THE RELATIONSHIP BETWEEN NUTRITIONAL STATUS AND DENTAL CARIES STATUS IN CHILDREN OF SDN 3 SAMBUNG JAWA, BUNGORO DISTRICT, PANGKEP REGENCY

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DENTAL EDUCATION

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THESIS

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Thesis,

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ABSTRAK

AILSA NAHDAH LEILANI TIARA. **Hubungan status gizi dengan status karies gigi pada anak sdn 3 sambung jawa kecamatan bungoro kabupaten pangkep** (dibimbing oleh drg. Fuad Husain Akbar, MARS. Ph.D.)

Latar Belakang: Status gizi didefinisikan sebagai "keadaan fisiologis individu, yang dihasilkan dari hubungan antara asupan nutrisi dan kebutuhan, dan dari kemampuan tubuh untuk mencerna, menyerap, dan menggunakan nutrisi ini". Status gizi sangat penting untuk pertumbuhan dan perkembangan yang tepat dan komponen penting dalam optimalisasi hasil klinis. Karies adalah penyakit mulut yang umum dengan manifestasi klinis kerusakan kronis dan progresif jaringan keras gigi. Anak usia sekolah, yaitu anak usia 5 hingga 12 tahun, lebih banyak mengonsumsi jajanan manis sehingga banyak di antara mereka yang mengalami kerusakan gigi. Permasalahan yang diakibatkan oleh makanan yang kurang gizi namun mengandung banyak kalori sangat mempengaruhi berat badan serta perkembangan tubuh, termasuk gigi dan mulut. **Tujuan Penelitian:** Untuk mengetahui hubungan antara status gizi dengan status karies gigi pada anak SDN 3 Sambung Jawa di Kecamatan Bungoro Kabupaten Pangkep. **Metode Penelitian:** Penelitian observasional analitik dengan desian cross sectional study. Sampel penelitian 155 anak kelas 3-6 SDN 3 Sambung Jawa. Analisis data yang digunakan adalah Uji Chi Square. **Hasil Penelitian:** Hasil distribusi frekuensi status gizi paling banyak memiliki kategori normal sebanyak 55 anak (35.5%) dan memiliki pengalaman karies gigi paling banyak pada kategori rendah sebanyak 34 anak (1,8±1,51). **Kesimpulan:** Penelitian menunjukkan bahwa terdapat hubungan antara status gizi dengan status karies gigi pada anak SDN 3 Sambung Jawa di Kecamatan Bungoro Kabupaten Pangkep dengan nilai P*value* ≤ 0,05.

Kata Kunci: Status Gizi, Nutrisi, Karies Gigi, Mulut, Anak

ABSTRACT

AILSA NAHDAH LEILANI TIARA. **The relationship between nutritional status and dental caries status in children of SDN 3 Sambung Jawa, Bungoro District, Pangkep Regency** (supervised by drg. Fuad Husain Akbar, MARS. Ph.D.)

Background: Nutritional status is defined as "the physiological state of an individual, resulting from the relationship between nutrient intake and needs, and from the body's ability to digest, absorb, and use these nutrients". Nutritional status is essential for proper growth and development and an important component in the optimization of clinical outcomes. Caries is a common oral disease with clinical manifestations of chronic and progressive damage to the hard tissues of the teeth. School-age children, namely children aged 5 to 12 years, consume more sweet snacks so many of them experience tooth decay. Problems caused by malnourished foods that contain many calories greatly affect body weight and development, including teeth and mouth. **Research Objective:** To determine the relationship between nutritional status and dental caries status in SDN 3 Sambung Jawa children in Bungoro District, Pangkep Regency. **Research Methods:** Analytical observational research with cross-sectional study design. The research sample was 155 students in grades 3-6 of SDN 3 Sambung Jawa. The data analysis used is the Chi-Square Test. **Research Results:** The results of the frequency distribution of nutritional status had the most normal categories as many as 55 children (35.5%) and had the most dental caries experience in the low category as many as 34 children (1.8±1.51). **Conclusion:** Research shows a relationship between nutritional status and dental caries status in SDN 3 Sambung Jawa children in Bungoro District, Pangkep Regency with a P-value of ≤ 0.05.

Keywords: Nutritional Status, Nutrition, Dental Caries, Mouth, Children

TABLE OF CONTENTS

TABLE OF IMAGES

TABLE LIST

APPENDIX LIST

CHAPTER I
INTRODUCTION

1.1 Background

Nutritional status is defined as "the physiological state of the individual, resulting from the relationship between nutrient intake and needs, and from the body's ability to digest, absorb and use these nutrients".[1] Nutritional status is essential for proper growth and development and an important component in optimizing clinical outcomes.[2] In general, nutritional status is influenced by two factors, namely food intake and health. Food consumption includes nutrients in food, both eaten in the family and processed foods, family purchasing power, and eating habits, food supplies at home, poverty, lack of education, lack of skills, and economic crisis. Meanwhile, health factors include health maintenance, physical and social environment, as well as infectious diseases related to health services and parenting in child care.[3]

The United Nations International Children's Emergency Fund (UNICEF) said that globally there are still 45.4 million children under five years old, experiencing acute malnutrition (*wasting*) in 2020 with the highest percentage of children under five suffering from acute malnutrition in South Asia at 14.7% and as many as 3.7% of children under five in East Asia and the Pacific experiencing acute malnutrition.[4] Southeast Asia Nutrition Survey Study Group (SEANUTS), in Indonesia, Malaysia, Thailand, and Vietnam, reported a prevalence of malnutrition of 21.6% and 19.2% of stunted children.[5] In Indonesia, nutrition problems also still exist at the national level, based on Susenas integration data and the 2022 Indonesian Nutrition Status Survey (SSGI), the prevalence of *underweight* is 17.1% and the prevalence of *overweight* is 3.5% while the prevalence of *wasting* is 7.7%. Based on South Sulawesi SSGI data in 2022, the prevalence of *underweight* (undernutrition) is 21.7%, the prevalence of *overweight* (overnutrition) is 2.7%, and the prevalence *of wasted* (thin) is 8.3%. In addition, for SSGI data in Pangkep Regency, South Sulawesi, the prevalence of underweight (undernutrition) is 29.5% and the prevalence of *overweight* (overnutrition) is 2.7% while the prevalence of *wasted* (thin) is 10.8%.[6] These data show that special attention is needed to the nutritional status of children resulting from eating the wrong food.[7]

The elements contained in food, namely carbohydrates, proteins, fats, and minerals, are very influential in the period before and after the growth of teeth. Foods that are sweet, soft, and attached to teeth can result in disturbed dental and oral health. Nutritional intake is very much needed at the beginning of children's growth and development, school-age children are the most vulnerable to the occurrence of dental caries because of poor child hygiene patterns, and poor children's diet, so if there is a nutritional imbalance, it can cause prolonged consequences and can settle on biological functions and salivary glands. The need for *macronutrients* and *micronutrients* is not only related to nutritional status but also related to the severity of dental caries.[7]

Caries is a common oral disease with clinical manifestations of chronic and

progressive deterioration of the hard tissue of the teeth.[8] Caries is the main disease that attacks teeth both at a young age and in old age, attacking milk teeth and permanent.[9] Dental caries is mainly caused by the metabolism of sugar-driven and microecologically regulated microbial carbohydrates, resulting in local acidification and disruption of the dynamic balance of tooth mineralization, leading to permanent tooth decay. *Ecological dysbiosis* caused by changes in the structure of oral microbial communities is a significant contributor to dental caries. When ecological disturbances (e.g., sugar intake and other factors) reach a threshold, the healthy biofilm community changes and develops into a disease community. Therefore, understanding the changes in the microbial community as dental caries take place is essential to understand the state of the disease.[10]

In 2022, the global dental and oral health status report released by the WHO showed that more than 2 billion people suffered from permanent dental caries and 514 million children suffered from first teeth.[8] In developing countries, especially sub-Saharan Africa, the prevalence of dental caries varies according to population group and socioeconomic status. The prevalence rate is 40.98% in Ethiopia, 52.4% in Sudan, 50.3% in Kenya, and 40.2% in Tanzania.[11] The results of basic health research on the prevalence of dental caries according to WHO standards in 2018 showed that the average age of 5-6, 8.43% and 67.3% of 5-year-old children had a prevalence of dental caries (DMFT) ≥ 6, including in the category of severe early childhood caries (Ministry of Health of the Republic of Indonesia, 2018).[12] Based on Riskesdas 2018 data in South Sulawesi province, the prevalence of dental caries is 55.5%.[13] Based on research data conducted on children aged 10-11 years at SDN 39 Tamalalang, Pangkep Regency in 2019, the highest percentage of caries was found in caries with a low caries category, which was 12 people (38.7%) and the lowest percentage of caries was found in caries with a medium caries category, which amounted to 2 people (6.4%).[14]

School-age children, namely children aged 5 to 12 years, are more proactive in choosing their favorite foods. This group consumes a lot of sweet snacks so many of them have tooth decay. Problems caused by foods that are malnourished but contain a lot of calories greatly affect weight and body development, including teeth and mouth.[15] SDN 03 Sambung Jawa is one of the schools located at Jalan Andi Mappe, Bungoro District, Pangkajene Islands Regency, South Sulawesi which has 155 students in grades three to six. This school is one of the schools located in the mainland and is located in the suburbs where most of the students' economic backgrounds are still relatively low so the quality of their nutritional status is still minimal. From the results of research and observations that have been carried out by researchers, it was found that there is no *UKS* (School Health Business) room for students. This shows that there is still a lack of awareness from the school about the health of its students, especially dental and oral health.

Based on the background, that school-age children tend to experience tooth decay which also affects the nutritional status of children and there has been no research on this that has been done in Pangkep Regency, it is necessary to investigate the connection between children's nutritional conditions and the prevalence of dental caries

in children of SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency.

1.2 Problem Formulation

Is there a relationship between nutritional status and dental caries status in children of SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency?

1.3 Research Objectives

To find out the relationship between nutritional status and dental caries status in children of SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency.

1.4 Research Benefits

a. For science, it contributes to the development of scientific treasures so that it can strengthen theories about nutritional status and caries in children
b. For the public, information can be obtained about the Relationship between Nutritional Status and Dental Caries in School-Age Children, and it is hoped that the community can prevent dental caries in children.
c. For the government, the results of this research are expected to be input from the local area in planning community development in the field of dental and oral health.

CHAPTER II
RESEARCH METHODOLOGY

2.1 Types and Design of Research

The type of research used in this study is analytical observational research with a *cross-sectional study design* where independent and dependent variable measurements are taken at the same time to determine the relationship between Nutritional Status and Dental Caries in Children of SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency.

2.2 Location and Time of Research

2.2.1 Research Location

The location of the research was carried out at SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency, on the grounds that there is still a lack of access to dental and oral health services in Pangkep Regency so that it is necessary to assess the quality of the services provided.

2.2.2 Research Time

The research was conducted in November - December 2023.

2.3 Research Variables

1. Independent variable: Nutritional status

2. Dependent variables: Status of dental caries

2.4 Variable Operational Definition

a. The status of dental caries is the limit of measuring the DMF-T value by looking at the condition of the teeth such as *Decayed* (D) is a tooth that can still be filled, *Missing* (M) is a tooth that has been extracted, Filling (F) is a tooth that has been filled.
b. Children's nutritional status is the state of health of the child's body as a result of food consumption and the use of nutrients that can be measured with BMI (Growth Index) using weight scales and *microtoise.*

2.5. Research Population and Sample

2.5.1 Research Population

The population in this study is the children of SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency.

2.5.2 Research Sample

The Great Dictionary of Indonesian (KBBI) states that the sample is representative of a small group that will represent the entire group (population). In this study, the researcher used *a total sampling* technique. *Total sampling* is a sampling technique where the number of samples is equal to the population. The reason for taking the total sampling is that the population is still around 100 people. So the number of samples in this study is all students in grades 3-6 of SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency as many as 155 children.[16]

2.6 Criteria Sample

2.6.1 Inclusion Criteria

Children in grades 3-6 of SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency, Makassar City who have caries, are cooperative and willing to be research subjects and follow research procedures.

2.6.2 Exclusion Criteria

Children in grades 1-2 of SDN 3 Sambung Jawa in Bungoro District, Pangkep

2.7 Research Procedure

1. Determination of samples in children of SDN 3 Sambung Jawa in Bungoro District, Pangkep Regency, Makassar City.
2. An oral cavity examination was carried out on the children to see dental caries using *the Diagnostic Set*.
3. After the sample was obtained, weight was weighed using a digital scale, and height measurement using *a microtoise* on the children to see their nutritional status.
4. After obtaining weight and height data, data analysis is carried out and then conclusions are drawn.

2.8 Research Criteria

The measuring tool used in this study is to measure caries using the DMFT index while measuring nutritional status using BMI (Growth Index).

1. DMF-T Index[17]

Based on WHO standards, the status of permanent teeth (crown and root) is recorded using numbered scores, and the status of primary teeth is recorded using

letter scores that correspond to the following table.

Table 2.1. DMF-T Index

Code			Status
Primary Teeth	Permanent Teeth		
Crown	Crown	Root	
A	0	0	Healthy
B	1	1	Caries
C	2	2	Filling with caries
D	3	3	Filling without caries
E	4	-	Extraction with caries
-	5	-	Extraction for other reasons
F	6	-	Fissure sealant
G	7	7	Fixed Protesa
-	8	8	Teeth do not grow
-	9	9	etc

Sumber : WHO. 2013. Oral Health Survey Basic Methods. 5th edition. Perancis: World Health Organization, pp. 43-74

Component D (*Decay*) includes all teeth with code 1 or 2. The M (*Missing*) component consists of a 4-coded tooth in subjects under 30 years old, and a 4 or 5-coded tooth in subjects 30 years and older, i.e. lost due to caries or for other reasons. Component F (*Filling*) only includes teeth with code 3. The calculation of the DMF-T caries index can be calculated using the following formula.

$$\text{DMFT Index} = \frac{Score\ Total\ of\ DT+MT+FT}{Total\ ART\ have\ been\ examined}$$

with:

DT : Number of permanent teeth that have caries

MT : Number of permanent teeth / removed due to caries

FT : The number of permanent teeth that have been because of caries

The DMF-T score results are adjusted to the criteria of the caries index according to WHO, which are very low (0.0-1.1), low (1.2-2.6), medium (2.7-4.4), high (4.5-6.5) and very high (≥6.6).

d) Nutritional Status Index[18,19]

Body Mass Index (BMI) is a substitute measure of body obesity because it is a measure of excess weight rather than excess body fat. Factors such as age, gender, ethnicity, and muscle mass can affect the relationship between BMI and body fat. In addition, BMI does not differentiate between excess fat, muscle, or bone mass, nor does it provide an indication of fat distribution among individuals. For children and adolescents, BMI is age- and gender-specific and is often referred to as age-for-age BMI. BMI is calculated using the following formula:

$$\text{IMT} = \frac{Weight\ (kg)}{Height\ (m^2)}$$

According to Sugondo (2009), the results of the calculation of the Body Mass Index (BMI) are classified based on the classification according to the classification of the Asia Pacific Criteria into underweight, normal and *overweight*, with the following range of numbers:

Table 2.2 Classification of Asia Pacific BMI criteria according to Sugondo (2009)[20]

Classification	Body Mass Index (BMI)
Underweight (*berat badan kurang*)	<18,5
Normal	18,5-22,9
Overweight	≥23
Risk	23-24,9
Obes I	25-29,9
Obes II	≥30

Source :Soegondo, S., 2009. Sibdroma Metabolik. In: Sudoyo, A.W., Setiyohadi, B., Alwi, I., Simadibrata, M., Setiasti, S., editors. Buku Ilmu Penyakit Fakultas Kedokteran Universitas Indonesia pp 1865.

BMI in children and adolescents can be calculated using a percentile calculator. BMI involves the following steps:

1) Measure height and weight.
   a. Accurate height measurement
      1. Remove child or teen shoes, voluminous clothing, and hair ornaments, as well as distracting unbraided hair
      2. Take height measurements using *microtoise* on uncarpeted floors and on flat surfaces such as unmolded walls.
      3. Have the child or youth stand with their feet flat, close together, and against the wall. Make sure your legs are straight, your arms are at your sides, and your shoulders are aligned.

4. Make sure the child or teenager is looking straight ahead and the line of sight is parallel to the floor.
5. Take measurements when the child or adolescent is standing with his head, shoulders, buttocks, and heels touching a flat surface (wall). Depending on the overall body shape of the child or adolescent, all points may not touch the wall.
6. Use a flat steel cap until it forms a right angle to the wall and lower the steel cap until it touches the top of the head firmly.
7. Make sure the measuring eye is at the same height as the steel cap.
8. Mark the bottom of the steel cap with the wall slightly marking the meeting point. Then, use metal tape to measure from the base on the floor to the measurement mark on the wall to get a height measurement.
9. Record the height accurately to 1/8 inch or 0.1 centimeter nearby.

b. Accurate weight measurement
1. Use a digital scale. Avoid using spring-loaded bathroom scales. Place the scale on a sturdy floor (such as tile or wood) and not on carpet.
2. Ask your child or youth to remove shoes and heavy clothing, such as sweaters.
3. Have the child or youth stand with both feet in the center of the scale.
4. Record the weight to the nearest decimal fraction (e.g., 55.5 pounds or 25.1 kilograms

2) Use the Child and Adolescent BMI Calculator to calculate BMI. BMI figures are calculated using standard formulas.

Once the BMI of children and adolescents is calculated, BMI is expressed as a percentile obtained from a graph for boys and girls or a percentile calculator. The BMI-for-age percentile growth chart is the most commonly used indicator to measure the size and growth patterns of children and adolescents in the United States. BMI weight status categories by age and associated percentile are based on the recommendations of the expert committee and are shown in the following table.

Table 2.3. BMI Weight Status Categories By Age and Percentile

Weight Status Category	Percentile Range
Underweight	Less than the 5th percentile
Healthy Weight	5th percentile to less than 85th percentile
Obesity	85th percentile to less than 95th percentile
Obesity	Equal to or greater than the 95th percentile

Sources: Centers for Disease Control and Prevention. Body Mass Index: Considerations for Practitioners [Internet]. 2023 [14 September 2023]. Tersedia dari: https://www.cdc.gov/obesity/downloads/bmiforpactitioners.pdf

2.9 Tools and Materials

Table 2.4. Tools and Materials

TOOL	MATERIAL
Probe	*Hand Scoen*
Mirror	Mask
Nierbecken	Water
Pingset	Betadine
Weight Scale	Alcohol
Microtoise	Cotton
Stationery	White Towel

2.10 Research Ethics

It has been approved by the ethics commission with the number UH17121077

2.11 Data Analysis

1. Data types : Primary data, i.e. data obtained by perform anthropometric measurements that include the child's weight and height. Dental status data was obtained by conducting dental health checks using sondes and oral glasses carried out by five dental preclinical students.
2. Data presentation : Presented in the form of tables, diagrams and drawings
3. Data processing : Using *Stastistical Product and Service*Software SPSS versi 22.0 for Windows
4. Data analysis :using *the Chi Square* test. Chi- *Square* is related to the selection function of the theoretical feature of information that tries to capture the intuition that the best term for a Ci class is the one that is distributed most differently in the positive and negative example sets of the CI class.[21]

$$\text{Chi-square (tk-ci)} = \frac{N\,(AD-CB)^2}{(A+C)(B+D)(A+B)(C+D)}$$

Information:

N = The total number of documents in the corpus;
A = The number of documents in the ci class that contain the term tk;
B = The number of documents containing the term is not in other classes;
C = The number of documents in the ci class that do not contain the term tk;

D = The number of documents that do not contain the term tk in other classes.

2.12 Research Flow