- Long-term studies could assess the sustained effectiveness of the therapy in relieving pain and improving posture over time.
- Comparative research with other therapeutic methods like chiropractic care and ergonomic interventions could establish its relative efficacy.
- Technological advancements may lead to the development of enhanced percussor devices with customizable features for more precise treatment.

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APPENDIX 1**➤ Consent Form****INFORMED CONSENT FORM**

Study Title: Immediate Effectiveness of Percussor Massage Therapy on Pain and Range of Motion in Forward Head Posture Among Janitors

Patient's name:

Date of birth/Age:

1. I confirm that I have read and understood the information sheet dated _____ for the above study and have had the opportunity to ask questions.
2. I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.
3. I understand that the sponsor of the clinical trials, others working on the sponsor's behalf, the ethics committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and any further research that maybe conducted in relation to it, even if I withdraw from the trial. I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published.
4. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).
5. I agree to take part in the above study.
6. I understand that if I have any questions relating to my participation in this research, I may contact the Principal Investigator, Vitrag Sancheti on the contact details +919579999000 who will be happy to answer them.

Signature (or thumb impression) of subject/legally acceptable representative: _____

Date: _____

Signatory's name: _____

Signature of the investigator: _____ Date: _____

Study investigators name: _____

Signature of witness: _____ Date: _____

Name of witness: _____

APPENDIX 2**➤ Evaluation Proforma****ASSESSMENT FORM****Demographic data:****Name:****Age:****Gender:****Occupation:****Address:****Phone number:****CHIEF COMPLAINS:****PAST MEDICAL/ SURGICAL HISTORY****ASSESSMENT**

PRE-ASSESSMENT VALUES	POST ASSESSMENT VALUES
DATE:	DATE:
PAIN:	PAIN
CVA:	CVA

APPENDIX 3

➤ Neck Pain Disability Index

Neck Pain and Disability Scale	
Name _____ Date ____/____/____ Last First Middle Initial Month Day Year	
ID Number _____ Chart Number _____ Examiner's Initials _____	
PLEASE MAKE AN "X" ALONG THE LINE TO SHOW HOW FAR FROM NORMAL TOWARD THE WORST POSSIBLE SITUATION YOUR PAIN PROBLEM HAS TAKEN YOU	
1. How bad is your pain today? 0 _____ _____ _____ _____ 5 NO PAIN MOST SEVERE PAIN	12. Does your pain interfere with personal relationships (family, friends, sex, etc.)? 0 _____ _____ _____ _____ 5 NOT AT ALL ALWAYS
2. How bad is your pain on average? 0 _____ _____ _____ _____ 5 NO PAIN MOST SEVERE PAIN	13. How has your pain changed your outlook on life and the future (depression, hopelessness)? 0 _____ _____ _____ _____ 5 NO CHANGE COMPLETELY CHANGED
3. How bad is your pain at its worst? 0 _____ _____ _____ _____ 5 NO PAIN CANNOT TOLERATE	14. Does pain affect your emotions? 0 _____ _____ _____ _____ 5 NOT AT ALL COMPLETELY
4. Does your pain interfere with your sleep? 0 _____ _____ _____ _____ 5 NOT AT ALL CAN'T SLEEP	15. Does your pain affect your ability to think or concentrate? 0 _____ _____ _____ _____ 5 NOT AT ALL COMPLETELY
5. How bad is your pain with standing? 0 _____ _____ _____ _____ 5 NO PAIN MOST SEVERE PAIN	16. How stiff is your neck? 0 _____ _____ _____ _____ 5 NOT STIFF CAN'T MOVE NECK
6. How bad is your pain with walking? 0 _____ _____ _____ _____ 5 NO PAIN MOST SEVERE PAIN	17. How much trouble so you have turning your neck? 0 _____ _____ _____ _____ 5 NO TROUBLE CAN'T MOVE NECK
7. Does your pain interfere with driving or riding in a car? 0 _____ _____ _____ _____ 5 NOT AT ALL CAN'T DRIVE OR RIDE	18. How much trouble do you have looking up and down? 0 _____ _____ _____ _____ 5 NO TROUBLE CAN'T LOOK UP OR DOWN
8. Does your pain interfere with social activities? 0 _____ _____ _____ _____ 5 NOT AT ALL ALWAYS	19. How much trouble do you have working overhead? 0 _____ _____ _____ _____ 5 NO TROUBLE CAN'T WORK OVERHEAD
9. Does your pain interfere with recreational activities? 0 _____ _____ _____ _____ 5 NOT AT ALL ALWAYS	20. How much do pain pills help? 0 _____ _____ _____ _____ 5 COMPLETE RELIEF NO RELIEF
10. Does your pain interfere with work activities? 0 _____ _____ _____ _____ 5 NOT AT ALL CAN'T WORK	TOTAL SCORE _____
11. Does your pain interfere with personal care (eating, dressing, bathing, etc.)? 0 _____ _____ _____ _____ 5 NOT AT ALL ALWAYS	AGE _____ OCCUPATION _____

APPENDIX 4➤ *Master Chart*

Immediate Effectiveness of Percussor Massage Therapy on Pain, Range of Motion in Forward Head Posture in Janitors															
Sr No	Name	Age	Sex	Contact No	Address	CV Angle	Pre-NPR	St-Cx Flexi	Cx Exten	Pre-NP	CV Angle	Post-NPR	St-Cx Flexi	Cx Exten	Post-NP
1	SK	43	F		Pimple Gura	29	7	37	28	82		3	41	32	42
2	RB	43	F	7.5E+09	Kasarwadi	38	5	39	32	84		2	42	35	47
3	RS	30	F	7.3E+09	Bhosari	45	6	30	30	84		4	38	38	62
4	LB	40	F	8.8E+09	Bhosari	47	4	32	32	76		2	39	37	51
5	AS	30	F	8.2E+09	Landewadi	34	5	33	30	73		3	35	39	47
6	SU	45	F	9.1E+09	Pimpri	36	5	38	31	55		3	43	38	36
7	SJ	37	F	8.3E+09	Pimpri	47	6	42	29	57		2	45	33	40
8	SC	35	F	7.6E+09	Phule naga	48	3	39	33	55		1	47	35	33
9	JP	30	F	7.5E+09	Nehru naga	37	6	41	32	48		3	45	36	26
10	SM	25	F	7.5E+09	Bhosari	42	3	39	30	49		1	41	38	32
11	RV	36	F	7.7E+09	Nehru naga	47	3	36	33	45		1	40	36	24