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Growth and Development Levels of 13 Year Old Children

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A B S T R A C T

This study aims to determine the profile of the level of growth and motor development of 13 year old male students in class VII at SMP Rama Sejahtera Makassar. Through this research, researchers can provide general information regarding the growth and motor development of 13 year old children who live in the middle of the city of Makassar, especially boys as the main focus that is accessible in this research. And the data from this research can be used by related parties, especially the Education Department, which collaborates with the Makassar City Health Service to carry out field reviews for the sake of continued growth and better development of children as future generations. The research method uses a quantitative descriptive approach by carrying out tests directly using test and measurement instruments. The sample in this study was 13 year old male students in class VII at SMP Rama Sejahtera Makassar totaling 30 people.

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INTRODUCTION

Humans do not live permanently, but continually change. Starting from fertilization, becoming a fetus, baby, birth, adulthood, and finally death. When a baby is born, it doesn't have any abilities except crying. By continuously interacting with the surrounding environment, the baby will further perfect himself, until the baby experiences physical changes until he becomes more balanced. As time goes by, the baby continues to experience changes. His behavior and skills are also developing. The baby begins to be able to do certain things, such as turning over, sitting, crawling, standing and finally being able to walk and run. Development and growth are important things for us to learn and understand. Many educators and parents do not understand children's developments. So there are still educators and parents who implement learning systems without looking at children's development. This will result in an imbalance between the learning system and the child's development which will make it difficult for him to follow the existing learning system. By knowing the factors of children's development and growth, it is hoped that we will easily find out which learning systems are effective, efficient, focused and appropriate to children's development, especially in the subjects of physical education, sports and health.

To develop the potential of students and create quality future generations, it is necessary to understand the development and growth of children. Thus, as educators we are required to know and understand the development and growth of students. Apart from that, it is necessary to understand the factors that determine growth and development, such as nutritional status, physical activity (exercise), genes (heredity), environment, economy and health. This can be seen through research results that there is a relationship between nutritional status and the level of physical fitness in children (Mappaompo et al., 2023). A good level of fitness will of course support better growth and development processes as a result of the normal functioning of the metabolic system in the body. So with this rationale in mind, researchers carried out tests and measurements related to the growth and development of 13 year old children at Rama Sejahtera Makassar Middle School which is located in the middle of Makassar city. This article can provide information regarding the level of growth and development of 13 year old Rama Sejahtera Makassar Middle School students, as well as providing an overview of the growth and development of 13 year old children in Makassar City.

THEORETICAL REVIEW

In general, the terms growth and development have the same meaning, namely experiencing change. But specifically, in accordance with scientific principles in psychology, the term growth is different from development. The term growth refers to changes in quantity, while development focuses more on quality. This means that the concept of growth is more directed towards definite physical characteristics such as from small to big, from short or low to tall and so on (Ndeot et al., 2022). Growth is any change in the body that is associated with increasing physical and structural body sizes. Meanwhile, development is increasing ability in the structure and function of the child's body which is more complex (Mayar et al., 2021). Growth can be seen from body weight, height and head circumference, while development can be seen from motor, social and emotional abilities, language abilities and cognitive abilities. Basically, every child will go through a growth and development process according to their age stages, but many factors influence this (Prastiwi, 2019). Measuring growth and detecting development in children needs to be carried out and analyzed so that if obstacles are found in the child's growth and development, they can be immediately overcome through providing balanced nutrition, intensive examination and care, and stimulation according to the child's needs (Ndeot et al., 2022).

The level of growth and development in children can be influenced by several factors, including the family's economic status and the parents' education level. Family economic status can influence children's growth and development. Children who are raised in families with high economic status will find it easier to meet their nutritional needs better than children who are raised in families with medium or low economic status. Children from low economic status backgrounds are usually associated with problems with food shortages, poor environmental health, and ignorance of the growth and development process. This will directly hinder the child's growth and development. Economic status is often related to a person's level of education, the higher a person's economic status, the higher their level of education. Families with a high level of education will more easily receive information or direction on how to improve children's growth and development, use of health facilities, and the best education for their children compared to families with a low level of education. Children's growth and development can also be influenced by various other factors such as parental stimulation, nutrition, and gender. Parental nutrition and stimulation are things that are really needed in the continuity of the child's growth and development process. Children who receive adequate nutritional needs and targeted stimulation from parents will have optimal growth and development (Santri et al., 2014).

Nutrition plays a very important role in the growth and development of early childhood. Nutrition or nutrition is a component that must be present and its existence is very necessary for the body, especially in the process of physical growth and development, the nervous system and brain, as well as the level of human intellect and intelligence. Fulfilling nutritional needs is the main factor in achieving growth and development results in accordance with genetic potential. (Mayar et al., 2021). The easiest ideal growth and development to observe is body weight and height. These two indicators can also be used as a benchmark for determining Body Mass Index (BMI) or Indeks Massa Tubuh (IMT). To count BMI or IMT The following formula can be used (Ladies, 2021) :

BMI = Body weight (kg) : [Height (m) x height (m)]
IMT = Berat Badan (kg) : [Tinggi Badan (m) x Tinggi Badan (m)]

Next, to review the classification of the calculation results using this formula, you can pay attention to the WHO version of the International BMI classification table (Ladies, 2021) as follows:

Table 1. WHO version of International BMI Classification

No	Classification	BMI (Kg/m)
1	Underweight	< 18,5
2	Normal body weight	18,5 – 22,9
3	More weight	>23
4	Pre-obes (a little fat)	23 – 24,9
5	Obes I	25 – 29,9
6	Obes II	>30

Calculating BMI is necessary because it gives an idea of their health status. Children with a healthy BMI tend to have a lower risk of several health problems, such as obesity, type 2 diabetes, and heart disease later in life. BMI can also be used to help parents and doctors monitor a child's overall growth and development. Children with an unbalanced BMI, either too high or too low, are at risk of experiencing a number of health problems. Obesity in children can cause health problems such as high blood pressure, and type 2 diabetes, and psychological problems such as low self-esteem. On the other hand, being underweight can hinder a child's physical and cognitive growth and development. A child's nutritional status is a condition that shows whether a child's nutrition is poor, deficient, good, overweight, or obese. Based on Minister of Health Regulation Number 2 of 2020, the measurement of children aged 5–18 years, including school age at 13 years, uses the body mass index per age (BMI/U) (Setiaputri, 2023).

Measuring nutritional status using the BMI/U index interpretation will help show whether a child's nutrition is good, deficient, or even more. That way, further treatment can be given according to the child's needs to support their growth and development.

The following are the BMI/U categories along with the threshold (z score):

- Malnutrition: -3 SD to <-2 SD
- Good nutrition: -2 SD to +1 SD
- More nutrition: +1 SD to +2 SD
- Obesity: > +2 SD

To make it easier to find out whether a child has a healthy weight based on his age and height, you can pay attention to the following BMI/BMI percentile chart:

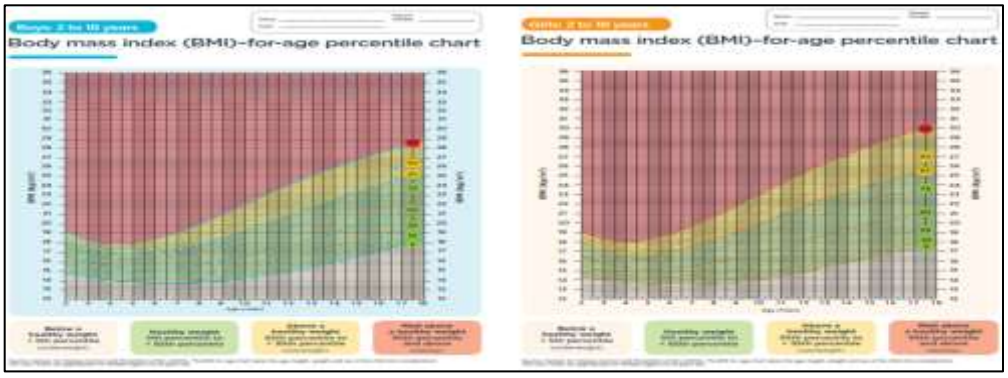

Figure 1. BMI/BMI percentile graph (NSW, 2024)

According to data from the Food and Agriculture Organization of the United Nations (FAO) (Adnani, 2022), the ideal height for children from various countries shows that the average height for children in Indonesia is:

Table 2. Average ideal height for Indonesian children

Age	Height of Boys	Height of Girls
1 year	71,7 cm	69,8 cm
2 years	81,5 cm	79,2 cm
3 years	89,0 cm	87,8 cm
4 years	95,8 cm	95,0 cm
5 years	102,0 cm	101,1 cm
6 years	107,7 cm	106,6 cm
7 years	113,0 cm	111,8 cm
8 years	118,1 cm	116,9 cm
9 years	122,9 cm	122,1 cm
10 years	127,7 cm	127,5 cm
11 years old	132,6 cm	133,5 cm
12 years old	137,6 cm	139,8 cm
13 years old	142,9 cm	145,2 cm
14 years	148,8 cm	148,7 cm
15 years	155,2 cm	150,5 cm
16 years	161,1 cm	151,6 cm

Height is an indicator for determining a child's nutritional status. It is important for parents to pay attention to their child's height.

This is to determine the child's nutritional status, such as good nutrition, excess nutrition, lack of nutrition, or even malnutrition. This nutritional status is important to prevent stunting, which is one of the nutritional problems in children. Stunting is a condition where a child's body is short due to a failure to grow and a chronic lack of nutrients for a long time. To avoid this, it is important to always pay attention to the child's height.

There are many factors that influence a child's ideal height so it cannot be generalized to other children. The following are several factors that influence a child's height (Adnani, 2022):

- Genetic or Heredity
  If both of a child's parents are relatively tall, then the chances of the child growing tall will be greater. This is what is called genetic potential.
- Adequate Nutrition
  A child's height is directly proportional to the adequate nutrition he receives. So that children have optimal height, they need to be given quality nutrition as early as possible, even starting from the womb.
- Sleep Duration
  Based on research, children who lack sleep or have poor sleep quality will tend to be less tall. The ideal sleep duration for babies is 18 hours per day, 10–13 hours per day for toddlers, and 8–11 hours per day for school-aged children.
- Sport
  Exercise apparently plays a role in stimulating the growth hormone in a child's body so that it can increase height. Some sports that can be done are basketball, jumping rope, swimming, and cycling.
- Health condition
  Congenital diseases such as kidney, heart, lung, and bone disorders that occur from the time a child is born can interfere with the child's growth and development process, including increasing height.

METHODOLOGY

This research is descriptive research with a survey method. According to (Sugiyono, 2013) the descriptive method is a method used to describe or analyze research results but is not used to make broader conclusions. This research was carried out at SMP Rama Sejahtera Makassar in 2013 involving a sample of 30 male students in class VII of SMP Rama Sejahtera Makassar. This research uses direct tests and measurements on samples. The measurement of growth level consists of 9 indicators including body height, leg length, arm length, sitting height, chest circumference, thigh circumference, arm circumference, head circumference and body weight. Meanwhile, the level of development is carried out by a motor skills test consisting of 3 indicators, including long jump without starting, vertical jhump, and distance of throwing a baseball.

RESULTS

The results of descriptive data analysis of the growth and development levels of 13 year old male students in class VII at SMP Rama Sejahtera Makassar in 2013 can be seen in the following table.

Table 3. Summary of Descriptive Data on Growth and Development Levels 30 Class VII Male Students at SMP Rama Sejahtera Makassar in 2013

No	Indicator	Amount (∑)	Average	Standard Deviation
	Growth:			
1	Height	4237 cm	141,23 cm	7,71
2	Leg Length	2484 cm	82,8 cm	3,98
3	Sleeve Length	1890 cm	63 cm	4,93
4	Sitting Height	2156 cm	71,87 cm	4,17
5	Chest size	1925 cm	64,17 cm	3,73
6	Thigh Circumference	1191 cm	39,7 cm	2,59
7	Arm circumference	631 cm	21,03 cm	2,31
8	Head Circumference	1532 cm	51,07 cm	1,51
9	Weight	930 kg	31 kg	3,77
	Motor Development:			
1	Long Jump Without Starting	4901 cm	163,37 cm	19,53
2	Vertical Jump	1031 cm	34,37 cm	4,33
3	How far a baseball can be thrown	739,86 m	24,66 m	4,09

According to data from the Food and Agriculture Organization of the United Nations (FAO) (Adnani, 2022), the ideal height for children from various countries shows that the average height for boys in Indonesia aged 13 years is: 142.9 cm. Meanwhile, the research results show that the average height of 30 13-year-old class VII male students at SMP Rama Sejahtera Makassar in 2013 was 141.23 cm. The results show that the height of class VII male students at SMP Rama Sejahtera Makassar in 2013 was below the average height of Indonesian boys in general.

Table 4. Frequency distribution of Body Mass Index (BMI) of 30 male students of Class VII SMP Rama Sejahtera Makassar in 2013 according to WHO

No	Classification	BMI (Kg/m)	Results	
			Frequency	Percentage (%)
1	Underweight	< 18,5	30	100 %
2	Normal body weight	18,5 – 22,9	-	-
3	More weight	>23	-	-
4	Pre-obes (a little fat)	23 – 24,9	-	-
5	Obes I	25 – 29,9	-	-
6	Obes II	>30	-	-
Amount			30	100%

Information:
BMI = Body weight (kg) : [Height (m) x height (m)]

DISCUSSION

Based on the research results by observing the table above, the average value for the height growth indicator was obtained at 141.23 cm. Leg Length 82.8 cm. Sleeve length 63 cm. Sitting Height 71.87 cm. Chest Circumference 64.17 cm. Thigh Circumference 39.7 cm. Arm Circumference 21.03 cm. Head Circumference 51.07 cm. Body weight 31 kg. Looking at these results, the most interesting thing to pay attention to is the Body Mass Index (BMI) by carrying out calculations involving two indicators, namely body height in meters (m) and body weight in kilograms (kg). Of the 30 male students in class VII of SMP Rama Sejahtera Makassar, it was found that 100% of the children were underweight with a BMI <18.5. Meanwhile, the research results show that the average height of 30 13-year-old class VII male students at SMP Rama Sejahtera Makassar in 2013 was 141.23 cm. The results show that the height of class VII male students at SMP Rama Sejahtera Makassar in 2013 was below the average height of Indonesian boys in general.

This needs attention from parents and all related parties to ensure balanced nutrition for children during their ideal growth period. Meanwhile, according to Healthline in (Ladies, 2021), the average body weight of 13 year old teenagers ranges from 34 kg to 67 kg (girls) and 34 kg to 66 kg (boys). From the weight range of 34kg – 66kg, there are 8 or around 26% of children who fall into that range. Meanwhile, test result data and measurements of children's motor development levels take into account 3 indicators. So the average value obtained for the indicator of motor development for the long jump without starting was an average of 163.37 cm, the average vertical jump was 34.37 cm, and the average distance of the softball throw was 24.66 m.

CONCLUSIONS AND RECOMMENDATIONS

The conclusion of this research is that in terms of growth, the average value for Body Height is 141.23 cm, Leg Length 82.8 cm, Arm Length 63 cm, Sitting Height 71.87 cm, Chest Circumference 64.17 cm, Thigh Circumference 39, 7 cm, Arm Circumference 21.03 cm, Head Circumference 51.07 cm, Body Weight 31 kg. Meanwhile, in terms of motor development, the average value for long jump without a start was 163.37 cm, vertical jhump 34.37 cm, and distance of baseball throw 24.66 m. It can be concluded that the height of class VII male students at SMP Rama Sejahtera Makassar in 2013 was below the average height of Indonesian boys in general. And from 30 male students in class VII of SMP Rama Sejahtera Makassar, it was found that 100% of the children were underweight with a BMI <18.5.

FURTHER STUDY

To find out universal levels of growth and development of children at every age level and be able to reach a wide population from remote villages to metropolitan cities, it is necessary to carry out further research. Apart from that, it is also necessary to involve collaborative research from social science and education disciplines, so that this research can be developed to examine children's cognitive development and psychological development so that it is not only limited to motor development. Through extensive and comprehensive research like this, it will be possible to uncover problems of child growth and development, so that it can be used as a basis for improving child growth and development for all related parties to prepare a generation of the nation that is superior in all aspects of life and can be relied on in the future.

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