Original Article

Physiotherapy and Occupational Therapy Journal
Volume 17 Number 4, October - December 2024
DOI: http://dx.doi.org/10.21088/potj.0974.5777.17424.6

A Study to Compare the Effectiveness of Pilates vs Back Exercises in Adolescents with Non Specific Low Back Ache

Waseem Raja[1], Shakshi Naithani[2], Ashish Dobhal[3]

How to cite this article:
Waseem Raja, Shakshi Naithani, *et al.* A Study to Compare the Effectiveness of Pilates vs Back Exercises in Adolescents with Non Specific Low Back Ache. Physio. and Occ. Therapy Jr. 2024;17(4):232-238.

Abstract

Background: Though pilates and back exercises both have been proven to benefit people for nonspecific low back ache, yet to be delineated regarding the efficacy. Clarity of conclusion could be reached as combined study has not been recorded so far. Hence the study aims to examine whether is two approaches causes a difference in outcomes in reducing low back ache.

Aim: To compare the effectiveness of pilates versus back exercises of in the adolescents with non-specific low back ache.

Objectives: Though pilates and back exercises both have been proven to benefit people for non specific low back ache, yet to be delineated regarding the efficacy. Clarity of conclusion could be reached as combined study has not been recorded so far. Hence the study aims to examine whether is two approaches causes a difference in outcomes in reducing low back ache.

Result: There was significant reduction in pain and functional disability between pre and post treatment programs in Group I when compared with Group II.

Conclusion: The results of the study indicated that the pilates is more effective than back exercises alone for reducing pain and functional disability in adolescents with non-specific low back ache.

Keywords: Pilates; Non-specific Low Back Ache; Visual Pain Index; Oswestry Disability Index; Functional Disability.

INTRODUCTION

Back pain (also known as "Dorsalgia") is pain felt in the back that usually originates from the muscles, nerves, bones, joints or other structures in the spine. Low back pain (referred to generally as Lumbago) is a common symptom of musculoskeletal disorders or of disorders involving the lumbar vertebrae and related soft tissue structures such as muscles, ligaments, nerves and intervertebral discs. Low back pain is common during adolescence.

Author Affiliation: [1]Senior Consultant, Department of Physiotherapy, Sai Institute of Paramedical and Allied Sciences, Dehradun, Uttarakhand, India, [2,3]Assistant Professor, Department of Physiotherapy, Uttaranchal College of Biomedical Sciences and Hospital, Dehradun, Uttarakhand, India.

Corresponding Author: Shakshi Naithani, Assistant professor, Uttarachal (PG) College of Biomedical Sciences and Hospital, Dehradun, Uttarakhand, India.

E-mail: naithani3shakshi@gmail.com

Recieved on: 09.12.2024 **Accepted on:** 15.01.2025

Poor posture, inappropriate forms of exercise and carrying heavy school bags are some of the causes of back pain in young people.Some of the many potential influences in the development of back pain in children include:

- Gender: Back pain is more common in females.
- Age: Children at 12 years and over experience significantly more back pain than younger children.
- Obesity and poor posture
- Heavy school bags carried on one shoulder or in one hand.
- Incorrectly packed backpacks.
- Sedentary life style such as watching a lot of television or sitting in front of the computer.
- Injuries caused by vigorous sports like foot ball or horse riding, flexibility dependent sports such as gymnastics or dance, and power sports such as weight lifting or rowing.
- Soft Tissue injuries such as strains and sprains.
- Competitive sports that demand intense training. It is thought that tight muscles can trigger low back pain. Adolescent back pain poses a distinct diagnostic challenge to the Physician due to skeletal maturity and activity levels seen in adolescent patients. A significant increase in back pain incidence occurred at the age of 12 years and over. In all age groups above 11 years, more than 50 percent had experienced back pain at some time in their life. For adolescents who had previously experienced back pain, there was a significant risk identified for future occurrence.[11]

BACKGROUND

Debbie Ehrmann Feldmann *et al*, 2001 stated that a previous history and earlier onset of low back pain are associated with chronic low back pain in adults implying the prevention in adolescence may have a positive impact in adulthood. Students who had low back pain at age 14 were more likely to have back pain 25 years later than students who didn't have it.

Decreased muscle flexibility and trunk strength have been postulated as risk factors for non specific low back pain.

In recent years more subtle stresses i.e. static and faulty postures are the usual root of back trouble. Today's lifestyle, more than any other in history, creates an insidious strain on the back, stressing the soft tissue and predisposing them to injury, Mc KENZIE, 1987.

Many teenagers have "Mechanical low back pain". This is often related to tight hamstrings and weak abdominal muscles. These individuals seem to do well with a physical therapy program stressing hamstring stretching and abdominal strengthening.

Exercises are critical for strong muscles and bones. Exercises help kids lower their risk of chronic pain in the future.

The more flexible men and women are as teenagers, the lower their risk of neck and back tensions in the future, according to a study published in the February 2006, British Journal of Sports Medicine.

Sedentary living is probably a primary non medical cause contributing to back pain.

Lack of exercise leads to the following conditions that may threaten the back:

Muscle inflexibility restricts the back's ability to move, rotate and bend.

Weak stomach muscles increase the strain on the back and can cause an abnormal tilt of the pelvis.

Weak back muscles increase the load on the spine and the risk of disc compression.

Obesity puts more weight on the spine and increases pressure on the vertebrae and discs.

Appropriate back care while sitting, standing, lifting objects, and lying helps to prevent undue stress on the low back. Studies of LBP in the adolescent age group are of particular importance, as back pain that occur initially during this time may fore shadow the subsequent, severe, chronic morbidity seen in adulthood, Olsen *et al* 1992; Balague *et al*, 1998.

Olsen *et al*, 1992 reported that 30 percent of the adolescent population experienced LBP at some point in their lives. The study published by chartered society of physiotherapy reported that as many as 48.5 percent of secondary pupils in U.K. already have some form of pain caused by their lifestyles. There are few studies about adolescent low back in India. According to the literatures, it is important to prevent and treat LBP in adolescents. Increasing muscle flexibility and trunk strength through back exercises and appropriate back care

helps to reduce the adolescent non-specific low back pain.

This comparative study helps to know the effect of back exercises with back care and back care alone in adolescents with non-specific low back pain.

Aim & Objectives

To compare the effectiveness of pilates versus back exercises of in the adolescents with non-specific low back ache.

Hypothesis

Null Hypothesis (H_o): There is no significant improvement in pain and functional ability in adolescents with non-specific low back ache.

Alternate Hypothesis (H_1): There is significant improvement in pain and functional ability in adolescents with non- specific low back pain.

MATERIAL METHOD

Study Design : Experimental

Setting : Guru Nanak Dev Hospital

Population : Adolescents in the range of 14 to 19 years with a history of non-specific low back ache.

Sample Size : 30 Subjects

Sampling Technique : Simple random sampling technique

Criteria

Inclusion Criteria:

- Subjects with a history of non-specific low back ache.
- Age group between 14-19 years.

Exclusion Criteria:

- History of Neurological/ Vascular/ Orthopaedic disorders
- Any recent injuries.
- Subjects who are psychologically depressed.
- Recent surgeries.
- Recent fractures.
- Subjects with specific low back ache.

Variables:

Independent variables:

Back exercises [26]

Pilates [27]

Dependent variables:

Pain [25]

Functional disability [13]

Tools:

Visual pain scale [25]

Oswestry disability index[13]

Procedure:

30 subjects fulfilling the inclusion criteria are chosen for the treatment. They received the visual and verbal instructions about the treatment program.

MEASUREMENT OF VARIABLES

Pre-treatment measurement:

Subjects were evaluated for the following before the commencement of the treatment program:

Pain Score [25]

Oswestry Disability Index

Pain Score

The amount of pain experienced by the subject is assessed by Visual pain scale. On the Visual pain scale, the pain score is recorded on a scale calibrated from 0 to 10, where no distress is recorded as 0 and unbearable distress as 10.25

Functional disability

Functional disability is measured by Oswestry Disability Index. The subject is asked to answer the questions in the Oswestry disability index by choosing the best answer that describes his/her typical pain and/ or limitations within the last week or two.

% disability = point total / 50 * 100 ODI Scoring :

0 – 20 % - Minimal disability

21 – 40 % - Moderate disability

41 – 60 % - Severe disability

61 – 80 % - Crippled

81 – 100 % - Bed bound patients.

Treatment Program

The subjects chosen for the treatment program were given practice instructions on how to do the pilates and to do back exercises. The subjects chosen are categorized into two groups. Group I includes fifteen subjects who were instructed to do the pilates. Group II includes fifteen subjects who were instructed to follow the back exercises.

The subjects performing pilates were instructed on the technique to follow while doing the exercises. Correct techniques of back exercises were also taught to the subjects. Any variations in the techniques were not encouraged.

The subjects were instructed to do the exercises twice daily 7 days a week for 4 weeks. The subjects were reviewed once in a week to record the pain, and functional disability.

RESULT

The Mean, Mean difference and standard deviation for pain score and functional disability grade between pre and post treatment for Group I (Pilates) are recorded in table 6.1. Analysis of the data shows that there is significant reduction in pain score and functional disability grade pre and post treatment programs.

The Mean, Mean difference and standard deviation for pain score and functional disability grade between pre and post treatment for Group II (Back exercises) are recorded in table 2. Analysis of data shows that there is reduction in pain score and functional disability grade pre and post treatment programs.

The comparison of significance of reduction in the pain score and functional disability grade between pre and post treatment programs for Group I and pre and post treatment programs for Group II was done with paired 't' test values.

The comparison of the significance of pain gain score and functional disability grade gain score between Group I and Group II are recorded in tables 3 and 4. Analysis of the data shows that there is a significant reduction in pain and functional disability in group I when compared with group II.

The graphical representation of the means of pain score and functional disability grade between the pre and post treatment programs in Group I and Group II are represented in graphs 1, 2, 3 , 4, 5, & 6 respectively.

There was significant reduction in pain and functional disability between pre and post treatment programs in Group I when compared with Group II.

Table 1: Descriptive statistics for pain score and functional disability grade for Group I (Pilates) pre and post treatment.

S. No.	Parameters	No. of Samples	Mean		Mean Difference	SD	
			Pre	Post		Pre	Post
1	Pain Score	15	5.25	1.50	3.75	0.96	0.58
2	Functional Disability grade	15	15.00	6.50	8.50	2.58	1.00

Interpretation:

The descriptive studies (Mean, Mean difference and standard deviation) for the pain score and functional disability grade for Group I pre and post treatment are shown in the above table.

Table 2: Descriptive statistics for pain score and functional disability grade for Group II (Back exercises) pre and post treatment.

S. No.	Parameters	No. of Samples	Mean		Mean Difference	SD	
			Pre	Post		Pre	Post
1	Pain Score	15	4.25	3.00	1.25	1.26	0.82
2	Functional Disability grade	15	13.50	10.50	3.00	2.52	2.52

Interpretation:

The descriptive studies (Mean, Mean difference and standard deviation) for the pain score and functional disability grade for Group II pre and post treatment are shown in the above table.

Table 3: Comparative statistics (Paired 't' test values) for pain score between Group I and Group II (Pre and Post treatment).

S. No	Group	No. of Samples	Pain gain Score		't' Value	'p' Value
			Mean	SD		
1	I	15	3.75	0.96	4.63	0.004 **
2	II	15	1.25	0.50		

Interpretation:

Note: ** denotes significant at 1% level.

* denotes significant at 5% level.

Based on the paired 't' test values and 'p' values, at 5% level of significance, there is significant difference between pre & post treatment for functional disability grade between Group I and Group II.

Table 4: Comparative statistics (Paired 't' test values) for functional disability between Group I and Group II (pre and post treatment).

S. No	Group	No. of Samples	Pain gain Score		't' Value	'p' Value
			Mean	SD		
1	I	15	8.50	3.42	3.05	0.022 *
2	II	15	3.00	1.15		

Interpretation:

Note: ** denotes significant at 1% level.

* denotes significant at 5% level.

Based on the paired 't' test values and 'p' values, at 1% level of significance, there is significant difference between pre & post treatment for pain score between Group I and Group II.

DISCUSSION

Ahlqwist A *et al* reported that LBP among children and adolescents has increased.[4] The literature shows that children with LBP suffer from this condition later in adulthood. Thus it is important to prevent and treat LBP in adolescents.

Skoffer B, Foldspang A (2008) stated that LBP can be correlated with physical inactivity.8 Research on back pain in children and ado lescents has been minimal (MC Grath 1990) as the disorder in this age group was previously thought to be rare.

In recent years, more subtle stresses, i.e. static and faulty postures are the usual root of back trouble. Decreased muscle flexibility and trunk strength have been postulated as risk factors for low back pain. Tight hamstrings and weak abdominal muscles are related to mechanical low back pain.

The objective of the study was to compare the effect of pilates and back exercises in reducing pain and functional disability in adolescents with non-specific LBA.

Back exercises improve the strength of muscles, bones and ligaments. Spinal mobility is improved. Robert J Dual (2005) concluded that stretching and strengthening of the muscles around the back aid in pain relief by helping take stress off the low back and hips and may greatly reduce the advancement of low back pain.[22]

Proper postural care while lifting, sitting, standing, lying helps to reduce stress on spinal structures. John Schubhe, DC (2004) stated that not maintaining good posture and adequate back support can add strain to muscles and put stress on the spine.[23]

Jeanne Markusic stated that bad posture can be the cause of spinal pain, it can make existing pain worse and it certainly can make the pain last a lot longer.[24]

In this Study, pilates were followed by Group I and back exercises alone by Group II.

The results indicated that the pilates is more effective in reducing pain and functional disability when compared with back exercises alone in adolescents with non-specific low back ache.

CONCLUSION

The results of the study indicated that the pilates is more effective than back exercises alone for reducing pain and functional disability in adolescents with non-specific low back ache.

CONFLICT OF INTESTATE

The subjects were not randomized depending on the severity.

Subjects without any recent injuries are taken up for the study.

The study was confined to adolescents only with non-specific low back ache.

Subjects who were psychologically depressed were not taken for the study.

Funding: Self

REFERENCES

1. Kim HJ, Green DW (2008): Adolescent Back Pain. Current Opinion Paediatrics, 20(1) : 37 – 45.
2. Richards BS, MC Carthy RE, Akbarnia BA (1999): Back pain in childhood and adolescence. Instr. Course Lecture, 48 : 525 – 42.
3. Masiero S, Carraro E (2008): Prevalence of nonspecific low back pain in school children aged between 13 - 15 years. Acta Paediatrics, 97(2): 212 – 6.
4. Ahlqwist A, Hagman H *et al* (2008): Physical therapy treatment of back complaints on children and adolescents. Spine, 33(20): E 721 – 7.
5. Bockowski L, Sobaniec W *et al* (2007): Low back pain in school-age children: risk factors, clinical features and diagnostic management. Advanced Medical Sciences, 52 Suppl 1:221- 3.
6. Macias BR, Murthy G, Chambers H (2008): Asymmetric loads and pain associated with backpack carrying by children. Journal Paediatrics Orthopaedics, 28(5): 512 – 7.
7. Clare Haselgrove, Leon Straker *et al* (2008): Perceived school bag load, duration of carriage, and method of transport to school are associated with spinal pain in adolescents: an observational study. Australian Journal of Physiotherapy, 54: 193 – 200.
8. Skoffer B, Foldspang A (2008): Physical activity and low back pain in school children. European Spine Journal, 17(3): 373 – 9.
9. Elizabeth Candy, Richard Watts *et al* (2004): Does the introduction of a simple wedge to school seating reduce adolescent back pain? International Journal of Therapy and Rehabilitation, Vol. 11, Iss. 10, PP 462 – 466.
10. Bernstein RM, Cozen H (2007): Evaluation of back pain in children and adolescents. American Family Physicians, 76(11): 1669 – 76.
11. Hestback, Lise *et al* (2006): The course of low back pain from adolescence to adulthood: Eight-year follow -up of 9600 twins. Spine : Vol. 31– Issue 4 – pp 468 – 472.
12. Debbie Ehrmann Feldman *et al* (2001): Risk factors for the development of low back pain in Adolescence. American Journal of Epidemiology, Vol. 154, No.1: 30 -36.
13. Fairbank JC, Pynsent PB (2000): The Oswestry Disability Index. Spine: 25(22): 2940 – 2952.
14. Karen Grimmer, Brenton Dansie (2002): Adolescent standing postural response to backpack loads : a randomized controlled experimental study. BMC Musculoskeletal disorders. Vol. 3 : 10.doi: 10.1186/1471 – 2474 – 3 – 10.
15. Kathleen Prendeville, Sara Dockrell (1998): A pilot survey to investigate the incidence of low back pain in school children. Physiotherapy Ireland. Vol. 19, No.1.
16. Burton A. Kim, Clarke Robert D (1996): The Natural history of low back pain in Adolescents. Spin: Vol.21 – Issue 20 – pp 2323 – 2328.
17. Gareth T. Jones *et al* (2003): Predictors of low back pain in British school children: A population based prospective cohort study. Paediatrics Vol.111 No. 4 pp 822 – 828.
18. G Kristjansdottir, H Rhee (2007): Risk factors of back pain frequency in school children. Acta Paediatrica, Vol. 91 Issue 7, Pages 849 – 854.
19. G. Kristjansdottir (1996): Prevalence of self-reported back pain in school children: a study of socio demographic differences, European Journal Pediatrics. 155 : 984 – 986.
20. Ma Jones, G Stratton (2005): Biological risk indicators for recurrent non-specific low back pain in adolescents. British Journal of sports medicine 2005. 39: 137 – 140.
21. Smith A, O Sullivan P, Straker L (2008): Classification of sagittal thoraco – lumbo – pelvic alignment of the adolescent spine in standing and its relationship to low back pain. Spine. 33 (19): 2101 – 7.
22. Robert J Daul (2005): Easy exercise program for low back pain relief.Spine – health.
23. John Schubbe, DC (2004): Good posture helps

reduce back pain. Spine – health.

24. Jeanne Markusic: Maintaining a healthy spine – posture. Spine – Universe.
25. Chris Adams: Visual pain scale. Ergonomics Guide.
26. Dr. Rick Swartzburg, D. C., General back exercises. Copyright 2001, #1 Back Pain Site.
27. John Ebnezar (2005): Essentials of Orthopedics for physiotherapists. Proper postural habits. Page no 302.
28. Cynthia. C. Norkin, Pamel K. Dsc, PT. Levangie: Joint structure and Function: a comprehensive Analysis.
29. Keith Bridwell, MD (2007): Anatomy lesson: Spine or Vertebral column. Spine universe