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The Influence of Exclusive Breastfeeding to the Manus Bone Maturity (Bone Age)

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Abstract

Baby bone health would improve intelligence in thought and action. Children with hand and foot bones strong to be more active and agile, compared to children with weak bones. This study aimed to determine the effect of exclusive breastfeeding on bone manus density (atlas bone age), at the age of infants aged 1 month and 6 months. This study uses a "prospective cohort" and a sample of 55 infants. Instrument data collecting baby left hand X-rays, using software measured the bone density of the baby. Data were analyzed by independent t test and paired t-test. The results showed that the average exposure of bone partially breast-fed infants is higher than exclusive breastfeeding infants in the first month.

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But in the sixth the average bone caught Exclusive breast-fed infants is higher than exclusive breastfeeding infant. This study concluded there was no effect of exclusive breastfeeding on bone density at the hands of infants aged 1 month, but exclusive breastfeeding effect on bone density at the hands of infants aged 6 months. It is recommended that young mothers of this nation to be aware and understand how and benefits of exclusive breastfeeding, so that is not affected by the promotion of infant formula. That health workers or health workers can set an example and give the correct explanation of the benefits of exclusive breastfeeding, so that the Ministry of Health program on the benefits of exclusive breastfeeding can walk and feel the benefits.

Keywords: Exclusive breastfeeding; bone density.

1. Introduction

Bone health is an important part for the development and growth of the baby. Bone health would improve intelligence in thought and action. Children with hand and foot bones strong to be more active and agile, compared to children with weak bones [1]. Childhood becomes a critical period for building bone mass. Strong bones is important for the growth and development of children. Inadequate calcium intake in children will increase the risk of bone fractures in children, so that children cannot reach optimal bone growth [2]. Based on data from the Health Research (Riskesdas) in 2007 and 2010 the incidence of stunting among children under five in Indonesia is still very high at 36.8% (18.8% very short, and 18.0% short) in 2007 and 35.6% (18.5% very short, and 17.1% short) in 2010, or more than a third of children under five in Indonesia [3,4]. Reports Case number Infants in Kendari City in 2013, 10% of low birth weight, stunting of 23.6%. The proportion of children under five are short (stunting) by 42%. Examination of bone age is a radiological examination to assess bone maturity (size, shape and bone mineralization) and its relation to chronological age of the child, based on the ossification center of the bones. The most accepted technique to determine bone age is the Atlas of Bone Age of Greulich and Pyle'S. Atlas has become the choice of reference for the interpretation of bone age [5]. Differences chronological age and bone age, can detect abnormalities in bone development. Pending or acceleration of the process of ossification can be caused by a disease. Skeletal age assessment is very helpful in monitoring the growth hormone therapy and diagnosis of endocrine disorders. Determination of bone age is also often used to predict the final height indivudi [6]. Research shows that a method for monitoring the growth of children is radiology. Bone maturation associated with rapid growth and sufficient food intake. Research using bone age atlas of Greulich and Pyles'S discovered that bone maturation child ren African race faster than children mature American race [5]. Exclusive breastfeeding theory contains many substances that can make optimal infant bone growth. This study aimed to determine the effect of exclusive breastfeeding on bone density manus (atlas bone age) at the age of infants aged 1 month and 6 months.

2. Materials and Methods

The design of this study using the "prospective cohort". This research was conducted in three health centers in the city of Kendari namely Eye Health Center, Health Center and Health Center Benu-Continent Poasia. The population is all infants aged 1 month in 3 health centers (Puskesmas Mata, Benu-continent, Poasia). A sample is a 1 month old baby in three health centers were 55 babies. Growth of infants will be followed until the age of

6 months and a second bone density measurements. Baby grouped by exclusive breastfeeding and exclusive breastfeeding in the first and sixth. Samples were obtained by simple random sampling method. The data collection is done by measuring bone density. Analysis of the data using an independent t test and paired t-test.

3. Results and Discussion

3.1 Results

Babies more male sex (63.6%) than females (36.4%). In the first month the number of infants receiving exclusive breastfeeding were 51 infants (92.7%), but at six months exclusive breast-fed infants were 29 infants (47.3%).

Table 1: Distribution of Babies Characteristics

Babies Characteristics	Frequency	Percentage
Sex		
Male	35	63,6
Female	20	36,4
Exclusive ASI 1 month		
Yes	51	92,7
No	4	6,3
Exclusive ASI 6 month		
Yes	29	52,7
No	26	47,3

In the first, the average bone density was highest in the finger bone is 291.10 ± 45.469 HU and lowest in the little finger bone as much as 261.90 ± 44.019, table 2.

Table 2: Distribution of infant bone density

infant bone density	1 month (Hu) n=10	6 month (Hu) n=51
T1 os metacarpal digiti V	261,90±44,019	368,86±61,480
T2 os metacarpal digiti IV	268,30±52,290	376,63±69,580
T3os metacarpal digiti III	278,10±62,148	357,27±67,145
T4 os metacarpal digiti II	291,10±45,469	338,61±61,015
T5 os metacarpal digiti I	274,00±74,081	309,75±57,440
T6 os hamate (carpal)		396,12±63,416
T7 os capitatum (carpal)		382,43±62,192

In the sixth month, on average, the highest bone density in the spine t6 is 396.12 ± 63.416 HU and lowest in mother finger bone as much as 309.75 ± 57.440. In the first, the average bone density Exclusive breast-fed infants was 269.47 ± 43.42 HU while infants who are not breastfed Exclusive of 321.6 ± 0 Hu. In the sixth, the average density of the carpal bones Exclusive breast-fed infants was 367.20 ± 59.35 HU while infants who are not breastfed Exclusive of 333.35 ± 85 Hu.

Table 3: Differences in bone density based on exclusive breastfeeding

Bone density	Exclusive ASI	Exclusive Non ASI	p
Karpal 1 month	269,47±43,42	321,6±0	0,288
Karpal 6 month	367,20±59,35	333,35±85	0,043
Metacarpal 6 month	412,09±56,98	368,98±56,44	0,009

Table 4: Differences in bone density with the first month of the sixth month

Bone density	n	Karpal 1 month	Karpal 6 months	p
Exclusive ASI	3	252,67±48,54	314,78±31,61	0,121
Exclusive Non ASI	6	273,90±35,67	298,46±25,08	0,209

The average density of the metacarpal bone Exclusive breast-fed infants was 412.09 ± 56.98 HU while infants who are not breastfed Exclusive of 368.98 ± 56.44 Hu. Independent t statistical test results obtained by value p> 0.05 for the first month, which means there is no difference in bone density between the carpal babies who are breastfed Exclusive with Exclusive breastfeeding. In the sixth found differences in the carpal and metacarpal bone density among breast-fed babies Exclusive with exclusive breastfeeding (p <0.05). This shows that exclusive breastfeeding affect bone growth at six months. The average bone density infants receiving exclusive breastfeeding in the first was 252.67 ± 48.54 HU and sixth month of 314.78 ± 31.61 Hu. the average bone density infants receiving exclusive breastfeeding in the first was 273.90 ± 35,67HU and sixth month of 298.46 ± 25.08 Hu statistical paired t test results obtained value of p> 0.05. This shows that there is no difference in the average density of the carpal bones infants between a month I got better with the sixth month of exclusive breastfeeding or not breastfeeding exclusively.

3.2 Discussion

The results showed no effect of exclusive breastfeeding on bone density in infants aged 6 months between breastfed Exclusive with exclusive breastfeeding, while in the first month have not found any effect of exclusive breastfeeding on bone density. In the first month have not found any difference in bone density. This is due in the first month of mothers that exclusive breastfeeding is still high so the baby is still the same bone density. In the sixth many breastfeeding mothers do not exclusively so that the baby's bone density has also been different.

Breast milk is the best and most complete nutrition. The nutritional value of the milk is greater than formula, because it contains fat, carbohydrate, protein and water in the right amount for the digestion, brain development and growth of children. Unique nutritional content causes the ASI has the advantage that cannot be duplicated by any formula. Types of fatty acids found in breast milk have an influence on brain development that led to the ability to see and cognitive function of children developed early / fast [7]. Individually breast milk is conditioned to meet the needs of the human infant. Breast milk contains nutrients with high biological ability to meet the needs of the baby growing rapidly. In addition to the nutritional content of breast milk contains hormones and growth factors (growth factors), which is a component of bioactive proteins. The component serves primarily to improve the adaptability of the gastrointestinal tract after birth by stimulating the growth of gastrointestinal cells, maturation of the gastrointestinal system, the formation of colonies of good bacteria, and the development of gastrointestinal lymphoid tissue. The growth factors are present in breast milk, among others, IGF-1, EGF, TGF- a and -b. The existence of hormones, growth factors and other components of the immune factors are very important in the development of the immune system of the gastrointestinal tract, so it plays an important role in preventing the disease to the child [8]. Exclusive breastfeeding for the infant can increase bone density. This caused breast milk (ASI) is well suited to rnemenuhi baby's needs in every respect: in the form of lactose carbohydrate in human milk; fat contains a lot of polyunsaturated fatty acids (polyunsaturated fatty acids); Its main lactalbumin protein is easily digested; many vitamin and mineral content; calcium-phosphate ratio of 2: 1, which is an ideal condition for the absorption of calcium. [9] Bone formation begins with the primary ossification. In the early signs of bone ossification membrane this is the entry point to a certain blood vessels carrying certain cells called osteoblasts and osteoclasts. Osteoblasts modified by fibrobalst, collagen fibers and fibers deposited calcium salts and other inorganic salts accumulate. Osteocalst-cells derived from bone marrow cells that form bone tissue growth. Bones cannot grow completely without any supply of calcium, phosphorus, and other inorganic components such as magnesium and manganese. Approximately 99% of total body calcium found in bones and teeth. Bone formation begins in an embryo and lasts for life. Calcium plays a role in bone mineralization, cell recognition and muscle contraction. In children who are growing about 180 mg of calcium is added to the bone every day, up to 400 mg as a teenager. Calcium plays a role in bone mineralization, cell recognition and muscle contraction. Vitamin D stimulates the absorption of calcium from the intestine and reabsorption of calcium by the kidneys. If vitamin D is less than the supply of calcium and phosphorus in the blood stream is not quite so soft bone (softened bones) becomes distorted and weight loss. Fluor is needed for the formation of tooth enamel perfect. Phosphorus is a component of enzymes, other metabolic, genetic material (DNA), cell membranes, and bone used in bone mineralization. About 85% of the phosphor body is in the bones. Bone contains 60% of the magnesium body with more than 300 enzymes using magnesium and many cells that produce energy needs magnesium to function. [10] **.** Some types of vitamin plays a role in bone contained in milk are: Vitamin A can control the activity of osteoblasts and osteoclasts. Too much Vitamin A in the diet can lead to reduced skeletal growth. In contrast to vitamin A deficiency causes defects in the process of bone formation. Deficiency of vitamin C, intercellular substance imperfectly formed bone and bone construction susceptible to collagen deficiency. Vitamin D deficiency causes rickets. Vitamin D stimulates the absorption of calcium from the intestine and reabsorption of calcium by the kidneys. If vitamin D is less then the supply of calcium and phosphorus in the blood stream is not quite so soft bone (softened bones) becomes distorted and weight loss [10].

Differences in bone density babies at six months due to the different nutritional content of breast milk with complementary feeding. The main source of calories in the milk is fat. The milk fat is easily digested and absorbed by infants because breast milk contains enzymes that digest fat lipase triglycerides to diglycerides, so little fat that is not absorbed by the digestive system of the baby. While formula (MP-ASI) does not contain the enzyme because the enzyme will break down when heated. That is why it will be difficult to absorb fat baby formula and cause the baby to be diarrhea and lead to accumulation of fat that will eventually lead to obesity (obesity) in infants. In addition, infants who received other foods, such as rice or mashed banana will only get plenty of carbohydrates so that nutrients that were not balanced. Too many carbohydrates cause the child more easily suffering from obesity with all its consequences. Exclusive breastfeeding for the infant can increase bone density. This caused breast milk (ASI) is well suited to meet baby's needs in every respect: in the form of lactose carbohydrate in human milk; fat contains a lot of polyunsaturated fatty acids (polyunsaturated fatty acids); Its main lactalbumin protein is easily digested; many vitamin and mineral content; calcium-phosphate ratio of 2: 1, which is an ideal condition for the absorption of calcium [9].

Research shows that babies who were breastfed Exclusive have higher bone mineral than formula fed babies at 3 months of age [11]. Breastfeeding will increase 2-3% in bone mineral density around the fingers [12].

4. Conclusion

Exclusive breastfeeding was not associated with bone density in infants age 1 month, but related to bone density in infants aged 6 months

5. Recommendations

Mothers should promote exclusive breastfeeding in infants. The necessity of the role of family, health workers, and community leaders to motivate mothers to give exclusive breastfeeding

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