

Therapeutic Exercise for Lower Back Pain Reduction and Posture Improvement In Elementary School Students

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ABSTRACT

Low Back Pain is a pain disorder that is sometimes felt in an unclear distribution in the lower back and buttocks. The incidence of musculoskeletal pain in children within 1 year of reported cases of Lower Back Pain (18-33%), neck pain (28%), and Mid-Back Pain (15-35%). One of the things that can be used to reduce pain and treat these conditions is the therapeutic exercise aimed at children. The purpose of this research was to determine the effect of therapeutic exercise on back pain and posture improvement in elementary school students. The research method used was pre-experimental research which was conducted on elementary school students without using a control group. This research was conducted online at SDN Sonorejo 2 Kediri in August 2020. Pain measurement used the Wong-Baker Faces Pain, which was measured at the pretest and posttest. The results showed that the mean pretest score was 4.07 and for the post-test average score was 0.87. This shows that the mean pretest score results are in the interpretation of a little more pain, while the average posttest score results are in the painless interpretation, which means that there is a decrease from the average pretest score results. Wilcoxon test results obtained p value = 0.000 where $\alpha = 0.05$, so it can be concluded that there is a significant reduction in low back pain after giving therapeutic exercise.

Keywords: Low Back Pain, Elementary School Student, Therapeutic Exercise

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BACKGROUND

Low back pain is a pain disorder that is sometimes felt in an indistinct distribution of the lower back and buttocks. Low back pain is of two types, namely acute pain and chronic pain. Acute lower back pain lasts less than 3 months. The causes of acute low back pain, including an unclear diagnosis, include muscle tension, muscle injury, and myofascial pain. Chronic low back pain lasts more than 3 months. Chronic low back pain is caused by intervertebral disc pain (39%), Z-joint disease (30%), and sacroiliac joint disease (15%) (Cooper, 2006). Back pain in most patients is categorized into 3, namely: (1) common back pain (non-specific low back pain), (2) nerve root pain, (3) vertebral pathology conditions that account for <1% of cases (Josephine; Key, 2010). The incidence of musculoskeletal pain in children within 1 year of reported cases of Lower Back Pain (18-33%), neck pain (28%), and Mid-Back Pain (15-35%) (Kamper et al., 2016). The prevalence of low back pain in school children ranges from 20% to 51% (Lafond et al., 2007).

Non-neutral posture is a risk factor for low back pain (Delleman et al., 2004). Movement and posture patterns are important components of a child's physical and emotional development. Movement is perceived as dynamic, whereas posture is seen as a static state characterized by a lack of movement. Postural disorders in the back (spine) include kyphosis, lordosis, and scoliosis. One of the posture disorders that occur in children is scoliosis. Scoliosis is a postural disorder in the coronal / frontal plane of the spine, can be diagnosed through observation from the back or front, and is being observed as an imbalance in the spine and on both sides of the trunk. Factors that affect human posture include heredity (genetics), age, gender, environmental conditions, emotional status, and physical activity (Solberg, 2008).

The main goals of treatment for chronic low back pain are to reduce pain, increase soft tissue flexibility due to spasm and tension, increase strength and resistance to trunk stabilization, and to improve mobility and posture. This leads to increased functional capacity, better ability to perform daily activities, and prevention of job loss (Şahin et al., 2018). The recommended primary conservative physical care preferences for chronic low back pain without serious pathology include exercise, yoga, biofeedback, progressive relaxation, massage, manual therapy, and interdisciplinary rehabilitation (Tomašević-todorović, 2014). Posture correction and core strengthening exercises are part of a therapeutic program for the treatment of children with back pain caused by mechanical stress such as poor posture and inactivity or improper rehabilitation after traumatic injuries (Kordi & Rostami, 2011). Exercise can affect adolescent spine health. Jones et al found a significant reduction in pain and increased physical activity after an 8-week exercise program for adolescents compared to normal activity (Hill & Keating, 2015).

Therapeutic exercises can be used to treat low back pain, one of which is stretching exercises. Research by (Zakaria et al., 2012), with the research title *Stretching Versus Mechanical Traction of the Spine in Treatment of Idiopathic Scoliosis*, proves that stretching exercise is more effective than spinal traction in the treatment of idiopathic scoliosis. Research by (Fanucchi et al., 2009) on children aged 12-13 years in the form of an 8 week exercise program during school hours. The results of this research were an absolute risk reduction in the treatment group for the prevalence of low back pain 3 months (24%) and low back pain 6 months (40%).

METHODS

This research is a pre-experimental study with one group pretest-posttest design, that is, by examining one group that was given treatment, without any control group. The research site was conducted at SDN Sonorejo 2 Kediri in August 2020. This research was conducted online because during the Covid-19 pandemic, the school did not allow face-to-face meetings. The sampling technique used was purposive sampling. The sample was taken from a population of students in elementary school totaling 30 students who met the research criteria. Research subjects who met the criteria were students aged 11-13 years, who could follow simple instructions from the researcher, and parents approved of student participation, as well as those who had complaints of low back pain. Respondents who have physical disabilities for were excluded.

Researchers send explanation and consent forms to parents of students who meet these criteria through the principal. Back pain scale data was measured using the *Wong-Baker Faces Pain*. This scale is an image that shows the expression of pain. Pain scores ranged from 0 to 10. A score of 0 was not painful, a score of 2 hurt a little, a score of 4 was a little more painful, a score of 6 was more painful, a score of 8 was very painful, and a score of 10 hurt the worst. The subjects of the study were measured the scale of low back pain before being given treatment (pretest), and measured again after treatment (posttest). Measurement of the pain scale was carried out online by sending a form that must be filled in by students and sent back to the researcher. The data analysis used was the *Wilcoxon* test.

The research was conducted by providing a video recording of therapeutic exercise to the subjects to be practiced at home accompanied by the students' parents. This exercise was also monitored by the researcher via teleconference to ensure that the subjects carried out the exercises according to the predetermined schedule. The exercise consists of four movements that are easy for students to do. This exercise is done in a straight up position with your arms at your sides, looking straight ahead, and keeping your back straight during the exercise. This exercise can be done for five minutes. The first step is performed with one leg raised close to the chest. This movement is performed alternately with one leg of the other. The second step by extending one leg back. This step is also performed alternately with one leg of the other. The next step is that one leg is stretched to the side and the tip of the leg makes a circle. This is done alternately with the other leg. The last step is to link the arms above the head, then the arms are brought to the sides of the body again. The four step are repeated three times on each side of the body. The study was conducted over four weeks, with three exercises a week, twice a day, and three repetitions in each exercise.

RESULT

This research involved 30 elementary school students. The research data are as follows:

Table 1. Research subjects characteristics

Variable	Category	Frequency	Percentage (%)
Sex	Male	13	43,3
	Female	17	56,7
Height	140-144	10	33,34
	145-149	10	33,33
	150-154	10	33,33
Weight	30-34	5	16,67

	35-39	14	46,67
	40-44	11	36,66
Body Mass Index	Underweight	18	60
	Normal	12	40
	Overweight	0	0
	Obesitas	0	0

Based on Table 1 explains the respondent's data in the form of sex, height, weight and BMI. The percentage of most respondents is female (56.7%), the most height is between 140-144 cm (33.34%), the most weight is 35-39 kg (46.67%), and the BMI is mostly in the underweight category (60%).

Table 2. Average values and results of the Wilcoxon test for the level of low back pain

Variable	Mean $\pm$ SD	<i>P-Value</i>
Pre test	4,07 $\pm$ 1,61	0,000
Post test	0,87 $\pm$ 1,00	

Specific data in this study, namely low back pain, obtained an average pretest score of 4.07 and an average post-test score of 0.87. This shows that the mean pretest score results are in the interpretation of a little more pain, while the average posttest score results are in the painless interpretation, which means that there is a decrease from the average pretest score results. The Wilcoxon test results obtained p value = 0.000 where $\alpha = 0.05$, so it can be concluded that there is a significant reduction in low back pain after giving therapeutic exercise (see table 2).

DISCUSSION

The sample of this study were elementary school students with 13 male students and 17 female students. Students with underweight BMI are 18 students and normal BMI is 12 students, which means there is no link between body weight and the percentage of low back pain. Several studies have shown a predictive association between back pain in adolescents and other factors such as smoking, poor mental health, being overweight, inactivity and lack of sleep. The results of this study in children with overweight will be associated with inactivity in physical activity at a later date. This will lead to weight gain, and will increase back pain (Kamper et al., 2016). The incidence of spinal changes and low back pain will continue to increase at a young age as overweight and obesity increase worldwide, accompanied by a lack of physical activity and other risk factors. It may develop into a more severe form in early adulthood. Children with spinal deformities, such as scoliosis, low back pain can infect up to 30% of the population (Hwang et al., 2019).

This research was conducted for four weeks showing a decrease in pain after being given therapeutic exercise treatment. This is in accordance with the research journal by (Hill & Keating, 2015) which found a significant reduction in pain and increased physical activity after an exercise program. Research conducted by (Fanucchi et al., 2009) shows that doing an eight-week exercise program reduces the intensity of low back pain in children aged 12-13 years. Regular involvement in a special exercise program during childhood can promote optimal spinal alignment and tissue load during the growth spurt. If the movement is

abnormal, musculoskeletal imbalance, and abnormal spinal loads can be managed during childhood, possibly preventing the onset of chronic and recurring low back pain. Research by (Shipton, 2018) states that sport alone or in combination with education has shown evidence of moderate quality. It is effective for the prevention of lower back pain. The preventive effect was found to be high, with a relative risk obtained of 0.55 (95% CI 0.41-0.74). Exercise can be focused on secondary prevention with an intensive program.

Researchers advise students to continue the exercises that have been given by researchers so that back pain complaints can be reduced. Students are also advised to maintain an ergonomic sitting position when doing online learning so that back pain does not arise. Ergonomic sitting position, namely the location of the seat with the study table adjusted to the student's height, the back position remains upright, and the knees form a 45° angle with the feet perfectly resting on the floor. The role of parents is very much needed to pay attention to the sitting position of students when studying online at home so that the sitting position remains ergonomic. Parents are also advised to assist students when doing therapeutic exercises so that the movements are carried out correctly.

Recommendations from (Lp, 2020) in a study entitled *Ergonomics for Working from Home during COVID-19 Pandemic* which states that body posture is the main factor that determines biomechanical strain and load on the lumbar-sacral area of the spine. Posture that is always used is one of the main factors responsible for musculoskeletal complaints. These complaints include: back pain, neck pain, wrist pain, shoulder pain, knee pain, and pain in the ankle. Neutral posture is very important. A forward bent posture that is maintained for a long time, creates intra-discal pressure that will cause low back pain or sciatica pain. The International Ergonomics Association (IEA) recommends alternating sitting and standing positions when using a digital device (laptop or computer). A combination of 10 minutes sitting and 5 minutes standing can be a better way to maintain performance levels. Taking a break for 2 minutes every 20 minutes of sitting is also recommended so that musculoskeletal complaints do not arise.

CONCLUSION

This study involved elementary school students. The results of the study in the form of back pain values as measured by the *Wong-Baker Faces Pain scale*, it was found that the average pretest score was 4.07 and the average post-test score was 0.87. This shows that the mean pretest score results are in the interpretation of a little more pain, while the average posttest score results are in the painless interpretation, which means that there is a decrease from the average pretest score results. *Wilcoxon* test results obtained p value = 0.000 where $\alpha = 0.05$, so it can be concluded that there is a significant reduction in low back pain after giving therapeutic exercise.

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