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Effect of Forward Head Posture on Dynamic Balance to Student Members of the Umsida Sports UKM

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Abstract

Forward head posture (FHP) is a type of postural that is generally described with the head tilted anteriorly/front. The wrong posture like FHP can affect the condition of certain body parts. The point of the Center of Gravity that moves will cause an uneven distribution of body weight and will disrupt the line of gravity which is a biomechanical component of the body's balance. HoweverGood body balance can be obtained by doing regular physical activity and exercise. This study aims to find out whether or not there is a correlation between forwarding head posture conditions and disruption of dynamic balance in individuals who are actively exercising. In this study, the design used was a cross-sectional approach. The measurement of the degree of forward head posture uses the craniovertebral angle, while the measurement of dynamic balance uses the Modified Bass Test. In the results of the correlation test with Spearman's Rank, the correlation coefficient value (sig.2-tailed) was 0.361 with a confidence interval (alpha) of 0.05 for the 2-sided test. With a significance of 0.361> 0.05, it shows that the Forward Head Posture condition does not have a significant relationship with Dynamic Balance in Umsida Sports UKM Students.

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INTRODUCTION

Posture is the composition of the body's posture in activities or in a state of silence, posture is the perception of a person who facilitates the position of the body to move in a position as comfortable and optimal as possible. There are quite a lot of complaints in the world of musculoskeletal physiotherapy related to the wrong postures (Kisner, C, and Colby, 2012).

Forward head posture (FHP)is a type of postural that is generally described with the head tilted anteriorly. front. The wrong posture like FHP can affect the condition of certain body parts. The continuous FHP position even becomes a daily posture will cause excessive loading and cause muscle tension, this pattern will have an impact directly on the musculoskeletal system, the worst impact that will occur is deformity (change) in shape/structure (Jung, 2016).

Phenomena that can cause forward Head Posturethat often happens every day, for example, When a child has to carry a fairly heavy backpack to school, then his head will be forced forward against the balance resulting in abnormal pressure on discs, joints, nerves, shoulders, and waist, then the use of the computer screen is too low, making the user have to repeatedly move his head forward to read the screen, playing console or PC games for long periods of time, and watching TV by bending the neck upwards (Welch, 2012).

Along with the development of technology and information in various fields of progress, the increasing use of technology such as gadgets is increasing, even the use of gadgets can facilitate human activities in daily life so that their use cannot be avoided. Smartphones are electronic devices that are most often used in everyday life today. The use of this smartphone is usually used by flexing/lowering the neck to stare at the Smartphone which is placed the smartphone position is lower than the head position and must keep the head in a bent position for a long time staring at the monitor, the head posture will decrease the cervical vertebral lordosis curve and cause the curve to change towards the posterior, while the upper thoracic vertebrae will try to maintain balance, this is the response of the body due to the shift of the Center of Gravity (COG) (Park, 2015).

This does not only happen to smartphone users, but also to workers who use computers daily. Research conducted by Kang et al. (2012) showed that heavy computer use tended to have a more advanced head position than the control group, thus changing the Center of Gravity (COG) which resulted in a decrease in static balance. The ability to control the body's center of mass (center of mass) or the center of gravity (center of gravity) to the support plane (base of support defined by the balance of the body. This ability is obtained from physical activity and sports that are usually done, then the disturbance of body balance has an impact on a person's ease of injury and will cause a decrease in one's productivity (Nala, 2015).

Disruption of posture can cause general disturbances in the human movement system, including balance. Body balance is the ability to react to any changes in body position so that the body remains stable. The point of the Center of Gravity that moves will cause an uneven distribution of body weight and will disrupt the line of gravity which is a biomechanical component of the body's balance. (Nala, 2015).

However, body balance can be obtained from physical activities and sports that are usually carried out. Various movements in each body segment need to be controlled by the body's balance system supported by the musculoskeletal system and fulcrum. The development of body balance is influenced by sensory information systems, synergistic sensory muscle responses (synergic postural muscle response), muscle strength (muscle strength), adaptive system, and joint range of motion. (Nala, 2015). There are two kinds of body balance, namely static balance, and dynamic balance. Static and dynamic balance is influenced by several important factors, namely the sensory and musculoskeletal systems.

Exercising regularly can increase muscle mass, it is muscle mass that affects muscle strength that supports a person's physical activity so that the person can maintain muscle strength to maintain body balance (Habut, 2015).

Based on the explanation of the materials above, the researcher is interested in seeing whether there is a relationship between the condition of FHP and the occurrence of balance disorders in athletes, where athletes tend to carry out regular levels of physical activity but at the same time, today's athletes include people who use smartphones and laptops with high intensity. high every day. This research will be carried out on members of the Student Work Unit (UKM) of Muhammadiya Sidoarjo University, which consists of active students who are actively involved in sports activities.

METHODS

In this study, the design used was a cross-

sectional approach. The research will be conducted from January – to June 2022. The population in this study are students who are members of UK Sports Umsida (UKORDA). The research sample was selected through a purposive sampling technique with pre-determined inclusion and exclusion criteria. For each sample, head posture was measured using the Forward Head Test to determine whether the neck posture was normal or not, and dynamic balance was measured using the Modified Bass Test to find out the correlation between neck posture and dynamic balance ability. Data analysis was carried out using computer statistical software SPSS 23.

RESULTS AND DISCUSSION

Table 1. The characteristics of the research subject

Characteristics of subject	N	Mean ± SD	Min	Max
Age (Years)	54	21.67±1.0899	20	23
Carniovertebra Angel Measurements (Degrees)	54	46.22±3.254	39	50
Measurement of Modified Bass Test	54	42.59±7.054	30	50

In **Table 1** the data presented are the characteristics of the study sample which include age, CVA and dynamic balance measurements. The data is presented in the form of the average value and standard deviation, the maximum value, and the minimum value.

Table 2. Kolmogorov-Smirnov Test. Normality Tes

	Kolmogorov-Smirnova		
	Statistics	df	Sig.
Carniovertebra Angel Measurements (Degrees)	.173	54	.000
MeasurementModified Bass Test	.261	54	.000

Based on the **Table 2** above, the significance value (Asymp. Sig) of the measurement variable Carniovertebra Angel is 0.000. While Measurement Modified Bass Test of 0.000. The two variables studied had a significance of <0.05. Thus it can be concluded that the data distribution of each variable is not normally distributed. Based on the normality test which proves that the data distribution is not normal, then the correlation analysis uses nonparametric analysis with the Spearman Rank correlation test.

Table 3. Balance improvement test in Control Group

	N	Correlation Coefficient		sig
Forward head posture Dynamic Balance	54	1,000	0,127	0,361

Based on **Table 3** the output above, it is known that N or the amount of research data is 54. As seen from the table of correlation test results with Spearman Rank, the correlation coefficient value (sig.2-tailed) is 0.361 with a confidence interval (alpha) of 0.05 for the 2-sided test. With a significance of 0.361> 0.05, it shows that the Forward Head Posture condition does not have a significant relationship with Dynamic Balance in Sports UKM Students. The correlation coefficient value shows 0.127 indicating that the level of strength of the relationship between variables is in the interval of 0.00 – 0.25, which means the correlation is categorized as very weak.

Neck Posture Can Disrupt Dynamic Balance

The postural deviations of the head and neck area could impair the data transmitted from the mechanoreceptors to the CNS. This will result in an improper response of the body and the creation of inappropriate motor responses to internal and external stimuli (Abbasi, 2022). One component of the balance of the human body is the vestibular system which originates from the ear and functions to provide information on balance, head movement, and eye movement. The vestibular can be stimulated by head movement. Response This sensory system is called the labyrinth system. The labyrinth system detects acceleration of head angle and head position as well as gravity. Sensory input from the labyrinth to the vestibular nucleus is located in the brainstem. Then the effector sends a response from the vestibular nucleus to motor neurons through the spinal cord, especially to motor neurons that innervate the proximal muscles, neck muscle coils, and back muscles (posture) (Sherwood, 2014).

This situation caused a change in the center of gravity (Center of Gravity) towards the anterior superior draw the line of gravity (Gravity of line) is not exactly on the vertical line, Under normal conditions the vertical line is parallel to the ears, clavicle, shoulder joints, lumbar vertebrae, and knees, thus making the body less efficient in the field of support (Base of Support). These changes cause mechanical changes related to pos-

tural control. In this condition, the body will try to adapt to the changes that occur by changing the balance control mechanism. This adjustment reduces the ability to balance when carrying out activities so that it will interfere with these activities (Lee, 2016). In the forward head posture hyperkyphosis occurs at 3-7 cervical flexion and 1-2 cervical extension.

Body Balance Also Depends On Muscle Strength

Body balance in various positions is only possible if the responses of the postural muscles work synergistically in response to changes in position, the plane of the fulcrum (BOS), the center of gravity (COG), and the line of gravity (LOG). When the postural muscles become weak, the muscle response will become less synergistic and will have an impact on the decreased ability to maintain balance (Irfan, 2012). Several muscle groups in both the upper and lower extremities function to maintain posture when standing upright and regulate body balance in various movements. Synergistic muscle work means that there is an appropriate response (speed and strength) between one muscle and another in carrying out certain motion functions (Irfan, 2012).

Muscle strength is generally needed in carrying out activities. All movements produced are the result of increased muscle tension as a motor response. Muscle strength can be described as the ability of muscles to withstand loads in the form of external (external) and internal (internal) loads. Muscle strength is closely related to the neuromuscular system, which is how much the nervous system's ability to activate muscles to contract. So that the more muscle fibers are activated, the greater the force generated by the muscle. The muscle strength of the legs, knees, and hips must be sufficient to maintain balance in the body in the presence of external forces.

Forward head posture can lead to upper cross syndrome, shortening of muscular fibers around articulation atlanto occipitals and overstretching of muscles around these joints. This can cause shift of line of gravity more anteriorly causing balance disturbances. Therefore this study aims to find the effect of forward head posture on postural balance in young adults (Al-Eraky, 2016) .

Muscle strength is directly related to the ability of muscles to withstand gravity and other external loads that continuously affect body position (Irfan, 2012. Muscle strength will be obtained along with the increased activity. In athletes, of course, have a high level of physical activity, muscle strength will have a major effect in maintaining body balance, in individuals with high levels of physical activity will experience an increase in the number of muscle cells containing myoglobin and mitochondria. An increase in the number of muscle cells will increase muscle strength which is used as an effector to maintain body balance. it seems that the positive effect of the exercise on the proprioception has produced more satisfactory postural responses and good balance than before the exercise (Irani, 2022).

Lack of physical activity can be a risk factor for balance disorders because the physiological components of the human body allow us to carry out balance reactions, where the most essential part is proprioception which maintains balance and also the ability to feel the position of joints or body parts in motion. Someone who performs moderate to high levels of physical activity and has better postural stability will be able to increase strength and a better balance of the body (Brown, 2014). The study findings agreed with those presented by (Shafeek, 2022) who observed that dynamic balance could be increased balance immediately after 30 consecutive minutes of using a smartphone for reading, writing, or playing games. Care should be thus taken to avoid any accidents while walking, sports participation, or other daily activities. This negative effect on dynamic balance can, however, disappear after 1 hour.

CONCLUSION

Posture is one component in supporting the body's ability to maintain balance. Condition forward head posture may cause balance disturbances by shifting COG. However, posture is not the only supporter of balance, in athletes with high physical activity intensity it can cause posture adjustments with muscle strength and coordination, so that strength and coordination can support body balance, especially the dynamic balance needed in sports activities.

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