

# Children at An Early Age: Motor Development of Breastfed and Formula-fed Children Aged 2-6 Years

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**Abstract**—This study aims to see the difference in terms of motor skills of breastfed and formula-fed children at 2-6 years of age. There are thirty children consuming breast milk and the same number of formula-fed children aged 2-6 years; the research shows a significant result between the two groups. The findings reveal the differences in motor skills performed by the number of children consuming breastmilk and formula milk. The children who consume breast milk are better in motor skills than those consuming formula milk. Parents who do breastfeeding join the interview on child motor skills. The findings indicate the difference in motor skills performed by children consuming breast milk and formula milk.

**Keywords**—child motor skills, breast milk, formula milk

## I. INTRODUCTION

Children are very precious for a country and could become the successor of the nation's ideals and to be the future leader to develop the homeland and state. However, as a valuable asset, not all children succeed to grow and develop. One of the reasons could be a condition in which many children do not consume breast milk.

Breast milk provides many benefits. Also, the government has promoted exclusive breastfeeding. Breast milk contains high-quality nutrients that are useful for infant development, such as colostrum, taurine, DHA, and AA, immunoglobulin, lactoferrin, lysozyme, and bifidus factor [1].

Exclusive breastfeeding prevents gastrointestinal disease and fewer growth disorders in infants [2]. Breast milk is beneficial not only for the health of babies today but also for the children's future motor skill development. Children who consume breast milk early generally experience more rapid motor development than those with formula milk. It is because formula-fed children usually perform less or

late development and will affect their quality. Many studies explain the benefits of breastfeeding on children's health, but this time, the researchers want to see further the motor skill differences in children who consume breast milk and formula milk.

Powerful Human Resources (HR) is regarded as a quality resource, and it is essential to do cost-effective shopping for formula milk [3]. Some facts about the dangers of milk formula are mentioned such as worsening the risk of asthma; increasing the risk of allergies; damaging the development of intelligence or cognition; and causing low-risk disease, obesity, hematotherapy, low-risk diabetes, malnutrition, and growth disorders. Today, however, mothers in big cities tend to choose either formula milk as a substitute or breastfeeding companion in meeting their baby's nutritional needs. This is done for various reasons such as less production of breast milk, busy activities, worries of uninteresting breast forms, inability to produce breast milk, and practicality of formula milk. A mother, having an essential obligation by educating her child through breastfeeding as the right of a child, inevitably affects the child's motor development.

Breastfeeding is very popular as the best food adaptation for the babies' needs on health [4]. However, many mothers who physiologically cannot breastfeed have to provide formula milk for her baby [5].

Breast Milk is a body fluid in a dynamic condition produced for infants as a source of energy, physical and mental growth, and immunity [6]. Exclusive breastfeeding is carried out without providing any fluids or solids except vitamins, minerals, or medications in the form of drops or syrup until six months of age. Therefore, to meet the baby needs properly, efficiently, and practically is done through breastfeeding (breast milk). It is

because breast milk is regarded as the most nutritious food for infants [7].

The World Health Organization has promoted different infant diets:

- Exclusive breastfeeding: The baby is breastfed with no non-human milk as their formula such as Oral Rehydration Solution (ORS), drops, and syrup.
- Dominant breastfeeding: The baby food mostly consists of breast milk and certain liquids such as water, water-based drinks, fruit juices, and can also contain ORS, drops, and syrup, but no formula milk.
- Partial breastfeeding or supplementary foods: The baby is breastfed and obtains another diet such as formula milk.
- Bottle-giving: It includes food, liquid or semi-solid food, consumed using bottles and nipples.

Another benefit of breastfeeding is to produce a physically and mentally healthy generation.

## II. RELATED WORKS/LITERATURE REVIEW

Research in California, exploring the risks and health benefits of people who consume breast milk and formula milk, shows that the formula milk contains chemicals that are not good for children's health, causing obesity, while breast milk is perfect for consumption [8]. However, the study does not find a mediating effect of a full response on the relationship between breastfeeding and underweight status, particularly in Indonesia. In contrast, breast milk will not cause obesity in infants [9]. Therefore, children consuming breast milk are better and more energetic in terms of motor skills than formula-fed children. In addition, research in Canada explains the benefits of breast milk for child cognitive development [10]. The positive benefit of breast milk is that it can increase the children's IQ and cognition. Another study in Kenya claims that mortality among breastfeeding mothers was higher than it in the maternal group giving formula [11]. The consumption of infant formula as a substitute for human milk can lead to differences in postprandial glycemia and insulinemia that contribute to metabolic programming in the first year of life [12]. Breast milk consumption by toddlers is very good for health and endurance. Therefore, children are required to consume breast milk until two years.

## III. MATERIAL & METHODOLOGY

### A. METHOD

**Subject.** There were sixty parents of children consuming breast milk. The children age from 24 to 60 months. The study was conducted on 30 parents whose children consumed breast milk and 30 parents with children consuming the baby formula. Also a list

of statements containing 40 parental comments on child motor skills is provided by breastfeeding mothers and those providing formula milk in Sleman District, Yogyakarta. The questionnaire is used to dig out information on children's motor skills by employing a Likert scale as highly appropriate, appropriate, inappropriate, and very inappropriate.

**Questions.** The researchers recruit all people who have children aged 24 - 60 months. After they were set out to be the sample in this study, a list of statements was given to the sixty parents. It contains 40 reports on the child's motor skills with the same sentences given to mothers who provide breast milk and those who provide formula milk.

**Procedure.** The procedure applied is adapted from the research by Guerra and Slaby (1989) and Slee (1993). All the parents of children who became the subjects of the study were interviewed individually by the researchers with the status which indicates breastfeeding and formula feeding. The interviews cover:

- (i) a description to build a biased reputation of an imaginary target,
- (ii) the child having a target picture to establish the reputation of bias,
- (iii) statements of conflict involving children and imaginary targets, and
- (iv) parents' explanation on motor skills of child's ankles.

The interview procedure will be explained more in detail. The biased reputation of the imaginary targets of a process is developed by Boneson and Dweck (1986). Then, the parents tell their children to practice running, writing, jumping, throwing balls, catching fish, walking on a straight line, and catching the ball. The children's performances are assessed using a Likert scale (well developed, expectedly developed, developed, and undeveloped) or points (4,3,2,1). Finally, the parents were interviewed with several questions, such as when parents were aware of the child's developmental delay and how to stimulate the child's motor development.

## IV. RESULTS AND DISCUSSION

### A. Motor Frequency

The presentation of parent frequency reports the motor development of children aged 2 - 6 years with breast milk and formula milk.

Table 1 shows the motor differences in breastfed and formula-fed children. The parents' statements on child motor development are reported. For example, a parent's statement whose child consumed breast milk says that her child is not able to throw a ball at the age of 2. It reports that the "two to three years of age ranges from 1% to 20% while the "four to six years of age" ranges from 30% to 80%. Meanwhile, parents

with formula-fed children report that the "two to three years of age" ranges from 1% to 15% while the "four to six years of age" ranges from 20% to 70%. Based on the Levene test, there is a significant result on the motor development between breastfed and formula-fed children.

*B. Duration of a child's motor development*

Parents are asked about the period of the child's development based on one indicator to another such as "the child's length of time to learn writing" from making a streak until the child is able to write letters correctly. The results are presented in Table 2.

From Table 2, it appears that there is a difference in motor development between breastfed and formula-fed children. Most of the duration of the child's motor development lasts in several months to a year. As many as 50% of the children show significant results regarding the length of motor development between breastfed and formula-fed children.

TABLE I. PRESENTATION OF PARENTAL STATEMENTS ON CHILD MOTOR DEVELOPMENT

No	Children	2 Y.O	3 Y.O	4 Y.O	5 Y.O	6 Y.O
1	Breast milk (N=30)	15.0	19.0	25.0	32.0	37.0
2	Formula milk (N=30)	10.0	15.0	21.0	25.0	35.0

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TABLE II. PRESENTATION OF PARENTAL STATEMENTS ON CHILD MOTOR DEVELOPMENT

No	Children	A few months	More than 6 months	More than 10 months	More than 1 year
1	Breast milk (N=30)	15.0	10.0	4.0	1.0
2	Formula milk (N=30)	12.0	20.0	5.0	3.0

*D. Parent Action*

The parents were asked what they do when they see the late motor development in their child. About 30% of parents say that they do simulations at home to improve it. On the other hand, about 70% of parents claim that their children are not given the stimulus and are allowed them to develop naturally.

*E. Child safety at home*

Parents' statements on child safety while playing indicate that 25% feel worried about the child playgrounds due to environmental factors around the house. The parents are afraid if their children play outside the house since it is near highways and full of dust.

*F. Stimulation of child motor development*

The parents were asked what responses and what they did to stimulate the child' motor development beside nutritional intake of breast milk and formula milk. The results are presented in Table 3.

TABLE III. PRESENTATION OF PARENTAL STATEMENTS ON STIMULATION OF CHILD'S MOTOR DEVELOPMENT

No	Children	Letting children develop naturally	Busy Parents	Other family helps	Joining a Training/Course	Fear of children not being able to do something
1	Breast milk (N=30)	18.0	5.0	2.0	4.0	1.0
2	Formula milk (N=30)	10.0	10.0	5.0	4.0	1.0

Table 3 shows that most parents allow their children to develop naturally. As many as 75% of the main reason is that parents are busy with their careers, so they are more likely to give formula milk than breast milk and the children are allowed more to develop by themselves without stimulations from the mother.

*G. Mother feeling*

Parents also explain their feelings when they see their child's late development compared to their peers. The results are presented in Table 4.

TABLE IV. PARENTAL JOB STATEMENT ON MOTOR DEVELOPMENT (PERCENTAGE, N = 60)

Housewife 65.0
Trader 20.0
Civil servants 5.0

V. DISCUSSION

In this study, the quantification of parental statements on a child's motor development such as how long it takes to develop through developmental

stages such as being able to walk straightforward is close to 50% in only a few months. In addition, from 2% to 30%, children experience delays in moving.

According to Tortella's research (2016) regarding the child's motor development time frame, children experience motor training and a chance to freely play for one hour in a week for three months. Developing motor skills in the age group should be planned and organized in playing activities. Previous studies on a socioeconomic status with a child's motor development are very few, although it is very influential to the progress [13]. In the development of the motor sensitivity of the preoperational stage, Piaget points out the children in the preoperative stage specifically mimic what adults do. When a mother does something in front of the child, he/she will tend to imitate the mother's behavior. Therefore, nutritional intake requires adults to stimulate the child's motor development [11]. Motor skills, such as fine motor skills, are very crucial for early childhood. Other studies have suggested that children spend most of their playing time to do activities such as running, jumping, playing Legos, coloring, and writing [16]. Another finding by Ohl (2013) states that a child's motor skill is highly influenced by a habituation factor of the mother or adult, and a food factor is also very influential to motor development. Breast milk can help the children to be more mature than those given formula milk. In addition, some scientists have suggested that breast milk is perfect for children. It is proved by the findings on the effects of food testing on the gastric activity in newborns [19].

The result of the *T-test* analysis can be seen that the *Sig.* value is 0.000. Because the *Sig.* value (0,000) is less than 0.05,  $H_a$  is accepted. Thus, it can be concluded that there is a significant difference in motor skills between children consuming breast milk and those with formula milk.

## VI. CONCLUSIONS

The differences in motor skill development between breastfed and formula-fed children can be indicated by the result of the Kolmogorov-Smirnov Test. The value of the motor development skills of children with breast milk consumption is 0.770 with the *Sig.* value of 0.593. Because the *Sig.* value is 0.593, which is greater than 0.05,  $H_a$  is accepted. Meanwhile, the value of motor development skills of children with formula milk consumption is 0.821 with the *Sig.* value of 0.511. Since the *Sig.* value is 0.511, which is greater than 0.05,  $H_a$  is accepted.

The findings of this study contribute to the understanding of several factors on different motor skills of breastfed and formula-fed children. According to the reports of the parents, there is a significant difference in motor skills between breastfed and formula-fed children. The research indicates that consuming breast milk is more

advantageous than formula milk for the child's motor development.

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