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PHYSIOzine™

Advancing Physiotherapy through Knowledge & Innovation

Integrating ICF core sets

Forward Head Posture

Improve mouth Opening

Tennis Elbow

Trunk PNF

An Interview with WAQAR NAQVI

Pulmonary Function Test

February 2025

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Advancing Physiotherapy Through Knowledge & Innovation

MESSAGE FROM CHIEF EDITOR

DR. JASPREET KAUR KANG

PRINCIPAL AT KD INSTITUTE OF PHYSIOTHERAPY

Welcome to Volume 2, Issue 1 of PhysioZine! This issue brings a rich collection of insightful articles, research studies, and expert interviews, all aimed at advancing the field of physiotherapy.

We are honored to feature an exclusive interview with Dr. Waqar Naqvi, discussing the role of Artificial Intelligence (AI) in Physiotherapy. Our contributors have explored a diverse range of topics, from chronic low back pain management and stroke rehabilitation to postural analysis in students and tennis elbow prevention. Each piece reflects the dedication of researchers and clinicians in enhancing patient care and physiotherapy practices.

We extend our gratitude to all authors and reviewers who have made this issue possible. Your continued support drives our mission to share knowledge and innovation within the physiotherapy community.
Happy reading!

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MESSAGE FROM FOUNDER

DR. DARSHAN PARMAR

ASSISTANT PROFESSOR AT KD INSTITUTE OF PHYSIOTHERAPY

It is with great pride that I welcome you to Volume 2, Issue 1 of PhysioZine! Our journey continues to evolve, bringing together the brightest minds in physiotherapy to share cutting-edge research, clinical insights, and innovative approaches that redefine patient care.

This issue highlights Artificial Intelligence (AI) in Physiotherapy, rehabilitation strategies for chronic pain, and postural analysis among students, along with impactful research on stroke recovery, pulmonary function, and musculoskeletal health. These contributions not only enhance our understanding but also open new avenues for evidence-based physiotherapy practice.

PhysioZine remains committed to fostering a global platform for physiotherapy professionals, ensuring that knowledge and expertise are shared beyond boundaries. I sincerely thank our authors, reviewers, and readers for their unwavering support.
Together, let's continue to push the boundaries of physiotherapy innovation and education!

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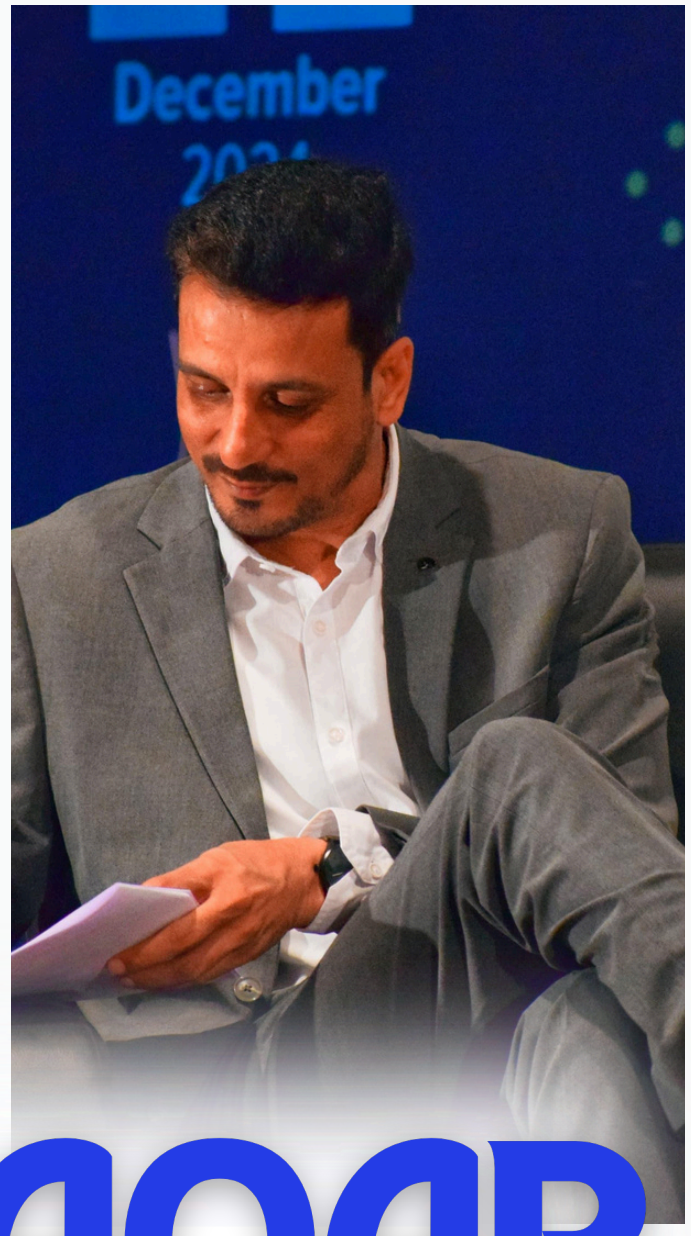
INTERVIEW



DR. WAQAR NAQVI

How is AI being integrated into physiotherapy, and what's its impact on research, clinics, and academics?

AI is creating waves in physiotherapy by reshaping how we work, learn, and innovate. In research, AI accelerates processes, such as analyzing large datasets, synthesizing evidence, and generating hypotheses. Clinically, it enhances patient care by tracking movement patterns, predicting outcomes, and providing insights into personalized treatment plans.

In education, AI helps to create interactive, adaptive tools that make learning more engaging and effective. However, it is not just about automation; AI is about augmentation, empowering us to do more while maintaining human expertise at the center.

How can AI help researchers and physiotherapists do studies more accurately and efficiently?

AI is a powerful tool for research. It can process massive amounts of data in minutes, identify trends, and suggest directions for further study. Tools, such as generative AI, assist with literature reviews, data visualization, and refining research questions. For physiotherapists, AI simplifies tasks, such as monitoring patient progress and analyzing outcomes. This saves time and ensures that our focus remains on interpreting the data and applying it to real-world scenarios, where it matters most.

INTERVIEW

How can AI improve patient outcomes in physiotherapy?

AI enhances patient outcomes by making care more precise and proactive. Wearable devices, for example, collect real-time data on a patient's movements, and AI analyzes the data to adjust the therapy plans dynamically. AI also supports early detection, spotting potential setbacks or complications before escalating. It is a tool that ensures that every patient receives individualized care, helping them recover faster and more effectively.

Is AI shaping physiotherapy education, and should it be part of the curriculum?

Yes, AI is transforming physiotherapy education, and it needs to be part of the curriculum. AI is already used to create adaptive learning tools, automate assessments, and simulate patient scenarios. However, it is more than simply learning how to use these tools. Students must understand how to evaluate AI outputs, think critically about them, and apply them responsibly. The shift from adapting to AI to becoming adept at leveraging is crucial for future professionals.

What challenges do you see with AI adoption in physiotherapy?

The greatest challenges are access, trust, and training. Not every clinic or institution has the resources to invest in AI tools, and even when they do, there is often a steep learning curve for practitioners to feel confident in using them.Trust is another issue. Patients and clinicians alike must consider the reliability and fairness of AI-driven recommendations. Addressing these challenges requires ongoing education, transparent communication, and the validation of the tools used.

What ethical concerns come up when using AI in physiotherapy?

Ethics are a critical part of the adoption of AI in physiotherapy. Data privacy is a top concern—AI systems often rely on sensitive patient information; therefore, protecting that data is essential. Bias is another issue. If AI models are trained on incomplete or skewed data, their outputs may not be equitable or effective for all the populations. Transparency is a key factor in this process. Patients need to understand how and why AI is being used in their care, and clinicians must remain accountable for decisions, ensuring that AI serves as a support tool, not the decision maker.

How could misuse of AI hurt the field of physiotherapy?

Misusing AI, such as relying on it blindly without validation, can lead to incorrect diagnoses or ineffective treatment. This could harm patients and erode their trust in the technology and profession. AI is an aid and not a replacement. Misuse occurs when we treat it as an answer instead of a tool to enhance our expertise. We need to be mindful of where and how to use it.

Will AI replace physiotherapists?

No, AI will not replace physiotherapists. However, physiotherapists who do not embrace AI may find themselves replaced by those who do so. AI augments our capabilities and does not take over our roles. Currently, it handles repetitive tasks, such as analyzing data or tracking progress. In the future, as automation advances, certain tasks may become fully automated. However, the heart of physiotherapy—building trust, adapting care, and delivering empathy—remains human. Those who adopt AI will lead the way forward.

INTERVIEW

Where do you see AI in the next 10 years?

AI is expected to become deeply embedded in physiotherapy. Wearables and predictive models are standard tools for personalizing care, while automation handles routine tasks, freeing clinicians to focus on complex decision-making. The metaverse plays a significant role in physiotherapy education, clinical practice, and research. We will see virtual environments in which students practice on simulated patients, clinicians deliver remote therapy sessions, and researchers conduct controlled studies in immersive settings. In addition, robotics has advanced significantly. AI-driven robotic devices will support precision therapy and rehabilitation, making treatment more effective and accessible. AI and these technologies will redefine how we approach patient care, research, and education while maintaining human connections at the center.

How can physiotherapists and researchers integrate AI responsibly?

Start small and learn continuously. Experiment with AI tools for specific tasks like data analysis or patient monitoring, and focus on understanding their strengths and limitations. Ethics must be at the forefront—protect data privacy, validate AI outputs, and remain transparent with patients and colleagues. The key is to use AI for augmentation, not automation—enhancing our ability to deliver care while keeping human expertise and empathy at the heart of our practice.

"The metaverse will be a key player in physiotherapy, enabling virtual environments for education, research, and clinical practice. Combined with AI and robotics, these tools will redefine how we deliver care while keeping human connection at the center."

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HOLISTIC SOLUTIONS FOR CHRONIC LOW BACK PAIN INTEGRATING ICF CORE SETS WITH REHABILITATION PROBLEM-SOLVING FORM - STRATEGIC PATHWAYS IN PHYSIOTHERAPY

Dr. Janani Arul

Assistant Professor, College of Physiotherapy, School of Health Sciences, Dayananda Sagar University, Harohalli

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Introduction:

A large number of people globally suffer from the common and disabling condition known as chronic low back pain (CLBP). Many people still struggle with chronic pain and functional impairments even with a wide range of treatment choices available, which lowers their quality of life and raises healthcare expenses. Traditional approaches frequently concentrate on managing symptoms rather than addressing the underlying causes of the recurrence.

One of the challenges in managing CLBP is the lack of a holistic, patient-centred approach that integrates both physical support and cognitive-behavioral strategies. Additionally, patients with CLBP frequently face difficulties in problem-solving and managing the daily challenges of their condition, which can further aggravates their symptoms and delay recovery.

There is a need for a comprehensive rehabilitation plan that not only provides physical support but also encourages patients to actively participate in their recovery. The combination of ICF corsets and a Rehabilitation Problem-Solving Form provides an effective solution to this issue by addressing both the physical and psychological components of CLBP. 3

However, the efficacy of this combination approach in improving patient outcomes has not been widely practised by among physiotherapist, hence this study provide an idea for a better strategy for chronic low back pain management.

This study aims to fill that gap by examining the effects of ICF core sets and the Rehabilitation Problem-Solving Form on pain relief, functional progress, and overall patient satisfaction in those with chronic low back pain. The results will provide useful insights into the potential benefits of a more holistic and integrated rehabilitation approach, with the goal.

SOLUTION TO THE PROBLEM STATEMENT:

To address the challenges presented by chronic low back pain (CLBP) and the limitations of current treatment approaches, the proposed solution integrates the use of ICF (International Classification of Functioning, Disability, and Health) core 4 sets with a Rehabilitation Problem Solving Form as a comprehensive rehabilitation strategy. This dual approach aims to target both the physical and psychological aspects of CLBP, providing a more holistic method for pain management and functional improvement.

1. ICF Core sets for Physical Support: ICF core sets are designed to provide targeted assessment in a brief & comprehensive way which helps to alleviate pain by providing treatment according to needs of physical & functional impairments by applying clinical practice guidelines revised 2021 for the specific physical impairments. By physically supporting the affected area, these core sets can play a crucial role in reducing pain intensity and preventing further injury during daily activities. The use of ICF core sets in this strategy ensures that patients receive the necessary physical aid to manage their condition effectively.

2. Rehabilitation Problem-Solving Form for Cognitive-Behavioral Support: The Rehabilitation Problem-Solving Form is a structured tool that guides patients in identifying and addressing the various challenges associated with their CLBP.8 This form encourages patients to engage in cognitive-behavioral techniques, such as goal setting, problem analysis, and the development of actionable solutions by applying Bio psychosocial Approaches into Physiotherapy Management.

This strategy encourages greater levels of self-efficacy, enhances coping strategies, and makes it easier for patients to manage their conditions over the long term by giving patients the power to take an active role in their rehabilitation.5

3. Integrated Approach for Enhanced Outcomes: By combining the physical support of ICF corsets with the cognitive-behavioral benefits of the Rehabilitation Problem Solving Form, this solution offers a comprehensive rehabilitation strategy that addresses the multifaceted nature of CLBP. This integrated approach not only aims to reduce pain and improve functional ability but also seeks to enhance the overall quality of life for individuals with chronic low back pain by applying clinical practice guideline for low back pain as an evidence based treatment approach.

UNIQUNESS / INNOVATION:

The proposed approach of integrating ICF corsets with the Rehabilitation Problem Solving Form offers a unique and innovative solution to the complex challenge of chronic low back pain (CLBP). The distinctiveness of this approach lies in its holistic, dual-focused strategy that simultaneously addresses the physical and cognitive-behavioral aspects of the condition, setting it apart from traditional treatment methods.

The core sets which is provided by WHO and rehabilitation problem solving form is available in the market and it is open access which will be great use for the physiotherapist to use for the integrated approach for chronic low back pain patient by applying the treatment by clinical practice guideline for low back pain as an evidence based treatment approach which will improve physical, functional and the quality of life

Influencing the physiotherapist about the use of ICF core sets by WHO & rehabilitation problem solving form as a tool and Idea of Innovation in Physiotherapy Management of Low Back Pain for the better outcome of the patient pain management.

I hope and assure that this idea of using ICF core sets & rehabilitation problem solving form helps in managing the low back pain patients and also a new rehabilitation strategy for the physiotherapist to improve the physical and functional quality of the life of the patients by applying the evidence-based practice in the rehabilitation process.

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PREVALENCE OF FORWARD HEAD POSTURE IN FEMALE COLLEGE GOING STUDENTS OF GANDHINAGAR

ABSTRACT

Background: Forward head posture is one of the commonest postural malalignments found in today's youth. This postural malalignment is one of the major causes of musculoskeletal conditions in the body. If these postural changes are detected early, the musculoskeletal conditions can be treated as well as further progression can be prevented. Hence the purpose of the study was to find out the prevalence of FHP amongst college going students.

Materials and methods: Total 200 participants were included in the study. Participants were evaluated for FHP using 'ON PROTRACTOR' mobile application via craniovertebral and craniohorizontal angle.

Result: Eighty percent of participants had forward head posture. Conclusion: Prevalence of FHP is high amongst female college going students in Gandhinagar city.

Keywords: Forward head posture, Prevalence, Female college going students

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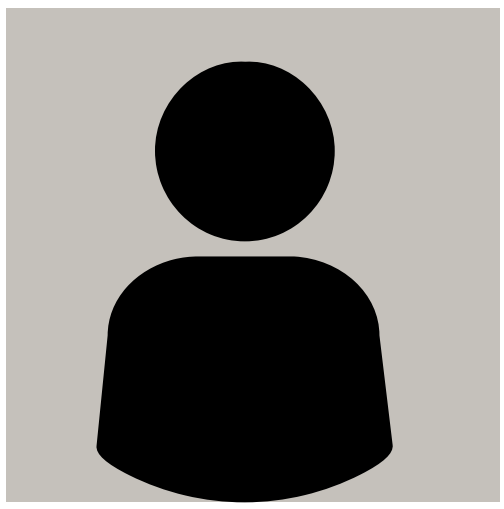


Dr Pooja Dave
Physiotherapist

INTRODUCTION

Forward Head Posture:

Posture is the attitude assumed by the body either with support during muscular inactivity, or by means of coordinated action of many muscles working to maintain stability or to form an essential basis which is being adapted constantly to the movement which is superimposed upon it.

'Turtle-neck posture' or 'Forward head posture' is one of the common postural disorders in patients with cervical pain. [1] FHP has been defined as 'Any alignment in which the external auditory meatus is positioned anterior to the plumb line through the shoulder joint'. [2] FHP is considered to co – exist with hyperextension of lower cervical spine, rounding of upper back and elevation – protraction ofshoulders.[3]In FHP, head shifts anteriorly from the line of gravity, scapula may rotate medially, a thoracic kyphosis may develop and overall vertebral height may be shortened.[4] Because of this structural changes, typically, muscles overused in a certain direction will become tighter and shorter an effect known as 'adaptive shortening'. Opposing muscles to repetitive movements sustain stretches during prolonged postures. As a result, these will tend to become longer and weaker – an effect known as 'stretch weakness',

Due to FHP there is tightness of the upper trapezius, pectoralis major and levator scapulae and weakness of rhomboids, serratus, middle and lower trapezius, deep neck flexors, especially scalene muscles.[5]

Neck pain is a common complaint in general population.[6] Among diverse neck pain, mechanical neck pain is the most common type with pain confined in the area on posterior aspect of neck, that can be exacerbated by neck movement or sustained posture. Along with considerable cost for individual and society neck pain is a frequent source of disability causing human suffering and affecting wellbeing of individual. [7]

Aims of the study

• Owing to ill-effects of FHP, it is necessary to evaluate the prevalence of forward head posture to avoid future complications amongst the college going students of Gandhinagar. Hence, the aim of the study was to find out the prevalence of Forward Head posture in female college going students of Gandhinagar with the age group of 17 to 23 years.

Objectives of the study

• To find out the prevalence of FHP with the help of craniovertebral angle and craniohorizontal angle.

MATERIALS & METHODS

STUDY SETTING

• C. M. Patel college of physiotherapy – Musculoskeletal
department, Gandhinagar.

DURATION OF THE STUDY

• 5 Months

INCLUSION CRITERIA

• Female college going students
• Age 17 – 23 years

EXCLUSION CRITERIA

•Non musculoskeletal pain of shoulder
• Signs of neurological involvement
• Cervical PIVD
• Cervical stenosis
• History of cervical trauma
• Previous neck & shoulder surgery

S**AMPLE SIZE**

A convenient sample of 200 healthy females aged 17-23 years participated in observational study. Subjects were recruited from
Physiotherapy, Nursing & Engineering department through word of mouth according to the inclusion and exclusion criteria. After explaining verbal information about the nature of study, informed consent was obtained from each participant.

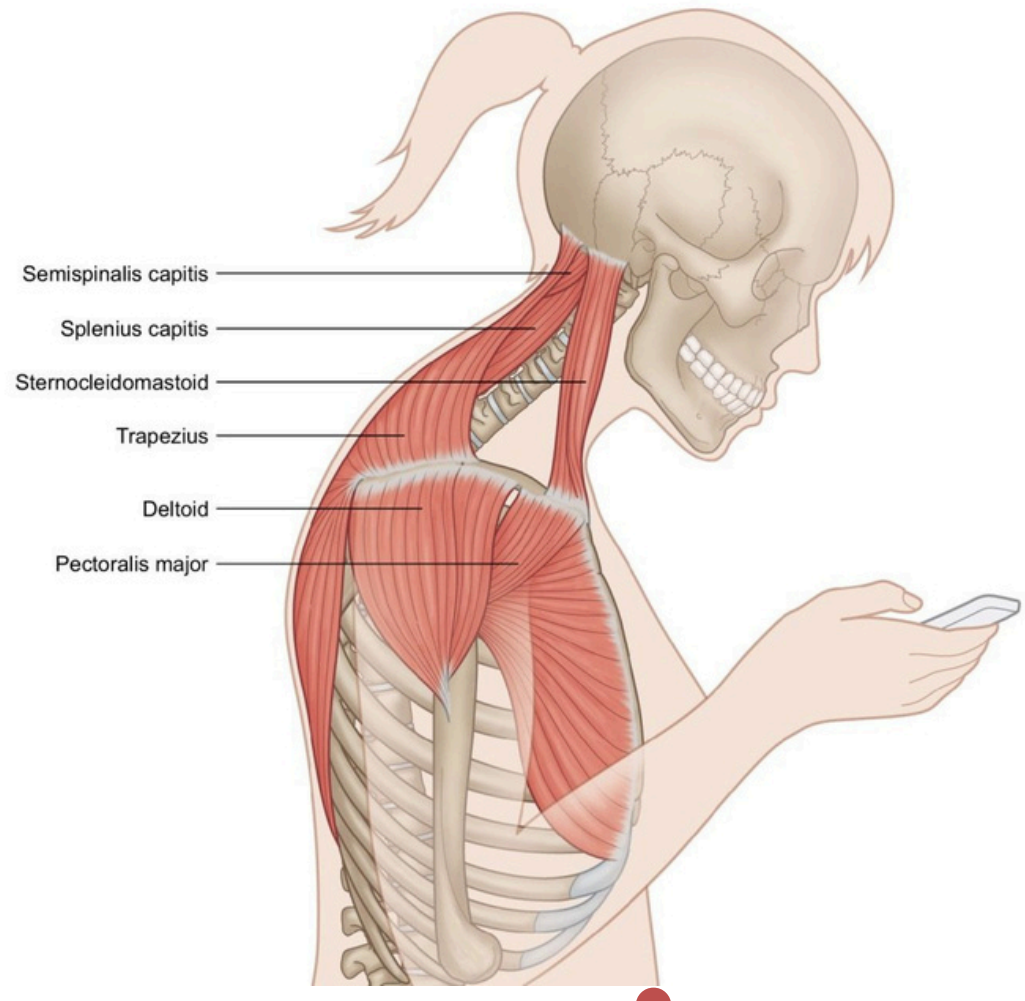
PROCEDURE

Interested subjects were informed about aims and procedure of the study. Subjects were included according to their inclusion and exclusion criteria. They shallsign the written consent, to be considered a study-subjects. A general physiotherapy assessment was taken, and the base line data was
collected on the reporting date.
Photogrammetry

A digital imaging technique was used to evaluate head and neck posture in the high sitting position. In this method the two angles called craniovertebral and craniohorizontal angles were measured using smartphone app “ON PROTRACTOR”. “A REDMI MAX 2” phone was placed at a distance of one meter on a fixed base without rotation or tilt. The height of the camera was adjusted to the level of the subject’s shoulder and a self-balanced position was chosen to standardize the head and neck posture of subjects.

Procedure for assessment of forward head posture

Participants were made to sit on the stool with their knees in 90 degree of flexion and their feet flat on the ground and were instructed to focus at a particular-eye level. The starting position was standardized by placing the subject in an upright position. A mobile phone was mounted on a stand and placed laterally one meter away from the subject. Bright color markers were placed on the C7 spinous process, tragus of ear and canthus of eye. The examiner located the C7 spinous process by asking the subject to move the cervical spine into the flexion and extension. The C7 spinous process is more prominent, while C6 spinous process is absent in palpation when the cervical spine is extended. The angle between the line joining C7 to tragus and a vertical line extending from C7 was measured. Also, the line connecting the external canthal angles of the eyes was measured, and photographs were taken.



The resting forward head posture was the outcome measure. The subject may change the resting Forward head posture if they were conscious. To avoid this, the subjects were instructed to perform flexion & extension of neck for 10 times. After which the lateral photographs were taken, to avoid experimental bias. Lateral photographs were analyzed using ON PROTRACTOR application to measure a degree of craniovertebral and craniohorizontal angle.

RESULT

In this observational study, total 200 participants were recruited. Each participant was evaluated for CV angle, CH angle, muscle strength and range of motion of cervical spine. The study concluded that 80% students had altered CV angle and 22.5% students had altered CH angle which is correlated with FHP. It shows that because of FHP, it affects the CV angle more than CH angle as the ratio of affection between CV angle and CH angle is approximately 4:1.

DISCUSSION

The study aimed to investigate the prevalence of FHP amongst female college going students of Gandhinagar. It was found that total 83% of participants had forward head posture among which 80% of participants had altered CV angle and 22.5% of participants had altered CH angle.

This prevalence was due to the difference in modern lifestyle. It was observed that participants were more of into use of laptops, mobile phones and attaining particular position or attaining improper posture for prolong period of time which could be one of the reasons behind forward head posture. Also, the work positions attained by students of physiotherapy and nursing field during standing, namely during assessment and treatment time could be one of the reasons. Also, while working in standing position, especially during the treatment period, neck postures are asymmetric or at extremes flexion or in other words, in ergonomically inappropriate body position

Also, the study hours affect the craniovertebral angle which leads to FHP. As due to the long duration of study, neck remains in one sustained position that is forward and bend position of the neck which causes neck pain and that is one of the reasons for FHP.

CONCLUSION

Prevalence of forward head posture was found to be high in female college going students between the age group of 17 years and 23 years. Prevalence of CV angle was found approximately 80% and CH angle was found approximately 22.5%. Total prevalence of forward head posture in college going girls of Gandhinagar city was 80%.

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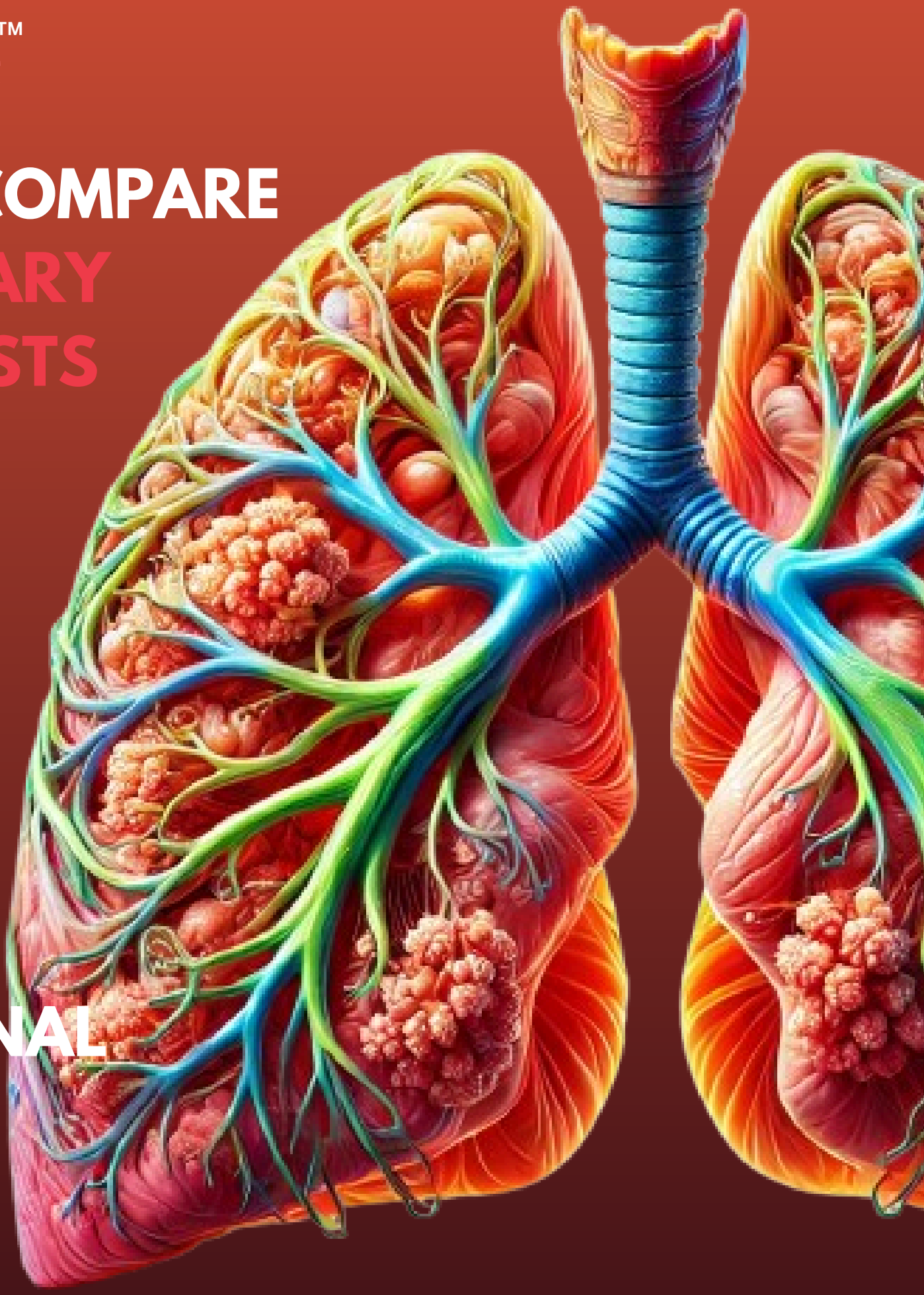
A STUDY TO COMPARE THE PULMONARY FUNCTION TESTS IN COLLEGE STUDENTS FROM DIFFERENT COUNTRIES: A CROSS SECTIONAL OBSERVATIONAL STUDY



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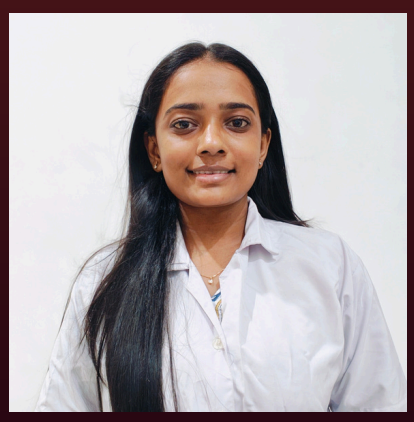

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UNDER GUIDANCE OF

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INTRODUCTION:

Pulmonary Function Test :

Measuring lung volume, capacity, flow rates, and gas exchange, pulmonary function tests (PFTs) are noninvasive examinations of lung function. Disorders impacting airflow come into two categories:

Obstructive: Limited airflow as a result of difficulty exhaling due to airway resistance.

Restrictive: Limited lung expansion; decreased lung volumes as a result of issues with the muscles of the chest or lung tissue.

There are two methods to execute PFTs:

1. Spirometry: utilizes an electrical equipment that detects airflow through a mouthpiece-equipped device.
2. Plethysmography: includes standing or sitting inside an airtight container in order assess lung function.

Based on what the healthcare provider requires, both approaches may be utilized.

PFT measures:

- Tidal Volume (TV): Air expelled or inhaled normally during breathing.
-Minute Volume (MV): The total amount of air expelled in a minute.
- Vital Capacity (VC): Maximum air exhaled following a complete inhale.
- Residual Functional Capacity: Air in the lungs following a typical exhale.
-Residual Volume: The amount of air in the lungs following complete exhale.
- Total Lung Capacity: Maximum volume of the lungs when fully expanded.
- Forced Vital Capacity (FVC): Air exhaled vigorously upon complete inhalation.
- (Forced Expiratory Volume/FEV).: Air expired during the first, second, and third seconds of FVC
- Forced Expiratory Flow (FEF): Mean flow rate in the FVC's middle half.
- Peak Expiratory Flow Rate (PEFR): The fastest rate at which forced air is expelled from the lungs.

REVIEW OF LITERATURE

This review studies variations in lung function through examining pulmonary function tests (PFTs) in young adults from various races, ages 18 to 25. It highlights significant findings on demographic variations in lung health and includes studies on students and standardized PFT tests.

1 Anuradha R Joshi, Ratan Singh, AR Joshi (2008) researched on Correlation of pulmonary function tests with body fat percentage in young individuals and concluded that increase in percentage of body fat and central pattern of fat distribution may affect the pulmonary function tests.

2 Sandip Meghnad Hulke et al (2011), researched on Effect of endurance training on lung function: a longitudinal study and concluded that physical activity does improve some of lung function and also there is no deterioration in lung function with 12 weeks of exercise but we recommend multiple longitudinal study.

3 Sheetal Panwar, Ashutosh Chourishi, Jayant Makwana et al (2012), researched on Effect of pranayama (yoga) on pulmonary function test of young healthy students and concluded that Pranayama seems to be beneficial for the pulmonary functions. Further studies are needed to confirm the possible mechanism(s) responsible for such an effect.

4 Vinayak P Doijad, Anil D Surdi et al (2012), researched on Effect of short term yoga practice on pulmonary function tests and concluded that yoga practice can be advocated to improve respiratory efficiency for healthy individuals as well as an alternative therapy or as adjunct to conventional therapy in respiratory diseases.

METHODOLOGY

Study design- A cross sectional observational study

Sampling Technique: Purposive Sampling

Setting: Marwadi University Campus Outpatient Department (OPD), Rajkot –

Data Source: OPD at Marwadi University

Sample Size: 80 participants

Criteria for Inclusion:

1. Age: between 18 - 25
2. Both males and females

Exclusion criteria:

1. Cardiovascular conditions that are unstable (such as uncontrolled hypertension or heart failure).
2. Behavioral conditions.
3. Severe anemia, malnutrition, malignancy, or liver or renal disease.
4. Corticosteroids or immunosuppressants use lately.
5. Acute discomfort of pneumonia or COPD during the prior weeks.
6. Other chronic lung conditions (such as asthma or bronchiectasis) or severe lung procedures.
7. Pulmonary tuberculosis which is active.
8. Prior radiation to the chest or pulmonary rehabilitation.

Method :

Participants: Based on predefined inclusion and exclusion criteria, 80 participants, aged 18 - 25, from 10 different countries were included in the study. After summarizing the goal and details of the study, informed consent was obtained.

Procedure: To ensure , each subject was led through the steps. For reference, significant measurements including age, weight, and height were recorded.

Pre-Test Preparation: A few hours prior testing, subjects were told not to eat large meals, smoke, or do strenuous exercise.

Spirometry: Spirometry was utilized to measure vital capacity, forced vital capacity, forced expiratory volume in one second (FEV1), and peak expiratory flow rate (PEFR) in order to assess lung function.

Diffusion capacity quantifies the effectiveness of gas exchange, and lung volumes are measured at various respiratory stages. Students' projected values based on height, weight, age, and gender are compared with conventional reference values in data interpretation.

STATISTICAL ANALYSIS AND RESULTS

Mean and standard deviation for FVC

FVC		
N	Mean	Std. Deviation
80	3.3069	.83800

ANOVA Analysis for FVC

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.204	9	1.245	1.968	.056
Within Groups	44.273	70	.632		
Total	55.478	79			

Mean and standard deviation for FEV1

FEV1		
N	Mean	Std. Deviation
80	3.0618	.7229

ANOVA Analysis of FEV1

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.399	9	.933	1.986	.054
Within Groups	32.894	70	.470		
Total	41.294	79			

Mean and standard deviation for PEFR

PEFR		
N	Mean	Std. Deviation
80	5.4253	1.60058

ANOVA Analysis for PEFR

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.034	9	3.782	1.572	.141
Within Groups	168.354	70	2.405		
Total	202.388	79			

Mean and standard deviation for FEV1/FVC

FEV1/FVC		
N	Mean	Std. Deviation
80	92.9453	7.31650

ANOVA Analysis for FEV1/FVC

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	491.971	9	54.663	1.024	.430
Within Groups	3736.994	70	53.386		
Total	4228.965	79			

DISCUSSION

The study compares PFT Among different countries students, which involves 80 participants aged 18-25. Hence, results showed no significant difference in PFT among the participants.

Theoretical reasoning:

1. Fitness and academic performance : it highlights the relationship between academic success and physical fitness
2. assessment improvement: contribution of research, standardizing metrics (cross population comparisons) and refining fitness assessment tools.
3. influence on educational policies: it informs policy and strategies to improve a healthier and more active body.

The study provides a significance of health trends in students and impact on academic performance and well-being

CONCLUSION

To conclude , our investigation revealed no appreciable variations in PFT outcomes between the groups. Even though the results exceeded our expectations, these findings will be significant for further respiratory health study.

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EFFECT OF TRUNK PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION EXERCISE AND CORE STABILITY EXERCISE ON TRUNK CONTROL, BALANCE, AND QUALITY OF LIFE IN INDIVIDUALS WITH STROKE-AN EXPERIMENTAL STUDY

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INTRODUCTION

Stroke (cerebrovascular accident [CVA]) is a sudden loss of neurological function caused by an interruption of the blood flow to the brain. Ischemic stroke is the most common type, affecting 80% of individuals with stroke, and results when a clot blocks or impairs blood flow, depriving the brain of essential oxygen and nutrients. Hemorrhagic stroke occurs when blood vessels rupture, causing leakage of blood in or around the brain.1

Common deficiencies in stroke include spasticity, weakness, and loss of equilibrium on the affected side causing inability to maintain postural alignment. The trunk is considered as a central key point to allow the body to remain upright and adjust weight shifts during static and dynamic postural adjustments. Following stroke one side of the limbs are affected but trunk muscles are affected on both the sides leading to insufficient trunk rotation, difficult in maintaining balance and gait.4

Specifically, as the thoracic and pelvic movements occur together due to the lack of the trunk motion that separates the thorax and pelvis during walking, stroke patients walk with a pathologically increased trunk movement. Trunk control impairment in stroke patients not only shows spinal problems which can be seen in the sagittal plane, but also shows asymmetric changes in the pelvis. Therefore, these impairments alter the balance and gait performance causing pathological movement.2

In order to improve the neuromuscular system's effectiveness in coordinating movement and function, there are different physical rehabilitation approaches used for enhancing recovery in post stroke patients, like frenkle's exercise, tai-chi and task oriented training but neither method was more (or less) effective in terms of improving independence in ADL or motor function. PNF is widely used in rehabilitation practice.5

PNF uses the body's proprioceptive system to facilitate or inhibit muscle contraction. The definition of PNF encompasses the terms proprioceptive (which has to do with any of the sensory receptors that provide information concerning movement and position of the body); neuromuscular (involving the nerves and muscles); and facilitation (making it easier). Diagonal pattern training is one of the trunk rehabilitation training methods that improve the movement, trunk asymmetry, flexibility, and strength provided by various planes. Diagonal pattern movement can also rotate the trunk diagonally, separate the thorax and pelvis, and include repetitive weight movements to promote the facilitation of trunk muscles.6

A good rehabilitation strategy, which might help improve trunk performance, trunk control and dynamic sitting balance, is approaches using trunk training therapeutic exercises like Core Stability Exercises (CSEs). Recent studies suggest that core strengthening plays a critical role in maintaining balance, functional mobility, gait, and fear of falls and in improving anticipatory postural adjustment in stroke survivors.7

CSEs are voluntary movements that aim at promoting the neuromuscular control, coordination, strength and endurance of muscles that are central to maintaining dynamic stability of the spine and trunk. It is the ability to control the position and motion of the trunk over the pelvis and leg that allows optimal production, transfer and control of force and motion to the terminal segment in integrated kinetic chain activities. It is essential to providing a solid base of core to exert or resist force, as it stabilizes the pelvis and spinal column for "proximal stability for distal mobility". Static core functionality is the ability of the core to align the skeleton to resist a force that does not change.8

MATERIALS AND METHOD

This study was approved as a less than minimal risk research by the ethical committee of Institution. Prior to the interview, individuals read carefully the consent form, which contains information on the objectives of the study, the selection process, risk, benefits and freedom of the participation, as well as information on confidentiality.

- STUDY DESIGN: An Experimental study
- SOURCE OF DATA: Different Physiotherapy OPDs
- SAMPLING TECHNIQUE: Simple Random Sampling.
- SAMPLE SIZE: 32 (16 in each group) according to power analysis.
- STUDY DURATION: 1 year

2.1 Selection Criteria

Inclusion criteria:

- Participants with stroke willing to participate.
- Diagnosed with a stroke through CT scan or MRI.
- Age: 35-65years.
- Duration of illness of1monthsor longer.
- The ability to sit and stand independently.
- Able to stand independentlyfor30 sec or longer.
- Individuals with moderate and low risk of fall according to Berg Balance Scale.
- Ability to walk 10m or longer alone indoors.
- Not using assistive devices.
- Should be able to understand and follow simple verbal instructions (Mini Mental Status Examination ≥ 24)

Exclusion criteria:

- With sensory ataxia or cerebellar ataxia.
- Severe spasticity (Modified Ashworth Scale grade>3).
- Active cardio-respiratory problems.
- Individuals with spinal problems or post spine surgery within 1year.
- Concurrent neurological disorder (e.g., Parkinson's disease) or major orthopedic problem that hampers balance.

3. METHODOLOGY

3.1 Outcome measures:

a) Trunk Impairment Scale29

The trunk impairment scale measures the static balance, dynamic balance, and the coordination of the body adjustment in a sitting position. The trunk impairment scale consists of a total 23 point with 7 points for static sitting balance, 10 points for dynamic sitting balance, and 6 points for co-ordination respectively. The higher the score, the better the trunk control ability.

b) Berg Balance Scale30

The Berg Balance Scale consists of sitting posture balance (1 question), standing posture balance (8 questions), and dynamic balance (5 questions).The total score is calculated as 0-56 points. Each item is scored on a 5-point ordinal scale ranging from 0 (unable to perform) to 4(normal performance).The higher the score, the better the balancing ability.

c) Stroke Impact Scale31

The purpose of this questionnaire is to evaluate how stroke has impacted your health and life. English and Guajarati both the versions were used for the individual's convenience. Gujarati version of the SIS is a self-reported measure that includes 59 items and assesses 8 domains (strength, memory, emotion, communication, ADL, mobility, hand function, and social participation). Each domain contains different number of items ranging from4- 10. Low total score indicates high impact quality of life (QOL) of stroke individuals.

3.2 Procedure:

32 stroke patients were recruited from different Physiotherapy OPDs and Neuro rehabilitation centers from Ahmedabad. The sample consisted of patients age between 35-65 years and the individuals were verbally explained the purpose of the study.

Patients were initially screened based on the inclusion criteria written informed consent was taken from all the participants. Participants were assessed and screening was done. All the baseline data were collected of the all participant. Allocation to the group was done using simple random sampling. Participants were on aware about the allocation. Study was single blinded.

Participants were randomly assigned into two groups: 16 patients in Trunk PNF Group and 16 patients in Core Stability

Group.

Both the group received conventional Physiotherapy Treatment as well.

Group A- Trunk Proprioceptive Neuromuscular Facilitation3

- Diagonal patterns 1 to 10 were performed.
- 5 repetitions were performed for each diagonal pattern.
- 30 sec rest period was given in between each diagonal pattern.
- The duration for the exercise was 25-30 min.

Group B- Core Stability Exercise4

Participants were positioned in supine. They were asked to recognize their neutral spine position that is midrange between flexion and extension.

The core muscles trained were Transverse abdominis, Multifidus, Para spinals, Quadratus lumborum, and Oblique's.

In first stage the participants were taught to activate abdominal wall musculature. They were initially trained to perform abdominal bracing in order to ensure that the participants were contracting the right musculature a biofeedback device were used.

The lower end of inflatable bag was placed at the posterior superior iliac spine. Before starting the contraction, the bag were inflated to a pressure of 40 mmHg with valve closed and participants were instructed to breathe deeply using abdominal wall musculature, then the inflated bag were adjusted to 40 mmHg.

Participants were requested to perform abdominal muscle contractions with following verbal commands standardized by examiner: "Tighter your abdomen in order to make it like a rigid cylinder without moving your ribs and pelvis".

Once the participants mastered the technique of abdominal bracing progression were made to other core stability exercise.

Participants were then positioned in quadruped position and asked to lift alternate arms, gradually progressing to alternate leg lifts and alternating arm/leg raises to activate multifidus.

The progression of the exercises was done once the patient were able to perform 30 repetition of each exercise with 8 sec hold. The participants were told to maintain normal diaphragmatic breathing throughout the intervention.

Conventional physiotherapy exercise5

- Sustained stretching of all spastic muscles.
- Antigravity/weight bearing postures such as kneeling and quadruped as tolerated by patient with necessary assistance.
- Reach outs with unaffected hand in weight bearing in sitting and quadruped.
- PNF pattern of bilateral upper and lower extremity.
- Strengthening of weak antagonist muscle with manual resistance.
- Balance training with perturbations in sitting and standing position.
- Functional training and transfers.
- Gait training, forward walking, backward walking and lunges.

4. RESULTS

The present study was conducted to compare the effect of trunk proprioceptive neuromuscular exercises and core stability exercise on trunk control, balance and quality of life in individuals with stroke.

Total32patientswereincludedinthestudyoutofwhich16 patients were the part of trunk proprioceptive neuromuscular exercise group who received trunk proprioceptive neuromuscular exercise and conventional physiotherapy and other group included 16 patients were part of the core stability exercise and conventional physiotherapy.

Data of 32 individuals were analyzed using statistical package of social science version29 (SPSSv.29) and Microsoft excel 2018.Beforeapplyingstaticallytests, data was screened for normal distribution using Shapiro Wilk test. The level of significance was kept at 5%. All the outcome measures were analyzed at baseline and after 4 weeks of treatment. Changes in outcome measures were analyzed within group as well as between groups.

On the basis of Shapiro-Wilk test, the data was not normally distributed. So for the within group analysis Wilcoxon test and for the between group analysis Mann Whitney test was used.

DISCUSSION:

The present study was conducted to compare the effect of trunk PNF exercise and core stability exercise on trunk control, balance and quality of life in individuals with stroke. This experimental study suggests that training given in the study is effective in improving trunk control, balance and quality of life in stroke individuals.

Both the group showed statistically significant improvement in TIS, BBS and SIS score. After the 4 week intervention program, participants in both the groups showed statistically significant improvement in TIS, BBS and SIS scores. But in between group comparison the result was not statistically significant.

Group A who received Trunk PNF exercise along with conventional exercise showed statistically significant improvement in trunk control and balance and quality of life:

PNF primarily aims to improving the functional mobility and daily living activity by facilitating muscle elongation about the basic PNF produces resistance, irradiation and reinforcement, manual contact, body position and body mechanism, verbal command, vision, stretch, timing, and patterns.

PNF is the neuro physiological approach in which impulses from the periphery are facilitated to the central nervous system through the stimulation of sensory receptors present in muscles and around the joints by stretch, resistance, traction, approximation and audiovisual command to the patient. PNF integrates the use of spiral and diagonal pattern specific of movements (with antagonist and agonist muscles) with procedures and superimposed techniques that induce the muscular contraction, relaxation and muscle strength.32

Group B who received core stability exercise program showed statistically significant improvement in trunk control and balance and quality of life:

Stroke affects core performance, which subsequently causes impairments to core motor control, issues with the patient's perception of position, and difficulty with coordination and postural adjustment, while also affecting core and extremity functions and impairing balance abilities, gait, and ambulation.

The impairments to core musculature not only affected the acute stage but also the chronic stage. Studies have shown that stroke patients still present with mild-to-severe trunk impairment at the chronic stage.

Another study found that weaker trunk extensor and flexor activations, as well as lower peak torques, have been noted in stroke patients six months after stroke onset when compared to healthy controls. Core stability exercises induce co-contraction of the trunk muscles and improve inter segmental coordination restricted to the degree of freedom of the body and allow a more selective.35

Another possible explanation could be that these exercises can induce generic neural changes and cortical reorganization in the premotor areas and in the contra lateral sensorimotor cortex. These exercises could help to restore inter hemispheric connections of both hemispheres, transcallosal fibbers, and therefore, has an important role in stroke recovery.

Group A and Group B did not showed statistically significant difference in TIS, BBS and SIS scores:

Group A – Trunk PNF exercise and Group B – Core stability exercise did not showed statistically significant difference in TIS, BBS and SIS score when between group analyses was done.

It suggests that both Group A and Group B are effective in improving trunk control, balance and quality of life in stroke individuals. Vishal Sharma and Jaskirat Kaur et al. conducted a study comparing core stabilization and pelvic PNF and concluded that core stabilization combined with pelvic PNF was more effective for improving trunk impairment, balance and gait of chronic stroke patients.4

Chan et al. showed that six weeks of core stability exercises and task-related trunk training improved dynamic sitting balance at four weeks after training ended. Regarding standing balance, subjects from the core stability exercises group in our study showed significant differences with regard to the control group for the Berg Balance Scale, while there were no differences in the other scales.

CONCLUSION

There is statistically significant improvement in trunk control, balance and quality of life in individuals with stroke who were treated with trunk PNF exercises and core stability exercises.

After 4 week of treatment both the groups showed improvement in scores of TIS, BBS and SIS score. But when between groups analysis was done, it did not showed statistically significant difference. Group A received trunk PNF exercises with conventional physiotherapy treatment and Group B received core stability exercises with conventional physiotherapy treatment.

Thus, it is concluded that both trunk PNF exercise and core stability exercises both are effective in improving trunk control, balance and quality of life in individuals with stroke.

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PREVENTING TENNIS ELBOW: SIMPLE MEASURES FOR A PAIN-FREE GAME

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Tennis elbow, a common affliction among sports enthusiasts and commoners can be a major setback for all. However, with the right preventive measures, you can reduce your risk and enjoy an injury-free game.

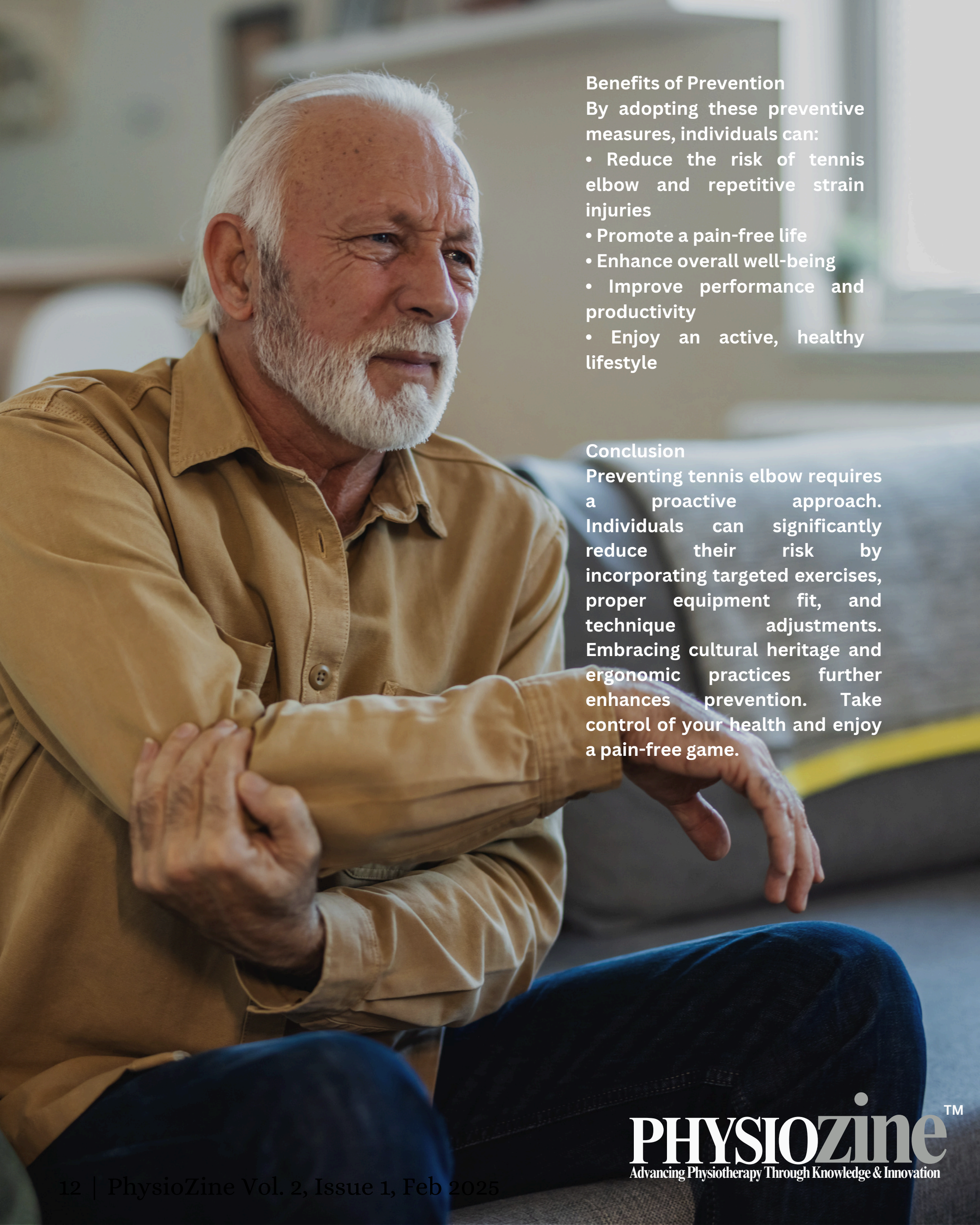
The Importance of Prevention
Tennis elbow's unpredictable nature makes prevention crucial. While treatment options are available, preventing the condition altogether is ideal. By taking proactive steps, players can avoid the discomfort, pain, and potential long-term damage associated with tennis elbow.

Targeted Exercises and Stretches
Targeted exercises and stretches are essential in preventing tennis elbow. Strengthening extension, flexion, and rotational movements greatly reduce risk. These exercises improve forearm, wrist, and elbow strength, enhancing overall stability.

Proper Equipment Fit and Technique
Proper equipment fit and technique adjustments also play vital roles in prevention. Ensure your grip size and racket weight are suitable for your playing style. Additionally, focus on proper serving, forehand, and backhand techniques to minimize strain.

Beyond Tennis: Prevention for All
Prevention extends beyond tennis or sports. Household ladies often face challenges, as diagnosis typically precedes treatment. Simple adjustments, however, can make a difference. Adjusting the heights of kitchen slabs to one's height or even personalised kitchen tools to one's physical activity is advisable.IT professionals can benefit from positioning their mouse and keyboard closer to their body, while everyone can reduce strain by keeping frequently used items within easy reach. Treatments are always personalised and individualised. It's never the same for X and Y.

Cultural Influence on Prevention
Interestingly, cultural gestures also influence prevention. Indian culture promotes gestures like folded hands, and keeping hands close to the body, whereas Western traditions involve extending hands away from the body. Embracing cultural heritage and blending it with ergonomic practices can help mitigate the risk of tennis elbow and other repetitive strain injuries.



Benefits of Prevention

By adopting these preventive measures, individuals can:

- Reduce the risk of tennis elbow and repetitive strain injuries
- Promote a pain-free life
- Enhance overall well-being
- Improve performance and productivity
- Enjoy an active, healthy lifestyle

Conclusion

Preventing tennis elbow requires a proactive approach. Individuals can significantly reduce their risk by incorporating targeted exercises, proper equipment fit, and technique adjustments. Embracing cultural heritage and ergonomic practices further enhances prevention. Take control of your health and enjoy a pain-free game.

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COMPREHENSIVE PHYSIOTHERAPY APPROACH TO IMPROVE MOUTH OPENING

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Introduction:

Oral submucous fibrosis (OSMF) is a chronic, insidious scarring disease of the oral cavity, characterized by a progressive inability to open the mouth due to loss of elasticity and the development of fibrous bands in the labial, buccal mucosa, soft palate, lip mucosa, and anterior pillars of the fauces.

Recent data suggest that the prevalence of OSMF in Gujarat, India, has increased from 0.03% to 6.42%. The most important risk factor is chewing tobacco.

Need for Developing this Protocol:

Oral submucous fibrosis is a disorder that restricts mouth opening, and no perfect treatment has been found yet. Both surgical and conservative physiotherapy treatments have been tried. Surgical treatment is reported to be very expensive and can lead to scarring and a further decrease in mouth opening after 1–2 years. Therefore, a conservative physiotherapy treatment protocol is needed that can increase mouth opening in individuals who chew tobacco without any side effects.

Scope:

• Designed to improve restricted mouth opening.
• Can be used by physiotherapists in clinical and home settings.
• Aims to enhance jaw mobility, reduce pain, and improve function.

Indications of the Mouth Opening Physiotherapy Protocol:

• Oral Submucous Fibrosis (OSMF)
• Trismus (limited jaw movement due to trauma, infection, or radiation) • Jaw Muscle Tightness
• Temporomandibular Joint Dysfunction
• Post-surgical or Trauma-related Mouth Opening Restriction

Contraindications of the Mouth Opening Physiotherapy Protocol:

• Acute TMJ Inflammation or Infection
• Jaw Fractures or Unstable Injuries
• Severe Osteoarthritis of the TMJ
• Uncontrolled Pain or Severe Discomfort
• Recent Maxillofacial Surgery Without Medical Clearance
• Active Oral or Facial Infections

Assessment Criteria:

Pre-Therapy Evaluation: Detailed evaluation procedures for patients, including:

• Mouth Opening Measurement
• Pain levels (VAS scale)
• Functional assessments

Exercise Therapy for Mouth Opening Protocol:

A. Jaw Stretching Exercises:

1. Massage: Massage the jaw muscles (masseter and temporalis) using gentle circular motions to relax tightness. Perform for 1 to 2 minutes.

2. Passive Stretching: Perform mouth opening exercises with a jaw opener. (10 repetitions with a 5-second hold in the center of the teeth, and on the left and right sides of the teeth).

3. Massage: Repeat the jaw muscle massage as described in point 1.

4. Stick Exercise: Use wooden ice cream sticks held together with rubber bands to maintain jaw opening. Gradually increase the number of sticks as per mouth opening capacity.

(10 repetitions with a 5-second hold in the center of the teeth, and on the left and right sides of the teeth).

6. Cheek Puff: Inhale deeply and puff your cheeks out. Hold the air inside the buccal mucosa by tightly closing your lips. Hold for 5 seconds and repeat 10 times. Then, take another deep breath and hold the air in your left cheek, switch to your right cheek, and hold.

B. Resisted Mouth Opening:

Place a hand under the chin and gently resist while trying to open the mouth. Hold for 5 seconds and relax. Repeat 5–10 times.

C. Jaw Mobilization Exercises:

Maitland Mobilization for TM joint: Medial glide and inferior glide of TM Joint. Perform 5 times for each glide with 3 repetitions on each side.

Electrotherapy in Mouth Opening Protocol:

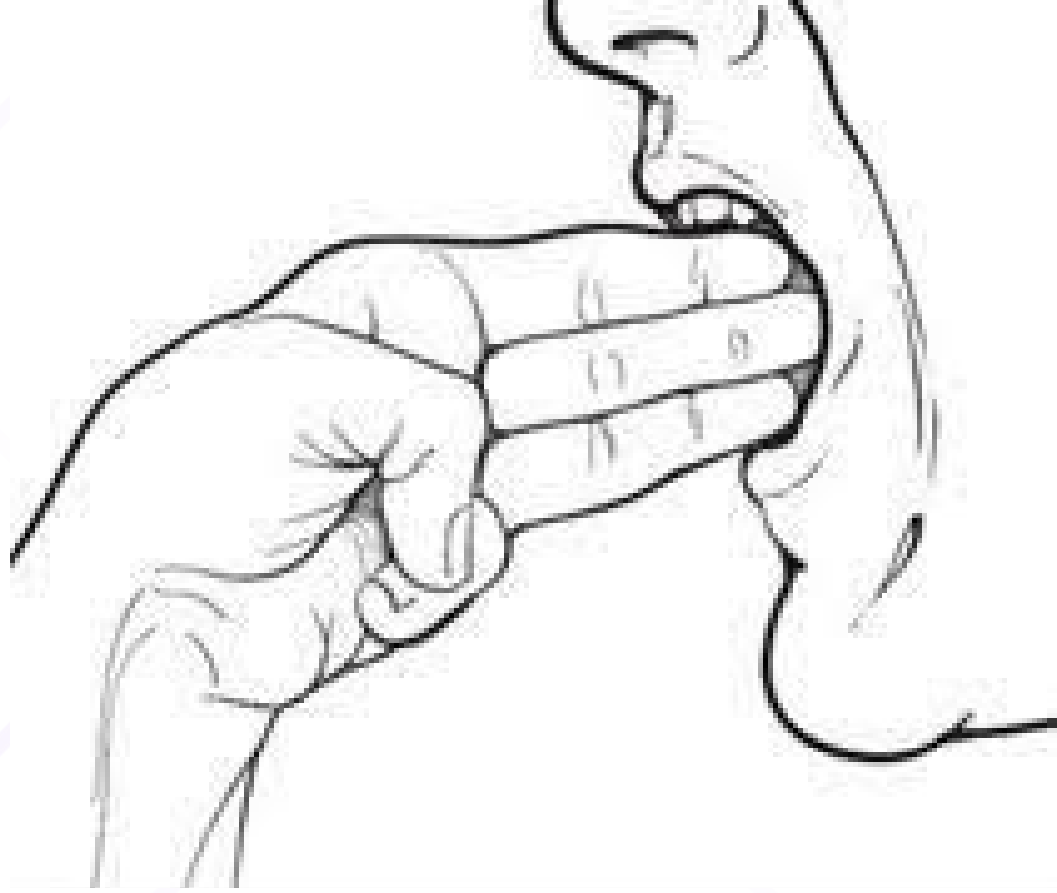
A. Ultrasound Therapy: Externally applied over the cheek
Intensity: 1.4 to 1.5 W/cm²
Mode: Continuous
Frequency: 1 MHz
Duration: 7 to 8 minutes

B. TENS (Transcutaneous Electrical Nerve Stimulation):
Use TENS to alleviate pain and muscle spasms. Apply electrodes around the TMJ region for 15–20 minutes at a comfortable intensity.

C. Heat Therapy:

Use moist heat packs for 10–15 minutes before exercises to relax muscles and improve flexibility in the jaw.

These therapies should be applied based on individual tolerance and progression to ensure effective recovery and improved mouth opening.



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