



Knowledge and Calcium Intake to the Risk of Scoliosis at Boarding School Students

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Abstract

Teenagers in the modern era often have improper sitting positions, which will affect posture abnormalities, namely scoliosis. Scoliosis occurs due to many factors, such as information obtained from knowledge. In addition, there are nutritional factors obtained from calcium intake because a deficiency will affect bone density. This study aims to understand the relationship between knowledge and calcium intake with the risk of scoliosis in adolescents. The method used was an analytic observational study and a cross-sectional study design. Thirty-five students were chosen by purposive sampling. The respondent checked using Adam Forward Bending Test Checklist and the Food Frequency Questionnaire (FFQ). All data were processed using SPSS. The results of the correlation test from the Spearman-rho test on the knowledge variable with a significance value of 0.309 ($p > 0.05$) and the calcium intake variable of 0.624 ($p > 0.05$) concluded that H1 was rejected and H0 was accepted, which means there is no relationship between knowledge and calcium intake on the risk of scoliosis in adolescents. This study concluded that there is no relationship between knowledge and calcium intake on the risk of scoliosis in adolescents. But the long-term effects of insufficient calcium intake need further investigation.

Introduction

Posture is composed of soft tissues such as central and peripheral nerves, muscles, ligaments, and hard tissues such as bones and joints. If the shaper of the body has problems, it will affect posture deviations characterized by stiff muscles, back pain, and body imbalances, and not anatomically (Qureshi & Shamus, 2012). This deviation causes the placement of the body related to gravity and the base of support is not per its position. The lateral deviation happened in the frontal plane. If it occurs continuously, then there is a posture abnormality, namely imbalance of the body with vertebral rotation is called scoliosis (Herdea et al., 2022). The condition of scoliosis is characterized by having a degree of vertebral curvature (Cobb angle) of $>10^\circ$ which can be seen on the coronal plane radiograph (Brox, 2014).

The prevalence of scoliosis worldwide reaches 1% of the population, mainly diagnosed

in adolescents between the ages of 10 to 18 years (Seleveciene et al., 2022). However, idiopathic scoliosis, which has an unclear cause, is found in around 80% of scoliosis cases. If there is no discernible underlying condition, scoliosis is referred to as idiopathic (Negrini et al., 2018). Continuous position changes can also be a trigger for scoliosis, especially if awareness, related to cognitive behavior, of this ergonomic position is lacking (Fersum et al., 2013).

A person's knowledge can affect his behavior. If someone's knowledge is good, then his behavior will be better. Knowledge is information captured by the five human senses and results in a person knowing (Zahn et al., 2017). In addition to the knowledge factor, calcium intake is no less vital in changing one's body posture, especially in adolescents. Because low calcium intake will have an impact on early bone density, it can affect future development and accelerate bone loss (Vannucci et al., 2018).

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Calcium is a vital element in the process of structural renewal and bone formation or remodeling. According to the Recommended Dietary Allowance for Calcium, the number of calcium nutritional needs at the age of 14-18 years is 1300 mg/day (Vannucci et al., 2018). Experienced a calcium deficit during the growth period will impact growth barriers such as bones becoming less stable, easy to bend, and brittle, and at the age of 50 years can cause osteoporosis (Bolland et al., 2015).

The effects of posture abnormalities can directly or indirectly affect the spine and other systems, especially the respiratory and cardiovascular systems. It means that the circulation of oxygen to the developing organs becomes difficult, and the central nervous system is deprived of oxygen. The lack of oxygen can cause several conditions, such as memory loss, and can have a further impact on the ability to think difficult (Mitova et al., 2014). In the preliminary study, students at SMP Tahfidz Al-Manshurin Malang have a risk of bad posture due to a wrong sitting position and insufficient calcium intake. Based on the explanation above, the researcher is interested in conducting research entitled "Knowledge and Calcium Intake to the Risk of Scoliosis at Boarding School's Students".

Method

This research was conducted by an analytical observational method using a cross-sectional study approach. This research took place at Junior High School Tahfidz Al-Manshurin Malang. The technique was to select the sample by using purposive sampling and obtained 35 students from grades 7 to 9 who met the research criteria. Collecting respondent data regarding scoliosis knowledge using a questionnaire, then the final results are categorized. Namely good, sufficient, and lacking. Measurement of calcium intake using the Food Frequency Questionnaire (FFQ) method

from the Ministry of Health of the Republic of Indonesia (KEMENKES) by (Sirajuddin et al., 2018), the results from the interview was then analyzed using the Nutrisurvey system software (Arsyad et al., 2020). The final result then becomes less if the respondent's intake is <80% RDA (Nutrition Adequacy Rate), it is said to be good if it is 80-100% RDA, and it is said to be better if >100% RDA (Maharsari, 2018). The measurement of scoliosis uses a body posture observation sheet, namely the Adam Forward Bending Test Checklist from the Standard of Scoliosis Screening by (Sacramento, 2007). Univariate analysis in this study includes the characteristics of respondents based on knowledge, calcium intake, Body Mass Index (BMI), and body posture. The bivariate analysis includes a normality test using Shapiro-Wilk and a correlation test using Spearman-rho.

Result and Discussion

The characteristics of the respondents are in TABLE 1. Based on the Body Mass Index (BMI) of 35 respondents, the highest number was 17 female students (49%) with normal, while the smallest number was obese only 2 female students (6%). Based on the level of knowledge of the respondents, 23 students (66%) have sufficient knowledge, 9 (26%) of them have good knowledge, and only 3 students (8%) were less knowledge. Regarding calcium intake, 35 respondents who had less calcium intake with the highest percentage, namely 29 students (83%), while calcium intake was very good only in 4 students (11%), and good calcium intake was 2 students. (6%).

On the other hand, based on the risk of scoliosis, it was found that from 35 respondents who were not detected experiencing the risk of scoliosis, there were 14 students (40%), while those who had the risk of mild scoliosis as many as 18 students (51%), and the risk of moderate scoliosis was only 3 students (9%).

Table 1. Characteristics of Respondents

Characteristics	N	Type	Percentage
BMI	35	Underweight	11%
		Normal	49%
		Overweight	34%
Knowledge	35	Obesity	6%
		Lack	8%
		Sufficient	66%
Calcium Intake	35	Good	26%
		Lack	83%
		Good	6%
Risk of Scoliosis	35	Very Good	11%
		None	40%
		Low	51%
		Moderate	9%

Table 2. Results of the Correlation Knowledge and Calcium Intake to the Risk of Scoliosis

Variable	N	α	p
Knowledge	35	0,05	0,309
Calcium Intake	35	0,05	0,624

The correlation test is by Spearman-rho test with a sample of 35 students. In the knowledge variable, the significance value was 0.309 ($p > 0.05$) while the calcium intake variable had a significance value of 0.624 ($p > 0.05$). Thus, in this study, it can be concluded that there is no relationship between knowledge and calcium intake on the risk of scoliosis in adolescents.

Knowledge is referred to as the main factor in changing a person's behavior through the process of seeking. So they can receive knowledge and skills (Liu et al., 2016). Knowledge about the risk factors for disease makes people try to behave in any way to avoid or prevent the risk of the disease. Understanding how perceptions of developing diseases affect the adoption of health-protective activities is crucial for identifying prospective health issues. It may also help public health messaging more effectively, targeted to promote the right kinds of behaviors (Faasse & Newby, 2020).

In contrast to the results of this study, there is no relationship between knowledge of the risk of scoliosis and respondents who are dominated by sufficient knowledge, thus requiring better. The level of knowledge is not the main factor affecting a person's health behavior in making decisions to prevent the risk of scoliosis. But several factors, including perceptions, emotions, motivation, and the

environment (Purnamasari & Raharyani, 2020). A person's perception of something will be different because there are several selections in the stimulus process, so that perception is closely related to the encouragement of a person's behavior in making a decision (Coronado-Vázquez et al., 2020). As people get older, motivation will also increase to carry out healthy living behaviors so that a person continuously adapts to his environment. It will affect good and healthy activities so that there is a reduced risk of scoliosis in adolescents (Faasse & Newby, 2020; Seleviciene et al., 2022).

Adolescent life is counted in the age range of 12-21 years, which will experience a growth spurt period which means the peak of growth in height, weight, and growth of bone mass or peak bone mass. Adolescence is the fastest period in the formation of bones. So it will grow large, long, thick, dense, and influenced by body weight and composition. Therefore they need more nutritional intake, but this growth will stop when they reach the age of 30 (Ward et al., 2017). Calcium intake in adolescents is very vital. Around 1,300 mg of minimum calcium intake is needed by the age of 9-18 years (Vannucci et al., 2018).

One of the most significant biological roles of calcium in the body is the mineralization of the skeleton. Calcium is a necessary

element. The skeleton's strength and structure are provided by calcium, which makes up the majority of bone and is found there at concentrations of more than 99% as calcium-phosphate complexes. It makes the bone a metabolic reservoir for maintaining the intra- and extracellular calcium pool. The remaining portion mediates muscular contraction, vascular contraction and vasodilatation, nerve impulse transmission, intracellular signaling, and extracellular signaling. It is found in blood, extracellular fluids, and muscle. For muscle development and contraction, calcium has functions in protein interactions in muscles, namely actin, and myosin (Bronner, 2001; Vannucci et al., 2018).

The impact caused by lack of calcium in the body includes stunted bone growth, which can affect the occurrence of bone shortening conditions as well as bone pathological conditions such as osteoporosis (Weaver et al., 2016). Bone development and degeneration are significantly affected by calcium-phosphorus metabolism and balance, which are affected by a variety of variables, including vitamin D, parathyroid hormone (PTH), and calcitonin levels. If the need for calcium in humans is not met, it will indirectly obtain sources of calcium from other body parts, such as bones that store a lot of calcium. If the body's needs are fulfilled, but bone calcium levels are reduced, it triggers susceptibility to bone disorders such as scoliosis (Zhu et al., 2019).

However, in the results of this study, there was no relationship between calcium intake and the risk of scoliosis, and the respondents predominantly had less calcium intake. It could occur due to the possibility that other bone-forming main compositions, such as mineralized extracellular matrix containing organic and inorganic materials other than calcium are still being met, including phosphorus, protein, vitamin D, and magnesium. The extracellular matrix (MES) is a complex structure that surrounds the cell and functions to provide structural support (Allgrove, 2015).

Conclusion

Based on the results of the research entitled "Knowledge And Calcium Intake To The

Risk Of Scoliosis At Boarding School Students" the following conclusions were drawn: (1) The highest level of knowledge related to the risk of scoliosis in Boarding School Students is having sufficient knowledge; (2) The highest level of calcium intake in Boarding School's Students is having less calcium intake; (3) Boarding School's Students are detected as having a mild risk of scoliosis; (4) There is no relationship between knowledge and calcium intake on the risk of scoliosis in Boarding School's Students. However, the long-term effects of insufficient calcium intake on other musculoskeletal disorders still need further investigation.

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