Literature review

Relationship between stunting and clinical ear, nose and throat disorders

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ABSTRACT

Background: Stunting is an impediment marker for child welfare. Based on the United Nations Nutrition report, in 2018, as many as 50.5 million children worldwide under the age of 5 years were wasting and 150.8 million were stunting. Stunting is associated with morbidity, mortality, stunted-child-development, decreased learning capacity, increased risk of infection, and decreased productivity. Until now, stunting is still a problem in many countries, including Indonesia which calls for serious solution. Stunting is associated with deficiencies of micronutrients such as vitamins A, D, zinc and iron resulting in impaired physical development and decreased immune system. In the field of ORL-HNS, stunting in toddlers could cause various disorders such as impaired hearing development, otitis media, rhinitis, and tonsillitis. **Purpose:** To describe the relationship between stunting and clinical abnormalities occurrence in the ORL-HNS, to increase awareness of stunting prevention and the related ORL-HNS disorders, and to be a reference for further research of ORL-HNS disorders in stunting patients. **Literature review:** Stunting or failure to thrive is a condition that describes a chronic undernutrition status during a child's growth and development since the beginning of life, which is represented by a z-score of height for age less than minus two standard deviations based on the WHO growth standard curve. **Conclusion:** Stunting is a condition caused by an unbalanced nutritional intake during the golden period, not by growth hormone abnormalities, nor by certain diseases. Micronutrient deficiency could have a role in the occurrence of several clinical abnormalities of ORL-HNS in stunting children.

Keywords: stunting, tonsillitis, rhinitis allergic, otitis media, hearing loss, micronutrient deficiency

ABSTRAK

Latar belakang: Stunting *merupakan penanda untuk kesejahteraan anak. Berdasarkan laporan* United Nations Nutrition *pada tahun 2018 sebanyak 50,5 juta anak di seluruh dunia yang berusia di bawah 5 tahun mengalami wasting dan sebanyak 150,8 juta mengalami* stunting*.* Stunting *berhubungan dengan morbiditas, mortalitas, terhambatnya perkembangan anak, penurunan kapasitas belajar, peningkatan risiko infeksi, dan penurunan produktivitas. Hingga saat ini, stunting masih menjadi salah satu permasalahan yang perlu diperhatikan di banyak negara, termasuk di Indonesia yang perlu diperhatikan.* Stunting *berhubungan dengan defisiensi mikronutrien seperti vitamin A, D,* zink *dan zat besi yang berakibat terganggunya perkembangan fisik dan penurunan sistem imunitas. Di bidang THT-KL* stunting *pada balita diduga dapat menimbulkan berbagai kelainan penyakit seperti gangguan perkembangan pendengaran, otitis media, rinitis, dan tonsilitis.* ***Tujuan:*** *Untuk menggambarkan adanya hubungan* stunting *dengan terjadinya kelainan klinis di bidang THT–KL, meningkatkan kewaspadaan untuk mencegah* stunting *dan kelainan THT-KL yang berhubungan dengan* stunting*, serta dapat menjadi rujukan penelitian lebih lanjut mengenai prevalensi gangguan THT-KL pada pasien dengan* stunting*.* ***Tinjauan Pustaka:*** Stunting *atau gagal tumbuh adalah suatu kondisi yang menggambarkan status gizi kurang yang memiliki sifat kronis pada masa pertumbuhan dan perkembangan anak sejak awal masa kehidupan yang dipresentasikan dengan nilai* z-score *tinggi badan menurut umur kurang dari minus dua standar deviasi berdasarkan kurva standar pertumbuhan WHO.* ***Kesimpulan:*** Stunting *merupakan kondisi yang disebabkan oleh kurang seimbangnya asupan gizi pada masa periode emas,*

bukan disebabkan oleh kelainan hormon pertumbuhan maupun akibat dari penyakit tertentu. Hasil dari beberapa penelitian mengungkapkan bahwa defisiensi mikronutrien dapat berperan terhadap terjadinya beberapa kelainan klinis THT–KL pada anak dengan stunting.

Kata kunci: stunting, tonsilitis, rinitis alergi, otitis media, gangguan pendengaran, defisiensi mikronutrien

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INTRODUCTION

According to WHO, stunting is a condition in which toddlers being too short for one's age, or the height is more than 2 standard deviations below the WHO Child Growth Standard median. Stunting is associated with morbidity, mortality, stunted child development, decreased learning capacity, increased risk of infection, and decreased of productivity. Stunting is a condition in which children under five years of age (toddlers) experience growth failure caused by lack of nutrition received by the baby. The condition of children experiencing stunting can be seen from their height or body length which is below the standard height of children their age, delayed of bone growth and low body weight for their ages.[1] Until now, stunting is still a problem in many countries, including in Indonesia which requires a serious solution.[2]

Referring to the Sustainable Development Goals (SDGs) agenda or the Sustainable Development Goals that have been agreed upon by members of the United Nations (UN) world organization, the agenda recommends that stunting is one of the targets that need to be prioritized.[2] The Sustainable Development Goals are a program in which there are 17 goals with 169 measurable targets and set deadlines. The Sustainable Development Goals were ratified at the United Nations general assembly on September 25, 2015 in New York where the program replaced the MDGs (Millennium Development Goals) program which ended in 2015. Reducing of stunting in children under-five is part of target 2 out of 17 targets to be achieved in the Objectives Sustainable Development program. By 2030, it is hoped that all forms of malnutrition could be overcome so that by 2025 there will be a reduction in the stunting rate of children under-five in the world as many as 40%.[2] In relation to this target, the stunting reduction program is a priority that must be handled by the government.

Stunting is associated with deficiencies of micronutrients such as vitamin A, vitamin D, zinc and iron resulting in impaired physical development and decreased immune system. In the field of ORL-HNS, stunting in toddlers is suspected to cause various disorders such as impaired hearing development, otitis media, rhinitis, and tonsillitis.[1]

The aim of this review is to describe the relationship between stunting and the occurrence of clinical abnormalities in the ORL-HNS, especially hearing loss, otitis media, rhinitis and tonsillitis; to increase the awareness in order to prevent stunting and ORL-HNS disorders related to stunting, and is expected to be a reference for further research on ORL-HNS disorders in stunting patients.

LITERATURE REVIEW

Epidemiology

Stunting is a marker for child welfare.[1] Based on the United Nations Nutrition report, as many as 50.5 million children worldwide

under the age of 5 years were wasting and as many as 150.8 million were stunting in 2018.[3] Kismul et al.[4] in a study in Congo in 2014, stated that the prevalence of stunting was much higher in boys than girls. There was a significant difference in the prevalence of stunting in urban and rural areas. Residents in rural areas are more likely to experience stunting than residents in cities.

According to WHO in 2019, the prevalence of stunting in the world was reported at 20.8% or around 141.3 million people. Meanwhile, the prevalence of stunting in Asia in 2020 was reported at 21.2% or around 75.8 million people.[5] In Indonesia, research data from the *Studi Status Gizi Balita Indonesia* (SSGBI) in 2019 reported that the number of stunting under-fives in Indonesia reached 27.67% or around 6.3 million people from a total population of 23 million children under-five in Indonesia.[6]

The relationship between micronutrient deficiency and the occurrence of stunting

Nutrition is one of the determining factors for the success of optimal child development. Adequate and balanced nutrition is needed in the golden period of growth and development of children. The golden period starts from the time the child is still in the womb until the age of two years or what is often referred to as "the first thousand days of a child's life". Malnutrition that occurs during the golden period can cause various problems, one of which is failure to thrive so that children become shorter than standard.[1]

United Nations International Children's Emergency Fund (UNICEF), which is a world organization that works to solve problems in children, had launched 'The first 1.000 days program', which starts from the time the mother is pregnant until the child is celebrating his second birthday. This period, which is also known as the window of opportunity, is the best time to prevent malnutrition and its consequences.[7]

One of the nutritional problems that is still occurring to this day is malnutrition. The definition of malnutrition according to WHO is a medical condition caused by the intake or provision of improper or insufficient nutrition. Malnutrition is more often associated with insufficient intake of nutrients or often called undernutrition which can be caused by poor absorption or excessive loss of nutrients. Included in the malnutrition group are stunting conditions or short height for age, wasting or low weight for age, underweight or low weight for height, and micronutrient deficiencies. However, the term of malnutrition also includes overnutrition. Included in the overnutrition group are overweight and obesity**.** According to UNICEF, a very critical period for growth and development starts from the time the child is in the mother's womb until the child is two years old so that at this time the child should not be malnutrition or during this time the malnutrition that occurs can still be handled so that the child could pursue optimal growth (catch-up growth). Over the age of 2 years, if malnutrition cannot be treated, it will be permanent or irreversible.[7] Scheffler et al.[8] stated in his research that malnutrition is known to cause stunting, but stunting itself does not indicate the occurrence of malnutrition.

'The first thousand days of life program' that had been launched by UNICEF stated that during this period children must receive breast milk, complementary foods that are rich in nutrients and micronutrient supplementation. Micronutrient supplementation that is important for toddlers are vitamin A, iron, zinc, and iodine. These nutrients are important because they play a role in growth and immunity. According to WHO in 2004, zinc deficiency is one of the 10 factors that cause death in children in developing countries, zinc intervention can reduce 63% of deaths in children and according to the International Zinc Nutrition Consultative Group in 2004, Zinc deficiency can cause 40% of children

to become malnutrition. Zinc is an essential mineral that plays a role in the synthesis, secretion, and control of growth hormone. The low synthesis of growth hormone can inhibit linear growth and is thought to cause stunting conditions in toddlers.[3]

Calcium and vitamin D play a role in the process of bone mineralization. Good bone mineralization during growth allows normal linear growth. Lack of calcium deposits in children will cause stunted growth. Vitamin D deficiency can also interfere with growth because vitamin D plays a role in calcium absorption. Bogale et al.[3] study also found that the slow growth rate in children in developing countries is an adaptation process due to calcium deficiency.

According to Almatsier[9] (2009), deficiency of vitamin A will affect protein synthesis, so it will affect cell growth. For this reason, children who suffer from vitamin A deficiency will experience growth failure. In addition, vitamin A also affects the immune function of the human body. As a result, lack of vitamin A causes a decrease in the body's immunity, making it easy to get infections, for example if it occurs on the surface of the intestinal wall, it will cause diarrhea.

Relationship between stunting and hearing loss

At the time of writing this manuscript, there had been no research linking stunting with its direct effect on hearing loss. However, there were few studies on the relationship between malnutrition and hearing loss. As we know, malnutrition can cause stunting, so the results of those studies could be used as a references to assess the relationship between stunting and hearing loss.

Hearing loss caused by partial or complete dysfunction of the auditory pathway from the outer ear to the cerebral auditory cortex, is the most important and frequent symptom of ear disorders. Hearing loss is a major public health problem and is currently the fifth leading cause of living with disability, even higher than many other chronic diseases such as diabetes, dementia and chronic obstructive pulmonary disease. Affected children are more likely to experience delays in speech, language, cognition, and poor school performance, while adults face the risk of unemployment and low living income.[10]

Hearing loss is most often of sensorineural origin due to irreparable loss of hair cells and/or spiral ganglion neurons. The causes of sensorineural hearing loss (SNHL) are multifactorial, including genetic and environmental factors such as noise, poisoning and aging. Gender is also a statistically significant factor, with male having worse hearing threshold than female. In addition to these factors associated with hearing loss, severe prenatal iodine deficiency has been listed by WHO as a cause of nutritional hearing loss, making diet and nutrition a broad role in this complex set of etiology that is not fully understood. Currently, the interaction between nutrition and SNHL is getting a lot of attention from researchers.[10]

Several studies had reported on the association of hearing loss with vitamins A, C, and E in humans. Magnesium (Mg) has also been reported to reduce hearing loss through a synergistic effect with vitamins. These findings suggest that free radical inhibitors, such as vitamins A, C and E, synergize with Mg to reduce changes in hearing threshold better than treatment with single agents. Therefore, it could be concluded that a higher intake of antioxidants and/or magnesium may be associated with a lower risk of hearing loss.[11]

In addition, vitamin B deficiency had been reported to increase the risk of hearing loss, as studies in animal models had shown that antioxidants reduced the potential for free radical damage associated with micronutrient deficiencies.[11]

According to Zuaneti et al.[12] malnutrition in childhood could cause a decrease in the hearing threshold with an inverted U-shaped audiometric curve pattern. This suggests that history of malnutrition before the age of two years affects the function of the inner ear and causes permanent damage even if the patient was not malnutrition. This may occur because the homeostasis of the inner ear is susceptible to adverse conditions resulting from a decrease in nutritional status.

Inner ear metabolism is strongly influenced by glucose and oxygen. The metabolic rate in the inner ear is high, especially in the stria vascular area. Organs in the inner ear stria vascular do not have energy reserves so that they require a continuous supply of glucose and oxygen. Therefore, changes in blood metabolites or the absence of proteins, minerals, and calories in acute conditions can cause disturbances in the normal functioning of the inner ear with a negative impact on the auditory system.[12]

Relationship between nutrition and allergies

Ig-E-mediated allergy pathogenesis is influenced by many factors such as genetic factors, environmental factors, and nutrition (Figure 1). There are various studies that have investigated the relationship between breastfeeding, prebiotics, probiotics, and synbiotics, vitamins and minerals, fibers, vegetables and fruits, cow's milk, and fatty acids in the pathogenesis of allergy-related diseases such as rhinitis allergic, allergic conjunctivitis, and eczema. The prevalence of allergic diseases varies in different countries. Globally, the prevalence of allergic diseases in the form of asthma, rhinconjunctivitis, and eczema in the 13-14 years age group was 14.1%, 14.6%, and 7.3%, respectively. The prevalence of asthma, rhinoconjunctivitis, and eczema in the age group 6-7 years reached 11.7%, 8.5%, and 7.9%.[13]

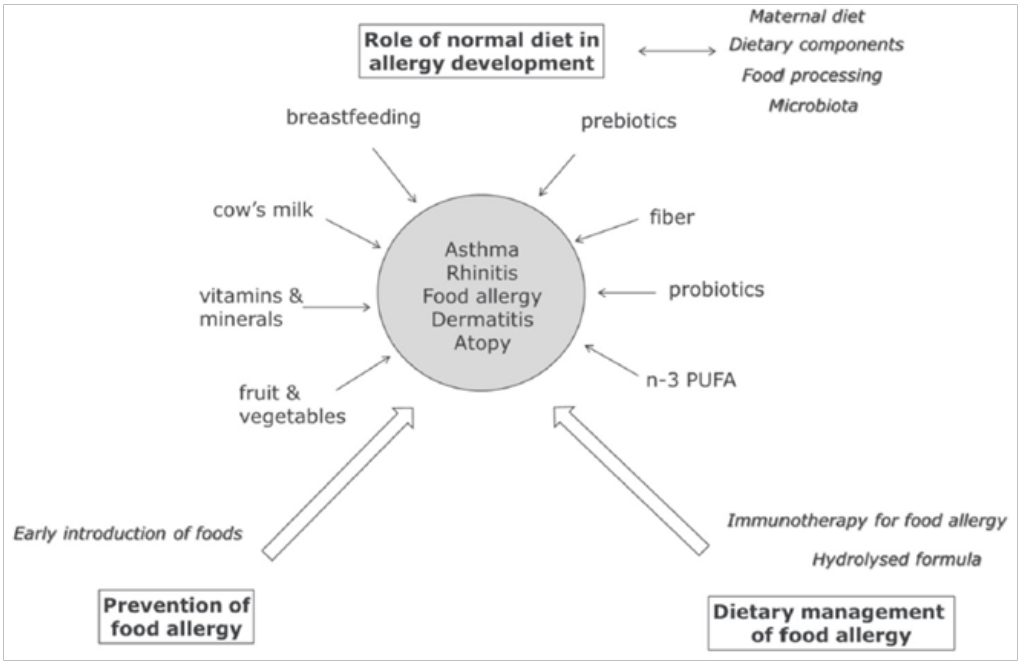

Figure 1. Pathogenesis and associated factors with allergy[13]

Reyes et al.[14] stated that in malnutrition asthmatic patients, circulating of IgE levels were higher than normal weight asthmatic patients. The increase in IgE levels was twice as much in grade II malnutrition asthmatic patients compared to normal weight asthmatic patients.

Relationship between stunting and rhinitis

The relationship between stunting and rhinitis had never been studied directly, but several studies had been able to conclude the effect of malnutrition on the occurrence of rhinitis. Therefore the results of these studies could be used as references to predict the relationship between stunting and rhinitis.

Rhinitis is characterized by the presence of acute or chronic nasal symptoms that are intermittent or persistent. Symptoms can include runny nose, itchy nose, sneezing, and nasal congestion. These symptoms reflect the nasal response to both exogenous and endogenous stimuli. Although the term of rhinitis refers to inflammation of the mucous membranes of the nose, some symptoms of rhinitis are not associated with inflammation.[15]

Type I hypersensitivity, clinically manifests in various allergic diseases such as atopic dermatitis, asthma, allergic rhinitis, allergic conjunctivitis, food allergy and certain types of urticaria. Immunoglobulin E (IgE) has a central role in type I hypersensitivity, reflecting the sensitization of mast cells to allergen-specific IgE antibodies bound to high-affinity receptors (FcεRI).[16]

Zinc is an important trace element that plays an important role in the immune system, from contributing to the skin barrier to gene regulation in lymphocytes.[3] Zinc is essential for FcεRI-mediated cytokine production in mast cells and transcription of IL-6 and TNF-α mRNA.[4] Zinc is also known to function as an antioxidant and stabilize cell membranes. Zinc deficiency affects approximately 2.2 billion people worldwide and as much as 25% of the world's population is at risk. A Korean study of 245 pregnant women showed that low zinc status was a very common (76.3%).[6] The clinical manifestations of zinc deficiency include alopecia, acrodermatitis enteropathica, diarrhea, emotional disturbances, weight loss, cellular immune dysfunction and neurological disorders.[1]

The study of Seo et al.[17] found that the decreased of serum zinc levels was associated with the increased of total IgE levels and allergic sensitization, including sensitization to D. farinae, cockroaches and dogs. There are several reports investigating the relationship between Zn levels and allergic diseases, including: allergic asthma and atopic dermatitis.

Vitamin D deficiency has been declared as a public health problem for adults and children worldwide. Asthma and related allergic diseases are a major cause of morbidity in children.

The results of the study by Kim et al.[18] found that lower vitamin D levels were associated with a higher prevalence of allergic rhinitis in children. There is insufficient evidence to support vitamin D supplementation for the prevention of allergic rhinitis. However, clinicians should consider evaluating patients for vitamin D deficiency during the management of allergic rhinitis, especially in children.

Bener et al.[19] also investigated the role of Vitamin D in childhood asthma and allergies. Data showed that 25(OH)D serum levels are lower in children with asthma, allergic rhinitis and wheezing than in healthy children. Vitamin D insufficiency was common in the study sample whereas severe vitamin D deficiency was found significantly more in children with asthma and allergic diseases than in healthy children. In the study sample,

the determinants of lower vitamin D levels in children with asthma and allergies were lower sun exposure, less time spent outdoors, breastfeeding for less than 6 months, and mothers who were also vitamin D deficient.

Relationship between nutrition and infection

According to Rodriguez et al.[20] in children under 5 years of age, malnutrition plays a direct or indirect role in 54% of the 10.8 million deaths per year and contributes to the second cause of death from infectious diseases. As many as 33% of deaths due to malnutrition occur due to acute respiratory system infections. There is a two-way relationship between malnutrition and infection. Malnutrition can lower the body's immune system against infection. On the other hand, infection may exacerbate pre-existing nutritional deficiency status or promote malnutrition through the pathogenesis of the disease.

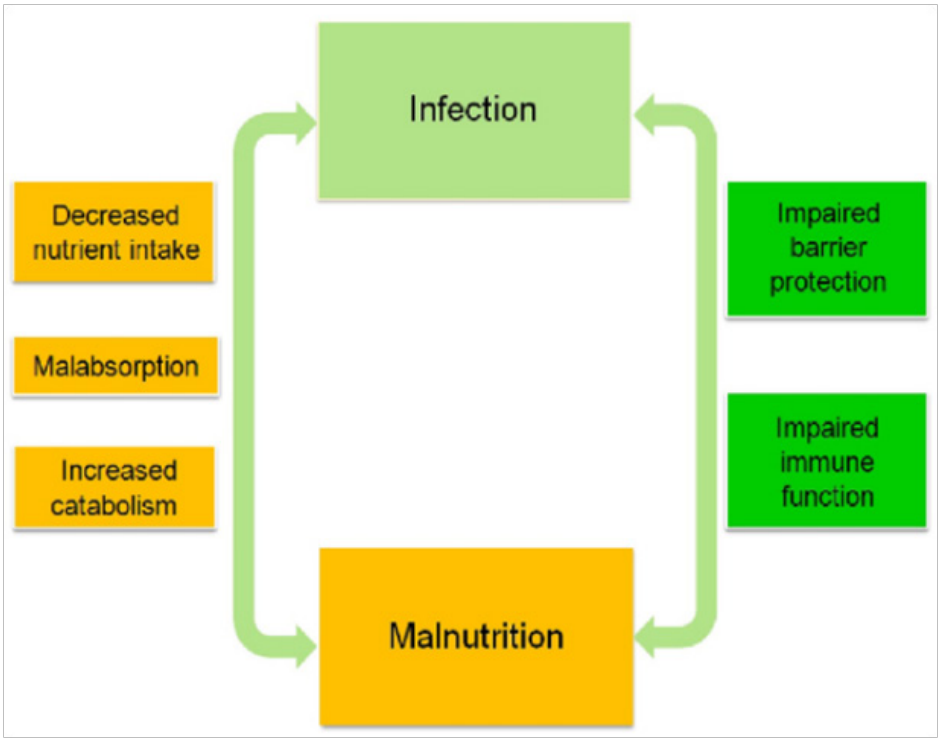

Figure 2. Relationship between malnutrition and infection[20]

Protein energy malnutrition affects the development of the immune system. Stimulation of the immune response due to infection increases energy requirements and metabolism, thereby causing a cycle between poor nutritional status and an increased likelihood of infection. The infection itself can cause a decrease in the body's stores of protein, energy, minerals, and vitamins. In malnutrition patients with infection, energy expenditure increases at the same time as caloric intake decreases. Metabolic responses to infection include hypermetabolism, negative nitrogen balance, increased gluconeogenesis, and increased fat oxidation modulated by hormones, cytokines, and other proinflammatory mediators. During infection, a negative nitrogen balance occurs several days to weeks after the febrile phase. On the other hand, negative nitrogen response was correlated with weight loss. Both of these cognitions are the result of decreased caloric intake and nitrogen excretion that occur as a result of infection.

The effect of diet on the development of the human immune system begins in the embryonic phase. During pregnancy, especially in the first trimester of pregnancy, the mother eats sufficient protein, vitamins and minerals, the embryonic tissue will develop properly. Good tissue development gives results as babies of normal weight and size. On the other hand, malnutrition has an adverse effect on the development of the immune system. After birth, breast milk serves as a source of energy, vitamins and minerals for the baby that can support the baby's growth and health. Breastfeeding is the most important action for the development of the immune system. Malnutrition babies who do not get enough protein and vitamins are at a higher risk of developing infectious diseases. In addition, malnutrition infants also do not respond well to vaccines.

The relationship between malnutrition and infection can be in two-way. On one hand, infection can affect nutritional status. On the other hand, malnutrition increases the risk of infection. There are several factors that can weaken the immune system to fight infection and cause malnutrition such as decreased intestinal absorption, individual behavior, anorexia, metabolic damage, decreased vitamin concentration, iron deficiency, zinc and copper deficiencies.[21]

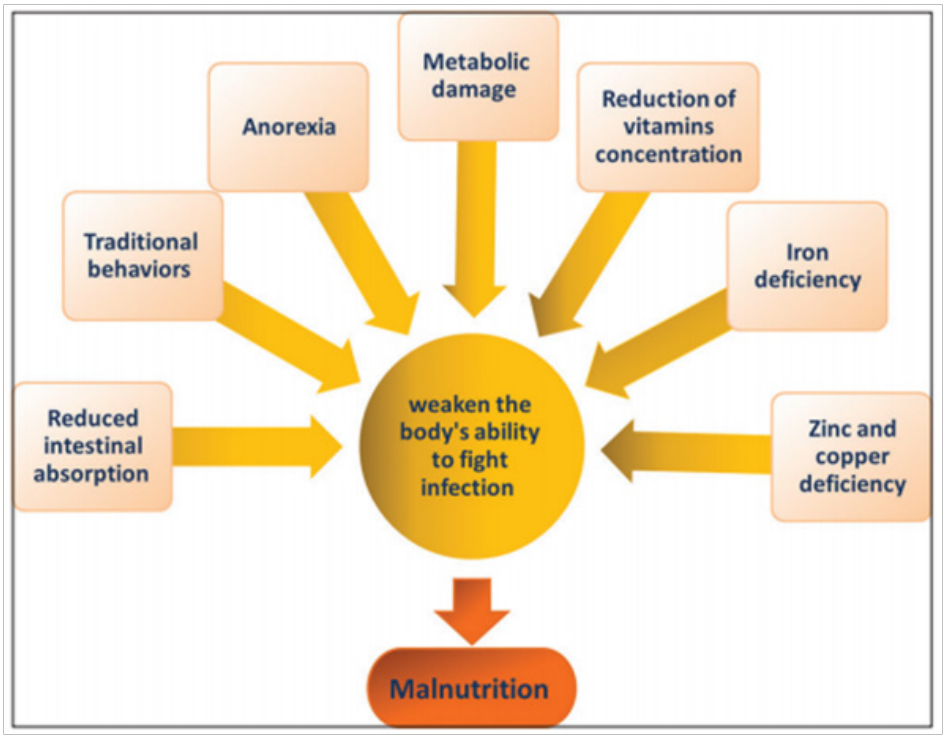

Figure 3. Factors that weaken the immune system against infection and causing malnutrition.[21]

Rytter et al.[22] stated that malnutrition affects the decrease in the immune response to infection. Malnutrition causes impaired barrier function in the gastrointestinal tract, decreased secretion of protective exocrine glands, and decreased plasma complement concentrations. Lymphatic tissue, especially the thymus has an atrophy and decreased delayed-type hypersensitivity. Patients with severe malnutrition produce lower antibodies after vaccination compared to normal patients.

Relationship between stunting and otitis media

Acute otitis media is a common health disorder found in children. In developed countries, by the third birthday, 80% of pediatric patients have had at least one episode of acute otitis media and 40% have had six or more recurrences by 7 years of age. Acute otitis media can complicate chronic suppurative otitis media. Chronic suppurative otitis media is a common cause of hearing loss in developing countries, especially in children.[23]

The relationship between stunting and otitis media had never been studied directly, but several studies had concluded the effect of malnutrition on the occurrence of otitis media. Therefore, the results of these studies could be used as references to predict the relationship between stunting and otitis media.

According to Saxena et al.[23] otitis media was strongly positively associated with malnutrition ($p<0.001$). As many as 60% of patients with otitis media are malnutrition. Another study by Lasissi et al.[24] also reported that children who were underweight or acutely malnutrition were at higher risk of developing otitis media.

Elemraid et al.[25] stated that children with chronic suppurative otitis media experienced higher malnutrition than controls, with lower serum zinc, selenium, and calcium concentrations than controls. Children with vitamin D deficiency and iron deficiency have a longer duration of middle ear infection.

Vitamin A has anti-infective, anti-inflammatory, and antioxidant activities. Vitamin A is a fat soluble vitamin. Vitamin A is required for normal immune system function, growth, reproductive function, vision, cell differentiation, and keeping the airway epithelium in good condition. Vitamin A deficiency has an impact on immunological function consisting of an increased risk of mortality and morbidity related to measles and respiratory system infections. Retinoids and their derivatives are micronutrients that play an important role in maintaining normal mucociliary epithelium. Deficiency in vitamin A causes disruption of the Eustachian tube, tympanic membrane, and middle ear mucosa through mechanisms that include subepithelial edema, antioxidant effects, narrowing of the Eustachian tube, and changes in the secretion of mucin, lysozyme, and secretory immunoglobulins. These changes lead to an increased frequency of otitis media and impaired closure of the tympanic membrane perforation. The delayed in closing the perforation in the tympanic membrane occurs due to disruption of epithelial regeneration so that it could make otitis media to become chronic.[26]

Vitamin D plays an important role in immunomodulation and influences the incidence and severity of bacterial and viral infections. Vitamin D also plays a role in the secretion of antimicrobial peptides such as catelicidin and defensins, enhances the natural immune system, and reduces the risk of infection.[27] Children with low serum vitamin D levels have a higher risk of developing respiratory tract infections and acute otitis media. Vitamin D supplementation is also known to reduce episodes of otitis media in at-risk children. Zinc deficiency causes impaired immune system function and resistance to infection by suppressing thymus function, T-lymphocyte development, lymphocyte proliferation, and T-cell-mediated B cell function. Zinc supplementation has been shown to produce a protective effect against suppurative otitis media.[26]

Relationship between stunting and tonsillitis

Tonsillitis is inflammation of the tonsils, typically of rapid onset. It is a type of pharyngitis. Symptoms include sore throat, fever, enlargement of the tonsils, trouble in

swallowing, and large lymph nodes around the neck.[28] According to Paradise et al.[29] recurrent tonsillitis was defined as at least 7 episodes per year, or at least 5 episodes per year for 2 consecutive years, or at least 3 episodes per year for 3 consecutive years. It is usually caused by a viral infection, but group A β-hemolytics account for 5% to 17% of cases. Although several theories have tried to explain the frequent occurrence of tonsillitis, the exact etiology of this phenomenon remains unclear. The immune system, and environmental factors all play a role in recurrent disease attacks.

Iron is an essential element for the development of the immune system. Iron is the most important component of peroxidase and the enzyme that produces nitrous oxide, which is essential for the enzymatic function of immune system cells. In addition, iron plays an important role in the regulation of cytokine production and in the development of cellular immunity. Zinc has three important biological functions: catalyzer, structural and regulatory; it is one of the most valuable trace elements for the organism. Zinc homeostasis has critical effects on immune function, oxidative stress and apoptosis. Levels of iron and zinc in the body had shown to affect various disorders including malignancy, degenerative diseases and infectious diseases. The results of the study by Somuk et al.[30] demonstrated that low concentrations of zinc and iron in tissues may increase the propensity for recurrent tonsillitis due to their basic contribution to the immune system.

The research of Mirza, et al.[27] concluded that low levels of vitamin D could be associated with the incidence of recurrent tonsillopharyngitis in children and adults, and it could also be explained that bacterial pathogens tended to cause higher vitamin D depletion. This fact can be confirmed by the protective effect of vitamin D against upper respiratory tract infections. They also suggest performing vitamin D screening for patients with recurrent tonsillitis, especially at this time where the prevalence of vitamin D deficiency is substantially high.

DISCUSSION

Stunting or failure to thrive is a condition that describes a chronic undernutrition status during a child's growth and development since the beginning of life, which is represented by a z-score of height for age less than minus two standard deviations based on the WHO growth standard curve.[1]

One of the nutritional problems that is still occurring until today is malnutrition. The definition of malnutrition according to WHO is a medical condition caused by the intake or provision of improper or insufficient nutrition. Malnutrition is more often associated with insufficient intake of nutrients or often called undernutrition, which can be caused by poor absorption or excessive loss of nutrients. Included in the malnutrition group are stunting conditions or short height for age, wasting or low weight for age, underweight or low weight for height, and micronutrient deficiencies. However, the term of malnutrition also includes overnutrition, such as overweight and obesity groups**.** A person will experience malnutrition if he does not consume food with adequate amount, type, and quality of nutrition for a healthy diet in the long term. The imbalance in nutrient intake can be in the form of deficiency or excess of nutrients, both macronutrients and micronutrients.[7]

According to Scheffler et al.[8] in his research, malnutrition is known to cause stunting, but stunting itself does not indicate the occurrence of malnutrition.

To the author's knowledge, until to date there had been no research that studied the direct relationship of stunting to various disorders in the ENT-HN field, thus limiting the source of references.

In conclusion, stunting is associated with morbidity, mortality, stunted child development, decreased learning capacity, increased risk of infection, and decreased productivity. Stunting is associated with deficiencies of micronutrients such as vitamins A and D, zinc and iron which result in impaired physical development and a decrease in the immune system. In the field of ORL-HNS, stunting in toddlers is suspected to cause various diseases such as impaired hearing development, otitis media, rhinitis, and tonsillitis.

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