



The Relationship Between Nutritional Status And Toddler Motor Development

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ABSTRACT

Nutritional status plays an essential role in children's growth and development. Adequate nutrition supports brain development, muscle growth, and motor development, whereas poor nutritional status may delay motor milestones. To determine the relationship between nutritional status and motor development among toddlers. A quantitative study using an analytical cross-sectional design was conducted among 60 toddlers aged 12–59 months selected through purposive sampling. Nutritional status was assessed using weight-for-age (WAZ) based on WHO standards, while motor development was evaluated using the Pre-Screening Developmental Questionnaire (KPSP). Data were analyzed using descriptive statistics and the Chi-Square test. Most toddlers had good nutritional status (70.0%) and age-appropriate motor development (73.3%). Statistics analysis showed a significant relationship between nutritional status and motor development ($p = 0.002$). Nutritional status is significantly associated with motor development among toddlers. Children with good nutritional status are more likely to achieve appropriate motor development.

Keywords : *nutritional status, motor development, toddler, growth, KPSP.*

1. INTRODUCTION

Toddlers are an age group that experiences very rapid growth and development, so they are often referred to as the golden age. During this period, rapid physical, neurological, cognitive, language, social, and motor development occurs. The success of the growth and development process during toddlerhood is greatly influenced by meeting the child's basic needs, especially the need for balanced nutrition, adequate stimulation, health services, and a supportive environment.

Nutritional status is an important indicator that reflects the balance between nutrient intake and the body's needs. Good nutritional status allows toddlers to experience optimal





growth and development of the nervous and muscular systems that support motor skills. Conversely, prolonged malnutrition can inhibit tissue growth, reduce brain function, slow nervous system maturation, and impair gross and fine motor development.

Motor development is a child's ability to perform movements that involve coordination between the nervous system, muscles, bones, and senses. Gross motor skills include the ability to sit, stand, walk, run, jump, and maintain balance, while fine motor skills include holding objects, drawing, stacking blocks, and performing movements that require eye-hand coordination. Achieving age-appropriate motor development is an important indicator in assessing a toddler's growth and development.

Malnutrition among toddlers remains a public health challenge in Indonesia. Toddlers with poor nutritional status are at higher risk of developmental delays, reduced learning abilities, impaired immune function, and increased susceptibility to infectious diseases. These conditions can have long-term impacts on the quality of human resources if not addressed early.

Regular monitoring of toddlers' nutritional status and development through integrated health posts (Posyandu) is a crucial step in early detection of growth and developmental disorders. In addition to measuring weight and height, health workers also conduct developmental screening using the Pre-Screening Development Questionnaire (KPSP) to identify any developmental delays and provide appropriate intervention.

Various studies have shown that nutritional status is a key determinant of a child's motor development. However, motor development is also influenced by other factors such as parental stimulation, maternal education, health, birth history, and the child's growing environment. Therefore, research is needed to identify the relationship between nutritional status and toddler motor development as a basis for developing nutritional intervention programs and child development stimulation.

2. RESEARCH METHODS

a. Research Design

This study employed a quantitative approach with an observational analytical design using a cross-sectional method, meaning that the independent and dependent variables were measured simultaneously. This design was chosen to determine the relationship between nutritional status and toddler motor development without providing any specific treatment to the respondents.

b. Location and Time of Research

The research was conducted at a Posyandu within the community health center's working area during January–April 2026. The location was selected based on the high number of toddler visits for routine growth and development monitoring.

c. Population and Sample





The research population was all toddlers aged 12–59 months who participated in Posyandu activities.

The sample size was 60 toddlers selected using purposive sampling techniques based on inclusion criteria, namely toddlers aged 12–59 months, having a Maternal and Child Health Book (KIA), present with their parents during the study, and parents willing to be respondents by signing an *informed* consent form. *consent*). Toddlers with congenital abnormalities, severe neurological disorders, or chronic diseases that could affect growth and development were not included in the study.

d. Research Variables

Independent Variables

- 1) Nutritional status of toddlers.

Dependent Variable

- 1) Toddler motor development.

e. Research Instruments

The instruments used include:

- 1) Digital scales and height/length measuring tools to determine nutritional status.
- 2) Anthropometric standard table WHO for nutritional status assessment based on weight index for age (BB/U) .
- 3) Pre-Screening Development Questionnaire (KPSP) to assess toddler motor development.
- 4) Respondent identity sheet and examination result recording form.

All measurements were carried out by researchers and assisted by health workers who understood the procedures for anthropometric measurements and developmental screening.

f. Data collection technique

Data collection is carried out through the following stages:

- 1) Manage research permits with relevant agencies and obtain approval from the toddler's parents.
- 2) Measure the weight and height/length of toddlers according to anthropometric procedures .
- 3) Determining nutritional status based on WHO standards.
- 4) Conduct motor development assessments using KPSP according to toddler age groups.
- 5) Collecting data on respondent characteristics through short interviews with parents.
- 6) Checking the completeness and validity of data before conducting statistical analysis.



**g. Data analysis**

Data analysis was carried out using statistical software through the following stages:

- 1) Univariate analysis was used to describe the characteristics of respondents, distribution of nutritional status, and motor development of toddlers in the form of frequency, percentage, mean, and standard deviation.
- 2) Bivariate analysis was conducted using the Chi-Square test with a significance level of $\alpha = 0.05$ to determine the relationship between nutritional status and toddler motor development.

3. RESEARCH RESULTS AND DISCUSSION**a. Research result****1) Respondent Characteristics****Table 1. Distribution of Toddlers by Age**

Toddler Age	Frequency (n)	Percentage (%)
12–24 months	18	30.0
25–36 months	20	33.3
37–59 months	22	36.7
Total	60	100

Based on Table 1, it is known that most of the respondents were in the 37–59 months age group, namely 22 toddlers (36.7%), followed by the 25–36 months age group with 20 toddlers (33.3%), and the 12–24 months age group with 18 toddlers (30.0%).

Table 2. Distribution of Nutritional Status of Toddlers

Nutritional status	Frequency (n)	Percentage (%)
Good Nutrition	42	70.0
Malnutrition	18	30.0
Total	60	100

The results of the study showed that the majority of toddlers had good nutritional status, namely 42 toddlers (70.0%), while 18 toddlers (30.0%) were included in the malnutrition category.



**Table 3. Distribution of Toddler Motor Development**

Motor Development	Frequency (n)	Percentage (%)
In accordance	44	73.3
Doubtful	12	20.0
Deviation	4	6.7
Total	60	100

Most toddlers had age-appropriate motor development, namely 44 toddlers (73.3%). Twelve toddlers (20.0%) were in the doubtful category and four toddlers (6.7%) showed deviations in motor development based on the KPSP screening results.

Table 4. Relationship between Nutritional Status and Toddler Motor Development

Nutritional status	Motoric Appropriate	Motor Improper	Total	p- value
Good Nutrition	36	6	42	0.002
Malnutrition	8	10	18	
Total	44	16	60	

The results of the analysis using the Chi- Square test showed a p-value of 0.002 ($p < 0.05$). This indicates a significant relationship between nutritional status and toddler motor development. Toddlers with good nutritional status had more appropriate motor development than toddlers with poor nutritional status. This finding indicates that meeting optimal nutritional needs contributes to achieving age-appropriate motor development.

b. Discussion

The results of the study indicate a significant relationship between nutritional status and toddler motor development. The Chi- Square test yielded a p-value of 0.002 ($p < 0.05$), indicating that nutritional status is a factor associated with achieving motor development in toddlers. Toddlers with good nutritional status tend to exhibit motor development appropriate to their age compared to toddlers with malnutrition.

The majority of respondents in this study, 42 toddlers (70.0%), had good nutritional status. This indicates that the majority of toddlers have received relatively adequate nutritional intake to support their growth and development. Good nutritional status plays a vital role in the formation of body tissue, brain development, nervous system maturation, and bone and muscle growth, which form the basis of children's





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motor skills. Conversely, toddlers with poor nutritional status are at risk of experiencing delayed physical growth and neuromuscular function development, resulting in underdevelopment of their motor skills.

The study also showed that the majority of toddlers had age-appropriate motor development, namely 44 toddlers (73.3%). Good motor development reflects that children are able to perform activities appropriate to their developmental stage, such as walking, running, jumping, climbing stairs, holding objects, stacking blocks, and coordinating movements involving large and small muscles. These abilities are the result of the interaction between nervous system maturity, physical growth, adequate nutrition, and stimulation provided by the environment.

The relationship between nutritional status and motor development in this study shows that toddlers with good nutrition have more appropriate motor development than toddlers with malnutrition. Adequate intake of energy, protein, vitamins, and minerals supports muscle tissue formation, brain development, and neuromuscular coordination, enabling children to achieve developmental milestones. *milestones*) appropriate for their age. Conversely, nutritional deficiencies can lead to decreased muscle strength, delayed nervous system maturation, fatigue, and reduced physical activity, which ultimately impact motor development.

The findings of this study align with the theory of child growth and development, which states that nutrition is a key factor influencing motor development. Adequate nutrition supports nerve myelination, synapse formation, cell metabolism, and muscle growth, enabling children to achieve optimal movement abilities. In addition to nutritional factors, motor development is also influenced by parental stimulation, health, physical activity, parenting styles, and a safe and supportive learning environment.

Regular monitoring of nutritional status and motor development through integrated health posts (Posyandu) plays a crucial role in the early detection of developmental disorders. Regular weight and height measurements, along with developmental screening using the Pre-Screening Development Questionnaire (KPSP), enable health workers to identify toddlers experiencing nutritional problems or developmental delays, enabling them to promptly administer appropriate interventions.

Parents also play a crucial role in supporting their children's growth and development. In addition to providing balanced nutrition, parents need to consistently provide motor stimulation through play, reading picture books, building blocks, drawing, running, jumping, and various other educational games. Regular stimulation strengthens muscle coordination and the nervous system, thus optimally developing children's motor skills.





Health workers, particularly midwives, nurses, nutritionists, and Posyandu (Integrated Service Post) cadres, are expected to continue educating families about the importance of balanced nutrition, growth monitoring, and early developmental stimulation. Continuous growth and development monitoring programs can be a promotional and preventive measure in reducing the number of developmental disorders in toddlers.

cross-sectional design only describes the relationship between variables at a single point in time, making it unable to directly explain causality. Furthermore, the study was conducted on a relatively limited sample size and only at a few integrated health posts (Posyandu), so the results cannot be generalized to the entire toddler population. Future research is recommended to use a longitudinal or cohort design with a larger sample size and include other variables such as maternal education level, family income, parenting patterns, history of infectious diseases, and level of developmental stimulation.

Research results show that nutritional status is a factor closely related to toddler motor development. Therefore, providing balanced nutrition, regular growth monitoring, and providing age-appropriate stimulation need to be continuously improved as part of efforts to achieve optimal child growth and development.

4. CONCLUSION AND SUGGESTIONS

a. Conclusion

This study shows that most toddlers have good nutritional status and motor development appropriate for their age. The results of the analysis using the Chi-Square test showed a p-value of 0.002 ($p < 0.05$), indicating a significant relationship between nutritional status and toddler motor development. Toddlers with good nutritional status tend to have more optimal motor development than toddlers with poor nutritional status.

b. Suggestion

1) For Parents

Parents are expected to fulfill their children's nutritional needs according to the principles of balanced nutrition, provide breast milk and age-appropriate complementary foods, and regularly stimulate motor development through educational play activities.

2) For Health Workers

Midwives, nurses, nutritionists, and Posyandu cadres are expected to increase education for families regarding the importance of fulfilling nutritional needs, monitoring growth, and early detection of development using KPSP on a regular basis.





- 3) For Community Health Centers and Integrated Health Posts
Community Health Centers (Puskesmas) and Integrated Health Posts (Posyandu) need to strengthen their toddler growth and development monitoring programs through routine weighing, nutrition education, counseling for parents, and follow-up for toddlers who experience nutritional disorders or developmental delays.
- 4) For Further Researchers
It is recommended that future research use a longitudinal or cohort design , involving a larger number of respondents, and adding other factors such as parenting patterns, maternal education, socioeconomic status, history of infectious diseases, and level of developmental stimulation to obtain a more comprehensive picture of the factors that influence toddler motor development.

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