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## **Early Childhood: Motor Comparison of Breastfed and Formula-fed Children Aged 4-6 Years**

Nurhayati<sup>1</sup>✉, Ramli<sup>2</sup>

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<sup>1</sup>Universitas Tadulako, Palu, Indonesia

<sup>2</sup>SMKN Negeri 2 Palu, Palu, Indonesia

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### **Abstract**

The study aims to see the comparisons and differences in motor skills of breastfed and formula-fed children aged 4-6 years both in fine and gross motor. The approach used is descriptive quantitative by looking at comparisons or differences in children's motoric development. The subjects in this study are 40 children consuming breast milk aged 4-6 years and 40 children consuming formula milk aged 4-6 years, so a total of participants are 80 children with parents as respondents and the results are significant. The findings show that children consuming breast milk are better and faster in fine motor and gross motor development than children consuming formula milk.

### **How to cite**

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## INTRODUCTION

Children are a very valuable national asset and become the successor to the ideals of the nation that will be the leader in the future that continues the progress of the nation and country. However, as a valuable asset, not all children have the right to be able to develop as children in general. This is one of them experienced by children as infants are not breastfed by their mothers. Breastfeeding is very popular as the best adapted food for the needs of babies that is recognized to have beneficial health effects (Hornell et al., 2013). But physiologically many mothers cannot breastfeed and have to use formula milk for their babies (Brown, 2005). Air Susu Ibu (ASI) adalah cairan tubuh dalam keadaan dinamis yang diproduksi khusus untuk bayi, sebagai sumber energi dan pertumbuhan baik fisik, mental serta kekebalan tubuh bayi (Hediger et al, 2000). (WHO, 2002) ASI Breast milk is a dynamic body fluid produced specifically for babies, as a source of energy and growth both physical, mental as well as immune of the baby (Hediger et al, 2000). (WHO, 2002) Exclusive breast milk is only giving breast milk without any liquid or solid food except vitamins, minerals or remedies in the form of drops or syrups until the age of 6 months. The most perfect, easy and inexpensive way to meet the baby's needs is breast milk. Breast milk as a food containing the most complete nutrition for babies (Blyth et al, 2002) The benefits of breast milk are undoubtedly no doubt even the government has encouraged the provision of breast milk exclusively. Breast milk contains high-quality nutrients that are useful for the development of babies such as: colostrum, taurine, DHA, and AA, immunoglobulin, lactoferrin, lysozyme, as well as bifidus factors (Ministry of Health RI, 2012).

Exclusive breastfeeding gives babies less gastrointestinal illness, and fewer growth disorders (Kramer & Kakuma, 2002). Breast milk is not only beneficial for the health of the baby today, but also for the future motor development of the child. Children with breast milk consumption early generally experience rapid motor development compared to children who only get formula milk because formula milk feeding in children usually develops less or late and will affect the quality of the child. Many studies explain the benefits of breast milk on children's health, but this time researchers want to see the motor differences of children who consume breast milk and formula milk.

The World Health Organization (WHO) has established a different infant diet (2008):

- Exclusive breast milk: babies given breast milk without non-human milk as their formula may receive oral rehydration solution (ORS), drops and syrup

- Breast feeding is dominant: baby food mostly consists of milk breasts and certain liquids such as water, water-based drinks and fruit juices, and can also contain ORS, drops and syrups, but no formula milk

- Partial breast milk or supplementation: infants are given breast milk and other foods such as formula milk

- Bottle feeding: includes food, liquid or semi-solid food, which is consumed with bottles and nipples

Another benefit of Breast Milk is to get a healthy generation physically and mentally. Obtaining resilient Human Resources (HR) as a quality resource, and saving state spending on formula milk procurement (Perry, Hockenberry, Lowdermilk & Wilson, 2010) Some facts about the dangers of formula milk, namely increasing the risk of asthma, increasing the risk of allergies, lowering the development of intelligence or cognitive, increased risk of acute respiratory disorders, increased risk of infection, increased risk of obesity or obesity, increased risk of heart disease, increased risk of diabetes, causing malnutrition and growth disorders. But nowadays, mothers, especially in big cities tend to choose to give formula milk either as a substitute or a companion to breast milk to meet nutritional needs for babies. This is done for various reasons such as breast milk is less numerous, busy, breast shape becomes not beautiful, breast milk is not enough, breast milk does not come out, and formula milk is considered more practical. In fact, a mother has an important obligation, such as educating her child through the provision of breast milk which is the right of the child that will affect the motor development of the child.

Furthermore, research conducted by Dewey et.al (2001) in Honduras found that babies who got exclusive breast milk during the first six months of life had better loco motor function, it was seen that faster crawling and already able to walk at the age of 12 months. The results of this study are in line with Purwaningsih and Lestari research (2015) which concluded that there is a meaningful difference between the psychomotor development of infants aged 0-6 months who are breastfed and formula-fed in Glagah Jatnom Klaten village, namely the motor development of babies who are breast-fed better than those given formula milk.

Children with not breastfeeding milk

exclusively will have a chance of experiencing sub-standard psychomotor development twice as much as children who get exclusive breast milk (Al-Rahman, 2016). This is based on aspects of cognitive function of exclusive breastfeeding giving better results to children's motor development. From 10.3% to 32.5% and there is a significant relationship between exclusive breastfeeding and child development, because children who are given exclusive breast milk growth will be suited with their growth (Lestari, 2013). In addition, breast milk also contains little iron (0.5-1.0 mg / liter), but infants or children who consume breast milk will not lack iron or anemia. Iron is needed by a baby or child to produce hemoglobin or part of red blood cells that carry oxygen throughout the body (Andarina, 2006).

From the explanation above, the author is interested to examine the motor comparison of breastfed and formula-fed children.

## METHOD

This study uses quantitative approach by looking at motor comparison of children who consume exclusive breast milk and consume formula milk with research time from January to February 2020. The samples taken in this study were children aged 4 to 6 years while the respondents were parents of the child. The subjects are a total of 40 parents whose children consumed breast milk consisting of 20 boys and 20 girls and 40 parents of children consumed formula milk consisting of 20 boys and 20 girls in Palu City. Participants were selected based on age 48 months to 60 months of age. All parents of the children were asked to fill out a questionnaire from the researchers containing 40 statements. The questionnaire to explore information about children's motor and information is attempted using a likert scale as it is very appropriate, appropriate, inappropriate and very inappropriate.

Question, Researchers recruit all parents who have children aged 48 months to 60 months. After they agreed orally to be sampled in this study, a list of research statements was given to 80 parents, namely 40 parents whose children consumed breast milk and 40 parents whose children consumed formula milk or PASI was found and provided a list of statements containing 40 statements of parents about the child's motor both fine motor and coarse motor with the same statement between the mother whose child consumes breast milk and the mother whose child consumes formula milk.

The process of data processing will pass

several stages, namely data inspection, code administration, entering data into the computer and entering data cleaning. The data will be processed or analyzed using statistical software. Data analysis will begin with data normality test, levene test, T-test or Mann-Whitney test at C1:95% to see comparison of data on children consuming breast milk and formula milk.

## RESULT AND DISCUSSION

### 1. Respondent Statement

Respondents in this study were mothers who had children aged 4-6 years. Presentation of the frequency report of parents about the motor of children who consume breast milk and children who consume formula milk from the age of 4 to 6 years.

It is proven from Table 1 that the motor differences of breastfed and formula-fed children. The statement of parents at home in terms of children's motor reported For example, the statement of parents whose children breast milk that their child can not throw the ball at the age of 4 years reported a frequency range of "age 4 years to 5 years" from 1% to 60% while the category range "age six years" from 50% to 98%. Meanwhile, parents whose children consumed formula milk according to the statement reported a frequency range of "ages four to five years" from 1% to 35% while the category ranged from "six years old" from 35% to 80%. Based on levene test showed significant results between motor skills of breastfed and formula-fed children.

**Table 1.** Presentation of Parental statement on child motor development

| Anak                | 3 Y.O | 5 Y.O | 6 Y.O |
|---------------------|-------|-------|-------|
| Breast Milk (N=40)  | 25.0  | 35.0  | 38.0  |
| Formula Milk (N=40) | 15.0  | 25.0  | 32.0  |

### Duration of child's motor development

Parents are asked about the duration of time for children to develop from one indicator to another such as "the length of time the child learns to write" from scratching the scribble until the child can write letters perfectly and the results are presented in table 2.

From table 2 it appears that while there is a small difference between children's motor skills who consumes breast milk and formula milk. Most of the duration of a child's motor development lasts for several months to a year. From 50% of children showed significant results between the motor development duration of breastfeeding

milk and formula-fed children.

**Table 2.**

| Anak                | Usia 4 Tahun | Usia 5 tahun | Usia 6 Tahun |
|---------------------|--------------|--------------|--------------|
| Breast Milk (N=40)  | 20.0         | 35.0         | 39.0         |
| Formula Milk (N=40) | 10.0         | 25.0         | 35.0         |

**Parental Action**

Parents are asked what they do when they see their child’s motor development late. About 30% of parents state that parents stimulate themselves at home so that their children’s motor development increases. But about 70% of parents state that their child is not given stimulus and is left to develop on their own or naturally.

**Child safety at home**

A parent’s statement on child safety while playing showed that 25% felt unsafe with children’s playgrounds due to environmental factors around the home that parents feared their children were playing outdoors because the house was near the highway and dusty.

**Stimulation of children’s motor development**

Parents were asked what the responses were and what to do to stimulate a child’s motor development apart from the nutritional intake of breast milk and formula milk in table 3.

**Table 3.** Presentation of parental statements stimulating the child’s motor development, the child let develop on his own, Parents busy, Other families help, Following training / courses, Fear the child can not

|                     |      |      |     |
|---------------------|------|------|-----|
| Breast Milk (N=40)  | 30.0 | 10.0 | 5.0 |
| Formula Milk (N=40) | 20.0 | 7.0  | 5.0 |

Based on the table above shows that parents allow their children to develop naturally or by themselves 75% the main reason is that parents are busy with careers so that many parents are more likely to give formula milk than breast milk and children are more allowed to develop on their own without stimulation from the mother.

**Mother’s feelings**

Parents are asked to explain their feelings when they see their child’s development late from their peers. The results are presented on 4.

**Table 4.** Parent’s work statement on motor vehicles (percentage, N=80)

|               |      |
|---------------|------|
| Housewife     | 50,0 |
| Trader        | 25,0 |
| Civil Servant | 5,0  |

Based on the characteristics of respondents in table 4 through the statement of employment of most parents or mothers of children, namely a housewife of 62.5% (50.0), traders 31.25% (25.0) and civil servants 6.25% (5.0) While the education of these respondents are many who graduated from high school and few respondents who went through higher education.

**Differences in Motor Development of Children 4-6 years who are given exclusive breast milk with Formula Milk or PASI**

The development of gross motor and fine motor children aged 4-6 years in general is quite good. Characteristically it also shows the same fine motor and rough motor development based on both age group and gender. The similarity is the hope that this research group comes from the same or homogeneous variance. Furthermore, to see and prove the hypothesis whether there is a difference in children’s motor development between those given exclusive breast milk with formula milk, independent parametric test T-Test is used. The normality test results of kolmogorv-smirnov data show that the value of  $p = 0.000$  so that it can be concluded that the data of fine motor development and gross motor of the child does not distribute normally  $p\text{-value} < 0.05$ . The statistical test alternative used is the non-parametric statistical approach of the Mann-Whitney Test at C1:95%.

**Table 5.** Differences in motor development in children 4-6 years between those given breast milk and those given formula milk or PASI.

| Breastfeeding | Motor development |         |         |
|---------------|-------------------|---------|---------|
|               | n                 | Min-Max | p-Value |
| Breast Milk   | 40                | 35-40   | 0,000   |
| Formula Milk  | 40                | 20-40   |         |

Based on the results of data analysis in table 5, it shows that the score of fine motor development and rough motor in 40 children who get exclusive breast milk is 35 to 40 while as many as 40 children who get formula milk have a motor development score of 20 to 40. Statistical test results obtained  $p = 0.000$  value so that C1:95%  $H_0$  rejected and  $H_a$  received ( $p\text{-value} < 0.05$ ) Hence,

it can be concluded that there is a significant difference between the children's motor skills who consume breast milk and formula milk.

In this study, quantifying parents' statements about a child's motor development such as how long it takes the child to develop past its stage is like walking over a straight line, almost close to 50% of the child passes the stage of development in just a few months, in addition the range of 2% to 30% of children experience delays in moving.

The time span of children's motor development is suited with Tortela's (2016) research, children are given motor training and free play for one hour a week for 3 months. Developing motor skills in the age group must be planned and organized in the implementation of children's play activities. Previous research, researched a lot about socio-economic status with children's motor development, very few researchers realized that choosing good food for children greatly affects children's motor development (Gullain, 2012). In Piaget's preoperational sensory motor development, specifically that the age of preoperative children specifically imitates what adults do automatically, this is when a mother does something in front of the child, the child tends to imitate the mother's behavior, therefore in addition to nutritional intake both stimulation from adults is needed to stimulate children motor development (Longobardi, 2013). Motor skills, such as fine motor skills, are very important for early childhood. Other studies have suggested that children spend most of their playing time doing various activities such as running, jumping, playing legos, eating breakfast, coloring, and writing (Marr, Cermak, Cohn, & Henderson, 2003). Another finding by Ohl, (2013) is that children's motor skills are strongly influenced by mother's habituation factors to assess children's motor skills, besides that children's food factors also greatly affect their motor development. Giving breast milk to a breastfed child or child is more mature than a child who is given formula milk. Some scientists have suggested that breast milk is very good for children, this is evidenced by the findings regarding the effect of food testing on gastric activity in newborns (Riezzo, 2003). The findings of this study contribute to understanding several different motoric factors of children consuming breast milk and formula milk. According to the results of parents' reports that there are significant differences in children motor skills those consume breast milk and formula milk. Research in California shows that the risks and health benefits of people consuming

breast milk and formula milk show that formula milk contains chemicals that are not good for children's health, which can make children obese, while breast milk is very good for consumption by children (Bou, 2016). Furthermore, the study did not find a mediating effect of the satiety response on the relationship between breastfeeding status and weight of children under five in Indonesia, so with breast milk it will not cause toddlers to be obese (Hathcock, 2013). Therefore, the motoric children consuming breast milk are better and more agile than children consuming formula milk. In addition, research in Canada explains the benefits of breast milk for children's cognitive (Walfisch, 2013). The positive effect for breastfed children is that there is an increase in the child's IQ and cognitive abilities. Another study in Kenya stated that the mortality among mothers group who breastfed was higher than the group who gave their children formula milk (Ruth Nduati, 2001). Consumption of formula milk as a substitute for human milk can cause differences in postprandial glycaemia and insulinaemia that contribute to metabolic programming in the first year of life (CJ Wright, 2015). Consuming breast milk for toddlers is very good for the health and immunity of the child. Therefore, children are required to consume breast milk until the age of two. Therefore, (Al-Rahmad, 2016) in his research concluded that mothers are expected to exclusively breastfeed their babies and children for better motor development, so that children's growth and development can be monitored and detected. Furthermore, it is expected that it will continue to provide support to mothers so that they continue to provide breast milk both from their families and from related parties.

## CONCLUSION

The World Health Organization (WHO) recommends breast milk as the best for babies because breast milk can help defend against infection, prevent allergies and protect against a number of chronic diseases. Although experts have said that breast milk is the best nutritional option for babies, not all mothers can and want to do it. From the results of this study, it can be seen that breast milk is very good for giving to babies and for children's motor development. Therefore, it is expected that mothers or parents who have children to exclusively breastfeed when the child is a baby for 6 months and provide formula-fed after the baby is over 6 months old so that the growth and development of the child, especially the child's motor skills, is better.

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