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Low Back ACHE Presentation and Rehabilitation in Different Age Groups 15-18 years, 18-25 years, 25-45 years, Above 45 years

Aditi Singh¹, Srishti Khurana², Mridula Sethia³

¹Assistant Professor, Amity Institute of Physiotherapy, Amity University, Noida Uttar Pradesh, ²BPT final year, Amity Institute of Physiotherapy, Amity University, Noida Uttar Pradesh, ³Physiotherapist, Dr. Mridula's The Healing Touch, Janakpuri, New Delhi

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Abstract

Introduction: Pain the lumbar region which starts below the ribs. Everyone experiences lower back ache at some point in their life. In this research we analyzed lower back ache presentation and rehabilitation for different age groups- 15-18 year, 18-25 year, 25-45 year, above 45years of age.

Methodology: Study Design: Experimental Study with sample size of 28 individuals with acute Low Back Pain (LBP). Age ranges from 15-18 years, 18-25years, 25-45 years, above 45 years with inclusion criteria as follows:

People doing a desk job and working in front of screen for long hours (7-8 hrs.), No orthopedic disease that might affect testing, those who can understand English language and children studying in school and college were also included. Exclusion Criteria included conditions diagnosed with- P.I.V.D, structural scoliosis, neurological conditions, metastasis of spine, inflammatory disorders affecting the lumbar spine, metabolic diseases, spinal surgery, undergoing medical or physiotherapy intervention for LBP.

Results and Discussion: The population size was equally sub divided into four groups as per age. Age: 15-18 year (Group A), 18-25 year (Group B), 25-45 year (Group C), above 45 years (Group D). One way anova test was performed to calculate the inter and intra relations of different age groups and their pre and post data (VAS scale and Schober's test). As a result, with the applied physiotherapy protocol (hydrocollator packs, crook lying, back isometric exercise, knee to chest) in all groups for 4 weeks, the most benefited group was group A whereas for flexion range of motion of lumbar spine the most benefited group was group C. The physiotherapy exercises proved to be most beneficial for improving flexion range of motion of lumbar spine in GROUP C overall benefited younger age group A.

Keywords: Low Back Ache; Rehabilitation, Lumbar

Corresponding Author: Aditi Singh, Assistant Professor, Amity Institute of Physiotherapy, Amity University, Noida Uttar Pradesh.

E-mail: aditiphysio5@gmail.com

Introduction

Pain the lumbar region which starts below the ribs. Everyone experience lower back ache at some point in their life or other but due to pandemic and continuous lockdown our work and studies everything became online that is online educational classes and work from home which had adverse effects even in younger population causing lower back pins due to bad posture and lack activity.¹

In this study we analysed lower back ache presentation and rehabilitation for different age groups- 15-18 year, 18-25 year, 25-45 year, above 45years of age.

Human body acts as a kinematic chain in weight bearing conditions. Therefore, any deviation at one joint might affect the other joint directly or indirectly.

Various reasons can lead to development of poor posture. These can be broadly classified as postural (positional) and structural deviations. A stooped or a slouched posture can be described as a posture wherein the back and shoulders are bent forward leading to misalignment of the posture.²

Low back pain is the most prevalent musculoskeletal condition and the most common cause of disability in developed nations.

So many steps were taken to decrease the speed of spread of this virus by the countries in which it is wreaking havoc.³

Aim

To study the presentation and rehabilitation of lower back ache in different age groups:

15-18 years, 18-25 years, 25-45 years, above 45 years.

Objective

1. To study the presentation of low back ache in different age groups
2. To work on their rehabilitation protocol
3. To eliminate low back ache
4. To gain full pain free ROM and strength of lumbar para-spinal muscles

Need of the Study

Due to the COVID-19 lockdown, people are confiding to their places which led to decreased physical activity. Hence the need is to investigate the incidence of back pain among different age groups due to lifestyle modifications during COVID-19 lockdown also in young working from home population who are constantly using different gadgets to get the work done due to remote learning.

Materials and Methods

Study Design: Experimental Study

Place of Data Collection: Dr Mridula's The Healing Touch Physiotherapy Clinic, Janakpuri, New Delhi

Sampling: Nonprobability sampling

Sample Size: 28 individuals with acute Low Back Pain (LBP)

Age range: 15-18 years, 18-25 years, 25-45 years, above 45 years

Selection Criteria

The subjects were included in the study considering the following criteria:

Inclusion criteria:

1. Patients with acute LBP, Age group 15-18years, 18-25years, 25-45 years, above 45 years both male and female.
2. People doing a desk job and working in front of screen for long hours (7-8 hrs)⁴
3. No orthopaedic disease that might affect testing
4. No visual impairment, visual field defect, or mental or perception problem that might affect testing
5. Those who can understand English.¹⁰
6. Children studying in school and college were also included.⁵

Exclusion Criteria:

Conditions diagnosed with-

1. P.I.V.D

2. structural scoliosis
3. neurological conditions
4. metastasis of spine
5. Inflammatory disorders affecting the lumbar spine.⁶
6. metabolic diseases
7. spinal surgery
8. undergoing medical or physiotherapy intervention for LBP.

Instruments Required:

1. Inch Tape⁷
2. Visual analogue scale (pain rating scale)⁸
3. Couch⁹
4. Marker

Procedure:

- Sample size of 28 individuals was selected.
- Questionnaires was sent through mail.
- Questionnaire was prepared by using google forms and it was sent via E-mail.
- Data collected and data interpretation is done.
- Visual analogue scale was filled by the subjects virtually through use of google forms.
- Written consent was taken from subject who fulfilled the inclusion criteria and who volunteered to participate in the study.
- Subject's demographic data was recorded.
- Patient's detailed history and presentation of low back ache was taken via google forms.
- The selected individuals based on the inclusion were told and all necessary instructions were given to them which they need to follow and also we provide them either with certain home exercises of neck or yoga asanas.
- We advised the subjects to follow all the instructions given for 30 days and we also advised them to stop practicing all other measures which they were performing before.

Outcome Measures

1. Lumbar spine Range Of Motion: Schober's Test
2. Back pain: VAS

Rehabilitation procedure:

An exercise protocol along with the duration created below:

Hydrocollator Pack¹¹ for 10 minutes. Knee to chest¹² 10 repetitions, without hold and Crook lying¹³ 10 repetitions and hold for 15 seconds along with Back isometric exercises¹⁴ 10 repetitions and hold for 10 seconds. Patient was asked to follow the mentioned protocol 3 sets and repeat it twice a day for 4 weeks.

Data Analysis

Data was compiled and exported to SPSS software (version 26) for analysis. The data collected was arranged for comparison of pre and post results of treatment protocol on LBP pain and 4 weeks which was analysed using descriptive statistics. Descriptive statistics was checked using mean and SD. Anova test and paired p value was calculated, the $p < 0.05$ was taken as the level of significance for checking the significant differences in means.

A total of 28 subjects were taken. Analysis was done on the basis of data collected after 4 weeks of performing the prescribed treatment protocol.

Data was compiled and exported to SPSS software for analysis. The data collected was arranged for comparison of pre and post results of treatment protocol on LBP pain and 4 weeks which was analysed using descriptive statistics. Descriptive statistics was checked using mean and SD. Anova test was calculated, The $p < 0.05$ was taken as the level of significance for checking the significant differences in means.

Table 1: PRE VAS and schober's test Data analysis of patients between age group of 15-18 years of age (Group A), 18-25 years (Group B), 25-45 years (Group C), above 45 years (Group D)

Cases	Flexion schober	Extension Schober	VAS
Group A			
A1	5	3	2
A2	3	4	5
A3	6	2	6
A4	8	3	4
A5	3	3	6

Cases	Flexion schober	Extension Schober	VAS
A6	2	1	2
A7	6	1	1
Mean	3.23	1.7	3.00
Standard Deviation	2.35	1.0	2.07
Group B			
B1	6	3	1
B2	6	2	1
B3	3	3	1
B4	4	4	2
B5	7	3	2
B6	8	4	2
B7	2	1	3
Mean	4.73	2.8	3.00
Standard Deviation	2.15	1.20	2.07
Group C			
C1	6	3	4
C2	2	4	6
C3	3	3	2
C4	2	4	7
C5	5	4	3
C6	2	2	3
C7	6	3	1
Mean	4026	3.2	3.73
Standard Deviation	1.66	1.2	2.21
Group D			
D1	4	5	5
D2	4	4	1
D3	8	1	1
D4	5	4	6
D5	5	2	1
D6	4	1	5
D7	4	3	7
Mean	4026	3.2	3.73
Standard Deviation	2.21	7.11	12.80

Table 2: POST VAS and schober's test Data analysis of patients between age group of 15-18 years of age (Group A), 18-25 years (Group B), 25-45 years (Group C), above 45 years (Group D)

Cases	Flexion schober	Extension Schober	VAS
Group A			
A1	5	3	2
A2	4	4	4
A3	6	2	5
A4	8	3	4
A5	4	3	5
A6	3	2	2
A7	6	1	1
Mean	5.26	2.66	2.8
Standard Deviation	1.62	0.816	1.61
Group B			
B1	6	3	2
B2	6	2	1
B3	4	3	1
B4	5	4	2
B5	7	3	2
B6	8	2	2
B7	4	2	3
Mean	5.26	2.66	2.8
Standard Deviation	1.62	0.816	1.61
Group C			
C1	7	4	3
C2	5	2	4
C3	3	3	2
C4	5	2	5
C5	7	3	3
C6	3	4	3
C7	7	2	1
Mean	4026	3.2	3.73
Standard Deviation	1.66	1.2	2.21

Cases	Flexion schober	Extension Schober	VAS
Group D			
D1	5	2	2
D2	5	3	1
D3	8	1	1
D4	8	2	3
D5	6	2	1
D6	6	1	3
D7	4	3	4
Mean	5.6	2.5	2.46
Standard Deviation	0.99	1.59	1.3

Table 3: One way anova test was performed to calculate any significant relation between POST flexion schober’s test for all groups; A,B,C,D.

Summary of Data						
	Treatments					Total
	1	2	3	4	5	
N	7	7				28
ΣX	36	40				155
Mean	5.1429	5.7143				5.536
Σx ²	202	242				925
Std.Dev.	1.6762	1.496				1.5749

Result Details				
Source	SS	df	MS	
Between-treatments	3.25	3	1.0833	F = 0.40807
Within-treatments	63.7143	24	2.6548	
Total	66.9643	27		

The Fratio value is 0.40807. The p-value is .748603. The result is not significant at p < .05.

Since the p value is > 0.05 the null hypothesis is true and accepted and the result is non significant.

Table 4: One way anova test was performed to calculate any significant relation between POST extension schober’s test for all groups; A,B,C,D.

Summary of Data						
	Treatments					Total
	1	2	3	4	5	
N	7	7				28
ΣX	18	19				71
Mean	2.5714	2.7143				2.536
Σx ²	52	55				201
Std.Dev.	0.9759	0.7559				0.8812

Result Details				
Source	SS	df	MS	
Between-treatments	2.9643	3	0.9881	F = 1.31746
Within-treatments	18	24	0.75	
Total	20.9643	27		

The Fratio value is 1.31746. The p-value is .291809. The result is not significant at p < .05.

Since the p value is > 0.05 the null hypothesis is true and accepted and the result is non significant.

Discussion

The presentation of low backache in younger age group that is 15 to 18 years, 18 to 25 years is mostly caused by prolonged sitting.

Paras-spinal muscle spasm in the lumbar region is seen and experienced by the patients of above 25 years of age group.

Palliative factors could be change in posture and avoiding to sit for longer period of time using a backrest while sitting and avoiding any provocative factors such as forward bending and rotation of the spine and prolonged sitting and standing.

Physiotherapy treatment along with home exercise prescription helped patients with easing acute and chronic low back ache but the symptoms may reappear once the patient stop doing exercises at home twice a day.

Limitations:

- Sample size was too small, Number of subjects were less.
- For the older age people degenerative changes of the back was not excluded hence age-related factors might affected the study.
- The environmental factors like travelling or driving were not considered as well.

Conclusion

Prevalence of low back pain in younger age group has increased due to remote learning and work from home but it can be treated with physiotherapy treatment and home exercise protocol.

Difficulty in ADLs is usually seen in elderly age group.

Prevalence of low backache has increased to younger age group due to recent lifestyle modifications made due to Covid 19.

Regularity in follow up of home exercise prescription has helped patients in easing the low back ache in all age groups.

Ethical clearance: Institutional Ethical committee of Amity University, Uttar Pradesh

Source of Funding: Self

Conflict of Interest: Nil

References

1. Grazio S, ĆURKOVIĆ B, Vlak T, BAŠIĆ KES VA, Jelić M, Buljan D, Gnjidić Z, NEMČIĆ T, GRUBIŠIĆ F, Borić I, Kauzlarić N. Diagnosis and conservative treatment of low back pain: review and guidelines of the Croatian Vertebrologic Society. *Acta medica Croatica: Časopis Akademije medicinskih znanosti Hrvatske*. 2012;66(4):259-93.
2. von Arx M, Liechti M, Connolly L, Bangerter C, Meier ML, Schmid S. From Stoop to Squat: A comprehensive analysis of lumbar loading among different lifting styles. *Frontiers in bioengineering and biotechnology*. 2021;9.
3. Shariat A, Anastasio AT, Soheili S, Rostad M. Home-based fundamental approach to alleviate low back pain using myofascial release, stretching, and spinal musculature strengthening during the COVID-19 pandemic. *Work*. 2020 Jan 1;67(1):11-9.
4. Garcia LM, Birkhead BJ, Krishnamurthy P, Sackman J, Mackey IG, Louis RG, Salmasi V, Maddox T, Darnall BD. An 8-week self-administered at-home behavioral skills-based virtual reality program for chronic low back pain: double-blind, randomized, placebo-controlled trial conducted during COVID-19. *Journal of medical Internet research*. 2021 Feb 22;23(2):e26292.
5. Ayed HB, Yaich S, Trigui M, Hmida MB, Jemaa MB, Ammar A, Jedidi J, Karray R, Feki H, Mejdoub Y, Kassis M. Prevalence, risk factors and outcomes of neck, shoulders and low-back pain in secondary-school children. *Journal of research in health sciences*. 2019;19(1):e00440.
6. Cunha C, Silva AJ, Pereira P, Vaz R, Gonçalves RM, Barbosa MA. The inflammatory response in the regression of lumbar disc herniation. *Arthritis research & therapy*. 2018 Dec;20(1):1-9.
7. MacDermid JC, Arumugam V, Vincent JI, Payne KL, So AK. Reliability of three landmarking methods for dual inclinometry measurements of lumbar flexion and extension. *BMC musculoskeletal disorders*. 2015 Dec;16(1):1-6.
8. Sung YT, Wu JS. The visual analogue scale for rating, ranking and paired-comparison (VAS-RRP): a new technique for psychological measurement. *Behavior research methods*. 2018 Aug;50(4):1694-715.
9. Siminoski K, Lee KC, Jen H, Warshawski R, Matzinger MA, Shenouda N, Charron M, Coblenz C, Dubois J, Kloiber R, Nadel H. Anatomical distribution of vertebral fractures: comparison of pediatric and adult spines. *Osteoporosis International*. 2012 Jul;23(7):1999-2008.
10. Grassi L, Caruso R, Costantini A. Communication with patients suffering from serious physical illness. *Clinical Challenges in the Biopsychosocial Interface*. 2015;34:10-23.
11. Yuen JW, Tsang WW, Sonny HM, Loo WT, Chan ST, Wong DL, Chung HH, Tam JK, Choi TK, Chiang VC. The effects of Gua sha on symptoms and inflammatory biomarkers associated with chronic low back pain: a randomized active-controlled crossover pilot study in elderly. *Complementary Therapies in Medicine*. 2017 Jun 1;32:25-32.

12. Park KH, Song MR. Development of a Web exercise video for nursing intervention in outpatients with low back pain. *CIN: Computers, Informatics, Nursing*. 2020 Sep 1;38(9):466-72.
13. Ohe A, Kimura T, Goh AC, Oba A, Takahashi J, Mogami Y. Characteristics of trunk control during crook-lying unilateral leg raising in different types of chronic low back pain patients. *Spine*. 2015 Apr 15;40(8):550-9.
14. Gajjar H, Titze C, Hasenbring MI, Vaegter HB. Isometric back exercise has different effect on pressure pain thresholds in healthy men and women. *Pain Medicine*. 2017 May 1;18(5):917-23.

The Effect of Weight Bearing Exercises on Spasticity in Spastic Diplegic Children

Aditi Singh¹, Arpita Gupta², Himandri Kapil³

¹Assistant Professor, ²BPT Final Year, Amity Institute of Physiotherapy, Amity University, Noida Uttar Pradesh, ³Reborn Physiotherapy and Neuro Rehab Centre, Indrapuram, Ghaziabad Uttar Pradesh

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Abstract

Introduction: Cerebral Palsy (CP) refers to the group of varied neurological conditions or disease or disease which alters the motor capacities, movements, tonicity of muscles & postural changes in a child. Spastic diplegic cerebral palsy impacts bilateral lower extremities causing troubles with gait stability & coordination. He or she performs awkward walking the reflex is heightened. A toddler with mild spastic diplegic may also stroll without an assistive tool for community travel on the other side intense spastic diplegic cp needs assistive tool to stroll household distance. Main concentration of this project is on Cerebral Palsy (spastic diplegia) children having increased muscle tone specially in lower limb as a major complain.

Methodology: 15 subjects were involved in the study aged from 1 to 10 years with a greater number of children falling GMFCS Level III and trained for weight bearing exercises, balance exercises, core exercises, positional exercises, walking exercises, modalities were also given to enhance the functioning of the muscle and worked to re-educate the muscles shows an increased result in the level of GMFCS from III to II. Modified Ashworth Scale was used to check the spasticity scoring present before and the rehabilitation program done for 6 weeks. Modified Time Up & Go Test was used to find out the functional capability and falling risks in children before and after the treatment.

Result: Data were collected based on spasticity level scored by using Modified Ashworth Scale (MAS) scoring (pre and post treatment for 6 weeks) and Modified Time Up & Go Test (MTUGT) scoring (pre and post treatment for 6 weeks) with respect to GMFCS levels improvements in each subject. Participants were having increased number of falls while walking for few meters ranges from 20-27s, [Mean (SD)= 23.06±1.34] as their baseline assessment; there was decreased number of falls and improved balance after the protocol followed ranges to 15-20s, [Mean (SD)= 16.87±1.50] after protocol followed for 6 weeks. Participants were having spasticity in their lower limbs which was scored by Modified Ashworth Scale reading 3 or 4, [Mean (SD)=3.33±0.49] as their baseline assessment; there was increase in muscle tone and some passive movements were difficulty while some show rigidity while performing flexion & extension. The scoring has been reduced to 1 or 2, [Mean (SD)= 2.33±0.50] after the rehab protocol.

Conclusion: The study will be able to identify the outcome measure of patient following weight bearing exercises.

Corresponding Author: Aditi Singh, Assistant Professor, Amity Institute of Physiotherapy, Amity University, Noida Uttar Pradesh.

E-mail: aditiphysio5@gmail.com

Through this we conclude that when we provide the positional exercises, weight bearing exercises, and walking exercises in the treatment to the patients. It helps them to improve their spasticity level.

Modalities were also used to initiate the muscles contraction and relaxation to re-educate the muscles to strengthen the muscles.

Keywords: Spasticity; diplegic; children; weight bearing; exercises; neuro-rehab.

Introduction

Cerebral Palsy (CP) refers to the group of varied neurological conditions or disease or disease which alters the motor capacities, movements, tonicity of muscles & postural changes in a child.¹ Cerebral Palsy, everlasting problems of movement & posture development causing pastime limitations which leads to noninnovative disturbance that passed of in developing mind.²

CP is “a group with endless disease having development disorders like movement problems and postural limitation, causing exertion, which attribute non-progressive disturbances being in developing fatal or infant brain.” It also hinders the capability on an individual to perform activities in a coordinated manner which also reflects the hinderance in the body function. CP can be spastic, dyskinetic and ataxia type leading to spastic muscles, uncontrolled movements, and poor balance co-ordination respectively.¹

Main concentration of this project is on CP (spastic) children having increased muscle tone specially in lower limb as a major complain. A toddler with mild spastic diplegic may also stroll without an assistive tool for community travel on the other side intense spastic diplegic cp needs assistive tool to stroll household distance.³

Spastic diplegic cp impacts bilateral lower extremities causing troubles with gait stability & coordination. He or she performs awkward walking the reflex is heightened. There are 3 types of classification based on affected limb. Spastic diplegic CP specially impact bilateral lower extremity causing troubles with get stability and coordination.²

There are a few ways to check the outcome measures which help us to find the stage of cerebral palsy: Gross Motor Function Classification (GMFCS) System, Modified Time Up and Go Test (MTUGT) and Modified Ashworth scale (MAS).⁴

1. Gross Motor Function Classification System (GMFCS) levels: it is a 5-level classification of children with disability of spastic diplegia based on the children current motor function abilities, limitations in gross functioning and check for need for assistance.⁴
2. Modified Timed Up & Go Test (MTUGT): used to check clinical performance-based measures of lower extremities functioning, mobility and falling risk.
3. Modified Ashworth Scale (MAS): the scale examines the tone of muscle, the individual which can also help us to know about limbs which are spastic.⁵

Need of the Study

The need of the study is to accept the effects of weight bearing exercises on spasticity. This study will help us to understand significance of weight bearing exercises in a particular area which can further inculcate in the rehabilitation for better results. Through this study we can assess the various effects of the weight bearing exercises MAS and MTUGT with respect to GMFCS level change after the exercises. Children were having issues while walking and transferring position from supine lying to sitting, sitting to standing, etc. we might also be looking for improvements in gait pattern as the exercises were included for weight bearing on lower limbs that help them to lower down the muscle tone which make the muscles released from contracted state.

AIM

To check the effects of weight bearing exercises on spasticity in child having spastic diplegia.

Objective

1. To study the effects of weight bearing exercises on spasticity by Modified Ashworth Scale (MAS) in spastic diplegic spastic children.

2. To study the effects of weight bearing exercises on spasticity by Modified Time Up & Go Test Scoring (MTUGT) in spastic diplegic children.
3. To study the effect of weight bearing exercises on spasticity based on motor functions by GMFCS Levels in spastic diplegic children.

3. Gross Motor Function Classification System (GMFCS)- classify motor function
4. Chair (back and arm cushioning)
5. Vestibular ball
6. Colorful pegs, markers
7. Body weight suspension treadmill
8. Couch, Stopwatch

Methodology

Study design: Experimental study

Study population: Cerebral Palsy Children (spastic CP)

Sample size: 15 participants

Place of data collection: The patients of Reborn Physiotherapy & Neuro Rehab Centre, Ghaziabad (UP) successfully participated.

Sampling method: Convenient Non-Probability Sampling

Selection criteria:

- Inclusion criteria:
 1. Diagnosed cases of spastic CP aged from 1 and 10years.¹
 2. Walking independently or with a walking aid.
 3. Able to follow visual commands.³
 4. Should not be taking any kind of pharmacological agents.
 5. GMFCS Levels I-III.⁷
- Exclusive criteria:
 6. Differential diagnosis like hemiplegia, DMD, dystonia.¹
 7. Children who cannot walk independently or at least with a walking aid.⁷
 8. Any types of orthopedic surgery on lower limb in last 12 months.¹⁰
 9. Surgery to be done during the period of study.
 10. Age group more than 10 years.¹⁰

Instrument required:

1. Modified Timed Up & Go Test
2. Modified Ashworth Scale -spasticity (hypertonicity)

Outcome Measure:

1. Modified Ashworth Scale⁸
2. Modified Time Up & Go Test⁹

Procedure:

To treat spastic cerebral palsy children, it requires a long-term treatment and medical care of various fields. The treatment, follow-up in following manner-

- (a) Balancing exercises: children of spastic CP have difficulty in balancing. To help them in balancing their own body, physiotherapist make them to perform various balancing exercises.

Exercises included like balance board or wobble board exercises, wedge exercises, vestibular ball exercises all these exercises for 5-15 minutes per day.

- (b) Weight bearing exercises: children are unable to take weight of their own body on their limbs which makes those parts of body weak. Children are made to take weight on their lower limbs by putting them in various positions and performing certain exercises.

Positions included like squatting that helps to weight bearing on the feet's, quadruped position which help them to take weight on their knees and hands. Single-leg standing and standing with/without support help them to weigh over whole body on their limbs for about 5-10minutes/day session.

- (c) Positioning exercises: exercises helping the children in achieving basic milestones positions which help in posture correction and strengthening of muscles.

Exercises also eliminate the gravity fear & maintaining the posture of the patient includes squatting, kneeling, half kneeling, side sitting,

prone on elbows, hand walking on treadmill, single leg standing & double leg standing for about 5 minutes/day session.

(d) Walking exercises: helping the children to initiate walking, with exercises like, treadmill walking, posterior walker walking, and walking with the minimal amount of external support in 5 minutes/day session.

(e) Coordination exercises: helping the children to build up their coordination and maintain the body in perfect anatomical posture.

Exercise included were Frenkel exercises, treadmill walking (for 1.5-2.2km/hours for 3 minutes a day), vestibular ball exercises all are combined and completed in 5-10 minutes/day.

(f) Core stability: exercises help the children in strengthening core muscles. These exercises include vestibular ball exercises, exercises of abdomen, supine to sitting, etc., for about 5minutes/day in a day session.

All exercises repeated for 2 days/week, 45-60 minutes session for 6 weeks.

Orthoses were given to maintain correct posture of limb and improve balance and movements. Such devices are braces, cast, splints, ankle foot orthoses, ankle foot knee orthoses.

Modalities were used to stimulate the muscles and initiate the movement by reeducating them.

Muscle stimulator was given over knee flexors and extensors at burst mode for 5 minutes per day to improve muscles contraction and relaxation movement.⁷

Vibrations were also provided for about

5minutes/day to the limbs & back muscles to give proprioception and reduce hyper sensory reflexes.

Myofascial therapies play a good role in increasing joint range of motion, provide flexibility to the muscles, also reduce tightness in them and by increases the velocity of therapy we can reduce flaccidity

Data-Analysis

The participants in research were given an informed consent form signed by parents, & responses were registered on MS-Excel sheet for review.

There were around 15 subjects included in the study meeting all the inclusive criteria. Exercises were conducted in equal intervals for each subject. Data were collected based on spasticity level scored by using MAS scoring (pre and post treatment for 6 weeks) and MTUGT scoring (pre and post treatment for 6 weeks) with respect to GMFCS levels improvements in each subject.⁸

The Shapiro-Wilks test used to check the normality levels, and provided with descriptive statistics, and paired t-tests were conducted with significance of $p < 0.05$ assumed.⁸

Result

There were around 15 subjects included in the study. Data were collected based on spasticity level scored by using Modified Ashworth Scale (MAS) scoring (pre and post treatment for 6 weeks) and Modified Time Up & Go Test (MTUGT) scoring (pre and post treatment for 6 weeks) with respect to GMFCS levels improvements in each subject.

Data collected was as follows:

Table 1: Data collected of subjects according to MAS & MTUGT (pre and post treatment).

	Gender	MAS		MTUGT (in seconds)	
		Pre- Treatment scoring(baseline)	Post-Treatment scoring	Pre-Treatment scoring(baseline)	Post-Treatment scoring
Mean:	Male: Female= 11:4, n=15	3.33	2.33	23.07	16.86

Table 2: Age and gender wise distribution of subjects.

Age(years)	Male	Female	Total
1-4	2	1	3
4-6	4	1	5
6-10	5	2	7
Total	11	4	15

Table 3: Distribution of subjects according to GMFC System levels

GMFCS levels	No. of subjects	Percentage (%)
Level I	3	20%
Level II	4	26.67%
Level III	8	53.34%
Total	15	100%

Table 4: MAS, MTUGT mean & SD value with respect to GMFCS levels.

Scales:	MAS		MTUGT		GMFCS Level	
	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Mean±SD	3.33±0.49	2.33±0.50	23.07±1.34	16.87±1.50	Level 3 (difficult walking leading maximum support but only for short distance, a more no. of falls is seen)	Level 2 (walking with mild assistance for a variable distance, a smaller number of falls are seen)
t-Value	1.325		2.236			
p-Value	0.024		0.040			

Discussion

This study was done to understand the effect of weight bearing exercises on spasticity in children's due to spastic diplegia, and to appreciate the outcomes we received from the data analysis.

This experimental study was conducted in Reborn Physiotherapy and Neuro Rehabilitation Centre, Ghaziabad, UP. As spasticity is very common problem faced by children with diplegia, therefore assessment should always be correct, and treatment should start at day 0 to give a good rehab in future.

In this study, spasticity changes were seen from pre-treatment to post-treatment scoring done by MAS with respect to change in gross motor functions are also observed. 15 subjects were involved in the study aged from 1 to 10 years with a greater number of children falling GMFCS Level III and trained for weight bearing exercises, balance exercises, core exercises, positional exercises, walking exercises, modalities were also given to enhance the functioning of the muscle and worked to re-educate the muscles shows an increased result in the level of GMFCS from III to II.⁷

Participants were having spasticity in their lower limbs which was scored as MAS 3 or 4, [Mean (SD)=3.33±0.49] as their baseline assessment; there was increased muscle tone, and some passive movements were difficulty while some show rigidity while performing flexion & extension.⁹ The scoring has been reduced to 1 or 2, [Mean (SD)= 2.33±0.50] after the rehab protocol which was followed for 6 weeks (refer to Table 4). There was reduced spasticity in their limbs which was leading to decreased level of gross motor function of the individual, making passive movement less rigid.³

Modified Time Up & Go Test is a tool used to check the mobility, balance, walking and standing. Scoring was done in pre-treatment and post-treatment to record the data for data analysis.

Participants were having spasticity and increased number of falls while walking for few meters ranges from 20-27s, [Mean (SD)= 23.06±1.34] as their baseline assessment; there was decreased number of falls and improved balance after the protocol followed 15-20s, [Mean (SD)= 16.87±1.50] for 6 weeks (refer to Table 4).¹⁰

Conclusion

CP is the group of the children with neurological conditions or disorders which alters the motor abilities, movements, muscle tone or posture of an infant/children. It also hinders the ability on an individual to perform activities in a coordinated manner which also the hinderance in body function.

More research should be conducted in this field especially with the growing technological, virtual reality which help to assist the patient and decreases load on therapist side as well giving them a mechanical advantage. We got a positive result for study however it would be better to have a larger population data so that we can have a better outcome and the validity of the study can be checked. The patients with CP spend their life suffering due to increased spasticity in the muscles.

The study will be able to identify the outcome measure of patient following weight bearing exercises.

Through this we conclude that when we provide the positional exercises, weight bearing exercises, and walking exercises in the treatment to the patients. It helps them to improve their spasticity level.

Modalities were also used to initiate the muscles contraction and relaxation to re-educate the muscles to strengthen the muscles.

Ethical Clearance: Institutional Ethical Committee of Amity University, Uttar Pradesh

Source of Funding: Self

Conflict of Interest: Nil

References

1. Pin TW. Effectiveness of static weight-bearing exercises in children with cerebral palsy. *Pediatric Physical Therapy*. 2007 Apr 1;19(1):62-73.
2. Chad KE, Bailey DA, McKay HA, Zello GA, Snyder RE. The effect of a weight-bearing physical activity program on bone mineral content and estimated volumetric density in children with spastic cerebral palsy. *The Journal of pediatrics*. 1999 Jul 1;135(1):115-7.
3. Macias-Merlo L, Bagur-Calafat C, Girabent-Farrés M, A. Stuberger W. Effects of the standing program with hip abduction on hip acetabular development in children with spastic diplegia cerebral palsy. *Disability and rehabilitation*. 2016 May 21;38(11):1075-81.
4. Meyns P, Van Gestel L, Bar-On L, Goudriaan M, Wambacq H, Aertbeliën E, Bruyninckx H, Molenaers G, De Cock P, Ortibus E, Desloovere K. Children with spastic cerebral palsy experience difficulties adjusting their gait pattern to weight added to the waist, while typically developing children do not. *Frontiers in human neuroscience*. 2016 Dec 23;10:657.
5. Su IY, Chung KK, Chow DH. Treadmill training with partial body weight support compared with conventional gait training for low-functioning children and adolescents with nonspastic cerebral palsy: a two-period crossover study. *Prosthetics and Orthotics International*. 2013 Dec;37(6):445-53.
6. Rw B, Smith M. Interrater reliability of a modified Ashworth scale of muscle spasticity. *Phys ther*. 1987;67(2):206-7.
7. Mutlu A, Livanelioglu A, Gunel MK. Reliability of Ashworth and Modified Ashworth scales in children with spastic cerebral palsy. *BMC musculoskeletal disorders*. 2008 Dec;9(1):1-8.
8. Dyball KM, Taylor NF, Dodd KJ. Retest reliability of measuring hip extensor muscle strength in different testing positions in young people with cerebral palsy. *BMC pediatrics*. 2011 Dec;11(1):1-8.
9. Damiano DL, Wingert JR, Stanley CJ, Curatalo L. Contribution of hip joint proprioception to static and dynamic balance in cerebral palsy: a case control study. *Journal of neuroengineering and rehabilitation*. 2013 Dec;10(1):1-0.
10. Killbride C, McDonnell A. Spasticity: the role of physiotherapy.

Effectiveness of Floor Exercises Versus Ball Exercises on Spinal Mobility in Spastic Diplegia (CP)

Aditi Singh(PT)¹, Deepika², Himadri Kapil(PT)³

¹Amity Institute of physiotherapy, Amity University, Noida, Uttar Pradesh, ²Bachelors of Physiotherapy, Amity Institute of physiotherapy, Amity University, Noida, Uttar Pradesh, ³Director, Reborn Physiotherapy and Neuro Rehabilitation Clinic, Indirapuram, Gurugram.

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Abstract

Background: The objective of this study was to compare the effectiveness between floor exercises and ball exercises on spinal stability in spastic diplegia (cp)

Introduction: Cerebral palsy (CP) is a static, non-progressive complaint caused by brain personality or injury in the antenatal, perinatal, and postnatal time period, is the major experimental disability affecting function in children. Voluntary movements are directly affected by weak torso control and causes abnormal motion patterns. Activation of core muscle forms an important part of stabilization of spines and vertebral alignment during bearing weight. The main gait pattern is its 'scissor gait' pattern.

Methodology: It was an experimental study design of children between 3-8 years of age with sample size of 30 individuals. They were divided by certain inclusion and exclusion criteria. Group A was given floor exercises and group B was given ball exercises. They were evaluated pre and post by TUG and PBS using t test, t and p values.

Results: This research evaluated data characteristics such as (age, gender, height, scales) were represented as percentage, mean and standard deviation and the significance across two study groups was analysed using t-test (paired and unpaired). The mean, standard deviation and significance were calculated

Conclusion: In our study , it was found that after receiving 6 weeks of floor exercises and ball exercises , TUG and PBS score have been significantly improved in group B than group A. Throughout the study, the Swiss ball is found to be an effective tool for improving trunk muscle activity, strengthening the trunk core muscles and improving stability in upright positions, along with allowing freedom of movement in upper limbs.

Keywords: Cerebral Palsy, Spastic Cerebral Palsy, floor exercises, Mat exercises.

Introduction

Spastic diplegia comes under the category of cerebral palsy. Cerebral palsy (CP) is a static, non-

progressive complaint caused by brain personality or injury in the antenatal, perinatal and postnatal time period, is the major experimental disability affecting function in children. It's categorized by the

Corresponding Author: Aditi Singh, Assistant Professor, Amity Institute of Physiotherapy, Amity University, Noida Uttar Pradesh.

E-mail: aditiphysio5@gmail.com

incapability to typically control motor function and it has the implicit to have an effect on the overall developmental of a child by affecting the child's capability to explore, speak, learn and become independent. The first step is to understand the description of CP and how to make the opinion. These are of various categories in which spastic diplegia is taken into the research topic. Spastic diplegia is particular type of lesion damage inhibit the proper development of upper motors neuron's function, impacting the motor cortex, the rudimentary ganglia and the corticospinal tract. Nerve receptors in the spine leading to affected muscles come to duty by absorbing the gammas aminos butyrics acid (GABA), an amino acid which regulates the muscle tone in humans. Without GABA immersion to those particular nerve rootlets, affected nerves constantly fire the communication for their corresponding muscles to permanently, strictly contract and the muscles get permanently hypertonic.¹

Spastic diplegia is as a matter of fact is a chronic condition. Contrary to conditions that may show parallel consequences, spastic diplegia is completely congenital. Effects like poisonous effects, Traumatic Brain Injury (TBI), meningitis, encephalitis and drowning will never cause spastic diplegia or CP generally. However, some common causes included are Periventricular leukomalacia abrupt in-womb deficiency oxygen - delivery through umbilical cord which can lead to early birth which fundamentally risk the child developing any type of CP. And, some maternity infections as rubella can cause spastic diplegia. Spastic diplegia can be diagnosed by various methods either as in scales, grades, functional and balance abilities. Certain manifestation along with observation can also help in identifying the spastic diplegia. The main gait pattern is its 'scissor gait' pattern²

Voluntary movements are directly affected by weak torso control and causes abnormal motion patterns. Activation of core muscle forms an important part of stabilization of spines and vertebral alignment during bearing weight. For spastic diplegia with floor exercises, exercises were given to back extensors and to abdominals with large and stable base of support. Subsequently, in 1963 Swiss ball came into consideration as an effectual support.³

Need for the study

This study gives details regarding differences regarding effectiveness between floor exercises and ball exercises for spinal stability in children accompanied by spastic diplegia.

Aim

To evaluate the effectiveness between ball exercises and floor exercises upon spinal stability in spastic diplegic children.

Objectives:

1. To assess the effect of floor exercises upon spinal balance in spastic diplegia
2. To evaluate the effect of ball exercises upon spinal balance in spastic diplegia.
3. To compare the effectiveness between floors and balls exercises in spastic diplegic condition.

Hypothesis:

- Null hypothesis- there is no significant effects in the difference of effects between floors and balls exercises upon spinal stability for spastic diplegic children.
- Alternate hypothesis- there is significant effects in the difference of effects between floors and ball exercises upon spinal stability for spastic diplegic children.

Methodology

Study Design: Experimental study design

Study Population & Sample: Children between age of 3 to 8 years with sample size of 30 individuals.^{9,4}

Place of Data Collection: Reborn Physiotherapy and Neuro Rehabilitation Clinic, Indrapuram.

Sampling Method : non-probability sampling.

Sample Size: 30 individuals⁴

Selection Criteria:

- (a) Inclusion Criteria:
- Children diagnosed with spastic diplegia (CP) between 3-8 years of age group⁹
 - Includes all gender patients.

- Gross Motor Functions Classifications Scale between 1-3.⁴

b) Exclusion Criteria:

- Children with injuries or any open wounds
- Non ambulatory children
- Patients with risk of serious side effects as fever, asthma.
- Patient with any cognitive and visual impairments.

Outcome Measures:

Independent variable: Balance, stability

Dependent Variable:

- Modified timed up and go test (TUG)
- Paediatric balance scale (PBS)

Instruments Required:

- Consent form
- Assessment charts
- Questionnaire
- Goniometer
- inch tape
- chair
- assistive devices and
- Swiss ball.

Group Allocation: 30 spastic diplegic children were split into two groups. Group A will adhere to floor exercises protocol and Group B will adhere to ball exercises protocol for 6 weeks.

Procedure:

Group A and B were given exercise program. The exercises were performed by group A and group B accordingly for 45 minutes once a day 3 times a week. All the children will be assessed before the beginning and after completion of the program. This study will be a short-term study of 6 weeks.

Following exercises were included in the program:

Group-A⁶

The repetitions and holds were administered per session,

- Sit to stand and stand to sit [20 repetitions]
- Retrieving objects from the floor [2 repetitions]
- One leg standing [5 minutes hold]
- Alternate one leg standing [5 minutes hold]
- Half kneeling [3 minutes hold]
- Kneeling [3 minutes hold]
- Walking supported [20 steps]
- Standing supported [5 minutes]
- Squatting [5minutes hold]

Group-B

The repetitions and holds were administered per session,

- Bouncing [relaxation]
- Row your boat (sitting) [20 repetitions]
- Sitting rolling [10 repetitions]
- Supine rocking forward and backward [20 repetitions]
- Supine side rocking [20 repetitions]
- Supine rolling [10 repetitions]
- Tummy time with gentle rocking side to side [20 repetitions]
- Prone flipped over (forward and backward) [20 repetitions]
- Prone rolling [10 repetitions]
- Prone side rolling [20 repetitions]
- Prone on hands[5minutes hold]
- Supine to sitting [10 repetitions]

Data analysis

Data analysis of this study showed that the following changes in the scoring of TUG and PBS before and after the exercise therapy program with t test and p value.

Result and Observation

This research was conducted with a total of 30 participants composed of 22 Males and 8 Females. The qualitative and quantitative data characteristics such as (age, gender, height, scales) were represented as percentage, mean and standard deviation and the significance across two study groups was analysed using t-test (paired and unpaired).

The mean, standard deviation and significance were calculated along with their graphical representations.

Table 1: Gender distribution

Gender	Total Count(n)	Total Percentage (%)
Male	22	73
Female	8	27

Table 2: Representing variables of the sample groups

Variable	Group A Mean ± SD	Group B Mean ± SD
Age	4.06 ±0.98	4.66 ±1.24
Height	109 ±15.6	111 ±15.4

Table 3: Group A and B Values for TUG

TUG	Group A		Group B	
	Pre	Post	Pre	Post
Mean	16.06	15	23.46	22.4
SD	3.45	3.44	3.09	2.31

SD = standard deviation

TUG = Timed UP and GO Test

PBS = Pediatric Balance Scale

Table 4: Group A and B Values for PBS

PBS	Group A		Group B	
	Pre	Post	Pre	Post
Mean	29.9	31.6	15.46	17.33
SD	9.85	8.72	3.34	3.37

Table 5: Within Group Pre and Post Comparison of Measurements

Variables	Group	t-Stat	t-Critical	P value	Significance
TUG	A (Pre-post)	4.29	1.76	0.0007	Significant
	B (Pre-post)	-5.13	1.761	0.0001	Significant
PBS	A (Pre-post)	2.21	1.76	0.04	Significant
	B (Pre-post)	4.00	1.76	0.013	Significant

Table 6: Between Group Comparison Of Measurements

Variables	T-Stat	T-Critical	P value	Significance
TUG (Pre A- Pre B)	-5.96	2.048	0.04	Significant
TUG (Post A -Post B)	-6.63	2.059		
PBS (Pre A-Pre B)	5.20	2.10	0.0007	Significant
PBS (Post A- Post B)	5.73	2.100		

P< 0.05 is considered significant

Discussion

This study was done to compare the effectiveness of the Effectiveness of floor exercises versus floor exercises on spinal stability for spastic diplegia (CP). In our study , we discovered that after receiving 6 weeks of floor exercises and ball exercises , TUG and PBS score have been significantly improved in group B than group A. Throughout the study, the Swiss ball is found to be an effective tool for improving trunk muscle activity, strengthening the trunk core muscles and improving stability in upright positions,

along with allowing freedom of movement in upper limbs There are various studies which have shown the effectiveness of the ball exercise on core stability. Cherraa’s Institute of Health and Sciences 2019 added that Swiss ball training requires you to concentrate and shift your weight on the ball so that you maintain stability, something that is not possible with traditional weight training exercises. Furthermore the interpretations are in conformity with the previous studies¹¹ Postural control when balancing over a Swiss ball involves adjusting the movement program to maintain stability, while maintaining the overall posture strategy. Ball training

improves nervous system function, which enhances functional strength. Although the movement patterns of the Swiss ball and floor groups appeared similar, underlying neuroadaptations such as increased nervous system activation, more efficient neuromuscular recruitment patterns, improved motor unit synchronization, decreased inhibitory neuronal reflexes, and nociceptive feedback may be quite different.

Strength of the Study:

The results of this study not only provide evidence of the validity of effectiveness of Swiss ball and floor exercises but also suggest an alternative approach to improve the spinal stability for children with spastic diplegia (CP).

Limitations of the Study

The above study has following limitations:

- Sample size was small
- Unequal male and female ratio
- The study was limited to age group (3-8 years)

Conclusion

After a 6 week protocol period, the children in group A (floor exercises) and group B (Swiss ball) exercises group have shown improvement with the outcome measures. But I'm comparison with both the groups mean differences in TUG, PBS's pre and post between both groups A and B, the Swiss ball group was found to be better with greater mean difference. Hence the present study held revealed that there is improvement in spinal stability with Swiss ball can be selected as the treatment of choice for the physiotherapist to effectively improve spinal muscle strength in Spastic diplegic children.

Ethical clearance: Obtained Institutional ethical committee of Amity university Uttar Pradesh committee.

Source of funding: Self

Conflict of Interest: Nil

Reference

1. MacLennan AH, Lewis S, Moreno-De-Luca A, Fahey M, Leventer RJ, McIntyre S, Ben-Pazi H, Corbett M, Wang X, Baynam G, Fehlings D. Genetic or other causation should not change the clinical diagnosis of cerebral palsy. *Journal of child neurology*. 2019 Jul;34(8):472-6.
2. Whittle MW. *Gait analysis: an introduction*. Butterworth-Heinemann; 2014 May 12.
3. *International Journal of Physiotherapy*. IJPHY. Directory of open access journals [Internet] 2017 [cited 2022 Jul9]. Available from: <https://doaj.org/article/3dedc6e914444b4b9f5204c163507d9f>
4. Sim YJ, Kim JS, Yi CH, Cynn HS. Trunk stabilization exercise using a both sides utilized ball in children with spastic diplegia: Case study. *Physical Therapy Korea*. 2015 Nov 19;22(4):79-86.
5. Sakhawalkar S, Paldhikar S, Chitre D, Ghodey S. Swiss Ball Training Verses Stable Surface Training on Functional Performance in Ambulatory Cerebral Palsy.
6. Elanchezhian C, SwarnaKumari P. Swiss ball training to improve trunk control and balance in spastic hemiplegic cerebral palsy. *Sri Lanka Journal of Child Health*. 2019 Dec 5;48(4):300-4.
7. *Pediatric physical therapy : the official publication of the Section on Pediatrics of the American Physical Therapy Association*. U.S. National Library of Medicine. MR F. Abstracts of the Academy of Pediatric Physical Therapy Platform Presentations at the combined sections meeting [Internet] 2017 [cited 2022 Jul9]. Available from: <https://pubmed.ncbi.nlm.nih.gov/34958339/>
8. Abraham D, Heffron C, Braley P, Drobnjak L. Sensory processing 101. *Sensory Processing 101*; 2015.
9. Jacob A. Effectiveness of Swiss Ball Vs Floor Exercises on Core Muscles Strengthening in Elite Cricketers (Doctoral dissertation, Cherraan's College of Physiotherapy, Coimbatore).

Effect of Static Neck Exercises on Neck Pain for School Students Attending Online Classes

Aditi Singh¹, Preet Sethi², K.D. Talwar³

¹ Assistant Professor, Amity Institute of Physiotherapy, Amity University Noida, Uttar Pradesh, ²Final year Student of Bachelors of Physiotherapy, Amity Institute of Physiotherapy, Amity University Noida, Uttar Pradesh, ³H.O.D., Dr. Talwar's Physiotherapy Clinic, Arun Vihar, Noida, Uttar Pradesh.

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Abstract

Neck Pain is a very common musculoskeletal condition that is becoming a major cause of concern not only in adults but also in the younger population. The aim of the study is to find out if providing static neck exercises has any effect on reducing neck pains. The study comprised of 40 participants which included both males and females of ages 14-19 years having mechanical neck pain. A baseline assessment was carried out using NPRS and NDI scales to select participants for the study. Once participants met the inclusion criteria, they were given static neck exercises for 1 month (three days in a week: 2 sets with 10 repetitions each). Later, post NPRS and NDI readings were collected and compared with the pre NPRS and NDI readings to find any changes in neck pain. Both pain and neck disability had shown statistical changes when pre and post readings of NPRS and NDI were compared. Hence, this study has shown that static neck exercises, are effective means of reducing neck pains.

Keywords: mechanical neck pain; static neck exercise; school students; NPRS; NDI.

Introduction

Neck pain is a musculoskeletal condition that is day by day becoming a major cause of concern especially in the young population. It can also be referred to as cervical pain (that is pain occurring between the C1 and C7 cervical region. In the early stages it can happen occasionally or frequently due to our day-to-day activities or sometimes due to our wrong posture. It's usually not a sign of major concern, as it can be relieved with rest and medications such as oral tablet/ topical medication (e.g. ointments) in a few days.

But sometimes due to various factors, it may prevail for a longer time. This can happen if the individual has previously faced any injury, trauma, illness. In this case, it may require serious medical care. Sometimes neck pain may come with other problems such as any nerve compressions that may cause pain radiating to shoulder and arms etc. Therefore, early management and intervention is important to prevent any other difficulty which can occur due to neck pain.

According to world-health-organisation neck pain is considered the 4th most leading cause of health problems. Analytics and data suggest that

Corresponding Author: Aditi Singh, Assistant Professor, Amity Institute of Physiotherapy, Amity University, Noida Uttar Pradesh.

E-mail: asingh29@amity.edu

approximately 5 to 87% of normal population experience pain in neck. Additionally other studies have shown that it is a cause of concern for disability in children between ages 14-20 years old. Studies also suggests that pain in neck and shoulders is leading cause of concern and is very commonly seen in young children & teenager students especially in developing countries.¹

Neck pain can range in the following categories. It can be least troublesome to an individual or it can also be the one affecting the individual the most; it can be so troublesome that it can interfere with the day-to-day activities of a person. Also, certain movements can aggravate the pain.

*Symptoms:*²⁻⁶

- Pain: can be because of exaggerating activities that may cause too much load on neck causing pain. It can become confined at an area, so person might feel sharp or pin-pricking needle type pain.
- Tingling: can be seen in cases when the neck pain is radiating down to the shoulders, arms, trunk. It may give a sensation of numbness. This can be seen in case of nerve compressions where individual complains of burning-sharp pain travelling down their arm. Further leading to a feeling of weakness.
- Feeling of tightness/ discomfort/ in neck.
- Unable to move neck in all directions completely.
- Headache.
- Soreness in muscle.
- Feeling of heaviness in neck and shoulders.

*Causes:*²⁻⁶

- Overuse of the muscles by working for long hours on computers and smartphones, causes strains, a hunched back, inappropriate posture.
- Any injury/ trauma such as whiplash injury to cervical spine or degeneration of disc or vertebra.
- Other pathological conditions like osteoarthritis in neck, herniated disc in cervical region can cause chronic neck pain.
- Stresses like anxiety, social factors.

- Infections such as meningitis, any tumours in the spine can disrupt the tissues around the joint, hence, pressing on the nerve; example- rheumatoid arthritis, spondylolisthesis, osteoporosis, weakened bones further causing fractures.

*Risk factors:*²⁻⁶

- Age: degeneration occurs as one gets old causing pain in muscles and bones.
- Long working hours which causes stress on neck muscles.
- Improper or poor posture.
- Any previous muscular or bone related injuries.
- Weak neck muscles.
- Intense working environment.

Neck pain is now also seen as an after effect of the covid-19 pandemic. This is because all schools, institutions, workplace business had to shift to online mode of learning and working by students and teachers' & other profession persons due to social distancing and precautions to avoid the spread of virus.

Publications and articles have stated that this remote way of learning and working has greatly impacted the health of students and adults. Previous studies stated, students have been suffering from neck pain, eye pain and headache. This long duration of hours of working and studying on laptops, computers, smartphones has greatly impacted students physical and mental health.

Therefore, the focus of this study is to find out if providing static neck exercises to school students who attend online classes, will help reduce their neck pain/ discomfort or not.

Need of the study:

This study will provide an insight for clinician fraternity as we will come to know the effective physiotherapy intervention for treating neck pains of mechanical type. It will also provide insight to patient fraternity as the treatment protocol is time and cost efficient.

Aim

To find out the effect of static neck exercise on neck pain for school students attending online classes.

Objective

1. To determine the effectiveness of static neck exercises on Numeric pain rating scale (NPRS) in neck pain cases.
2. To determine the effectiveness of static neck exercises on Neck Disability Index scale (NDI) in neck pain cases.

Hypothesis:

Null hypothesis: There will be no significant effect of static Exercises for Neck pain and disability in neck pain cases.

Alternate hypothesis: There will be significant effect of static neck exercises on neck pain and disability in neck pain cases.

Methodology

- Study Design: Intervention study.
- Study Population: school students with neck pain from attending online classes.
- Study Setting: Dr. Talwar's Physiotherapy Clinic.
- Sampling: non-probability sampling.
- Sample Size: 40 cases of mechanical neck pain
- Selection Criteria:
 - Inclusion Criteria:^(8 and 1)
 - ⇒ School students of age group between 14-19years.
 - ⇒ Students who attend online classes.
 - ⇒ Students with those complaining of neck pain.
 - ⇒ Bothe males and females.
 - ⇒ Mechanical neck pain with less than 3 months duration.
 - Exclusion Criteria:^(7,8,1)
 - ⇒ neck pain due to myelopathy, atlantoaxial subluxation, and metastases.

- ⇒ Cervical spondylosis.
- ⇒ Participants having neck-pain which chronic.
- ⇒ Participants who are not school or high school students or teenagers.

➤ Outcome Measures:

- ⇒ Numeric pain rating scale (NPRS).
- ⇒ Neck disability index (NDI).

➤ Procedure:

Participants who met the inclusion criteria were selected and baseline assessment was done using the NPRS and NDI scales. The exercise protocol was carried out for 1 month. The following mentioned exercises were performed by the participants for three days in a week: 2 sets with 10 repetitions each. These were performed by participants themselves.⁽⁸⁾

Once the 4-week exercise session was completed, Post NPRS and NDI readings were collected and tabulated to find any changes in neck pain.

- Exercise Procedure: Patient position: patient should be seated comfortably with shoulders relaxed. An upright position is to be maintained throughout the exercise protocol.
- 1. **Static Neck flexion:** patient was instructed to place their hands on the forehead. Next, while maintaining normal breathing & posture, press the forehead against the palm of your hand in forward direction. This was to be done 20 times. Relax and take a 10 sec break between each set.



Figure 1

- 2. Static Neck extension:** patient was instructed to place the towel behind their head and to hold and maintain the position. Patient was asked to press in the backward motion against the towel while maintaining the towel pull in forward direction. This was to be performed 20 times.



Figure 2

- 3. Static Side neck flexion:** patient was asked to wrap a towel around the head. For right side neck flexors, the patient will press onto the right side of towel while maintain the towel pull in opposite direction. Similarly, it should be performed for left side. 20 repetitions each for left and right side.

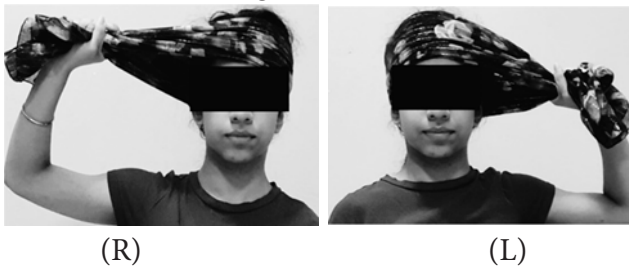


Figure 3

- 4. Static Neck rotations:** patient was instructed to place the palmer side of the hand onto their cheek. For right side neck muscle rotators patient will place their hand onto right cheek. While maintaining this posture they must try to rotate the neck to the right side. Similarly, it should be performed for left side as well. 20 repetitions each.

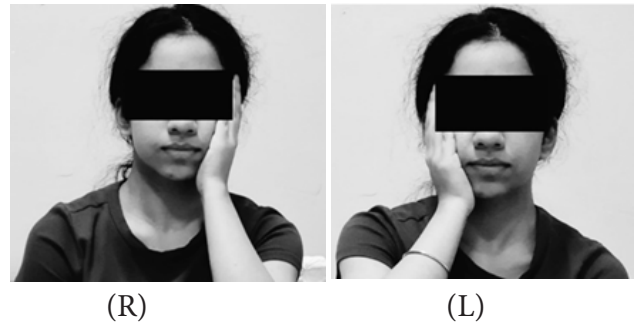


Figure 4

Table 1: NPRS Obsevation Table

S. No.	Pre-Exercise NPRS scale values	Post Exercise NPRS scale values
1.	6	4
2.	4	3
3.	6	5
4.	6	4
5.	8	5
6.	8	4
7.	4	3
8.	4	4
9.	7	6
10.	5	4
11.	7	6
12.	6	5
13.	5	5
14.	6	4
15.	4	3
16.	7	4
17.	3	3
18.	6	5
19.	3	3
20.	4	3
21.	4	2
22.	6	4
23.	6	5
24.	6	6
25.	5	4

S. No.	Pre-Exercise NPRS scale values	Post Exercise NPRS scale values
26.	5	5
27.	10	8
28.	7	5
29.	6	5
30.	6	4
31.	5	4
32.	4	4
33.	9	7
34.	6	5
35.	5	3
36.	3	3
37.	6	5
38.	10	9
39.	5	4
40.	7	5

Table 2: NPRS Calculations

	Before exercise	After exercise
Mean	5.75	4.5
Median	6	4
Mode	6	4
Range	7	7
Minimum	3	2
Maximum	10	9
Count <i>n</i>	40	40
Sum	230	180
Standard Deviation:	1.7059473644449	1.3959648809042

$P(T \leq t)$ one-tail is 0.00029127

t Critical one-tail is 1.664624645

Therefore, $p < .001$

Table 3: Neck Disability Index Observation Table

S. No.	Age	Gender	Pre Exercise score	Final % score	Post exercise score	Final % score
1.	16	Male	3	6	3	6
2.	16	Male	4	8	4	8
3.	16	Female	17	34	13	26
4.	18	Female	15	30	11	22
5.	16	Female	8	16	6	12
6.	15	Female	12	24	9	18
7.	19	Female	9	18	7	14
8.	17	Male	6	12	6	12
9.	15	Female	19	38	15	30
10.	15	Female	17	34	14	28
11.	15	Female	16	32	14	28
12.	18	Male	17	34	15	30
13.	18	Male	15	30	11	22
14.	17	Male	11	22	9	18
15.	17	Male	20	40	16	32
16.	18	Male	2	4	2	4
17.	17	Male	4	8	4	8
18.	18	Female	20	40	17	34
19.	16	Male	10	20	8	16
20.	18	Male	10	20	7	14
21.	15	Female	12	24	10	20
22.	15	Female	16	32	14	28

S. No.	Age	Gender	Pre Exercise score	Final % score	Post exercise score	Final % score
23.	16	Female	4	8	3	6
24.	16	Female	14	28	12	24
25.	15	Female	7	14	7	14
26.	16	Female	7	14	6	12
27.	16	Female	6	12	5	10
28.	18	Male	22	44	19	38
29.	17	Female	24	48	20	40
30.	17	Female	10	20	9	18
31.	18	Male	4	8	4	8
32.	16	Female	8	16	5	10
33.	16	Male	22	44	20	40
34.	18	Female	13	26	10	20
35.	18	Male	8	16	6	12
36.	19	Male	5	10	5	10
37.	15	Male	7	14	6	12
38.	16	Male	27	54	22	44
39.	17	Male	5	10	3	6
40.	18	Male	14	28	13	26

Table 4: Mean % Difference Among Ndi Scores:

	Pre NDI %	Post NDI %
Total Number of Participants	40	40
Mean NDI %	23.5%	19.5%

P(T<=t) one-tail is 1.7105E-11

t Critical one-tail is 1.68595446

Therefore, $p < .001$

Results and Observations

The above static exercise protocol for neck pain has shown significant difference in results. Pain and NDI both have shown statistical differences.

The mean of pain before giving exercise was 5.75; after the exercise regimen the mean for pain was reduced to 4.5.

Paired t-test tool was carried out to assess the “Pre- and Post” results of NPRS and NDI. This has shown a significance of $p < .001$.

Though neck disability is not majorly present in the participants. However, some percentage of disability that was present was also treated.

Before giving the exercise intervention, the mean NDI % was observed to be 23.5%. After the exercise intervention, the mean NDI % reduced to 19.5%.

The mean age of the 40 participants was observed to be 16.67 years.

Discussion

This study has been conducted by the inclusion of 40 student participants (both male and females) of age groups 14-19 years, having neck pain as one of their main concerns. The subjects were given static neck exercises for a period of 1 month, 2 sets, each with 10 repetitions for three days in a week. The results of the exercises have depicted significant changes in the scores of NPRS and NDI by the comparison of Pre-& Post- exercise results.

By undertaking Neck Disability Index questionnaire, we can see that neck pain is a major concern in both males and females equally. The mean age that is affected due to mechanical neck pain is 16.67

which is approximately students of 16 to 17 years of age. With the help of Numeric Pain Rating Scale, the mean of pain that was reported before the exercise intervention was 5.75. After receiving the static neck exercises, the mean of pain had reduced to 4.5. With the help of NDI questionnaire, we observed that the mean% of disability before the exercise intervention was 23.5%. After receiving the exercises, the mean% of disability reduced to 19.5%. By the application of Paired t-test tool we could observe a significance in the results of NDI and NPRS which was $p < .001$.

A study conducted by Sowmya, MPT-Ortho of physiotherapy college of Chennai, proved and stated that strengthening of neck by giving isometrics or dynamic neck exercises both are effective to treat neck pains especially in chronic conditions. In support to this, our study also proves that isometric or static neck exercises are equally effective in relieving neck pains due to mechanical causes.⁹

A study performed by park su jin stated the effectiveness of strengthening the deep flexor muscle group of neck for treating posture, endurance, strength. According to the study, flexor group muscles are important to maintain neck-shoulder joint complex for posture related concerns. Thus, our study not only focused on strengthening flexor muscle groups but also other muscles groups such as neck extensors, neck side flexors, neck rotators.⁽¹⁴⁾

According to Leili tapak and Iman, their study reported high prevalence of neck pain in elementary school students due to reasons such as incorrect sitting posture, assignment and study load, inappropriate furniture of school and the difficulty to view board in class. Thus, from our study we come to know that online classes have also affected school students leading to mechanical type of neck pains.¹

Therefore, according to our results and observations obtained, the null hypothesis that stated- exercises will have no effect or change on neck pain, can be rejected; as this intervention has proven significant changes in mechanical neck pain.

- *Limitations:*

1. The sample size was less.
2. There was no comparative group, therefore we could not compare and find if any

other intervention is better than static neck exercises.

- *Recommendations:*

1. The study duration can be increased to see other effects of static neck exercises such as range of motion, strength, posture correction.
2. These exercises protocols can be performed on a larger population.
3. Stretching type of exercise can be performed together in this study.
4. The static neck exercises can be performed using TheraBand's and beach volleyball.

Conclusion

Static neck exercises are effective means to increase muscle size of the neck by strengthening the muscles around the neck. It helps in improving functionality and ability of the muscle to perform neck movements in all directions smoothly. Hence making the muscle-joint complex more efficient.

Even if we want to give dynamic or advance resistance training for further rehabilitation of patients, strength is an important factor in all aspects. Isometrics or static exercises are safe, best, and effective way to begin by building strength and functionality in any muscle; at the same time taking care of the muscles and joints around to not be exerted or stressed.

Therefore, from this study we can conclude that providing static neck exercises on neck pain for school students who have attended online classes is effective to treat and relieve pains, discomfort, stiffness etc.

Ethical Clearance: Institutional Ethical committee of Amity University, Uttar Pradesh

Source of Funding: Self

Conflict of Interest: Nil

References

1. Elham Gheysvandi, Iman Dianat, Rashid Heidarimoghadam, Leili Tapak, Akram Karimi, Shahan Jarini, Forouzan Rezapour-Shahkolai. Neck and Shoulder pain among Elementary school students: prevalence and its risk factors. National library of medicine (BMC Public Health). 2019; 19:1299 October 16.

2. Neck Pain. Mayo Clinic. Mayo Foundation for Medical Education and Research (MFMER). 1998-2022. July 2020, 31.
3. Scott Curtis, DO. All About Neck Pain. Spine-Health. 2019 September 12.
4. Neck Pain: Symptoms, Causes, and How to treat it. Healthline. 2005-2022.
5. Neck Pain. Cleveland Clinic. 2022.
6. Neha Pathak, MD. NeckPain. Web MD. 2021 August 30.
7. Steven P Cohen. Epidemiology, Diagnosis, and Treatment of neck pain. National Library of Medicine (National Center for Biotechnology Information). 10.1016/j.mayocp.2014, September 08.
8. Nazar Deen, Saeed Akhter, Sanjeela Abbas. The effectiveness of Isometric strengthening with static stretching vs. static stretching in non-specific chronic neck pain. International Journal of Physical Medicine and Rehabilitation. 2020.
9. Sowmya MV. Isometric neck exercises versus Dynamic neck exercises in chronic neck pain. Research Gate. 2014 January.
10. J David, S Modi, AA Aluko, C Robertshaw, J Farebrother.

Chronic Neck Pain: A comparison of Acupuncture treatment and Physiotherapy. British Society for Rheumatology, volume 37, issue 10, 1998 October, 01.
11. Jennifer A Klaber Moffett, David A Jackson, Stewart Richmond, Amanda Farrin.

Randomized Trial of a brief Physiotherapy intervention compared with usual physiotherapy for Neck Pain patients: Outcomes and patient's preference. The BMJ 2005; 330:75, January 06.
12. Jordan, Alan DC, PhD; Bendix, Tom MD, PhD; Nielsen, Henrik MD, PhD; Hansen, Finn Rolsted MD, Dorte PT; Winkel, Anette PT, BSc.

Intensive Training, Physiotherapy, or Manipulation for Patients with Chronic Neck Pain. Spine Journal, volume 23, 1998 February 01.
13. Arianne P Verhagen. Physiotherapy Management of Neck Pain. Journal of Physiotherapy 67:5-11; 2021.
14. Myoung-Hyo Lee, Su-Jin Park, Jin-Sang Kim.

Effects of Neck Exercise on High-School Student's Neck-Shoulder Posture. Journal of Physical Therapy Science, 2013.
15. Zaheen Ahmed Iqbal, Sohrab Ahmad Khan, Ahmad Alghadir.

Effect of Deep Cervical Flexor Muscles Training using Pressure Biofeedback on Pain and Disability of School Teachers with Neck Pain. Journal of Physical Therapy Science. 2013 June.

Effects of Stretch of Popliteal Fascia on Patellofemoral Pain Syndrome (Runner's Knee)

Aditi Singh¹, Shikha Thakur², Soumya Singh³

¹Assistant Professor, ²BPT final year, Amity Institute of Physiotherapy, Amity University Noida, Uttar Pradesh, ³Physiotherapist, A+ Orthopedic and Sports Med Centre, New Delhi

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Abstract

Introduction: The Patellofemoral pain syndrome (PFPS) also called Runner's knee is a very prevalent clinical condition that affects about 7% to 40% of active young adults and adolescents. The popliteal fossa is covered with popliteal fascia that performs as a one-layer aponeurotic sheet. For hamstring muscle, popliteal fascia can be defined as a three-layered architecture acting as a kinetic retinaculum. The aim of this project was to examine effects of stretch of popliteal fascia on patients having patellofemoral pain syndrome.

Methodology: Total of 30 patients participated, who were suffering from patellofemoral pain syndrome. The subjects were divided into 2 group and each of the group consisted of 15 participants, Group A was the Experimental Group which were given popliteal fascia stretch, and Group B was the Control Group which was given popliteal fascia stretch with hamstring stretch. The improvement in pain was measured by Visual Analogue Scale (VAS) and to assess the anterior knee pain Kujala Scoring Questionnaire was measured.

Result: VAS score which implicated pain was reduced in the control group as compared to experimental group. Similar findings were seen in KUJALA Scoring Questionnaire, the control group had better results in functionality as compared to the experimental group.

Conclusion: Popliteal stretch was not an effective treatment for patellofemoral pain syndrome as there was no significant difference in Pre and Post data of pain (VAS), similar finding was founded in Kujala Scoring Questionnaire. During the evaluation, a personalized multi modal management program is needed, which focuses on targeting patient's functional limit as well as specific impairments.

Keywords: Patellofemoral pain syndrome, popliteal fascia, hamstring muscle, popliteal fascia stretch

Introduction

The Patellofemoral pain syndrome (PFPS) also called Runner's knee is a very prevalent clinical condition that affects about 7% to 40% of active young adults and adolescents¹. Diagnosis of PFPS

could be made by the presence of anterior or retro patellar knee pain which is associated with sitting for a prolonged period or weight-bearing movements that brings load on the patellofemoral joint such as ascending and descending stairs, squatting, jogging,

Corresponding Author: Aditi Singh, Assistant Professor, Amity Institute of Physiotherapy, Amity University, Noida Uttar Pradesh.

E-mail: asingh29@amity.edu

kneeling, running, and jumping.² Studies have found that PFPS affects women double as men showing 3.8% in males and 6.5% in females.³

The popliteal fossa is covered with popliteal fascia that performs as a one-layer aponeurotic sheet. For thigh flexor muscles the fascia acts as a three-layered retinaculum and provides a secured channel for neurovascular structure in the lower limb. To ensure the flexors muscles remain in their original position, the popliteal fascia's superficial layer covering the thigh is tightly woven with biceps femoris' epimysium laterally and semimembranosus medially.

The Patellofemoral pain mechanism is due to tightness of the hamstring and popliteus muscles. For hamstring muscle, popliteal fascia can be defined as a three-layered architecture acting as a kinetic retinaculum. "Retinaculum" is described as a transverse thickening that is localized happening in the deep fascia which gets attached to bony prominence which is locally situated. The retinaculum keeps tendon that runs deep into them which would be pulled or bow out of their original position due to the activity of muscles.⁴

In two works of literatures, there is evidence there is a major link between tightness of hamstrings and PFPS.^{5,6} Finding was significant tightness of hamstring. During an isometric contraction, there was an earlier contraction of lateral hamstring than the medial hamstring.⁷ Tightness of the hamstring is a cause of PFPs as it can lead to pain as there is an increase of pressure behind the kneecap. There is increase in pressure between the femur and patella as greater posterior force is placed on the knee due to tight hamstrings.⁸

All these factors lead to the suffering of patella, with greater stress and the structures which are supporting. There are 2 studies that recommend that stretching the tight muscles could be beneficiary.^{5,6}

Aim

The aim of this project was to examine effects of stretch of popliteal fascia on patients having patellofemoral pain syndrome (runner's knee).

Objective

1. To assess the effectiveness of popliteal fascia, stretch on the Visual Analogue Scale (VAS) inpatients having Patellofemoral Pain Syndrome.
2. To assess the effectiveness of popliteal fascia, stretch on Kujala Scoring Questionnaire in patients having Patellofemoral Pain Syndrome

Need of the Study

Study' need was no research on this topic yet and this research finds whether there was popliteal fascia stretch effects on patellofemoral pain syndrome or not as it is seen that there is tightness of hamstring muscles in PFPs and popliteal fascia acts as a retinaculum for hamstring muscle, so to see whether the stretch of popliteal fascia and hamstring stretch could reduce the patellofemoral pain.

Methodology

Study population: patients having patellofemoral pain syndrome.

Study Locale: The patients of A+ Orthopaedics and Sports med centre, Delhi successfully participated.

Sample size: 30 participants

Sampling Technique: Chit-pull method

Selection criteria-

- Inclusion Criteria-
 1. Patients with patellofemoral pain syndrome
 2. 18-40 years' age⁹
 3. both female and male
 4. having pain in one or both the knees
 5. Visual Analog Scale pain intensity more than 3 or more.¹⁰
 6. Special test like Clark's sign and McConnell sign should be positive.³
- Exclusion Criteria-
 1. MRI or X-ray indicating knee pathologies like intra-articular or meniscal injury

2. Laxity or injury of any collateral or cruciate ligaments
3. Osteoarthritis of Knee¹
4. Osgood Schlatter disease, jumpers knee¹¹
5. any significant effusion of knee joint bursitis or tendinitis¹¹
6. On clinical evaluation significant radiating pain from hip or lumbar spine, referring pain to knee¹¹
7. recurrent dislocation or subluxation of patella.⁸

Instrumentations

1. Couch
2. Medium Size Towel
3. Low stool

Outcome Measure

1. Visual Analogue Scale (VAS)¹²
2. Kujala Scoring Questionnaire¹³

Procedure

1. The participants fulfilling the inclusion criteria were included in the study.
2. Before starting the treatment, a written consent form was taken from each of the participants regarding their consent to participate in study.
3. After that the demographic data was collected from participants.
4. The subjects were divided into 2 group and each of the group consisted of 15 participants each.

Experimental Group (Group A) which was given popliteal fascia stretch

Stretch of popliteal:

1. Patient in walk standing position, affected leg in front and unaffected leg at back, patient keeps its affected legs' forefoot on a step making sure his heels are touching the ground.¹⁴
2. Ask patient to little bit bent the knee and toes out slightly, after that rotate the leg straight, putting hands on knee then slowly bend and straight out the leg until a stretch is felt right behind the knee.

In each session patient was asked to maintain stretch for 20 seconds and perform 6 repetitions/ 1 set/ day.¹⁴ This set was repeated 3 days/ week for 6 weeks.

Control Group (Group B) which was given popliteal fascia stretch with hamstring stretch. Control group received popliteal fascia stretch same as Group A, along with this hamstring stretch was given.

Stretch of Hamstring:

1. Patient in supine lying, patients place towel or strap across the affected foot.
2. Patient is suppose to hold the straps. The unaffected legs' knee bent.
3. Patient slowly extends the affected leg keeping knee slightly bent, patients raise leg slowly until hamstring are stretched.
4. During initial phase the hold of stretch was 20 seconds, 6 repetition/ 1 set/ day.¹⁵

This set was repeated 3 days/ week for 6 weeks.

Outcomes Variables:

1. The pain measurement will be measured by the **Visual Analog Scale (VAS)**- it is self- assessing questionnaire comprising of 10 cm line in which 0 carries for no pain and 10 stands for maximum pain, in patients VAS reliability of PFPs usual pain is 0.60 to 0.79 and for worst pain 0.88.¹²
2. To assess anterior knee pain **Kujala Scoring Questionnaire**- it is a questionnaire of 13 items, for assessing the pain in anterior knee. It is the ability of the patients to perform activities like running, stair climbing, squatting etc.) and records if patient has any disabilities or symptoms like swelling, atrophy of thigh, limping). Total score is given from 0 to 100, in which higher the scores better the outcome. Anterior knee pain average score was 82.8, and for patellar instability 62.2 was average score¹³.
 - Independent Variables- Stretches of popliteal fascia and hamstring stretches
 - Dependent Variables- Kujala Scoring Questionnaire and VAS

Data Analysis

On the first session, Kujala Scoring Questionnaire was filled by the patients which was evaluated on their functionality. In their last session, this scale was given again to check if there were any improvements. The pain was evaluated on the VAS scale. The Level of alteration in pain and symptoms was analysed on basis of the stretch of popliteus or stretch of popliteus with hamstring. To analyse if there was improvement in the study in pain as well as functionality, pre-data and post-data of the experimental group and control group were evaluated. The difference between the pre-data and post-data was also evaluated. In addition to that t- test was also done.

Results

Table 1: VAS Pre and Post Data

Evaluation of Experimental Group (Group A)		
	Pre- VAS	Post- VAS
Mean	6.066	4.933
Median	6	5
Evaluation of Control Group (Group B)		
	Pre- VAS	Post- VAS
Mean	6.066	4.533
Median	6	4

VAS Score: The individuals treated in experimental group having VAS which were treated with popliteal stretch had PRE-VAS mean score of 6.066 whereas after 6 weeks it improved to 4.99, whereas the group B had mean score of PRE-VAS score was 6.066 which was improved to 4.533. So, its seen that Group B had better reduction in pain as compared to Group A.

Table 2: Kujala Pre and Post Data

Evaluation of Experimental Group (Group A)		
	Pre- VAS	Post- VAS
Mean	75.73	77.86
Median	76	78
Evaluation of Control Group (Group B)		
	Pre- VAS	Post- VAS
Mean	71.93	75.066
Median	73	76

Kujala Score: The individuals treated, experimental group treated with popliteal stretch had PRE- KUJALA mean score of 75.73 whereas after 6 weeks it improved to 77.86, having a difference of 2.133, whereas the group B had mean score of PRE-KUJALA score was 71.93 which was improved to 75.066 having a difference of 3.133, resulting in that Group B had better results.

Table 3: Paired T-Test for VAS

Data of Group A		
	Variable 1	Variable 2
Mean	6.06	4.93
Variance	0.49	0.63
Observation	15	15
Hypothesized Mean Diff.	0	
t Stat	8.5	
P(T<=t) One Trail	3.35748E-07	
t Critical One-Trail	1.761310136	
Data of Group B		
	Variable 1	Variable 2
Mean	6.06	4.3
Variance	0.63	0.40
Observation	15	15
Hypothesized Mean Diff.	0	
t Stat	11.5	
P(T<=t) One Trail	8.06008E-07	
t Critical One-Trail	1.761310136	

Table 4: Paired T-Test For Kujala Score

Data of Group A		
	Variable 1	Variable 2
Mean	75.73	77.86
Variance	31.35	25.40
Observation	15	15
Hypothesized Mean Diff.	0	

t Stat	-6.34	
P(T<=t) One Trail	9.05435E-06	
t Critical One-Trail	1.761310136	
Data of Group B		
	Variable 1	Variable 2
Mean	71.93	75.06
Variance	47.35	53.06
Observation	15	15
Hypothesized Mean Diff.	0	
t Stat	-7.59	
P(T<=t) One Trail	1.24522E-06	
t Critical One-Trail	1.761310136	

In this article paired t-test has been used to compare the mean of two groups as each individual in the 1st group has been appeared in 2nd group. The alpha (α) score was taken as 0.05.

PAIRED T-TEST FOR VAS DATA OF GROUP A- The PRE-VAS mean score of 6.066 whereas after 6 weeks it improved to 4.99, the P one tail is to know whether POST VAS score was improved or not, so the P value in Table-3 is 3.35748E-07, which means it's less than alpha score (0.05). This means we must reject the null hypothesis; it means that the average of post-VAS was more than the average of Pre- VAS.

PAIRED T-TEST FOR VAS DATA OF GROUP B- The mean of the PRE-VAS score was 6.066 which was improved to 4.533, the P one tail is to know whether POST VAS score was improved or not, so the P value in Table-3 is 8.06008E-09, which means its less than alpha score (0.05). This means we must reject null hypothesis; it means that the average of post-VAS is more than the average of Pre- VAS.

PAIRED T-TEST FOR KUJALA DATA OF GROUP A- The PRE-KUJALA mean score of 75.73 whereas after 6 weeks it improved to 77.86, the P one tail is to know whether POST KUJALA score was improved or not, so P value in Table-4 is 9.05435E-06, which means its less than alpha score (0.05). This means we must reject null hypothesis; it means that the average of post-KUJALA is greater than the average of pre- KUJALA.

PAIRED T-TEST FOR KUJALA DATA OF GROUP B- The PRE-KUJALA mean score of 71.93 whereas after 6 weeks it improved to 77.066, the P one tail is to know whether POST KUJALA score was improved or not, so P value in Table-4 is 1.24522E-06, which means its less than alpha score (0.05). This means we must reject null hypothesis; it means that the average of post-KUJALA is greater than the average of pre- KUJALA.

Discussion

The study's aim was to find the stretch of popliteal fascia on patellofemoral pain syndrome. There were 30 participants divided into 2 groups, 15 each, which were categorized into Group A and Group B. The Group A was experimental group, popliteal stretch was given to them, and Group B was treated with hamstring stretch and received popliteal stretch same as Group A. Visual Analogue Scale and Kujala Scoring Questionnaire were two parameters used in this study.

In our study it was seen that the participants of age group 18-24 were only 13% and 86% of the population was between age group of 26-40.

We also observed that the female percentage 56% which was much greater than male percentage 43% participating in this study, similar findings was found in study by Lisa C White et.al that PFPs is very common in females but it is seen that males' hamstrings are tighter, and therefore there can be many reasons for this condition.

In our study, VAS score which implicated pain was reduced in the control group as compared to experimental group. Similar findings were seen in KUJALA Scoring Questionnaire, the control group had better results in functionality as compared to the experimental group, because it was seen that hamstring was tighter in individual with Patellofemoral Pain Syndrome and stretching of hamstring released the pressure behind the patella.⁷

It was found that the effectiveness of popliteal stretch with hamstring stretch was proven clinically effective but when analysed statistically it was proven insignificant maybe the protocol of 6 weeks was less to prove outcome if the protocol was taken

of 8-10 weeks it would have proven beneficiary another reason could be that the follow-up was not done properly. The expectations of future scope could be This study can be conducted in the future taking larger sample size and different outcome measure/variables can be used to see if it holds any significance. Also, it will be recommended that the study can be done in a longer duration of time to see if any changes can occur in the longer run along with this it will be recommended to take long term follow-ups.

PFs patient presents with a broad variation of pathophysiology and impairment associated with them.⁹ It is very crucial to assess individually each patient about their impairments, any functional limitations as well as restrictions due to activities.¹⁷

Conclusion

Popliteal stretch was not an effective treatment for patellofemoral pain syndrome as there was no significant difference in Pre and Post data of pain (VAS), similar finding was founded in Kujala Scoring Questionnaire. Better results were found in patients treated with Hamstring stretch along with popliteal stretch. During the evaluation, a personalized multi modal management program is needed, which focuses on targeting patient's functional limit as well as specific impairments.

Ethical Clearance: Institutional Ethical committee of Amity University, Uttar Pradesh

Source of Funding: Self

Conflict of Interest: Nil

References

1. Mario Bizzini, John D Childs, Sara R Piva, Anthony Delitto. Systematic Review of the Quality of Randomized Controlled Trials for Patellofemoral Pain Syndrome. *Journal of Orthopaedic and Sports Physical Therapy*. February 2003.
2. Jared M. Bump; Lindsay Lewis. Patellofemoral Syndrome. St Lucie Medical Center. February 18, 2022.
3. Benjamin E. Smith, James Selfe, Damian Thacker, Paul A Hendrick, Marcus Bateman, Fiona Moffatt, Michael Skovdal Rathleff, Toby Smith. Incidence and prevalence of patellofemoral pain: A systematic review and meta-analysis. *Pip Logan's Lab*. December 2017.
4. Masahiro Satoh, Hiroyuki Yoshino, Akira Fujimura, Jiro Hitomi, Sumio Isogai. Three-layered architecture of the popliteal fascia that acts as a kinetic retinaculum for the hamstring muscles. *Anat Sci Int*. 2016 Sep
5. Sunit Patil , Lisa White, Alex Jones, Anthony C W Hui. Idiopathic anterior knee pain in the young. A prospective controlled trial. James Cook University Hospital, Middlesbrough, United Kingdom. 2010 June
6. Lisa C White 1, Philippa Dolphin, John Dixon. Hamstring length in patellofemoral pain syndrome. Department of Rehabilitation, James Cook University Hospital, Middlesbrough, UK. 2009 March
7. Sunit Patil, John Dixon, Lisa C White, Alex P Jones, Anthony C W Hui. An electromyographic exploratory study comparing the difference in the onset of hamstring and quadriceps contraction in patients with anterior knee pain. James Cook University Hospital, Middlesbrough, UK. 2011 October
8. Brad Walker. Patellofemoral Pain Syndrome. October 8, 2021
9. Xingquan Xu, Chen Yao, Rui Wu, Wenjin Yan, Yao Yao, Kai Song, Qing Jiang, and Dongquan Shi. Prevalence of patellofemoral pain and knee pain in the general population of Chinese young adults: a community-based questionnaire survey. 2018 May 24
10. Domenica A. Delgado, BA, Bradley S. Lambert, PhD, Nickolas Boutris, MD, Patrick C. McCulloch, MD, Andrew B. Robbins, BS, Michael R. Moreno, PhD, and Joshua D. Harris, MD. Validation of Digital Visual Analog Scale Pain Scoring With a Traditional Paper-based Visual Analog Scale in Adults. *J Am Acad Orthop Surg Glob Res Rev*. 2018 Mar
11. Mahsa Emamvirdi MA, Amir Letafatkar PhD, and Mehdi Khaleghi Tazji PhD. The Effect of Valgus Control Instruction Exercises on Pain, Strength, and Functionality in Active Females with Patellofemoral Pain Syndrome. *Sports Health*. 2019 May-Jun
12. R Thomeé , J Augustsson, J Karlsson, Patellofemoral pain syndrome: a review of current issues. Department of Rehabilitation Medicine, Sahlgrenska University Hospital, Göteborg, Sweden. 1999 Oct 28

13. D. Dammerer, M. C. Liebensteiner, U. M. Kujala, 2 K. Emmanuel, 3 S. Kopf, 4 F. Dirisamer, and J. M. Giesinger. Validation of the German version of the Kujala score in patients with patellofemoral instability: a prospective multi-centre study. *Arch Orthop Trauma Surg.* 2018 Jan 25.
14. Jakson K Joseph, Sandeep P, Kavya Ms. Role of popliteus muscle retraining in knee rehabilitation- a case report. JSS College of Physiotherapy, JSS old Hospital campus, Mysuru, Karnataka, India 28th May 2017.
15. Heather Hollinger. The effect of stretching and strengthening on Patellofemoral pain syndrome. Hamline University. 2016.

Comparative Effectiveness of Powerpoint Over OHP as an Effective Teaching Learning Tool at R.D. Gardi Medical College Ujjain (M.P)

Anita Choudhary¹, Sai Sailesh Kumar Goothy²

¹Professor and Head, ²Associate Professor, Department of Physiology, R.D. Gardi Medical College, Ujjain, Madhya Pradesh, India.

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Abstract

Background: Since years, a number of initiatives were taken to improve the teaching methodology in Medical education.

Objective: The present study was undertaken to emphasize the importance of LCD-based teaching over OHP and to increase teachers' acceptability to LCD.

Materials and methods: This study was carried out with 100- 125 students. The study incorporated 50 minutes teaching sessions in the department of physiology with the use of two different teaching tools. Students were divided into two groups. One topic was selected and Roll numbers 1 to 75 were taught by Powerpoint by LCDs & students from roll number 76 to 150 by Transparencies, in the second week they were assessed by written test.

Results: Significant difference in marks obtained by the students taught on PPT as compared to OHP ($P > .001$) it was observed that students who scored less after OHP exposure showed improvement after PPT exposure. (Table 1 & 2) 80% of students prefer PPT over OHP and understanding of the subject was more with PPT. Students found OHP good for the text material and insufficient for the applied and diagram part while preferred PPT for 3-D view of diagrams, concepts and applied.

Conclusion: In Department of Physiology at our Institute most preferred TL method was found to be by PPT then OHP. As results also indicated improved performance by the students, In view of that Teachers also agreed to the responses by the students, and showed acceptability for PPT.

Keywords: Teaching learning method; students; Medical education.

Introduction

Since years, a number of initiatives were taken to improve the teaching methodology in Medical education. A five-year strategy from 1998/99 to 2002/2003 (Education and Manpower Bureau 1998)

was proposed to promote the use of new teaching technology in regular curricula. In our institution most of the senior faculty still using the conventional method of teaching on OHP on the contrary to young faculties who usually use PowerPoint presentation

Corresponding Author: Anita Choudhary, Professor & Head, Department of Physiology, R.D. Gardi Medical College, Ujjain, Madhya Pradesh, India.

E-mail: dranitats@gmail.com

(ppt) as a tool in most teaching-learning methods (TL) with the help of LCD's, where teaching skill is not a prescriptive process, as concerned with medical professional studies teaching method has a great impact on the understanding of the subject, it requires a lot of effort for making the concept palatable. Students In classrooms have mixed reactions to both the tools and found LCD as an improvised tool in facilitating the students and providing a better understanding of the subjects¹⁻³. The present study was undertaken to emphasize the importance of LCD-based teaching over OHP and to increase teachers' acceptability to LCD.

Materials and Methods

Study setting: The study was conducted for I MBBS students in the Department of Physiology RDGMC Ujjain for six weeks in college demonstration room & teacher-researchers were involved Sample size & sampling technique:

Study participants: This study was carried out with 100- 125 students. The study incorporated 50 minutes teaching sessions in the department of physiology with the use of two different teaching tools.

Methods: Students were divided into two groups. One topic was selected and Roll numbers 1 to 75 were taught by Powerpoint by LCD s & students from roll number 76 to 150 by Transparencies, in the second week they were assessed by written test. In the second exposure there was a cross-over application of the T-L media with the different topics) and again were given the test to ensure content validity topics of equal difficulty level were chosen for PPT and OHP Throughout the period of this research the Teacher-researcher kept record of experiences for self-assessment. Senior teachers were also given questionnaires for their preference of the teaching tool.

Inclusion criteria: students attended all the sessions of study (80 students appeared for the written test)

Exclusion criteria: Chronic absentees from the class and those missing even one session of study A questionnaire was prepared to know the drawbacks and advantages and also the preference for the type of TL tool by 125 regular students attending the class at the end of the test.

Statistical analysis: The sample was described by using mean+/-SD for quantitative variables. Statistical analysis was conducted using) paired & unpaired t-test The analysis was performed using the SPSS version 16.0 program for Windows and results were tabulated.

Results

Significant difference in marks obtained by the students taught on PPT as compared to OHP ($P > .001$) it was observed that students who scored less after OHP exposure showed improvement after PPT exposure. (Table 1 & 2) 80% of students prefer PPT over OHP and understanding of the subject was more with PPT. Students found OHP good for the text material and insufficient for the applied and diagram part while preferred PPT for 3-D view of diagrams, concepts and applied. As we have had open-ended questions 50% of students found bad handwriting as the biggest drawback of OHP While 25% pointed to poor illumination and 18% had a problem with the font size used. On the other hand, 43% of students pointed out that teaching is very fast on PPT Along with 32% were unable to draw the diagram & 16% suggested lot of complex material is projected, and 96% experienced all the above drawbacks. When asked to comment on advantages 45% prefer OHP for simple and easy text, 26% prefer simple diagrams, 34% liked animation used by PPT.

Table 1: Comparison between marks obtained by the students taught through PPT-2 & OHP -2

Groups	Mean	Standard Deviation	t	p
PPT A1	17.5500	1.33877	14.53	0.0000
OHP A2	13.1500	1.36907		
PPT A2	17.0250	1.25038	12.439	0.0000
OHP A1	13.1250	1.53902		

Table 2: For students who scored less their performance was improved with PPT method (p>0.001)

Groups	Mean	Standard Deviation	t	p
PPT A1	17.5500	1.33877	16.10	0.0000
OHP A1	13.1250	1.53902		
PPT A2	17.0250	1.25038	13.404	0.0000
OHP A2	13.1500	1.36907		

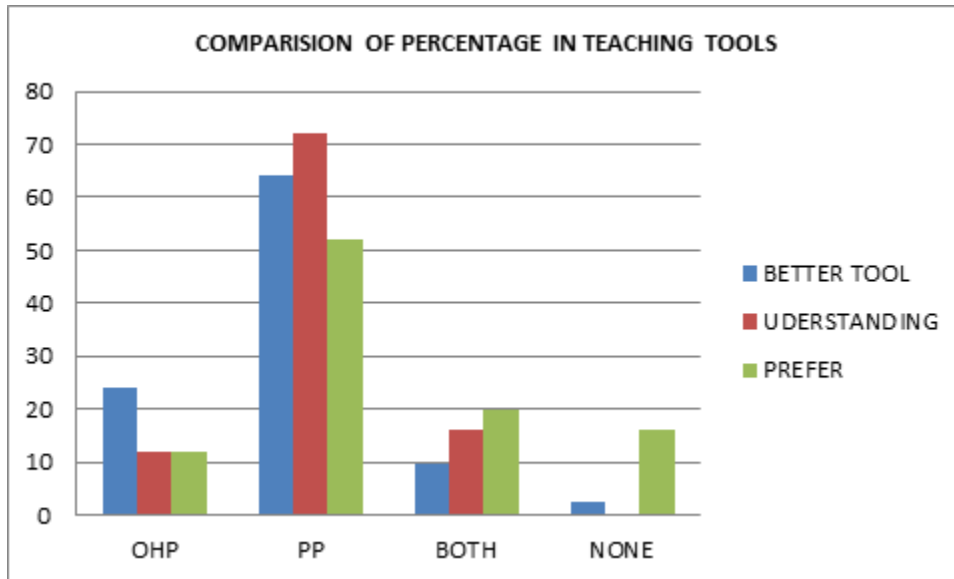


Figure 1: Comparison of percentage in teaching tools

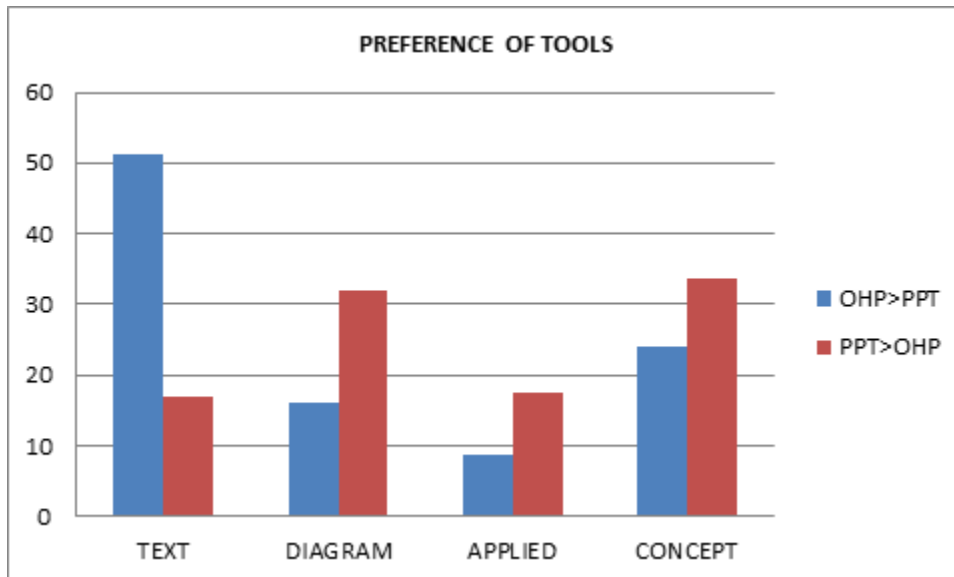


Figure 2: Percentage in teaching tools

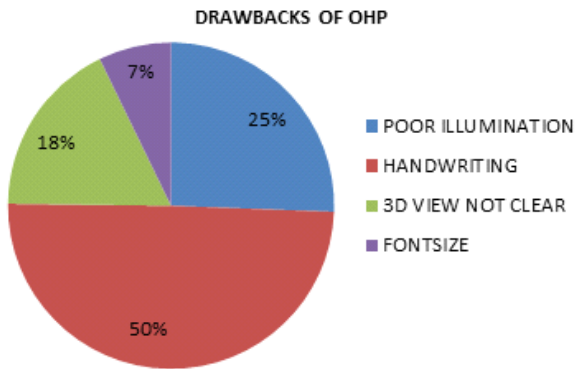


Figure 3: Drawbacks of OHP

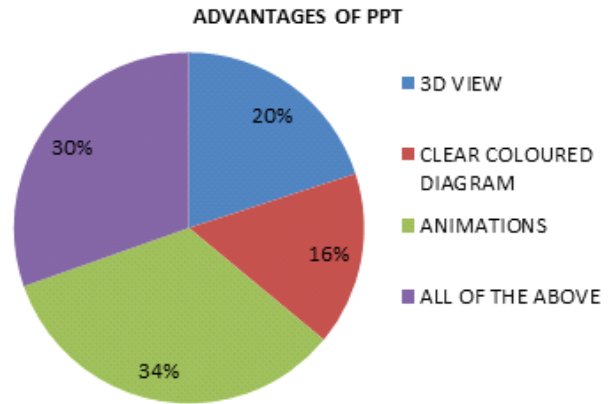


Figure 6: Advantages of PPT

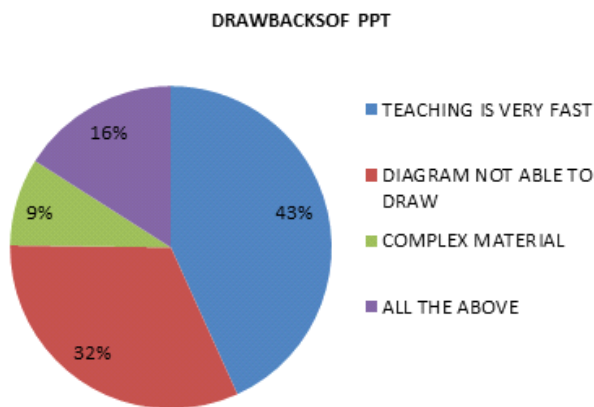


Figure 4: Drawbacks of PPT

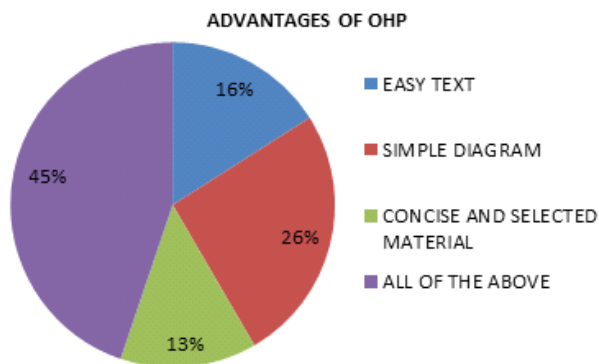


Figure 5: Advantages of OHP

Discussion

Topic of present study was selected to clarify the problems that are encountered with teaching by both the tools the results of the study shows that majority of students prefer teaching by PPT their performance also improved although 51% students prefer OHP for better text material as that is simple with simplified diagrams which can be drawn but found PPT good for 3Dview, animations understanding of Applied and concept of the subject as lots of application we can make use of it.as 50% of students pointed hand written transparencies im proper use of font size ,poor illumination of the projector become major problem with OHP.43% reported fast teaching , use of complicated figures and diagrams few such problems with PPT. From teachers perspective use of PPT as main tool for teaching ,they found there are more technical difficulties^{3,4}also students focus more on technology and overuse of animations can distract the students and lot of experience is required⁵. But also agreed to points like storage of subject material is easy, very easy to modify ,attractive fonts /colors can be used animations can be introduce to make topic more palatable.

Conclusion

In department of Physiology at our Institute most preferred TL method was found to be by PPT then OHP. As results also indicated improved performance by the students, In view of that Teachers also agreed to the responses by the students, and showed acceptability for PPT

Implications:

Both methods have some drawbacks and some advantages it is the proper use of the tool which can significantly make the difference in the teaching-learning process.

Ethical clearance: The study protocol was approved by the institutional human ethical committee.

Conflict of interest: None declared

Source of funding: Nil

References

1. The Ad Hoc Committee of Deans. Educating doctors to provide high quality medical care: a vision for medical education in the United States [Internet] Washington DC: Association of American Medical Colleges; c2004. [cited 2006 Jul 20].
2. Whitcomb ME. More on improving the education of doctors. *Acad Med.* 2003;78:349-350.
3. George Brown and David Tomlinson .How to Improve Handouts – *Medical Teacher.* 1980;2(5):215-220.
4. MohammedNazrul Islam ,Md.AnarulAzimMajunder,SayeedaRahman. Students' Perceptions of 'Technology-Based' Lecture Handouts-Malaysian *J Med Sci.* 2005;12(1): 26-28.
5. Tavares M A, M.C .Silva(1999) Handouts as an educational support for the teaching /learning program in clinincal anatomy - *Clinical Ana tomy .* 1999; 12(5):337-44.

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