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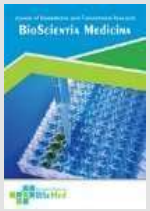

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Effect of Diagnosis, Complications, and Nutrition for Using Nasogastric Tube to Body Weight of Child Patients with Feeding Difficulty at Dr. M. Djamil General Hospital, Padang, Indonesia

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A B S T R A C T

Background: Several conditions in children can cause nutritional intake via the oral route to be inadequate. Providing enteral nutrition via a nasogastric tube (NGT) is an alternative option. Research on the use of NGTs in Indonesia is still limited, so this research aims to determine the effect of NGT use on the weight of pediatric patients with feeding difficulties at Dr. M. Djamil General Hospital, Padang. **Methods:** Experimental research with a pre and post-test-only design was conducted on 96 children aged 1 month - 18 years in the children's inpatient room at Dr. M. Djamil General Hospital, Padang. Body weight measurements were carried out before and after using NGT for 4 weeks (January 2022 – January 2023) at the pediatric nutrition and metabolic diseases polyclinic. Data were analyzed using paired t-test and ANOVA. **Results:** Most subjects (40.9%) were in the 1-12 month age group. The most common type of nutrition was ONS (oral nutritional supplements) (84.4%), the most common diagnosis was pulmonology (33.3%), and the majority were without complications (72.9%). There is an influence on the child's weight before and after using NGT (p-value <0.01). Significant differences were also found in changes in children's weight with diagnosis and complications (p<0.01). **Conclusion:** The use of NGT can increase the weight of pediatric patients who have feeding difficulties at Dr. M. Djamil General Hospital, Padang. Significant differences were found in changes in children's weight by diagnosis and complications.

1. Introduction

Providing adequate nutrition is a fundamental factor for children's growth and development. Optimal nutrition supports metabolic processes, cell and tissue formation, as well as the development of body organs and brain function. Lack of nutritional intake in childhood can result in various serious consequences, such as stunting, wasting, and cognitive deficits, which have an impact on children's long-term health and quality of life. However, various conditions can cause children to have difficulty eating, and their nutritional intake is not met through the oral route. Abnormalities in the structure of the oropharynx, such as cleft lip, cleft palate, or esophageal atresia, can make swallowing and chewing difficult. Chronic diseases such as cancer, inflammatory bowel disease, and cystic fibrosis can interfere with appetite, nutrient absorption, and body metabolism. Physical or emotional trauma can cause stress and anxiety, which can affect a child's appetite and ability to eat. Feeding difficulties in children can result in various negative impacts. Lack of energy intake and important nutrients can hinder children's physical growth and mental development. Lack of nutrition can weaken the immune system, making children more susceptible to infections and disease. Prolonged nutritional

deficiencies can increase the risk of serious health complications, such as anemia, osteoporosis, and heart failure.[1-4]

A nasogastric tube (NGT) is an option for providing enteral nutrition to children who have difficulty eating. NGT is a thin tube that is inserted through the nose and directed into the stomach. NGT allows the delivery of nutrients directly to the stomach, thereby bypassing the oral and digestive processes in the small intestine. Providing nutrition via NGT has been proven to be effective in increasing energy and nutrient intake, as well as supporting the growth and development of children with eating difficulties. NGT can be used in the short term to treat acute problems or in the long term to help children who need additional nutrition for a long time. One study reported that approximately 25% of hospitalized pediatric patients required temporary feeding tubes. The most commonly used enteral feeding tube in hospitalized children is a nasogastric tube (NGT). The use of NGT in children is influenced by the type of food that will be given to the child, the child's diagnosis, and the complications experienced by the child.[5-9] In Indonesia, research on NGT in children with feeding difficulties is very limited. This study aims to determine the effect of diagnosis, complications, and type of nutrition when using a nasogastric tube on the weight of child patients with feeding difficulties at Dr. M. Djamil General Hospital, Padang, Indonesia.

2. Methods

This research is experimental research with a pre and post-test-only design. This design was chosen because researchers wanted to know the effect of using an NGT on the weight of pediatric patients with difficulty eating. The population of this study was all pediatric patients aged 1 month – 18 years who had feeding difficulties and were treated in the children's inpatient room at Dr. M. Djamil General Hospital, Padang. The research sample was taken using a consecutive sampling technique. The research sample consisted of 96 children who met the inclusion criteria, namely: pediatric patients aged 1 month – 18 years, had difficulty eating, were treated in the children's inpatient room at Dr. M. Djamil General Hospital Padang, and were willing to be research respondents. Meanwhile, the exclusion criteria for this study are pediatric patients with allergies to enteral formula, pediatric patients with medical conditions that do not allow the use of NGT, and pediatric patients who are not willing to be research respondents.

Pediatric patients who met the inclusion criteria were explained about the study and asked for their consent to become respondents. If the parent/guardian agrees, an initial weight measurement is carried out. The pediatric patient had an NGT installed and was given enteral nutrition for 4 weeks. At the end of the 4th week, final body weight measurements were taken. Data were analyzed using the SPSS program. The paired t-test was used to determine the difference in body weight before and after NGT use. The ANOVA test was used to determine the effect of diagnosis and complications on changes in children's weight and quality of life. This research was conducted with due regard to research ethics. Pediatric patients and parents/guardians were explained about the study, and their consent was sought before they became respondents. Respondent data is kept confidential. Respondents were explained about the benefits and risks of research. This study has obtained research permission from the Research Ethics Committee of the Faculty of Medicine, Universitas Andalas, Padang, Indonesia.

3. Results

Table 1 shows the characteristics of the research subjects, including age, gender, parental education, type of nutrition, diagnosis, and complications. A total of 42.7% of research subjects were aged 0-1 year, 16.7% aged 1-3 years, 10.4% aged 3-5 years, and 30.2% aged more than 5 years. The fairly even age distribution shows that this research involved children from various age groups. 54.2% of research subjects were male and 45.8% female. The almost equal proportion of men and women shows that this research is not dominated by one particular gender. As

many as 26% of the research subjects' parents had low education, while 74% had higher education. The higher proportion of parents with higher education suggests that this study may have included more children from families with better economic backgrounds. The type of nutrition most frequently given to research subjects was ONS (84.4%), followed by formula milk (12.5%) and high ONS (3.1%). The predominant use of ONS suggests that this type of nutrition may be the preferred choice for children with feeding difficulties. The most common diagnosis in research subjects was pulmonological disease (33.3%), followed by neoplasm/malignancy (26.1%) and others (33.3%). Congenital abnormalities (2.1%) and digestive diseases (5.2%) were the least common diagnoses. A total of 72.9% of study subjects experienced no complications, 26.1% experienced other complications, and 1% experienced mechanical complications. The high proportion of subjects without complications suggests that this study may have included children with relatively stable conditions. Table 1 shows the characteristics of various research subjects in terms of age, gender, parental education, type of nutrition, diagnosis, and complications. This information is important for understanding the research context and interpreting research results.

Table 1. Characteristics of respondents.

Characteristics	Frequency (%)
Age (years)	
0-1 year	41 (42,7)
1-3 years	16 (16,7)
3-5 years	10 (10,4)
>5 years	29 (30,2)
Gender	
Male	52 (54,2)
Female	44 (45,8)
Parental education	
Lower education	25 (26)
Higher education	71 (74)
Types of nutrition	
ONS	81 (84,4)
High ONS	3 (3,1)
Formula milk	12 (12,5)
Diagnosis	
Congenital abnormalities	2 (2,1)
Neoplasm/malignancy	25 (26,1)
Digestive disease	5 (5,2)
Pulmonology diseases	32 (33,3)
Others	32 (33,3)
Complications	
No complications	70 (72,9)
Other complications	25 (26,1)
Mechanical complications	1 (1)

Table 2 shows that there is a significant increase in children's body weight after using NGT (p-value <0.01). The median initial body weight of children was 10.2 kg (with a range of 2.17-66 kg), and the median final body weight after NGT use was 11.05 kg (with a range of 3.1-67 kg). The median change in weight of children using ONS was 0.7 kg (with a range of -1.50 – 3 kg). The median change in weight of children using High ONS is 1 kg (with a range of 0.13 – 1 kg). The median change in weight of children who use formula milk is 0.4 kg (with a range of -1.5 – 2 kg). There is a significant difference in changes in children's weight based on the type of nutrition (p-value = 0.164). The median change in weight of children with a diagnosis of congenital abnormalities was 0.32 kg (with a range of 0.05 – 0.6 kg). The median change in weight of children with a diagnosis of neoplasm/malignancy is 0.6 kg (with a range of -1.5 – 3 kg). The median change in weight of children with a diagnosis of digestive disease was 0.8 kg (with a range of 0 - 1.2 kg). The median change in weight of children with a diagnosis of pulmonology is 0.5 kg (with a range of -1.5 – 1.5 kg). The median change in weight of children with a diagnosis of Others is 1 kg (with a range of -1.5 – 2.3 kg). There was a significant difference in changes in children's weight based on diagnosis (p-value <0.01). The median change in child weight without complications was 1 kg (with a range of 0.5-3 kg). The median change in weight of children with other complications was 0 kg (with a range of -1.50 – 0.4 kg). The median change in weight of children with mechanical complications was 0.4 kg (with a range of 0.4 – 0.4 kg). There was a significant difference in changes in children's weight based on complications (p-value <0.01).

Table 2. Effect of diagnosis, complications, and type of nutrition on the use of nasogastric tubes on the body weight of pediatric patients.

Variable	**Category**	**Median (min-max)**	**p-value**
Child's weight			<0,01
	Initial weight	10,2 (2,17-66)	
	Final weight	11,05 (3,1-67)	
Variable	**Weight changes**		**p-value**
	Category	**Median (min-max)**	0,164
Types of nutrition	ONS	0,7 (-1,50 – 3)	
	High ONS	1 (0,13 – 1)	
	Formula milk	0,4 (-1,5 – 2)	
Diagnosis	Congenital abnormalities	0,32 (0,05 – 0,6)	<0,01
	Neoplasm/malignancy	0,6 (-1,5 – 3)	
	Digestive disease	0,8 (0 - 1,2)	
	Pulmonology disease	0,5 (-1,5 – 1,5)	
	Others	1 (-1,5 – 2,3)	
Complications	No complications	1 (0,5-3)	<0,01
	Other complications	0 (-1,50 – 0,4)	
	Mechanical complications	0,4 (0,4 – 0,4)	

4. Discussion

The findings of this study show that there is a significant increase in children's body weight after using NGT (p-value <0.01). This is in line with several previous studies which showed similar results. A study found that enteral nutrition supplementation via NGT can significantly increase the weight of children with failure to thrive. Other studies show that the use of NGT in children with malnutrition can significantly increase their weight and nutritional status. Another study found that NGT can help improve children's growth and development, including their weight. One important factor in children's growth and development is adequate nutritional intake. Nutrients, such as energy and protein, are needed to build and maintain body tissue and support the function of organs and body systems. NGT (Nasogastric Tube) provides controlled and consistent nutritional intake. This means that children can receive the amount of energy and protein they need on a regular basis without having to worry about inconsistent or inadequate food intake. Adequate energy and protein intake helps children to grow and develop optimally. Optimal nutrition helps strengthen children's immune systems so they are more resistant to disease. Adequate nutrition helps a child's organs and body systems function optimally. Children with failure to thrive may not be able to meet their nutritional needs through oral food intake. NGT can help them to get the nutrition they need to grow and develop optimally. Children with malnutrition may lack important nutrients. NGT can help them to regain lost nutrients and improve their nutritional status. Children with certain medical conditions, such as digestive diseases or cancer, may have difficulty eating and digesting food. NGT can help them to get the nutrition they need to maintain their health and fitness. NGT can help reduce the digestive burden in children with certain medical conditions, allowing them to absorb nutrients more optimally. NGT provides nutrition directly to the small intestine, bypassing the digestive process in the mouth, esophagus and stomach. NGT can help slow intestinal transit time, thereby allowing the body to absorb nutrients more optimally. NGT can help reduce metabolic stress in children with certain medical conditions. This can help increase nutrient absorption and child growth. NGT helps increase children's weight and nutritional status so they are more active and energetic. NGT helps reduce symptoms of disease, such as vomiting, diarrhea, and pain. NGT helps increase children's self-confidence by enabling them to participate in social activities and physical activities. NGT provides a controlled and consistent intake of nutrients, including protein and essential amino acids needed for growth hormone production. NGT helps reduce the digestive burden in children with certain medical conditions, such as gastrointestinal diseases. This allows the child's body to divert energy and resources to other processes, including the production of growth hormones. Insulin-like Growth Factor 1 (IGF-1) levels are a hormone that plays an important role in growth and development. NGT can increase IGF-1 levels by increasing nutritional intake and reducing digestive burden. NGT can help children sleep more soundly, which is an important time for growth hormone production. NGT helps improve children's nutritional status, which can increase growth hormone production.[10-15]

Even though there is a difference in the median change in children's weight based on the type of nutrition (ONS, high ONS, and formula milk), the p-value shows that this difference is not statistically significant (p-value = 0.164). Another study showed that there was no significant difference in weight changes in children with failure to thrive who received enteral nutrition with standard formula and high-calorie formula. Other studies show that formula milk with a high protein content can increase a child's weight more effectively than standard formula milk. ONS and high ONS formulas have differences in calorie, protein, and micronutrient content, which can affect nutrient absorption and metabolism rates and, ultimately, changes in body weight. High ONS formulas generally have a higher calorie content than ONS formulas. This can help children who need extra

energy to gain weight. High ONS formulas generally have a higher protein content than ONS formulas. Protein is needed to build and repair body tissue, which is important for children's growth and development. ONS and high ONS formulas generally contain the same micronutrients, such as vitamins and minerals. However, the micronutrient levels in the high ONS formula may be higher to meet the needs of children who require more energy and protein. Differences in calorie, protein, and micronutrient content in ONS and high ONS formulas can affect nutrient absorption and metabolism rates. High ONS formula with a higher calorie content can increase a child's energy intake, which can help increase body weight. High ONS formula with higher protein content can help children build and repair body tissue more effectively, which can help increase body weight. The micronutrients in ONS and high ONS formulas help children's bodies absorb and metabolize nutrients. The higher levels of micronutrients in the High ONS formula may help increase the absorption and metabolism of protein and calories, which may help promote weight loss. Children who receive high ONS formula may gain weight more quickly than children who receive ONS formula. This is because the High ONS formula provides more energy, protein, and micronutrients needed for growth and development. Children who receive ONS formula may gain weight more slowly than children who receive High ONS formula. This is because the ONS formula provides less energy, protein, and micronutrients. Every child has a different tolerance for certain types of nutrition. Some children may have an intolerance to the lactose in the formula, which can affect nutrient absorption and body weight. Children with certain medical conditions, such as gastrointestinal diseases, may require special formulas to meet their nutritional needs.[16-20]

This study shows that there is a significant difference in changes in children's weight based on diagnosis (p-value <0.01). This shows that a child's diagnosis can influence his weight gain. A study shows that children with certain diagnoses, such as chronic diseases, have a higher risk of experiencing growth and development disorders, including weight gain. Other studies show that children with certain diagnoses, such as malnutrition, have a higher risk of developing weight deficits. Children with certain diagnoses, such as gastrointestinal diseases, may have difficulty eating and drinking, resulting in reduced nutritional intake. This can affect his weight gain. Some diagnoses, such as endocrine diseases, can affect a child's metabolism so that more energy is burned than energy received. This can lead to weight loss. Children with certain diagnoses, such as neuromuscular disease, may have difficulty moving and doing physical activity. This can affect their weight gain.[21-24]

The results showed that there was a significant difference in changes in children's weight based on complications (p-value <0.01). This shows that the complications experienced by children can affect their weight gain. A study shows that children with certain complications, such as infections, have a higher risk of experiencing growth and development disorders, including weight gain. Other studies show that children with certain complications, such as sepsis, have a higher risk of developing weight deficits. Children with certain complications, such as fever and diarrhea, may have difficulty eating and drinking, resulting in reduced nutritional intake. This can affect his weight gain. Some complications, such as sepsis and infection, can increase a child's body's metabolism so that more energy is burned than energy received. This can lead to weight loss. Stress due to complications can affect hormones that regulate appetite and metabolism, which can cause weight loss. Complications experienced by children can affect their weight gain. Factors such as nutritional intake, metabolism, and stress can explain differences in changes in children's weight based on complications.[25-30]

5. Conclusion

The use of NGT can increase the weight of pediatric patients who have feeding difficulties at Dr. M. Djamil

General Hospital, Padang. Significant differences were found in changes in children's weight by diagnosis and complications.

6. References

1. Mason S, Harris G, Blissett J. Tube feeding in infancy: implications for the development of normal eating and drinking skills. Dysphagia. 2005; 20: 46-61.
2. Soedibyo S, Mulyani R. Feeding difficulties in patients: a survey in the outpatient pediatric unit. Sari Pediatr. 2016; 11(2): 79.
3. Prasetya D, Haryanti S, Nurani N. Risk factors of hospital-acquired malnutrition in children: a study in a rural hospital of West Borneo, Indonesia. Malays J Nutr. 2021; 27(1): 169-76.
4. Saengnipanthkul S, Chongviriyaphan N, Densupsoontorn N. Hospital-acquired malnutrition in paediatric patients: a multicentre trial focusing on prevalence, risk factors, and impact on clinical outcomes. Eur J Pediatr. 2021; 180(6): 1761-7.
5. Romano C, Van Wynckel M, Hulst J, Al E. European society for paediatric gastroenterology, hepatology and nutrition guidelines for the evaluation and treatment of gastrointestinal and nutritional complications in children with neurological impairment. J Pediatr Gastroenterol Nutr. 2017; 1: 65.
6. British Association of Parenteral and Enteral Nutrition. Oral nutritional supplements (ONS). Bapen. 2015; 1:1-5.
7. Falaihaini A. Factors related to the incidence of hospital-acquired malnutrition in pediatric patients. Universitas Indonesia. 2018; 1: 22-29.
8. Rahmi AT, Azrimaidaliza, Desmawati. Difficulty eating and nutritional status of children aged 3-5 years in Jati Sub-District, Padang City. J Endur Reviews Health Probl Science. 2020; 5(3): 430-7.
9. Lyman B, Kemper C, Northington L, Al E. Use of temporary enteral access devices in hospitalized neonatal and pediatric patients in the United States. J Parenter Enter Nutr. 2016; 40(4): 574-580.
10. Seyedhejazi M, Hamidi M, Sheikhzadeh D, Aliakbari Sharabiani B. Nasogastric tube placement errors and complications in pediatric intensive care unit: a case report. J Cardiovasc Thorac Res. 2011; 3(4): 133-134.
11. Krom H, Zundert Z, Otten M, Veer L, Benninga M, Kindermann A. Prevalence and side effects of pediatric home tube feeding. Clin Nutr. 2018; 1: 1-6.
12. Boctor D, Jutteau W, Fenton T. The prevalence of feeding difficulties and potential risk factors in pediatric intestinal failure: Time to consider promoting oral feeds? Clin Nutr. 2021; 40(10): 5399-406.
13. Ricciuto A, Baird R, Sant'Anna A. A retrospective review of enteral nutrition support practices at a tertiary pediatric hospital: a comparison of prolonged nasogastric and gastrostomy tube feeding. Clin Nutr. 2015; 34(4): 652-8.
14. Mokhlesin M, Mirmohammadkhani M, Nooripour S, Rashidan S, Ahmadizadeh Z. Feeding problems score and its related factors in two-year-old children born very preterm and full term. Iran J Nurs Midwifery Res. 2019: 256–60.
15. Mokhlesin M, Mirmohammadkhani M, Nooripour S, Rashidan S, Ahmadizadeh Z. Feeding problems score and its related factors in two-year-old children born very preterm and full term. Iran J Nurs Midwifery Res. 2019: 256–60.
16. Sdravou K, Emmanouilidou-Fotoulaki E, Printza A. Factors associated with feeding problems in young children with gastrointestinal diseases. Healthc. 2021; 9(6): 741.

17. ASPEN. Oral nutrition supplements preparation guide. 2022; 1: 22.
18. Chen M, Chao H, Yeh P, Lai M, Chen C. Therapeutic efficacy of nasoenteric tube feeding in children needing enteral nutrition. Front Pediatr. 2021; 9: 1-9.
19. Krom H, Zundert Z, Otten M, Veer L, Benninga M, Kindermann A. Prevalence and side effects of pediatric home tube feeding. Clin Nutr. 2018; 1: 1-6.
20. O'Connor G, Hartfiel-Capriles Z, Saduera S. Intermittent bolus versus continuous feeding in children receiving an enteral formula with food-derived ingredients: a national multicentre retrospective study. Clin Nutr ESPEN. 2023; 54: 175-9.
21. Nangia S, Vadivel V, Thukral A, Saili A. Early total enteral feeding versus conventional enteral feeding in stable very-low-birth-weight infants: a randomised controlled trial. Neonatology. 2019; 115(3): 256-62.
22. Gien J, Murthy K, Pallotto EK. Short-term weight gain velocity in infants with congenital diaphragmatic hernia (CDH). Early Hum Dev. 2017; 106-107: 7-12.
23. Gao L, Shen W, Wu F. Effect of early initiation of enteral nutrition on short-term clinical outcomes of very premature infants: A national multicenter cohort study in China. Nutrition. 2023; 107: 11-19.
24. Soliman A, De Sanctis V, Elsiddig S. Impact of oral nutritional supplements (ONS) on growth outcomes and IGF-1 level in underweight older children and young adolescents (5-14 years) with short stature and no systemic disease: high versus normal calories density formula. Acta Biomed. 2021; 92(4): 1-9.
25. Bicakli D, Sari H, Yilmaz M, Cetingul N, Kantar M. Nasogastric tube feeding experiences in pediatric oncology patients and their mothers: a qualitative study. Gastroenterol Nurs. 2019; 42(3): 286-93.
26. Pruccoli J, Pelusi M, Romagnoli G, Parmeggiani A. The impact of nasogastric tube feeding on drive for thinness and body dissatisfaction in children and adolescents with anorexia nervosa. Eur Psychiatry. 2022; 65: 384-5.
27. Wong A, Banks M, Bauer J. A survey of home enteral nutrition practices and reimbursement in the Asia Pacific Region. Nutrients. 2018; 10(2): 1-13.
28. Raegger C, Decsi T, Dias J. Practical approach to paediatric enteral nutrition: a comment by the ESPGHAN committee on nutrition. J Pediatr Gastroenterol Nutr. 2010; 51(1): 110-22.
29. Yi D. Pediatric gastroenterology, hepatology & nutrition enteral nutrition in pediatric patients. Hepatol Nutr. 2018; 30(1): 12-19.
30. Klek S, Hermanowicz A, Dziwiszek G. Home enteral nutrition reduces complications, length of stay, and health care costs: results from a multicenter study. Am J Clin Nutr. 2014; 100: 609–15.