

Infant's Growth and Development at the Age of 6-12 Months Based on Breasfeeding

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ABSTRACT

Infancy is a golden and critical period in the cycle of life. In this period, an infant that is not provided with exclusive breastfeeding has 14 times higher risk to death compared with an infant that is provided with exclusive breastfeeding. Malnutrition in the first year causes reduced brain cells up to 15-20% which leads to impaired growth and development of infant. Exclusive breastfeeding can fulfill the need for nutrients within the first 6 months of life. The objective of this study was to analyze the difference in growth and development of infants at the age of 6-12 months based on breastfeeding in the working area of Puskesmas Perawatan Ngkeran, Aceh Tenggara Regency. This is used comparative analytical research with cross sectional design. The sample was 124 infants consisting of 62 infants with exclusive breastfeeding and 62 non exclusive breastfeeding, taken by purposive sampling. The data were collected by using questionnaires through interviews, measurement and observation. They were analyzed using chi square and logistic regression testing for confounding check. The results showed that there was a significant difference in growth and development of infants based on breastfeeding (p value=0.000) with prevalence ratio (PR)=4.167 (95%CI: 1.867-9.301), which indicated that the infant who did not get exclusive breastfeeding had 4.167 times higher risk to experience bad growth and development. Based on the examination of confounding variable found that food supplementation was the variable with the risk that influences infant's growth and development. Mothers are expected to practice exclusive breastfeeding, health practitioners are suggested to conduct more counseling of exclusive breastfeeding for pregnant mothers, to have early breastfeeding initiation, to create supporting groups of exclusive breastfeeding and to issue health policy of exclusive breastfeeding.

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1. INTRODUCTION

First years of a child's life are very important. This period is called golden age, the window of opportunity and critical period. The golden age is the period in which the growth of nerve cells and synapses occurs so rapidly that complex brain tissue ($\pm 80\%$) forms and absorbs information fastest. It is the period with opportunity to maximize all potential of the child, where adequate nutrition, good health status, proper parenting, and appropriate stimulation help the child achieve optimal ability. It is also called a vulnerable period where malnutrition in this period will have long-term and even permanent effects [1].

Exclusive breastfeeding can fulfill the need for nutrients within the first 6 months of life [2]. Globally, less than 43 percent of 6 month-old infants were exclusively breastfed [3]. This rate is 37% in

developing countries [4] and it is 30.2% in Indonesia [5]. The Research shows that an infant that is not provided with exclusive breastfeeding has 14 times higher risk for death compared with the infant that is provided with exclusive breastfeeding [6]. Several global facts reported by The Lancet Breastfeeding Series prove that breastfeeding boosts intelligence (IQ) on average of 1-3 points, prevent overweight (13%) and obesity. Exclusive breastfeeding is an investment in preventing low birth weight (LBW), stunting and infectious diseases [4]. Those who survive due to malnutrition have an impact on subsequent low quality of life and can not be improved even though at the next age the nutritional needs are fulfilled [6].

In Indonesia, growth disruption has been seen from the high prevalence of stunting (37.2%), wasting (12.1%), and underweight (19.6%) [5], and there were 12.8-28.5% of children less than 2 years old with developmental disorders [7]. Lack of nutrition in the first years of life causes brain cells to decrease 15-20%. This process leads to developmental disorders such as psychomotor, cognitive and social disorders [8]. Growth and development of infants is largely determined by the amount of breast milk [9].

The research of Ukegbu et.al [10] shows growth patterns (mean of body weight and length) in exclusively breastfed infants according to the WHO growth curve compared to non exclusively breastfed infants. The study also showed exclusive breastfeeding promotes optimal growth in the first 6 months of life. Systematic review studies and meta analysis have found a positive effect of breastfeeding on cognitive development. Breastfed children had a higher mean of IQ i.e. 2.62 points higher than non breastfed infants after controlled with maternal IQ [11]. Lee et.al's study [12] shows that longer duration of breastfeeding boosts babies' cognitive development. Based on the explanation above, it is necessary to conduct further studies to study the effectiveness of exclusive breastfeeding for growth and development of infants. The objective of the study was to analyze the difference in growth and development of 6-12 month-old infants based on breastfeeding in the working area of Puskesmas Perawatan Ngkeran, Aceh Tenggara Regency.

2. RESEARCH METHOD

This research has been passed ethical clearance with number 1303/XII/SP/2017. The study was employed the used of quantitative research with comparative analytic design through cross sectional approach. The population of this study were all infants aged 6-12 months in the working area of Puskesmas Perawatan Ngkeran, Aceh Tenggara Regency. Two hundred twenty respondents have been chosen for this study. The total sample was 124 respondents, 62 with exclusive breastfeeding and 62 non exclusive breastfeeding. The sampling technique applied was the purposive random sampling.

The independent variable in this study was breastfeeding consisting of exclusive breastfeeding and non exclusive breastfeeding. Exclusive breastfeeding is defined as being breastfed and not given any additional food and beverages including water or prelactal foods before breastfeeding is released, except medications and vitamins when the babies are ill, from birth until 6 months. Non exclusive Breastfeeding is defined as being breastfed and also given other foods and drinks or being fed with formula milk with additional food and other beverages in infants before 6 months old. Data collection was conducted in December 2017 using questionnaires containing the characteristics of mothers and infants aged 6-12 months, anthropometric measurements of infants, developmental pre-screening questionnaires and the questionnaires were the modification of hearing test [13] conducted through interviews, observation and measurements.

Univariate analysis was conducted on description of the data about the frequency distribution of various characteristics on studied variables, both independent and dependent variables. Bivariate analysis was performed with chi square at significance level of 95% ($\alpha = 0,05$). Value of $p < 0.05$ indicates that there is a difference in the growth and development of 6-12 month-old infants based on breastfeeding (exclusive and non exclusive) and the logistic regression testing for confounding variable.

3. RESULTS AND ANALYSIS

3.1. Univariate Analysis

The univariate analysis consisted of characteristics on mother with Infants aged 6-12 months, birth weight, food supplementation based on breastfeeding are illustrated in Table 1.

Table 1. Characteristics of Mothers, Birth Weight, and Food Supplementation

| Characteristic | Breastfeeding | | | |
|---------------------------|---------------------------------|------|-------------------------------------|------|
| | Exclusive breastfeeding n=62 | | Non exclusive breastfeeding n=62 | |
| | | % | | % |
| Mother's age | | | | |
| < 20 years | 4 | 6.4 | 1 | 1.6 |
| 20-35 years | 53 | 8.5 | 54 | 87.1 |
| > 35 years | 5 | 8.1 | 7 | 11.3 |
| Education of mother | | | | |
| Primary | 27 | 43.5 | 25 | 40.3 |
| Intermediate | 18 | 29.0 | 25 | 40.3 |
| Upper (diploma, bachelor) | 17 | 27.5 | 12 | 19.4 |
| Occupation of mother | | | | |
| Working | 5 | 8.1 | 5 | 4.8 |
| Unworking | 57 | 91.9 | 57 | 95.2 |
| Family income | | | | |
| > Rp 2.500.000,- | 6 | 9.7 | 3 | 4.8 |
| < Rp 2.500.000,- | 56 | 90.3 | 59 | 95.2 |
| Infant's birth weight | | | | |
| < 2500 gram | 2 | 3.2 | 6 | 9.7 |
| 2500 - 4000 gram | 58 | 93.6 | 55 | 88.7 |
| > 4000 gram | 2 | 3.2 | 1 | 1.6 |
| Food supplementation | | | | |
| Good | 46 | 74.2 | 42 | 67.7 |
| Bad | 16 | 25.8 | 20 | 32.3 |

3.1.1. Growth of 6-12 Month-Old Infants based on Breastfeeding

The normal growth by head circumference for age z-score was found to be higher in infants who have been exclusively breastfed than those with non exclusive breastfeeding i.e. 96.8% and 93.5% respectively. Based on weight for age z-score (WAZ), it was found out that infants with exclusive breastfeeding had higher WAZ with good nutrition than those with non exclusive breastfeeding i.e. 90.4% and 69.4% respectively. Based on length for age z-score (LAZ), the research found out that infants who have been exclusively breastfed had higher normal LAZ than those who were not exclusively breastfed i.e. 93.6% and 87.1% respectively. It is presented in Table 2.

Table 2. The Frequency Distribution of Growth on 6-12 Month-Old Infants based on Breastfeeding

| Growth | Breastfeeding | | | |
|------------------------------------|---------------------------------|------|-------------------------------------|------|
| | Exclusive breastfeeding n=62 | | Non exclusive breastfeeding n=62 | |
| | | % | | % |
| Head circumference for age z-score | | | | |
| Normal (2s/d-2SD) | 60 | 96.8 | 58 | 93.5 |
| Abnormal (>2SD and <-2SD) | 2 | 3.2 | 4 | 6.5 |
| Weight for age z-score | | | | |
| Good nutrition (2s/d-2SD) | 56 | 90.4 | 43 | 69.4 |
| Less nutrition (-2s/d-3SD) | 3 | 4.8 | 13 | 20.9 |
| Malnutrition (<-3SD) | 3 | 4.8 | 6 | 9.7 |
| Length for age z-score | | | | |
| Normal (2s/d-2SD) | 58 | 93.6 | 54 | 87.1 |
| Height (>2SD) | 0 | 0.0 | 2 | 3.2 |
| Stunting (-2s/d2SD) | 3 | 4.8 | 4 | 6.5 |
| Severe stunting (<-3SD) | 1 | 1.6 | 2 | 3.2 |

3.1.2. Development of 6-12 Month-Old Infants based on Breastfeeding

Development of infants in gross motor, fine motor, speech language and social independence in accordance with age is that it is higher in infants who have been exclusively breastfed than those with non exclusive breastfeeding i.e. 95.2% and 82.3% respectively. The development of normal hearing was found out to be higher in exclusively breastfed infants than those with non exclusive breastfeeding i.e. 91.9% and 80.6% respectively this is illustrated in Table 3.

Table 3. The Frequency Distribution of Development on 6-12 Month-Old Infants based on Breastfeeding

| Development | Breastfeeding | | | |
|--|-------------------------|------|-----------------------------|------|
| | Exclusive breastfeeding | | Non exclusive breastfeeding | |
| | n=62 | % | n=62 | % |
| Gross motor, fine motor, speech language and social independence | | | | |
| Appropriate | 59 | 95.2 | 51 | 82.3 |
| Suspect | 3 | 4.8 | 8 | 12.9 |
| Delayed | 0 | 0.0 | 3 | 4.8 |
| Hearing Potency | | | | |
| Normal | 57 | 91.9 | 50 | 80.6 |
| Hearing disorder | 5 | 8.1 | 12 | 19.4 |

3.2. Bivariate Analysis

3.2.1. The Difference in Growth of 6-12 Month-old Infants based on Breastfeeding

The infants with non exclusive breastfeeding had lower percentage of normal growth than those with exclusive breastfeeding i.e. 64.5% and 88.7% respectively. The statistical results showed that there was difference in the infants' growth based on breastfeeding ($p=0.001$) with $PR=4.321$ (95% CI:1.683-11.096) which is demonstrated in the following Table 4.

3.2.2. The Difference in Development of 6-12 Month-old Infants based on Breastfeeding

The infants with non exclusive breastfeeding had lower percentage of normal development than those with exclusive breastfeeding i.e 71.0% and 90.3% respectively. The statistical results showed that there was difference of infants' development based on breastfeeding ($p=0.006$) with $PR=3.818$ (95% CI:1.398-10.429) is presented in Table 4.

3.2.3. The Difference in Growth and Development 6-12 Month-old Infants based on Breastfeeding

The Difference between growth and development of 6-12 month-old infants based on breastfeeding was that the infants with non exclusive breastfeeding had a balanced amount of bad and good i.e. 50.0% and most of infants with exclusive breastfeeding had normal growth and development i.e. 80.6%. The statistical result showed that there was difference of infants' growth and development based on breastfeeding ($p=0.000$) with $PR=4.167$ (95% CI:1.867-9.301) which is presented in Table 4.

Table 4. The Difference in Growth and Development of 6-12 Month-old Infants based on Breastfeeding

| Variable | Subvariables | Non exclusive breastfeeding | | Exclusive breastfeeding | | <i>p value</i> | PR 95% CI |
|------------------------|--------------|-----------------------------|------|-------------------------|------|----------------|-------------------------|
| | | n | % | n | % | | |
| Growth | Bad | 22 | 35.5 | 7 | 11.3 | 0.001 | 4.321 (1.683-11.096) |
| | Good | 40 | 64.5 | 55 | 88.7 | | |
| Development | Bad | 18 | 29.0 | 6 | 9.7 | 0.006 | 3.818 (1.398-10.429) |
| | Good | 44 | 71.0 | 56 | 90.3 | | |
| Growth and Development | Bad | 31 | 50.0 | 12 | 19.4 | 0.000 | 4.167 (1.867-9.301) |
| | Good | 31 | 50.0 | 50 | 80.6 | | |

3.3. The Examination of Confounding Variables

The examination of confounding variables intended to validly estimate the relationship between one main variable and dependent variable by controlling some confounding variables. The analysis in testing confounding variables was done by employing regression logistics method.

Based on the regression logistics analysis results, it was show that food supplementation variable had $p=0.000$ which indicated that food supplementation was a factor that influenced infant's growth and development. Meanwhile, birth weight and family income had p value >0.05 which indicated that they did not influence infant's growth and development. Results of data analysis are presented as shown in Table 5.

Table 5. The Testing of Confounding Variables with Complete Modeling using Regression Logistics Method

| Variables | Wald | <i>p value</i> | Exp (B) | 95% CI | |
|-----------------------|--------|----------------|---------|--------|--------|
| | | | | Lower | Upper |
| Breastfeeding | 10.700 | 0.001 | 4.374 | 1.807 | 10.591 |
| Food supplementation | 12.599 | 0.000 | 5.159 | 2.085 | 12.766 |
| Infant's birth weight | 1.407 | 0.236 | 0.394 | 0.084 | 1.837 |
| Family income | 0.049 | 0.826 | 0.834 | 0.165 | 4.208 |

The confounding variables were issued one by one from the complete modeling i.e. breastfeeding with supplementation food, followed by breastfeeding with infant's birth weight and breastfeeding with family income. The result proved that three variables did not change PR >10% which indicated that food supplementation, infant's birth weight, and family income which were suspected as confounding variables were not the risk factor as they did not significantly influence infant's growth and development.

Even though food supplementation showed p value 0.000 indicating that statistically, it significantly influenced infant's growth and development, but when views changed PR after the proof turns was not more than 10%, which indicated that infant's growth and development was not only influenced by food supplementation, but there were also other factors that influenced growth and development of infants. The data as shown in Table 6.

Table 6. The One by One Analysis of Confounding Variables with Regression Logistics

| Variables | Wald | p value | Exp (B) | 95% CI | |
|----------------------|--------|---------|---------|--------|--------|
| | | | | Lower | Upper |
| Breastfeeding | 11.619 | 0.001 | 4.560 | 1.906 | 10.910 |
| Food supplementation | 13.790 | 0.000 | 5.488 | 2.234 | 13.481 |
| Breastfeeding | 10.827 | 0.001 | 3.912 | 1.736 | 8.815 |
| Birth Weight | 2.557 | 0.110 | 0.308 | 0.073 | 1.304 |
| Breastfeeding | 12.162 | 0.001 | 4.215 | 1.878 | 9.460 |
| Family Income | 0.073 | 0.786 | 0.809 | 0.175 | 3.740 |

3.4. Discussions

3.4.1. Growth of 6-12 Month-old Infants Based on Breastfeeding

Normal growth is reflected in the growing size of anthropometrics that corresponds to the age of the infant. A healthy child is the one whose weight and length of body increases as it ages [13]. The growth referred in this study is the overall measurement results of head circumference for age z-score, weight for age z-score, length for age z-score of 6-12 month-old infants.

The normal growth by head circumference for age z-score was found to be higher in infants who have been exclusively breastfed than those with non exclusive breastfeeding. This study was also in accordance with the study by Ananta et al [14] involving 1.804 mothers and 0-11 month-old infants from 17 selected provinces which found a significant correlation ($p=0.031$). Infants given formula milk had more abnormal of head circumference than those who were exclusively breastfed. The study in Kelurahan Kebon Jeruk Jakarta [15] also found the same result that there was a small difference in head circumference between exclusively breastfed infants and those who were formula fed with p value=0.002 and eta square=0.0076.

Breast milk has a composition of LCPUFAs (Long-chain polyunsaturated fatty acids) or polyunsaturated fatty acid which is a long chain of essential fatty acids such as AA (Arachidonic Acid) and DHA (Docosahexaenoic Acid). This composition should be available in sufficient quantities for growth of infants' brain [13].

There were 2 infants (3.2%) exclusively breastfed with abnormal head circumference for age z-score (microsefali) that were born with low birth weight (LBW). The growth of the head circumference of the low birth weight infants was slower than those with normal birth weight. But this situation did not directly mean the baby had brain growth disorders. Measurement of head circumference is required for the next 3 months to make sure, while improving in diet, the environment that supports growth and development and review the infant's health history. It is expected that the intervention will change or increase the size of head circumference because infancy is still a period of rapid growth. After 3 months, if head circumference is still less normal then it is immediately referred to the higher health facilities.

Infants exclusively breastfed had higher WAZ with good nutrition than those with non exclusive breastfeeding. This study is in line with Vyas [16] who stated that exclusively breastfed infants had a stable weight gain based on WAZ and a causality relationship with the viability of exclusive breastfeeding. Ma [17] found that there was a lower prevalence of length and weight by age, weight by body length in artificially fed infants, infants who were fed with breast milk added with other foods compared to exclusively breastfed infants. Ramokolo et al. [18] in Sub-Saharan Africa found that non exclusively breastfed infants at 12-24 weeks of age were at higher risk of overweight and obesity by 2 years of age. This shows that the first 6 months of life is a critical period of a child's growth for suffering from overweight and obesity.

The content of fat in breast milk is easily digested and absorbed compared to formula milk fat. Carbohydrates (lactose) as a source of calories in breast milk is absorbed by body according to the infant's

needs while breastfeeding. The ratio of whey protein and casein in breast milk is 60:40, while cow milk is 20:80. This whey protein in a baby's gut forms a soft clot that is easily absorbed by the baby's intestine. In cow's milk carbohydrate and fat content produce high calories so that infants are at risk of obesity [19]. Breast milk contains insulin and leptin that can regulate the metabolism of fats and carbohydrates in the body so breastfed infants weigh and length in accordance with the WHO growth curve and tend not to be obese when compared to formula fed infants, or the mix of breastfed infants and formula milk [20].

Based on the results of this research, there were still 3 infants (4.8%) who were exclusively breastfed had malnutrition ($\leq 3SD$) i.e an infant who was born with low birth weight (2000 grams of gemelli pregnancy), an infant was born with excessive weight (4,800 grams) and an infant with normal weight. Low birth weight infants tend to experience late growth as a result of immature organs. Infants with excessive weight are more generally born by obesity mothers or mothers with diabetes so in the first days of birth they experience more severe adaptations such as increased incidence of hypoglycemia and at risk of experiencing growth disorders due to generally disturbed metabolism. Birth weight is just one of the factors that influences infants' growth; enormous genetic and environmental factors also influence the growth of infancy.

Infants who have been exclusively breastfed had higher normal of LAZ than those with non exclusively breastfed. This study is in line with research by Zalla et.al [21] in Haiti, that discovered the duration of exclusive breastfeeding (until 6 months old) was positively correlated with the prolonged increase and weight gain of infants according to age. It indicated exclusive breastfeeding effectively prevents wasting and stunting in infants. There was a gain in the normal range and increased body length in all age groups in the first 6 months [22].

Breast milk contains cytokine and growth factors that play an important role in preparing for the infant's immune system. A study on 398 pregnant women in London, Russia and Italy found an inverse relationship between breastfeeding time length and growth factor for hepatocyte growth factor (HGF) content, in which the HGF content was higher in colostrum than mature breast milk. HGF is a multi functional cytokine, which plays a role in angiogenesis, tumorigenesis and repair of body tissues [23].

Based on the results of the study, it was found out that there were an exclusively breastfed infant (1.6%) with severe stunting ($\leq 3SD$); the baby was born with a low birth weight (2,000 grams). In LBW, the infants who were not treated properly and not given good stimulation most likely caused the infant to be unable to pursue the delay of the growth and development in the first year of life.

Statistically, significant results were found in growth between the non exclusive breastfeeding and exclusive breastfeeding infants. The infants who were not exclusively breastfed had 4.321 times higher risk to suffer from poor growth. The non exclusive breastfeeding growth of the majority also has normal growth among others due largely infants born with normal weight (2,500-4,000 grams). Besides that, this area is a rural area, where environmental pollution, especially air pollution is still little, so it is conducive for the growth of the infants, and mother are still actively carrying her baby to the integrated service post in the village (it is called as posyandu) because infants under one year old still needs immunization so that the infant's growth still observed.

3.4.2. Development of 6-12 Month-old Infant Based on Breastfeeding

Development during infancy occurs very rapidly and briefly, and this period is the basis for the next stage of development. A healthy child is the who gets cleverer as they get older [13]. Exclusively breastfed infants have better gross motor, fine motor, speech language and social independence in accordance with age than those with non exclusive breastfeeding. This study is in line with the one done by Dewey et.al [24] which shows that exclusively breastfed infants are able to crawl earlier and able to walk at 12 months of age than those who receive supplementary foods too early. The study by Setyarini et.al [25] demonstrated that a history of breastfeeding had significant ($p=0.001$) influence on the emotional mental development of 3-4 year-old children after being controlled by mother's knowledge, attitude, education level, and child's birth weight.

Breast milk contains components of Hsc/ p 70 that protects the white matter of the brain cell from the death (apoptosis) and which reduces developmental disorder of motor, language, cognitive, and behavioral intelligence especially in premature infant [26]. Breastfeeding influences emotional and mental development through the bonding attachment [9].

Infants who have been exclusively breastfed had higher hearing than those with non exclusive breastfeeding. This study is in line with the publication of Darlington [27] describing the results of the research by Mandy Belfort, from a children hospital in Boston, that there is a causal relationship between breastfeeding in infancy and receptive language at age three and with verbal and non-verbal IQs at a better school age.

Theoretically, the development of hearing ability is in line with the development of speech and language which is influenced by brain growth and development [13]. Based on the results of the study, there

were 5 infants (8.1%) who were exclusively breastfed had hearing disorders. It did not directly identify any abnormalities. The infant had a span of 6 months to complete the development of hearing. Exclusive breastfeeding and adequate stimulation and as the infant gets older, it is expected that the infant's hearing will also be normal.

Statistically, significant results were found between the development of non exclusive breastfeeding and exclusive breastfeeding infants. The infants who were not exclusively breastfed had 3.818 times higher risk to experience poor development. That the development had normal majority in both groups is partly because most of mothers do not work, in which the mother had a whole day with the baby, so the stimulations for baby can be given more frequently and anytime, additionally most of infants born with normal weight (2,500-4,000 gram). This birth weight had the lowest risk than the other groups of birth weight from irregularities development in infancy. Generally, infants born with normal weight have a physiological body that works better correlated with good development.

3.4.3. Growth and Development of 6-12 Month-old Infants Based on Breastfeeding

The golden period is the most important period in the growth and development stage of a child. The infants' growth and development is largely determined by the amount of breastfeeding that infants acquired. Statistically, there was a significant result between non exclusively breastfed and exclusively breastfed infants i.e. the infants who are not exclusively breastfed have 4.167 times higher risk to experience poor growth and development.

This study is in line with the research by Perera et.al [21] which showed that none of exclusively breastfed infants had growth faltering. A research by Johnson et.al [28], described that non breastfed infants as independent factors were associated with low growth rates. Studies by Kelishadi et.al [29] in Iran showed longer duration of breastfeeding (≥ 6 months) was associated with lower risk of overweight in children and adolescents compared to those with a breastfeeding duration of less than 6 months, with an odds ratio (OR) 0.86 (0.74-0.99). This means that longer duration of breastfeeding is a protective factor of overweight in childhood and adolescence. The research by Azagoh et.al [30] in infants who were earlier given complementary feeding of breastmilk showed an increase in prevalence of stunting and overweight. This means that early feeding in infants will increase the risk of malnutrition in young infants.

A cohort study by McCrory and Murray [31] that assessed the correlation between breastfeeding and the development of nine month old infant. It was discovered that infants who had never been breastfed had a lower developmental outcomes on milestones rather than infants who were partially or exclusively breastfed. This shows that there is a positive relationship between breastfeeding on the development of gross motor, fine motor, problem solving ability, and children's social personality.

Research of Jedrychowski et.al [32] in 468 children found that breast milk given in the first years of a child's life is a strong predictor of continued cognitive development in later life. They found IQ scores rose by 3.8 points (95% CI:2.11 to 5.45) in children who were exclusively breastfed (> 6 months). Jenkins [33] found of the correlation between exclusive breastfeeding with cognitive development of children observed from increased reading concentration in children who aged 4 years old. Victora et.al [4] describes that breastfed infants up to 12 months old have IQ 3.76 points higher, have higher levels of education and higher monthly income at age 30 than breastfed infants only in 1 month.

Breast milk compositions are loaded with complete nutrition, including DHA and AA, which are needed for infant brain development. Studies using systematic review and meta analysis found that breastfeeding was correlated with increased intelligence test performance. Positive effects of breastfeeding in cognitive development on random observation found that breastfed children had higher mean IQ of 2.62 points than non breastfed infants after controlled with maternal IQ [11].

In confounding examination of food supplementation variables, infant's birth weight and family income are not confounding variables because the change in PR value is not more than 10% but food supplementation have $p=0.000$. Based on this test, growth and development of infant were not only influenced by food supplementation, there are other factors that affect growth and development of infants, such as genetic, environment, immune status, history of illness, stimulation, etc. This suggests that good food supplementation will promote good growth and development. Unfavorable feeding practices affect the immunity or endurance of the infant. If the infant is attacked by the disease, then the infant's appetite will be disrupted, resulting in impaired absorption of food substances that cause disruption of infant's growth and development. This means that the infant's air over the age of 6 months should be introduced to food supplementation to support the infant's growth and development because at the age of 6 months, in addition to breastfeeding babies also need additional nutritious food. The results of this study show that pure infant's growth and development are influenced by breastfeeding.

Based on the results of this study, it was found that non exclusively-breastfed infants had a balanced amount between good and poor growth development. The exclusively breastfed infants mostly had good

growth and development. A balanced amount of good and poor growth development in non exclusively breastfed infants were due to maternal age of 20-35 years old, which at this age is a healthy reproductive range, and additionally, majority of them were born with normal birth weight (2,500-4,000 grams), which had the lowest risk of health problems compared to other birth weight (<2,500 or > 4,000 gram).

The results also showed that 12 infants (27.9%) who were exclusively breastfed had poorer growth and development. This needs to be examined to see in which part the delay of growth and development of infants and then do the stimulation and intervention to pursue the delay. According to the authors' assumption it can occur because the process of growth development in infancy is a complex process with many influencing factors.

The long-term consequences of impaired growth and development included stunting and wasting so that when they become teenagers, they are at risk of dwarfing, anemia, chronic energy deficiency by measuring the upper arm circumference, pelvic development and reproductive organs which are not optimal [34]. A narrow pelvis is at risk during labor and anemia affecting a woman's menstrual cycle and fertility. Girls with chronic energy deficiency were at 2-3 times higher risk in low birth weight, stunting risk increased 2.36 times higher in LBW [35], cognitive abilities and low economic productivity [36] and increased risk of breast cancer [37]. Less nutritional events will recur in the intergenerary cycle of women.

There are many infants who are not breastfed exclusively because of the incessant promotion of infant formula milk through the mass media and even to health workers, lack of public awareness about pattern of infant feeding, lack of understanding of the right exclusive breastfeeding, lack of counseling on exclusive breastfeeding and no group to support exclusive breastfeeding in the community also affects the success of exclusive breastfeeding that can ultimately affect infant growth and development.

4. CONCLUSION

Infancy is a golden and critical period in the cycle of life. Exclusive breastfeeding can fulfill the need for nutrients within the first 6 months of life. The objective of this study was to analyze the difference in growth and development of infants at the age of 6-12 months based on breastfeeding in the working area of Puskesmas Perawatan Ngkeran, Aceh Tenggara Regency. The results shows that there was differences between the growth ($p=0.001$; $PR=4.321$; 95% $CI:1.683-11.096$), development ($p=0.006$; $PR=3.818$; 95% $CI:1.398-10.429$) and growth and development ($p=0.000$; $PR=4.167$; 95% $CI:1.867-9.301$) of 6-12 month-old infants based on breastfeeding. Variables that were predicted as the confounding were food supplementation, infant's birth weight and the family income, after passing the tests found out only that the food supplementation was the variable with the risk to influence infant's growth and development. Based on this conclusion in order to optimize infants' growth and development, it was needed to issue a policy that supports exclusive breastfeeding in Aceh Tenggara Regency. The regulation as a local wisdom for working mothers or civil servants, that given maternity leave for up to 6 months in order to provide exclusively breastfeeding.

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