# STUNTING BONE AGE EXAMINATION IN STUNTING CHILDREN IN THE RADIOLOGY INSTALLATION OF SIJUNJUNG HOSPITAL, WEST SUMATRA

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## *ABSTRACT*

Bone age maturity is a key component in evaluating a child's growth. Assessment of bone maturity is determined by measuring "Bone Age", namely an X-ray examination of the left wrist bone. Ossification of trabecular bone occurs in a predictable pattern, so that assessment of bone maturity can be made at several ossification centers and then compared to standard radiographic images for males and females. The results of the radiographs are compared with the individual's chronological age as an indicator of the speed of growth, using the ± SD reference it can be concluded that it is in the late or normal category. Examination of a single X-ray on the representative left hand to assess the center of ossification so as to avoid radiation exposure for radiographic examination of all bones. Assessment of hand radiographic analysis can show a correlation with facial growth during puberty. This research is a qualitative descriptive research method with an observational study, conducted on January 27 2023 at the radiology installation of Sijunjung Hospital with a population of stunted children with a sample of seven stunted children, data collection by examining the left manus anterior posterior projection after that the radiograph results evaluated by a radiologist. The results showed that there were three stunted children who did not experience delays in bone age maturity, namely one boy aged 5 years, one boy aged 11 years and one girl aged 13 years and there were four children who were stunted. delayed bone age maturity, namely one girl aged 10 years, two boys aged 10 years and one boy aged 15 years so that further research needs to be done for the factors causing bone age maturity in stunted children.

**Keywords** : Stunting Child, Bone Age, Manus Sinistra

## BACKGROUND

Stunting or 'short stature' ('shortness') is a condition of lack of body length or height of a person for his age, which is determined by calculating the Z score of the Height-for-Age Index (TB/U) (Gibson, 2005). A person is said to be stunted if the Z score for height for age (HAZ or height/age index) is less than minus two standard deviations (-2 SD) (WHO, 2006). Stunting indicates a linear growth disorder in a person. The problem of stunting in children needs to be a concern, because it is a reflection of the quality of human resources in the future. Stunting is an indicator of child health that provides an overview of the history of nutrition in the past, environmental and socioeconomic conditions (Gibson, 2005). Stunting increases the risk and morbidity in childhood, especially in developing countries (The Lancet's Series 2008). In connection with the increased risk and morbidity, stunting also causes physical and functional disorders in children (The Lancet's Series, 2008). Stunting contributes 14.5% to death and 12.6% to impaired functional abilities (disability adjusted life years) in children under five (The Lancet's series, 2008). The stunting condition is thought to be related to the immune system. Research in Africa proves an increase in the incidence, severity and duration (long illness) of malaria in the group of children with stunting (Verhoef, 2002).

Stunting is one of the challenges and global nutritional problems that are being faced by people in the world. The Ambitious World Health Assembly targets a 40% reduction in stunting rates worldwide by 2025. The 2018 Global Nutritional Report reports that there are around 150.8 million (22.2%) stunted children under five, which is one of the factors hindering human development in the world. The World Health Organization (WHO) has determined five subregions of stunting prevalence, including Indonesia which is in the Southeast Asia region (36.4%) (United Nation, 2018) (UNICEF, Levels and Trends in child malnutrition - UNICEF WHO The World Bank Join Child Malnutrition Estmates, 2019).

Radiology is a branch of medicine that deals with the use of all modalities that use radiation for diagnosis and therapeutic procedures using radiological guidance. which provides conventional radiological examination services with

examination results in the form of photos/images to assist doctors in making a diagnosis. This radiology utilizes X-rays for diagnostic purposes, both diagnostic radiology and interventional radiology. Diagnostic radiology is an activity related to the use of facilities for diagnostic purposes while interventional radiology is a branch of radiology that is involved in the therapy and diagnosis of patients, by carrying out therapy in the patient's body through the outside of the body with guide wires, stents and others using X-rays (Perka BAPETEN No. 8 of 2011).

Bone age is a radiological examination using X-ray modality, by comparing bone age with chronological age on radiological images of the left PA human. This examination is routinely carried out to diagnose abnormalities in the endocrine system and also the effects of the therapy given. The results of the radiological picture will be matched with the altas bone age and then the bone age of the child will be known, then the child's bone age will be compared with the child's chronological age. If there is a discrepancy between bone age and chronological age, this indicates an abnormality in the skeletal system. In general, the results of this bone age examination can see the growth status that is experiencing acceleration or deceleration (Jaya, 2015).

Bone age maturity is a key component in evaluating a child's growth. Assessment of bone maturity is determined by measuring "Bone Age" (BA), which is an X-ray examination of the bones of the left wrist. Ossification of trabecular bone occurs in a predictable pattern, so that assessment of bone maturity can be made at several ossification centers and then compared to standard radiographic images for males and females. BA can then be compared with an individual's chronological age as an indicator of growth speed, potential for further growth, and by using ± SD reference it can be concluded that it is included in the late (delay) or normal category. A single X-ray examination of the left hand is considered representative for assessing the ossification center in general and thus avoids radiation exposure for radiographic examination of the whole bone (Nilsson, 2005).

Representatives from the West Sumatra National Family Planning Population Agency (BKKBN) said Sijunjung District had a high number of cases of stunting or failure to thrive due to malnutrition. The stunting prevalence rate in Sijunjung reached 30.1%. This number is quite alarming. because it is above the average provincial stunting rate, or the third highest in West Sumatra, therefore it is necessary to carry out a bone age examination for stunted children at the Sijunjung Hospital.

## METHOD

The type of research used in this study is a descriptive qualitative research method with observational studies. This research was conducted in the radiology installation of the Hospital. Sijunjung on 27 January 2023 - 03 February 2023, the population of this study was children who experienced stunting with a total sample of 7 stunted children, data collection was carried out by performing an X-ray examination of the left manus anterior posterior projection in stunted children, then the radiograph results were evaluated by a specialist doctor radiology. Data analysis was carried out in a descriptive form..

## RESULT AND DISCUSSION

After examining bone age in stunded children at Hospital, a total of 7 stunded children, the following radiographic results were obtained :

Radiograph One

Radiograph Two

Radiograph Three

Radiograf Four



Radiograph Five Radiograph Six Radiograph Seven

Table 1. Results of Bone Age Radiograph Expertise in Stunted Children

| Radiograph | Gender | Age | Radiology Specialist Doctor's Expertise Results |
|---|---|---|---|
| Radiograph One | Man | 5 Years | The bone age of the child corresponds to the bone age of a 5 year old. Bone modeling is good, current height estimates cannot be assessed because the bone age of a small child is 6 years. |
| Radiograph Two | Girl | 13 Years | A 13 year old boy with a current height of 139 cm. bone age range 11 years 1 month to 15 years 1 month. Bone age is appropriate for a 13 year old girl, normal bone modeling |
| Radiograph Three | Girl | 10 Years | A child aged 10 years and 9 months, with a current height of 106 cm. bone age range 8 years 9 months to 12 years 9 months. Bone age according to girls aged 4 years 2 months. Normal bone modelling. Current height cannot be estimated as bone age corresponds to a 4 year 2 month old girl. |
| Radiograph Four | Man | 10 Years | The age range for children is 8 years to 12 years 4 months, the bone age of children is according to the bone age of children aged 6 years. Good bone modeling. The current high estimate is 68.0 % until the final high estimate. Impression : Retarded Boys |
| Radiograph Five | Man | 10 Years | Bone age range 8-12 years. The child's bone age matches the bone age of a 9-year-old child, the bone modeling is good, the estimated current height is 75.2% until the final estimated height. Impression : Average Boys |
| Radiograph Six | Man | 15 Years | A boy aged 15 years 5 months with a current height of 130 cm, bone age range 13 years 5 months to 17 years 5 months, the child's bone age matches that of a 13 year old boy, good bone modeling. The current estimated height is 88% of the maximum height, the estimated maximum height will be approximately 147 cm |
| Radiograph Seven | Man | 11 Years | A boy aged 11 years 9 months, bone age range 9 years 9 months to 13 years 9 months. Bone age corresponds to that of an 11 year old boy. Bone modeling is good, estimated current height is 80.4% of maximum height |

Table 2. Bone Age Maturity

| Radiograph | Bone Age Maturity |
|---|---|
| Radiograph 1 | Not late |
| Radiograph 2 | Not late |
| Radiograph 3 | Late |
| Radiograph 4 | Late |
| Radiograph 5 | Late |
| Radiograph 6 | Late |
| Radiograph 7 | Not late |

Of the seven stunted children who had been examined for bone age, there were 3 children who did not experience delays in bone age, namely on the results of radiograph 1, namely a 5 year old boy, the bone age matched the age of a 5 year old child, on radiograph 2, namely a boy. 13 year old boy, the bone age of the child corresponds to the age of the 13 year old child and on radiograph 7, namely an 11 year old boy, the bone age of the child corresponds to the age of the 11 year old child whereas four children were found to have delayed bone age maturity, namely on radiograph 3,

namely a 10-year-old girl, the child's bone age corresponds to the age of a 2-month-old girl, on radiograph 4, namely a 10-year-old boy, the child's bone age is according to age bone age of a 6 year old child with an estimated height of 68% to final height, on radiograph 5, namely a 15 year old boy, the bone age of the child corresponds to the bone age of a 13 year old boy with an estimated height of 88%, which is approximately 147 cm and on radiograph 6, namely a 10-year-old boy, the bone age of the child is in accordance with the bone age of a 9-year-old child with an estimated height of 75.2% until the final height later. If there is a discrepancy between bone age and chronological age, this indicates an abnormality in the skeletal system (Jaya, 2015). The skeletal system is one of the systems in the human body that has an important role in the homeostasis and integrity of the human body. The skeletal system has a function as a means of passive movement, protecting vital organs such as the brain, heart and lungs, a place for the formation of new blood cells, storing minerals that the body needs, supporting the human body and giving the body shape. Disturbances in the skeletal system will reduce the effectiveness of skeletal functions, some of which are even fatal (Sambrook, 2010). Skeletal shape is a form of height compared to body weight. According to Sheldon in 1940, three types of skeletal forms were obtained from this comparison, namely ectomorphic, mesomorphic and endomorphic (Proffit, 2007). This skeletal shape has a relationship with the growth and development of an individual. Individuals with ectomorphic skeletal forms reach maturity slower than individuals with endomorphic and mesomorphic skeletal types (Rahardjo, 2009).

According to Marlina (2010), there is a relationship between the shape of the skeleton and the process of growth and development. One of them is the intermolar growth and development which has been measured the average distance on the endomorphic, mesomorphic and ectomorphic skeleton. The ectomorphic skeletal form has the smallest intermolar value. This is due to lack of nutrition so that it tends to experience growth delays. Stunting occurs through a cycle of maternal malnutrition, where mothers who experience growth retardation and chronic malnutrition are at risk of giving birth to babies with low birth weight (Sumarmi, 2016). According to Aguayo and Menon (2016), stunting that occurs in childhood can continue to be a cause of stunting in later life periods and in adolescence this is detrimental because it can cause disturbances in reproductive development or puberty so that it can result in pregnancy. at risk of stunting (Vicora et al., 2008).

## CONCLUSION AND SUGGESTION

Based on examination of bone age in stunted children at Sijunjung Hospital, a total of 7 stunted children, it can be concluded there are three stunted children who do not experience delays in bone age maturity, namely one boy aged 5 years, one boy aged 11 years and one girl aged 13 years and four stunted children experience delayed bone maturity, namely one girl aged 10 years, two boys aged 10 years and one boy aged 15 years, it is necessary to carry out further research on the factors causing delays in bone age maturity in stunted children.

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