The Effect of Shalat Movement on the Down Back Flexibility in Boarding School Students

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Abstract

Flexibility is one component of body fitness needed for daily activities, such as bending, running, and walking. Human flexibility significantly increases in childhood and reaches its peak in adolescence. One of the exercises related to increasing lower back flexibility is stretching exercise in the form of Islamic prayers five times a day. This study was conducted to know the effect of stretching exercise on lower back flexibility in students age 12-15 years. This research is analytical observational research with a cross-sectional design using proportionate stratified random sampling. The subject of the research is 70 students of the Islamic school and 70 students of public school in Kota Palembang. Lower back flexibility is measured by the Sit and Reach Test. The Mann-Whitney Test analyzed data. There is a significant difference between lower back flexibility of Islamic school that do stretching exercise and lower back flexibility of public school that does not include stretching exercise (p = 0,000). Stretching exercise in the form of Islamic prayer increases lower back flexibility.
Keywords. cross-sectional studies, exercise therapy, exercise, students.

1. Introduction

Flexibility is defined as the ability of the muscles to extend as much as possible so the body can move with the maximum joint range of motion and is not accompanied by pain when the joints are moved. [1,2] Flexibility is needed in daily activities. Good flexibility causes one or more joints to move together efficiently thereby reducing and preventing injury to muscles and joints, helping to develop speed, coordination and agility and saving energy expenditure when performing movements.[2]

A person will gain general flexibility until the age of 12 years, and after that, it will experience a decline.[3] Decreased flexibility in adolescence is associated with decreased daily activities. Youth activities which are mostly spent in the classroom make a teenager have to sit for a long time and sometimes in the wrong sitting position. This habit will cause tension in the muscles and ligaments of the lower back so that it can cause limited motion of the lower back joints.

Flexibility exercises in adolescence can prevent a decrease in flexibility by increasing muscle elasticity and reducing joint strength.[5] One of the exercises associated with increasing flexibility, especially the flexibility of the lower back is stretching exercises. In the form of prayer activities.[6] The activity of praying five times a day and night consists of 280 different body movements, such as standing, bowing 36 times, prostration 72 times, neck movements, raising hands, moving fingers, and sitting, which are considered stretching exercises light. [7]

There is little research on the benefits of prayer from a scientific point of view. In general, research on flexibility related to stretching exercises in the form of prayer movements is still not widely done at a young age. Therefore, this study aimed to determine the effect of stretching exercises in the form of prayer activities on lower back flexibility in students aged 12-15 years.

2. Methods

This study was an observational analytic study with a cross-sectional design. This research was conducted from October to November 2018 at Pondok Pesantren Tahfidz Nurul Qur'an (Islamic boarding school) and SMPK Xaverius I Palembang (public boarding school). The research sample was all students aged 12-15 years with a proportionate stratified random sampling technique. The total sample amounted to 140 people who were divided into two groups of students who routinely did stretching exercises in the form of prayer activities and did not routinely do stretching exercises in the form of prayer activities. Students who are research subjects are students who do not have spinal disorders and do not do sports, such as football, futsal, volleyball, gymnastics, swimming, yoga, table tennis, badminton, marathon running/jogging, Pencak silat, and other sports more than one times in a week with a duration of more than 2 hours. The data of this study were primary data which included age, BMI, and low back flexibility values measured using the Sit and Reach Test. The data were processed using the SPSS version 25 application and analyzed using univariate analysis and bivariate analysis using the Mann-Whitney analysis test to determine the difference in the average value of lower back flexibility in the two groups of students.

3. Results

There are 70 boarding school students, each divided into four age categories and 3 BMI categories. The results showed that the highest age in the two groups of students was 12 years old, amounting to 29 Islamic boarding school students (41.4%) and 25 public school students (35.7%). The highest BMI among Islamic boarding school students was thin BMI, which amounted to 51 students (72.9%), while the highest BMI for public school students was normal BMI, amounting to 28 students (40.0%). The frequency distribution of subjects based on age and BMI can be seen in table 1.

Table 1.Frequency distribution of subjects by age and BMI (n = 140)

Variable	Islamic boarding school students n (%)	Public boarding school students n (%)
Age (years)		
12	29 (41,4)	25 (35,7)
13	16 (22,9)	22 (31,4)
14	13 (18,6)	22 (31,4)
15	12 (17,1)	1 (1,4)
BMI		
Underweight	51 (72,9)	18 (25,7)
Normoweight	17 (24,3)	28 (40,0)
Overweight	2 (2,9)	24 (34,3)

The results showed that the highest average value of lower back flexibility in Islamic boarding school students was in the 15 year age group, namely 37.58 cm and in public school students there was in the 14 year age group, namely 21.97 cm. Based on BMI, the highest average value of lower back flexibility in pesantren students is found in fat BMI, which is 35.50 cm and in public school students there is an average BMI of 20.78 cm. The frequency distribution of the mean value of lower back flexibility based on age and BMI can be seen in Table 2.

Table 2.Frequency Distribution of Average Lower Back Flexibility Values by Age and BMI (n = 140)

Variable	Islamic boarding school students (cm)	Public boarding school students (cm)
Age (years)		
12	27,43	17,72
13	27,65	19,50
14	31,34	21,97
15	37,58	21
BMI		
underweight	28,83	19,50
normoweight	32,64	20,78
overweight	35,50	18,47

The value of lower back flexibility as measured using the sit and reach test for pesantren and public school students aged 12-15 years can be seen in table 3.This study shows that the

average value of lower back flexibility in pesantren students (29.95 cm) is higher than public school students (19.66 cm).

Table 3. Results of Lower back Flexibility Values Using the Sit and Reach Test

Lower Back Flexibility Value	n	Mean	SD	Min	Max
Islamic boarding school students	70	29,95	5,71	20	45
Public boarding school students	70	19,66	7,06	4	35

The results of the bivariate analysis using the Mann-Whitney test showed the value of p = 0.000 (p <0.05). This means that statistically there is a significant difference in the value of lower back flexibility in students who do stretching exercises in the form of prayer activities and do not do stretching exercises in the form of prayer activities.

4. Discussion

The results of this study indicate that the highest mean value of lower back flexibility in pesantren students is at the age of 15 years (37.58 cm) and public school students at the age of 14 years (21.97 cm). Age is one of the factors that affect flexibility. The flexibility of a person will continue to increase from childhood to adolescence WHO sets the age limit for adolescents divided into three parts, namely early adolescents aged 10-13 years, mid adolescents 14-16 years, and late adolescents 17-20 years.

Another factor that affects flexibility is the Body Mass Index (BMI). The results showed that the highest mean value of lower back flexibility among Islamic boarding school students as those with a fat BMI (35.50 cm) and public school students who had a normal BMI (20.78 cm). Someone who is overweight will experience decreased flexibility because there is excess fat in the joints and muscles, causing limited range of motion. [8]

According to Arora et al., there is a weak relationship between a person's body mass index and lower back flexibility. [9] Factors that more influence lower back flexibility in adolescents are daily activities or routine exercise. Sports that affect the flexibility of the lower back are those that have an axis of movement on the trunk and lumbar, such as swimming, gymnastics, yoga, and others.

From the results of the Mann-Whitney test, it was found that there was a statistically significant difference in the value of lower back flexibility among pesantren students and public school students. This shows that there is an effect of stretching exercises in the form of prayer activities on lower back flexibility in students aged 12-15 years. The results of this study are in line with research conducted by Prasetyono (2015) regarding the effect of prayer movements on lower back flexibility. [10-12]

A Muslim who performs prayers five times a day a night performs about 280 different movements, which are the same as light stretching exercises.[7] Stretching exercises are one of

the best exercises to increase flexibility.[12] During prayer, many muscles of the body are stretched, and joints move. Regular prayer movements help reduce muscle tension and stretch the muscles of the lower back, thereby preventing muscle injury. [6]

Takbir movement, raising both hands parallel to the ears and moving the shoulder muscles, will increase blood flow to the cartilages in the torso. Cartilage is a tissue that does not have direct blood flow so that it only gets nutrition when the joints and tissues around the joints are moved. During the bow movement, which is the movement of bending the body forward for 15 seconds, the M rectus abdominis, M erector spinae on the spine, and the muscles in the calf area are fully stretched. During the prostration movement, which is placing the forehead, nose, knees, and palms parallel to the ears on the floor and flexing the elbows for 15 seconds, stretching the M biceps femoris, M semitendinosus, and M semimembranosus which are the hamstring muscle groups of the hamstrings. [13] The stretch that occurs in the muscles of the body during bow and prostration movements will increase muscle elasticity, thereby increasing the flexibility of the lower back.

Sit and reach test is a physical fitness test to measure the flexibility of the lower back. The flexibility of the lower back according to the measurements of the sit and reach test is that the body performs maximum flexion to push both hands as far as possible past the ruler above the box. The sit and reach test represents the flexibility of the hamstrings, hips, and lower back, which are the supporting muscles when the body performs flexion.

Stretching exercises have a neurophysiological effect that is related to the structural tolerance or active contractile response associated with increasing body flexibility during routine stretching exercises. Stretching exercises that are done regularly and over a long period can improve flexibility by increasing stretch tolerance, which is the muscle's ability to lengthen and tolerate sensations of muscle tissue resistance and sensory discomfort when the joint is moved. [14-16]

When a muscle is stretched or in an extended state, the muscle spindles and GTOs are activated, and afferent Ib nerve endings are activated to transmit information to the brain and alpha motor neurons in the muscle, causing muscle fibres to contract and limit muscle elongation. Regular stretching exercises will affect the muscle spindles by inhibiting the stretch reflex, which will inhibit the afferent activity of the intramuscular receptors so that the muscles can extend to the maximum. Stretching exercises will also induce a Golgi tendon organ response (GTOs) which will inhibit muscle tension. The response to the nervous system by decreasing the activation of afferent fibres and muscle tension will increase muscle flexibility.

The primary source of passive muscle elasticity is titin protein.[17] The body's oxidation process influences the elasticity of titin protein. The oxidation of the body increases during sports activities as a natural effect of the body's metabolism. The researchers found that the titin contains sites that are susceptible to oxidation. These locations are mostly hidden in the folds of the titin molecule and are inactive. Muscle stretching causes the oxidation site to open up, and this makes titin sensitive to oxidation. The mechanical force, in this case, stretching the muscles, breaks down the critical area of the titin fold.[18] The oxidation that occurs in the titin protein locks the titin bundle in an unfolded state and causes the stiffness of the titin to decrease drastically. Without oxidation, the mechanical force can only produce a temporary change in elasticity in titin, which lasts a few seconds at most. However, the effects of mechanical and oxidative forces cause titin to be more elastic over a long period.[16] This suggests that stretching exercises lead to a long-lasting increase in flexibility.

5. Conclusion

Stretching exercises in the form of prayer activities improve lower back flexibility in students aged 12-15 years.

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