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Association Between Immunization Status and Complete Nutrition Provision with Wasting Incidence in Toddlers

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ABSTRACT

Background: Wasting is a form of acute malnutrition characterized by a very low weight-for-height ratio (z-score between -3 SD and < -2 SD), indicating rapid weight loss and poor nutritional status. Incomplete immunization and inappropriate complementary feeding are among the major contributing factors.
Objective: This study aims to analyze the relationship between immunization status and complementary feeding practices with the incidence of wasting among toddlers in the working area of the Sidomulyo Health Center, Samarinda, Indonesia.
Method: A quantitative correlational study with a cross-sectional design was conducted. A total of 168 toddlers aged 2–5 years were selected using stratified sampling from seven integrated health posts (Posyandu). Data were collected through validated questionnaires and analyzed using Chi-Square tests to assess the associations between variables.
Results: The results showed a significant relationship between immunization status and wasting (p = 0.001, OR = 0.32), where toddlers with incomplete immunization had a higher risk of experiencing wasting. Additionally, a significant relationship was found between the timing of complementary feeding and wasting (p = 0.000, OR = 8.94), with toddlers receiving complementary foods before 6 months being nearly nine times more likely to experience wasting than those who received it at or after 6 months.
Conclusion: Incomplete immunization and early introduction of complementary foods are significantly associated with increased risk of wasting among toddlers. Public health strategies should prioritize complete immunization coverage and timely, appropriate complementary feeding to prevent malnutrition in early childhood.

Keywords: immunization, mpasi, nutrition, toddlers, wasting

Introduction

Malnutrition, particularly wasting, is a critical public health concern that reflects acute undernutrition in children. Wasting is defined by a significantly low weight-for-height ratio, with a z-score between -3 SD and < -2 SD, indicating a recent and severe process of weight loss (Ministry of Health of the Republic of Indonesia, 2020). This condition, especially when it occurs during the first 1,000 days of life—a crucial period for cognitive and physical development—can lead to irreversible developmental impairments. In more severe cases, acute wasting is characterized by a z-score below -3 SD, which substantially increases morbidity and mortality risks in children.

Globally, the World Health Organization (WHO, 2022) reports that approximately 45 million children are affected by wasting. In Indonesia, the national prevalence of wasting in children under five years increased from 7.1% in 2021 to 7.7% in 2022. The situation is more alarming in East Kalimantan Province, which recorded a prevalence of 9.1%, with Samarinda City reporting the highest rate at 9.3%. Specifically, within the working area of the Sidomulyo Health Center in Samarinda Ilir District, the number of wasting cases rose from 62 in 2022 to 94 by July 2024, highlighting the urgency to identify and address the contributing risk factors.

Among the key factors influencing wasting are immunization status and complementary feeding practices. These two components are especially vital during the first 1,000 days of life, which is a window of opportunity for optimal child growth and development.

Immunization serves as a protective mechanism against various infectious diseases. Children who lack complete basic immunization are more susceptible to infections, which can impair nutrient absorption, elevate metabolic demands, and reduce appetite—ultimately exacerbating the risk of undernutrition (Rochmawati, 2019; Tambunan, 2019; Samiak, 2020; Zukhrina & Yarah, 2020; Wati & Ekasari, 2025). According to national data, only 50% of children in Indonesia had received complete basic immunization by 2024, with East Kalimantan slightly higher at 57% (BIAN, 2022). Local data from Sidomulyo Health Center show that 86 out of 245 toddlers (35.1%) had incomplete immunization status.

Another significant risk factor is inappropriate complementary feeding. Introducing complementary foods before six months of age can lead to digestive disturbances such as diarrhea and increase the risk of respiratory infections like pneumonia, which in turn contribute to poor nutritional outcomes. Conversely, after six months, complementary foods must be nutritionally adequate to meet the increasing energy and micronutrient needs of growing children. Inappropriate feeding practices—whether in terms of timing, quality, quantity, or frequency—can significantly hinder the attainment of optimal nutritional status. A study by Hasnita et al. (2023) found that toddlers who received inappropriate complementary feeding were 4.4 times more likely to suffer from wasting. Preliminary data from Sidomulyo Health Center indicate that 30 out of 245 toddlers (12.2%) received inappropriate complementary feeding.

Given the high prevalence of wasting in the Sidomulyo Health Center area and the identified problems in immunization coverage and complementary feeding practices, this study was conducted to explore the relationship between immunization status and complementary feeding practices with the incidence of wasting in toddlers. Understanding these associations is expected to support the development of effective and targeted interventions to reduce wasting rates at the local level.

Objective

This study aims to analyze the relationship between immunization status and complementary feeding practices with the incidence of wasting among toddlers in the working area of the Sidomulyo Health Center, Samarinda, Indonesia.

Method

Study Design

This research employed a quantitative correlational design with a cross-sectional approach. The aim was to investigate the relationship between immunization status and complementary feeding practices with the incidence of wasting in toddlers. In a cross-sectional study, data on both independent and dependent variables are collected simultaneously (Carvalho et al., 2025). The study included two groups: toddlers experiencing wasting (case group) and those without wasting (control group) (Afandi et al., 2024).

Population and Sample

According to Sugiyono (2021), a population is a generalization region consisting of subjects with specific characteristics defined by researchers. The population in this study included all toddlers aged 2–5 years and their parents within the working area of Sidomulyo Health Center, totaling 402 toddlers.

The sample size was calculated using the Slovin formula, resulting in 188 respondents drawn from a population of 353 toddlers. Stratified sampling was used across seven Posyandu: Anggrek, Flamboyan, Kenari, Setia, Teratai, Sri Rejeki, and Lestari I, in Samarinda Ilir. The inclusion criteria for the study consisted of toddlers aged 2 to 5 years who possessed a complete KIA (Child Health) Book and were accompanied by a parent or guardian willing to participate in the research. Meanwhile, the exclusion criteria included toddlers residing in orphanages, those suffering from chronic illnesses requiring continuous care, and those who were not present during the data collection process at the Posyandu.

Research Instruments

Instrument validity refers to the accuracy and precision of a measurement tool (Mohajan, 2020). In this study, the validity test was conducted on 30 toddlers at Rumbia II Posyandu in October 2024 using the Point Biserial Correlation and Guttman scale. For the Immunization Status Questionnaire, which consisted of 15 items, 12 items were found to be valid and 3 items were invalid based on a Pearson correlation value greater than 0.361. The Complementary Feeding Questionnaire had 10 items, with 8 deemed valid and 2 invalid. Reliability, which measures the consistency of an instrument, was assessed using the Kuder Richardson 20 (KR-20) formula as recommended by Ghozali (2020). A KR-20 value greater than 0.7 indicates high reliability. The variables and indicators measured included Immunization Status, which was divided into “Complete” (items 1, 2, 4, 10, 13, and 15) with a total of 7 items, and “Incomplete” (items 3, 5–9, 11–12) with 8 items. For Complementary Feeding, the indicators were categorized as “< 6 months” (items 2, 4–6, 8–10) with 7 items, and “≥ 6 months” (items 1, 3, 7) with 3 items.

Data Collection Procedure

Data were collected using a structured questionnaire distributed to parents or caregivers at the selected Posyandu. This method aligns with the quantitative approach described by Grove et al. in Nursalam (2020).

Data Analysis

Univariate Analysis was used to describe the frequency distributions of each variable. Bivariate Analysis was performed using the Chi-Square test to assess the relationship between independent variables (immunization status and complementary feeding) and the dependent variable (wasting). A p-value < 0.05 was considered statistically significant.

Discussion

The findings of this study support previous research regarding the vulnerability of toddlers aged 2–3 years to wasting, which is often attributed to the transition from breastfeeding to solid food with inadequate nutritional intake (Masruroh et al., 2023). In this study, 27 toddlers within this age range were identified as experiencing wasting. Additionally, children at this age are more prone to infections such as diarrhea and pneumonia, which further compromise nutritional status (Ghe et al., 2023). The study also showed that 38 toddlers in this age group had incomplete immunization, making them more susceptible to infectious diseases due to reduced immunity (Wulandari et al., 2020).

Early introduction of complementary feeding (MPASI) is another factor associated with wasting. According to Imansari et al. (2024), children aged 2–3 years are frequently introduced to MPASI before six months of age, which is often linked to maternal knowledge gaps regarding age-appropriate feeding. This aligns with the current study, where 20 toddlers were given MPASI before six months. Gender differences were also noted; boys were more likely to experience wasting (23 respondents), have incomplete immunization (16 respondents), and be introduced to MPASI early (18 respondents)—likely influenced by parental perceptions of greater nutritional needs for boys (Wangsa, 2024; Sumiayin, 2022).

Parental factors, especially maternal age and education, also play a significant role. Ghe et al. (2022) reported that children of mothers aged 20–35 years are more likely to experience wasting. This study found 34 cases of wasting in this maternal age group. A possible explanation is that younger mothers may lack experience and knowledge of proper feeding practices (Maria, 2024). Educational background is equally important; mothers with only elementary to high school education were more likely to have wasted children (34 cases), reflecting findings by Masruroh et al. (2023) and Cholifatun (2023), who emphasized the role of education in maternal decision-making and caregiving.

The study also noted that housewives represented the majority of mothers with wasted children (34 respondents). While being a housewife can allow more time for caregiving, it may also reflect limited access to health information and support networks, which can affect child nutrition (Cholifatun, 2023).

Regarding complementary feeding, the univariate analysis revealed that 29.2% of toddlers received MPASI before six months. This aligns with findings by Hasnita et al. (2023), who reported that early MPASI is associated with a greater risk of wasting. However,

conflicting findings exist. Kopa et al. (2023) found no significant link between early MPASI and wasting, although inappropriate timing is known to cause digestive disorders and nutritional imbalances (WHO, 2020; Cristy, 2022). MPASI is ideally introduced at six months, when the infant's digestive system is ready for solid foods.

Immunization status was also a critical factor. As shown in Table 5, 52.4% of toddlers had complete immunization, while 47.6% did not. Immunization is a preventive measure against infectious diseases that can indirectly affect nutritional status by reducing the incidence of illness (Ministry of Health, 2022).

Wasting prevalence in this study was 25.6%. This finding supports previous research that links early MPASI (Hasnita et al., 2023) and incomplete immunization (E. Erika, 2020) to higher wasting rates. Wasting can impair growth, immunity, and cognitive development, and in severe cases, lead to death (WHO, 2020).

Statistical analysis confirmed a significant relationship between immunization status and wasting ($p = 0.001$; OR = 0.32; 95% CI: 0.15–0.70). Toddlers with incomplete immunization were more likely to experience wasting. These results contrast with those of Oktavia (2023), who found no significant association. Nevertheless, this study reaffirms that timely and complete immunization enhances children's resistance to infections and supports healthy growth.

Similarly, the provision of MPASI showed a strong association with wasting ($p = 0.000$; OR = 8.94; 95% CI: 4.07–19.67). Toddlers who received MPASI before six months were nearly nine times more likely to be wasted than those introduced to MPASI later. This supports findings by Hasnita et al. (2023) and contrasts with Simamora et al. (2024), who reported no significant link ($p = 0.555$). The findings suggest that early MPASI, if nutritionally inadequate, may lead to undernutrition and increase the risk of wasting.

Interestingly, 47.5% of toddlers who received early MPASI did not experience wasting, possibly due to nutrient-rich foods that compensated for the early introduction. This highlights the importance not only of timing but also of nutritional quality and quantity of complementary foods. As breast milk alone is insufficient after six months, MPASI must include balanced macronutrients (carbohydrates, protein, fat) and micronutrients (vitamins and minerals) to meet growing children’s needs.

Conclusion

This study emphasizes the crucial role of immunization and appropriate complementary feeding practices in supporting toddler health and preventing malnutrition. Ensuring that children receive complete immunizations and that complementary feeding begins at the recommended age are essential components of effective public health strategies. Strengthening community awareness, improving access to healthcare services, and enhancing parental knowledge are key measures to promote optimal growth and development in early childhood, particularly in regions vulnerable to nutritional challenges.

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Authors' contribution

Each author contributed equally in all the parts of the research. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Conflict of interest

The researchers stated that there is no conflict of interest related to the implementation and publication of the results of this research. The entire research process, from planning, data collection, analysis, to report preparation, was carried out independently without any influence or pressure from any third party. A commitment to research ethics is upheld throughout the research process, ensuring transparency, accuracy and honesty in reporting results. Respondents' participation was voluntary with informed consent, and their confidentiality and privacy were maintained in accordance with applicable research ethics standards. With this statement, researchers hope that the research results can be trusted and used as a valid reference for the development of science and health practices related to ethnomedicine and reproductive health.

Ethical consideration

Not applicable.

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