Journal of Endocrinology, Tropical Medicine, and Infectious Disease (JETROMI)
Journal homepage: https://talenta.usu.ac.id/jetromi

NUTRITIONAL STATUS OF KINDERGARTEN CHILDREN IN MEDAN HELVETIA SUBDISTRICT AND THE FACTORS AFFECTING IT

Ira Nurhasanah Pasaribu[1], Hendri Wijaya*[1], Bintang Yinke Magdalena Sinaga[1], Rina Yunita[4]

[1]*Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[2]*Department of Paediatrics, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[3]*Department of Pulmonology and Respiratory Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[4]*Department of Microbiology, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia*
**Corresponding Author: hendri.wijaya@usu.ac.id*

ARTICLE INFO

Article history:
Received 20 October 2024
Revised 22 February 2025
Accepted 30 April 2025
Available online 01 May 2025

E-ISSN: 2686-0856
P-ISSN: 2686-0872

How to cite:
Ira Nurhasanah Pasaribu, Hendri Wijaya, Bintang Yinke Magdalena Sinaga, Rina Yunita (2025). Nutritional Status Of Kindergarten Children In Medan Helvetia Subdistrict And The Factors Affecting It. Journal of Endocrinology, Tropical Medicine, an Infectiouse Disease, 7(2), 62-68. (make in IEEE style)

ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is caused by reduced insulin sensitivity and secretion. Several recent investigations have found that vitamin D is connected with insulin secretion and sensitivity. Vitamin D insufficiency is linked to poor glucose regulation. The research aims to determine the correlation between serum 25-hydroxyvitamin D levels and glycemic control in T2DM patients.
Method: T2DM patients' serum levels of 25-Hydroxyvitamin D, Fasting Blood Glucose (FBG), 2-hours postprandial blood glucose (PPBG), and HbA1c were examined in this cross-sectional analytical observational study. Statistical analysis was also performed.
Result: From 49 samples included, the number of male subjects was almost the same as female, mean age was 58 years. There was a decrease in serum 25-Hydroxyvitamin D levels with a median of 27.87 ng/ml. Glycemic control was found to be poor, the median of FBG levels was 134 mg/dl. 2-h PBG levels were 208 mg/dl and HbA1c levels were 7.5%. Analysis using Spearman correlation between serum 25-Hydroxyvitamin D levels with levels of FBG. 2-h PPBG. and HbA1c showed values r=-0.538 and p=0.001; r=-0.354 and p=0.013; r=-0.501 and p=0.001.
Conclusion: There was a statistically significant negative correlation between serum 25-Hydroxyvitamin D levels and levels of FBP, PPBG, and HbA1c in T2DM patients.

Keywords: *25-Hydroxyvitamin D, FBG, PPBG, HbA1c.*

ABSTRAK

Latar Belakang: *Rendahnya status gizi berdampak pada kualitas sumber daya manusia karena status gizi memengaruhi kecerdasan dan daya tahan tubuh terhadap penyakit. Tujuan penelitian adalah untuk menganalisis faktor-faktor yang berkontribusi terhadap status gizi anak sekolah di taman kanak-kanak (TK) di Kecamatan Medan Helvetia.*
Metode: *Penelitian ini adalah studi analitik kuantitatif dengan memakai pendekatan cross sectional. Populasi penelitian adalah anak sekolah di TK Kecamatan Medan Helvetia dengan sampel sebanyak 100 orang. Teknik pengambilan sampel dalam penelitian ini memakai metode stratified random sampling. Metode pengumpulan data ialah metode angket dengan menggunakan alat pengumpulan data berupa kuesioner dan food recall 24 jam serta pengukuran antropometri dengan memakai alat timbang dan microtoise. Analisis data dengan menggunakan uji chi square dan fisher's exact.*

Hasil: *Hasil penelitian menunjukkan dari 100 anak diketahui jenis kelamin perempuan sebanyak 58 anak, jenis kelamin laki-laki sebanyak 42 anak, umur anak < 60 bulan sebanyak 29 anak, umur anak 60-72 bulan sebanyak 64 anak, umur anak >72 bulan sebanyak 7 anak, status gizi buruk sebanyak 1 anak, status gizi kurang sebanyak 29 anak, status gizi baik sebanyak 57 anak, status gizi lebih sebanyak 9 anak, dan obesitas sebanyak 4 anak. Hasil analisis bivariat menunjukkan terdapat hubungan antara asupan makanan dan penyakit infeksi yang dialami anak dengan status gizi (p<0,05), tidak terdapat hubungan antara pendapatan keluarga, pengetahuan ibu, status imunisasi, dan tingkat pendidikan ibu dengan status gizi anak (p>0,05).*
Kesimpulan: *Faktor yang memengaruhi status gizi anak TK di Kecamatan Medan Helvetia adalah asupan makanan dan penyakit infeksi.*

Kata kunci: *Anak TK, status gizi, asupan makanan, penyakit infeksi*

1. Introduction

The toddler period, or the so-called “under fives” is crucial for children's growth. This phase is important as it lays the foundation for their physical, cognitive, and emotional development. Proper nutrition and care during this stage are essential for their overall health and future well-being. Unfortunately, 149.2 million toddlers suffer from stunting, 45,4 million are wasted and 38.9 million children are overweight, globally [1]. Furthermore, 1 out of 3 children in Indonesia suffer from stunting. 1 out of 10 is wasted and approximately 8% of them are overweight [2]. According to research in 2017, the prevalence of stunted children in North Sumatra is 28.4%, 13.5% are wasted and 1,9% are overweight [3].

Nutritional status, especially for the “under fives” affects the quality of human resources because it helps determine the level of intelligence and the body’s resistance to diseases in the future [4]. Several infectious diseases commonly experienced by children, particularly in the under-five age group, include pneumonia, tuberculosis, and diarrhea. According to WHO, pneumonia accounted for 14% of total deaths among under-five children worldwide in 2019. In 2021, 10.6 million people in Indonesia were diagnosed with Tuberculosis, of which 1.2 million were children.

According to WHO and UNICEF, approximately 2 billion cases of diarrhea are found annually, which accounts for 1.9 million deaths of the under-five age group globally. The results of the 2018 Riset Kesehatan Dasar showed that the prevalence of diarrhea for all age groups was around 8%, while for children under five, the rate reached 12.3% [5]. Children’s nutritional status is said to be influenced by the quantity of food, the body’s health, and the family's financial ability [6,7].

This research is essential because the prevalence of undernutrition among young children in Indonesia remains relatively high. According to the World Health Organization (WHO), 22.9% of children under five in Indonesia experienced undernutrition in 2020. This condition can affect children's cognitive, motor, and health development. Therefore, this study aims to identify the prevalence of undernutrition and the factors influencing it in the Medan Helvetia District. Similar studies were conducted in Jakarta (2019) and Yogyakarta (2020), which found that socioeconomic factors and parental education significantly influenced children's nutritional status. However, no research has specifically focused on the Medan Helvetia District. This study seeks to broaden the understanding of the factors affecting children's nutritional status in this area. Thus, the results of the study can serve as a reference for developing effective nutrition intervention programs. By conducting this research, it is expected that accurate data on the nutritional status of young children in the Medan Helvetia District can be obtained. The results can assist the government and health institutions in developing strategies to improve children's nutritional status. Furthermore, this study can contribute to the advancement of knowledge and health policies in Indonesia. Sources: World Health Organization (WHO), Ministry of Health of the Republic of Indonesia, and Indonesian Journal of Public Health (JKMI) [8,9].

Medan City has several subdistricts, one of which is Medan Helvetia. In the Medan Helvetia subdistrict, there are 34 Kindergartens, consisting of 1 public kindergarten and 33 private Kindergartens. The researcher has not obtained secondary data on the number of malnutrition cases in the Medan Helvetia subdistrict, particularly among the under-five. The study aims to research the nutritional status of kindergarten children in Medan Helvetia.

2. Method

This study is a quantitative research using a cross-sectional approach, which is a research method where data is collected at a single point in time (point-time approach). The design of this study aims to identify the factors that contribute to the nutritional status of kindergarten children in the Medan Helvetia subdistrict. This sub-

district includes 7 urban neighbourhoods including, Dwi Kora, Sei Kambing CII, Helvetia, Helvetia Tengah, East Helvatia, Tanjung Gusta, and Cinta Damai. The total population of children attending Kindergartens during this period is 1,589 children, and at least 100 children under these Kindergartens will be included in this research unless they refuse to participate. We utilize the stratified random sampling method which results in 5 samples will be taken from Dwi Kora, 7 from Sei Kambing CII, 10 from Helvetia, 7 from Helvetia Tengah 39 from East Helvetia, 7 from Tanjung Gusta and 25 from Cinta Damai, which totals to 100 participants in this study. We utilize questionnaires and a 24-hour food recall method, as well as anthropometric measurements with the help of microtoise and weighing scales.

After the data processing is completed, an in-depth analysis and evaluation of the results will be carried out with univariate analysis and bivariate analysis to find the relationship between every independent variable and dependent variable in this study. We use the Chi-square and Fisher's exact technique to discover the hypothesis of this study. A significant relationship will be marked by a $p>0.05$

3. Result

Based on Table 1, this study shows that the majority of Kindergarten children (TK) involved were aged 60-72 months (64.0%), with most being female (58.0%). The mothers of these children were predominantly in the early adulthood age group, specifically between 26-35 years old (55.0%).

Table 1 Subject Characteristic

Subject	(n)	(%)
Children's Age (months)		
< 60	29	29
60-72	64	64
>72	7	7
Gender		
Male	42	42
Female	58	58
Mother's Age (Years)		
Late Adolescence (17-25)	4	4
Young Adult (26-35)	55	55
Adult (36-45)	38	38
Early elderly (46-55)	3	3
Late Adolescence (17-25)	4	4

Based on Table 2, the most nutritional status is normal, food intake is inadequate and family income is high.

Table 2 Subject Characteristic Nutritional Status, Food Intake, and Family Income

Subject Characteristic	Nutritional Status (n)	Percentage (%)
Nutrition		
Severe	1	1
Malnutrition		
Underweight	29	29
Normal	57	57
Overweight	9	9
Obese	4	4
Total	100	100
Food Intake		
Adequate	46	46
Inadequate	54	54
Total	100	100
Family Income		
Low	38	38
High	62	62
Total	100	100

Based on Table 3, there was a significant relationship between food intake and the nutritional status of children ($p<0.05$), and infection Status and nutritional status of children ($p<0.05$). There was no significant relationship was found between family income and children's nutritional status ($p>0.05$) and the mother's knowledge about children's nutritional status ($p>0.05$), Immunization status, and the nutritional status of children ($p>0.05$), and level of education and the nutritional status of children ($p>0.05$)

Table 3 Subject Characteristic Nutritional Status, Food Intake, and Family Income Analysis

Variable	Nutritional Status			p Value
	Overweight & obesity	Normal	Underweight & Severe malnutrition	
Food Intake				0.004*
Adequate	11	26	9	
Inadequate	2	31	21	
Family Income				0.672**
High	7	37	18	
Low	6	20	12	
Level of Knowledge				0.234**
Good	4	31	13	
Moderate	7	20	16	
Bad	2	6	1	
Infection Status				0.030**
Never	0	3	1	
Occasionally	5	34	17	
Often	4	17	4	
Always	4	3	8	
Immunization status				0.399*
Complete	5	20	15	
Incomplete	8	37	15	
Level of Education				0.092**
High	3	27	17	
Medium	10	30	12	
Low	0	0	1	

4. Discussion

The findings of this study indicate that the prevalence of overweight among children in the Kindergarten of Medan Helvetia District is 9%, significantly higher than the 3.5% reported in the Indonesian Nutrition Status Survey (SSGI) 2022. Moreover, 29% of the children experience undernutrition, a figure exceeding the national prevalence of 7.1% for wasted toddlers noted in the SSGI 2021, and 16.6% in Medan City specifically [8]. Regarding immunization status, only 40% of children had complete immunizations, with 21% receiving them on schedule. This rate is lower than the SSGI 2021 figures, which reported 65.8% of children in Indonesia and 59.3% in North Sumatra receiving complete basic immunizations [10,11]. The study reveals a significant relationship between food intake and nutritional status ($p<0.05$), consistent with Anggraeni, Rasmada & Toby (2021), which also found a strong link between these variables. In contrast, Kapantow, Momongan & Roring (2018) reported no significant association between energy intake and nutritional status ($p=0.561$) [12,13]. Furthermore, the results show no significant relationship between family income and nutritional status ($p>0.05$), aligning with Sudarsih & Wijayanti (2013). However, findings diverged from Kasumayanti & Zurrahmi (2020), which identified a significant relationship between family income and nutritional status ($p=0.002$) [14,15]. Adequate food intake is fundamental for a child's growth and development, as it provides the necessary macronutrients and micronutrients required for energy production, cellular repair, and immune function. Over time, the inability to provide sufficient nutrition negatively impacts a child's growth and health. Additionally, low-income families may lack access to healthcare and sanitation, further increasing the risk of malnutrition and infections, creating a cyclical pattern of poor health and poverty [16,17].

A mother's knowledge about nutrition, hygiene, and child care profoundly influences a child's nutritional status. Mothers with limited knowledge may lack awareness of balanced diets, breastfeeding practices, and appropriate complementary feeding methods. This creates a vicious cycle where undernutrition weakens the immune system, making the child more susceptible to infections, which in turn exacerbate nutrient deficiencies [18,19]. Immunization protects children from preventable diseases that can impair nutritional status. Vaccines reduce the incidence and severity of infections such as measles, which are known to cause significant nutrient depletion and weight loss. Unimmunized children are at a higher risk of contracting infections that can result in prolonged illness and hospitalization, further hindering growth and development. Studies have shown that higher maternal education is associated with better breastfeeding practices, timely introduction of complementary foods, and reduced incidence of childhood illnesses. Conversely, mothers with limited education may struggle to recognize the signs of malnutrition or access appropriate healthcare resources, increasing the risk of poor nutritional outcomes. Thus, improving maternal education is a key strategy in combating child malnutrition [20,21]. Additionally, the study found no significant link between maternal knowledge and children's nutritional status ($p>0.05$), supporting the findings of Kapantow, Lamia & Punuh (2019). Nevertheless, this contrasts with Ayuningtyas, Hasanah & Yuliawati (2021), who found a significant relationship between maternal knowledge and nutritional status. Lastly, the research indicates a significant relationship between the history of infectious diseases and nutritional status ($p<0.05$), corroborating findings by Cono, Gatum & Nahak (2021) [13,16,17]. This underscores the impact of infections on appetite and nutrient intake, ultimately affecting children's nutritional status. The contrasting findings regarding the relationship between maternal knowledge and children's nutritional status can be explained by several factors. For instance, the study by Kapantow, Lamia, and On the other hand, Ayuningtyas, Hasanah, and Yuliawati (2021) might have examined a population where maternal knowledge directly impacted feeding practices, hygiene, and healthcare utilization. In such settings, mothers with higher nutritional knowledge may have been better equipped to provide balanced diets, recognize signs of malnutrition, or seek timely medical intervention, resulting in a significant relationship between maternal knowledge and children's nutritional status. The study by Kapantow, Lamia, and Punuh (2019) demonstrated significant strengths in its approach by emphasizing contextual factors such as socioeconomic and environmental influences, offering a comprehensive perspective on the determinants of child nutrition within their study area. Their robust methodology in identifying non-significant variables also contributed to a better understanding of the complex nature of malnutrition. However, the study had limitations, including a lack of exploration into how maternal knowledge interacts with other factors, such as cultural practices or access to healthcare, which might have obscured its potential impact. Additionally, the findings may have been constrained by the study's sample size or specific location, limiting their generalizability. In contrast, the research by Ayuningtyas, Hasanah, and Yuliawati (2021) excelled in highlighting the direct influence of maternal knowledge on child nutrition, emphasizing the critical role of educational interventions in improving outcomes. However, its limitations included a failure to account for external confounding factors such as food insecurity or environmental conditions, which could independently affect nutritional status.

These strengths and limitations highlight the distinct contributions and challenges of each study, showcasing the importance of contextual considerations and methodological rigor when evaluating the multifactorial determinants of child nutrition.

5. Conclusion

The conclusions drawn from the study conducted on Kindergarten children in the Medan Helvetia District are the majority of children have a good nutritional status, accounting for 57%. A significant portion of the children, 54%, have inadequate food intake. Furthermore, 62% of families have a high income, while 48% of mothers possess good nutrition knowledge. Notably, 56% of children have a history of infectious diseases occurring at least once in the last three months, and 58% have incomplete immunization status. The most common educational attainment among mothers of these children is senior high school, representing 51%.

Acknowledgment

I would like to express my heartfelt gratitude to my thesis supervisor, Dr. Hendri Wijaya, DTM&H, M.Ked(Ped), Sp. A(K), for his unwavering support and guidance throughout the writing process. I also extend my appreciation to my examiners, Dr. dr. Bintang Yinke Magdalena Sinaga, M.Ked(Paru), Sp.P(K), and Dr. Rina Yunita, Sp.MK(K), for their insightful suggestions and critiques that greatly enhanced my work. I am deeply thankful to my parents, Iradatsyah Pasaribu, S.H., and Nurbeity Pohan, as well as my siblings, for their unconditional love, prayers, and support during my studies. I would also like to acknowledge the academic community at the Faculty of Medicine, Universitas Sumatera Utara, for their guidance and knowledge

throughout my education.

Conflict of Interest

This author does not have any conflict of interest.

References

[1] *Purnamasari D. Diagnosis Dan Klasifikasi Diabetes Melitus Dalam Buku Ajar Ilmu Penyakit Dalam Jilid II Edisi VI. Jakarta : Interna Publishing; 2017. 2323 – 7*

[2] *Soelistijo SA, Suastika K, Lindarto D, Decroli E, Hikmal P, Sucipto KW, et al. Pedoman Pengelolaan Dan Pencegahan Diabetes Melitus Tipe 2 Dewasa Di Indonesia. Jakarta : Perkumpulan Endokrinologi Indonesia. 2021. 1 – 119*

[3] Abubaker S, Albasseet A, El-abd KA, Alandijani AA, Alendijani YA, Alkhenizan A. Association Between Vitamin D Levels And Glycemic Control Among Adult Diabetic Patients In Riyadh, Saudi Arabia. Cureus. 2022;14(6):1–7 [https://pubmed.ncbi.nlm.nih.gov/35844355/]

[4] Wang M, Zhou T, Li X, Ma H, Liang Z, Fonseca VA, et al. Baseline Vitamin D Status, Sleep Patterns, And The Risk Of Incident Type 2 Diabetes In Data From The UK Biobank Study. Diabetes Care. 2020;43: 1 – 9 [https://pubmed.ncbi.nlm.nih.gov/32847829/]

[5] Yang K, Liu J, Fu S, et al. Vitamin D Status and Correlation with Glucose and Lipid Metabolism in Gansu Province, China. DMSO. 2020;Volume 13:1555 – 63 [https://pmc.ncbi.nlm.nih.gov/articles/PMC7216298/]

[6] Ehrampoush E, Mirzay J, Arjmand H, et al. The association of vitamin D levels and insulin resistance. Clinical Nutrition ESPEN. 2021;42: 325 – 32 [https://pubmed.ncbi.nlm.nih.gov/33745601/]

[7] Alkhatatbeh MJ, Khalid KAR. Association between serum 25-hydroxyvitamin D, hemoglobin A1c, and fasting blood glucose levels in adults with diabetes Mellitus. Biomedical Reports. 2018;9: 523 – 30 [https://pubmed.ncbi.nlm.nih.gov/30546881/]

[8] Valladares T, Cardoso MR, Aldrighi JM. Higher serum levels of vitamin D are associated with lower blood glucose levels. Menopause. 2019;26(7): 781 – 84 [https://pubmed.ncbi.nlm.nih.gov/30694916/]

[9] Huu TT, Tran HD, Tran TN, Hoang BB. Relationship Between Vitamin D Status and the Relevant Parameters of Glucose in Patients with Type 2 Diabetes. DMSO. 2021;(14): 2489 – 94 [https://www.dovepress.com/relationship-between-vitamin-d-status-and-the-relevant-parameters-of-g-peer-reviewed-fulltext-article-DMSO]

[10] Zhao H, Zhen Y, Wang Z, et al. The Relationship Between Vitamin D Deficiency and Glycated Hemoglobin Levels in Patients with Type 2 Diabetes Mellitus. DMSO. 2020;(13): 3899 – 907 [https://www.dovepress.com/the-relationship-between-vitamin-d-deficiency-and-glycated-hemoglobin--peer-reviewed-fulltext-article-DMSO]

[11] Swamy M, Ganiger A, Prasad SD, Ratna S. Serum 25-Hydroxy Vitamin D levels in Type 2 Diabetes Mellitus-A Comparative study. Inter Jour of Clin Bio and Res. 2016;3(2): 255 – 8 [https://www.ijcbr.in/article-details/2051]

[12] Hossain MdF, Haq T, Fariduddin Md, Selim S, Hasanat MA, Shahed-Morshed Md. Vitamin D And Its Association With Glycemic Status In Bangladeshi Adults With Newly Detected Type 2 Diabetes Mellitus. OJEMD. 2021;11(01):1 – 11 [https://www.scirp.org/journal/paperinformation?paperid=106570]

[13] Yaribeygi H, Maleki M, Sathyapalan T, Iranpanah H, Orafai HM, Jamialahmadi T, et al. The Molecular Mechanisms By Which Vitamin D Improve Glucose Homeostasis: A Mechanistic Review. Life Sciences. 2020;244:117305: 1 – 7 [https://pubmed.ncbi.nlm.nih.gov/31953161/]

[14] Osmani DrAM, Haseena S. A possible correlation between low serum vitamin-D levels and type 2 diabetes Mellitus. Int J Adv Biochem Res. 2020;4(1): 6 – 11 [https://www.biochemjournal.com/archives/2020/vol4issue1/PartA/3-2-9-516.pdf]

[15] Elsheikh E, Abdullah AI, Al-Harbi SS, Alagha AO, AlAhmed DH, Alalmaee MMA. The Relationship between Vitamin D Levels and Blood Glucose and Cholesterol Levels. Clinics and Practice. 2024;14(2):426 – 35 [https://www.mdpi.com/2039-7283/14/2/32]

[16] Kaiafa G, Veneti S, Polychronopoulos G, Pilalas D, Daios S, Kanellos I, et al. Is HbA1c an ideal biomarker of well-controlled diabetes? Postgraduate Medical Journal. 2021;97(1148): 380 – 83 [https://pubmed.ncbi.nlm.nih.gov/32913038/]

[17] Pant V, Keuoor G, Santosh P. Postprandial Blood Glucose can be less than Fasting Blood Glucose and this is not a Laboratory Error. J Nepal Med Assoc. 2019:67 – 8 [https://pmc.ncbi.nlm.nih.gov/articles/PMC8827575/]

[18] Rakhis SAB, AlDuwayhis NM, Aleid N, AlBarrak AN, Aloraini AA. Glycemic Control For Type 2 Diabetes Mellitus Patients: A Systematic Review. Cureus. 2022;14 (6): 1 – 8 [https://pubmed.ncbi.nlm.nih.gov/35891859/]

[19] Yahaya JJ, Doya IF, Morgan ED, Ngaiza AI, Bintabara D. Poor Glycemic Control And Associated Factors Among Patients With Type 2 Diabetes Mellitus: A Cross-Sectional Study. Sci Rep. 2023;13(1): 9673 – 83 [https://pubmed.ncbi.nlm.nih.gov/37316565/]

[20] Salih YA, Rasool MT, Ahmed IH, Mohammed AA. Impact Of Vitamin D Level On Glycemic Control In Diabetes Mellitus Type 2 In Duhok. Annals Of Medicine & Surgery. 2021;64. 1 – 5 [https://pubmed.ncbi.nlm.nih.gov/33786167/]