ORIGINAL ARTICLE

Description of Functional Disorders in Children with Stunting in Puskesmas Rowosari Semarang

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ABSTRACT

Introduction: The consequences of stunting in children are immediate and long lasting, including increased morbidity and mortality, poor development and decreased productivity. Stunting can affect the structure and function of the brain and thus reduce the functional status

Methods: In this observational study, we collected cross-sectional data with a consecutive sampling technique. The research subjects were toddlers attending posyandu at Puskesmas Rowosari Semarang. We used the modified Functional Independence Measure for Children (WeeFIM) to collect the subject's gender, age, parent's social economy and type of functional disorder. We analysed the data with SPSS Statistics.

Results: Of the 14 children with stunting, 11 (78.6%) had functional disorders. Among these 11 children, 7 (63.6%) were male and 8 (72.7%) were > 2 years old. All subjects came from a low socioeconomic status. The functional disorders included grooming disorders (9 children, 81.8%), dressing disorders (8 children, 72.7%), bathing disorders (7 children, 63.6%), impaired control of defecation (6 children each, 54.5%), impaired control of urination (6 children, 54.5%), eating disorders (4 children, 36.4%), toileting disorders (4 children, 36.4%), hearing loss (1 child, 9.1%) and ambulation disorders (1 child, 9.1%).

Conclusion: Toddlers with stunting are at risk of experiencing functional disorders.

Keywords: Toddlers, Stunting, Functional Disorders, Modified WeeFIM

ABSTRAK

Pendahuluan: Dampak stunting pada anak dapat bersifat langsung dan berjangka panjang, diantaranya peningkatan angka kesakitan dan kematian, perkembangan yang buruk serta penurunan produktivitas. Stunting dapat mempengaruhi struktur dan fungsi otak sehingga menurunkan status fungsionalnya.

Metode: Penelitian ini merupakan penelitian observasional dengan pengumpulan data cross-sectional menggunakan teknik pengambilan sampel konsekutif. Subyek penelitian adalah balita yang mengikuti posyandu di Puskesmas Rowosari Semarang. Peneliti menggunakan pengukuran *modified Functional Independence Measure for Children* (WeeFIM) untuk mengumpulkan jenis kelamin subjek, usia, sosial ekonomi orang tua, dan jenis gangguan fungsional. Data dianalisis dengan aplikasi SPSS.

Hasil: Dari 14 anak stunting, 11 anak (78,6%) mengalami gangguan fungsional. Di antara 11 anak tersebut, 7 (63,6%) adalah laki-laki dan 8 (72,7%) berusia > 2 tahun. Semua subjek berasal dari status sosial ekonomi rendah. Gangguan fungsional meliputi gangguan berdandan (9 anak, 81,8%), gangguan berpakaian (8 anak, 72,7%), gangguan mandi (7 anak, 63,6%), gangguan kontrol buang air besar (6 anak, 54,5%), gangguan kontrol perilaku, gangguan buang air kecil (6 anak, 54,5%), gangguan makan (4 anak, 36,4%), gangguan toileting (4 anak, 36,4%), gangguan pendengaran (1 anak, 9,1%) dan gangguan ambulasi (1 anak, 9,1%).

Kesimpulan: Balita dengan stunting berisiko mengalami gangguan fungsional.

Keywords: Toddlers, Stunting, Functional Disorders, *Modified WeeFIM*

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INTRODUCTION

According to the World Health Organization (WHO), stunting is defined as a height that is more than two standard deviations below the mean for the age. Stunting in children leads to poor linear growth during a critical phase.[1] This condition has both immediate and long-term effects, such as increased morbidity and mortality, poor cognitive development, increased risk of infection and disease in adults and a decline in productivity. In Indonesia, over the past 10 years the incidence of stunting in children has been around 37%. The first of six Global Nutrition Targets for 2025 is to reduce stunting, and indicators for this target are important for the second Sustainable Development Goal of Zero Hunger.[2]

Height loss and growth deficiencies are linked to growth failure during the first 2 years of life. Growth retardation frequently starts when a child is still in the womb and lasts for at least the first 2 years after birth. The severe, irreversible physical and neurocognitive impairment that results from

stunted growth hinders human development. Developmental abnormalities are 3.6 times more likely to affect children with stunting than children without stunting. Early malnutrition is a factor in the developmental delays of children with stunting. Central nervous system maturation is greatly influenced by nutritional variables. According to animal and human research, severe nutritional deficits impact brain growth, which in turn affects later development of skills. Based on the limited research that is currently available on dendritic spine pathology in undernourished newborns throughout the critical period, the changes involve apical dendrite shortening and a considerable reduction in the number of dendritic spines.[4,5]

In the context of social and environmental support networks, the functional status is considered to be a summary indicator of the total impact of health issues. The functional status is based on a hierarchy of increasing complexity, starting with specific physical actions (such as lifting and walking) that are incorporated into higher-level activities (such as carrying out social and professional tasks). Changes in social or environmental support, the onset of illness and nutritional issues in children under the age of 5 years can all lead to a decline in the functional status. Brain structure and function (such as cognition, attention, memory, fluency, spatial navigation, locomotor skills, learning and visuospatial abilities) can be impacted by stunting.[6]

Puskesmas Rowosari (Rowosari Health Centre) is a functional organisational unit of the Semarang City Health Office that is responsible for organising health development in the Tembalang District. Puskesmas Rowosari has 59 posyandu (integrated healthcare units) for toddlers. The number of cases of malnutrition was 1.38%. Puskesmas Rowosari Semarang currently has 14 children with stunting,[5] but there has been no research on the functional disorders of these children. Therefore, we have described functional disorders in children with stunting at Puskesmas Rowosari Semarang.

METHODS

This observational study involved cross-sectional data collection with a consecutive sampling technique. The Ethics Commission of the Central General Hospital Dr Kariadi Semarang approved this study (number 1358/EC/KEPK-RSDK/2022). The research was conducted at Puskesmas Rowosari Semarang in December 2022. The inclusion criteria were boys and girls aged < 6 years (toddlers), a stunting diagnosis, willing to participate (including consent from parents) and able to follow the measurement process with modified Functional Independence Measure for Children (WeeFIM) according to established procedures. There were 14 subjects. All participants and their parents provided written informed consent. The independent variable was toddlers with stunting and the dependent variable was functional disorder. This study used the identity form of research subjects. Functional disorders were determined by using the modified WeeFIM. All data were analysed with SPSS Statistics.

RESULTS

Of the 14 subjects, 11 (78.6%) had a functional disorder (Table 1). Table 2 shows the characteristics of the children with a functional

disorder. Most of the subjects were male (n = 7, 63.6%) and > 2 years old (n = 8, 72.7%). All subjects came from low socioeconomic families. Table 3 lists the functional disorders. The disorders, from most frequent to least frequent, included grooming disorders (9 children, 81.8%), dressing disorders (8 children, 72.7%), bathing disorders (7 children, 63.6%), impaired control of defecation (6 children, 54.5%), impaired control of urination (6 children, 54.5%), eating disorders (4 children, 36.4%), toileting disorders (4 children, 36.4%), hearing loss (1 child, 9.1%) and ambulation disorders (1 child, 9.1%).

Table 1. Subjects with and without a functional disorder

Status	n	%
With a functional disorder	11	78.6
Without a functional disorder	3	21.4

Table 2. Characteristics of subject with a functional disorder

Characteristic	n	%
Gender		
Male	7	63.6
Female	4	36.4
Age (years)		
≤ 2 years	3	27.3
> 2 years	8	72.7
Socioeconomic status		
Low (below minimum wage)	14	100
Height (above minimum wage)	0	0

Table 3. Types of functional disorders

Functional disorder	n	%
Defecation control disorder	6	54.5
Urination control disorder	6	54.5
Hearing impairment	1	9.1
Eating disorder	4	36.4
Grooming disorder	9	81.8
Bathing disorder	7	63.6
Dressing disorder	8	72.7
Disorder of toileting	4	36.4
Ambulation disorder	1	9.1

DISCUSSION

Malnutrition affects a child's growth and development. Stunting is a type of malnutrition that is an issue throughout the world. Stunting is a serious issue for children in rural regions; they have developmental abnormalities as a result of persistent starvation. Early-life malnutrition has been linked to epigenetic changes in inflammation, leptin levels and glucocorticoid levels. Developmental delays may occur from these changes, which may also affect neurogenesis, apoptosis and synapse function. The brain regions important in cognition, memory and locomotor skills are affected by starvation. Additionally, there is a link between cognitive performance and stunting. Compared with children without stunting, children with stuning have a lower intellect. Growth retardation often begins when the foetus is still in the womb and continues for at least the first 2 years after birth. Human development is hampered by severe, irreversible physical and neurocognitive damage caused by stunted growth.[1,6,7]

In this study, 11 of the 14 children (78.6%) with stunting experienced functional disorders. This is consistent with research showing that children with stunting are more likely to experience delays in their gross and fine motor development. In a previous study, 71.7% of children with stunting had suspected impairment of fine motor development and 60.4% of the children with stunting had suspected impairment of gross motor development.[8] Impaired motor system and muscular development negatively affects movement. Coordinated voluntary movement do not develop appropriately in children with stunting. Moreover, striated muscles that control unconscious activities mature more slowly.[5,9,]Indonesia. A questionnaire and growth assessment were done, following the development measurement to stunted and non-stunted children who met the inclusion and exclusion criteria. Development was measured by the Denver Developmental Screening Test II (DDST-II[10] This phenomenon is related to the functional disorders found in the present study related to bowel and bladder control, eating, grooming, bathing, dressing, toileting and ambulation. Numerous studies indicate that impaired central nervous system maturation plays a major role in delayed motor development of children with stunting. Toddlers with malnutrition are twice as likely to experience hearing loss. Malnutrition is also associated with factors that increase susceptibility to ear infections. Recurrent inner ear damaged by malnutrition can lead to an increased risk of hearing loss. Malnutrition, especially micronutrient deficiencies, can interfere with the development and function of the cochlea.[11]

According to our study, male toddlers were more likely than female toddlers to develop stunting and functional problems. The social roles that boys and girls play in a community and the values associated with them may be related to this phenomenon. These factors may affect the dietary resources available to them as well as their susceptibility to illness and infection. Gender roles can influence how boys and girls spend their time and thus impact their exposure to the environment and their ability to get food. According to some research, girls who spend more time at home may benefit from increased parental attention and easier access to food while meals are being prepared. Boys may spend more time playing outside with other boys, requiring a higher energy expenditure and exposing them to infection-causing environments and dangers. According to prior research, boys are more vulnerable to malnutrition than girls.[12–15]

The are numerous causes of stunting in Indonesia, including socioeconomic variables affecting the nutritional health of pregnant women and young children. Consistently, in this study all children with stunting are from a low socioeconomic class (with an income below the minimum wage). Other studies have also found that stunting mostly occurs in people who have an income that is below the minimum wage.[5,6,16]

In this study, most of the subjects with stuning and a functional disorder were > 2 years old. This phenomenon is related to the fact that after the age of 2–3 years, the effects of chronic malnutrition on infants will be irreversible. Delays in the development of gross and fine motor control as well as social and verbal interaction are linked to acute malnutrition in children under 5 years of age. Nutritional interventions in children under the age of 2 years have a higher level of effectiveness.[12,17–19]

Growing data indicate that children with stunting have a lower cognitive capacity than children without stunting, are less likely to enrol in school or enrol late, tend to attain lower grades and have impaired behavioural development early in life. Children with stunting frequently have delayed motor skill development, such as crawling and walking, are apathetic, and exhibit less inquisitive behaviour, all of which diminish engagement with caregivers and the environment.[13,20]

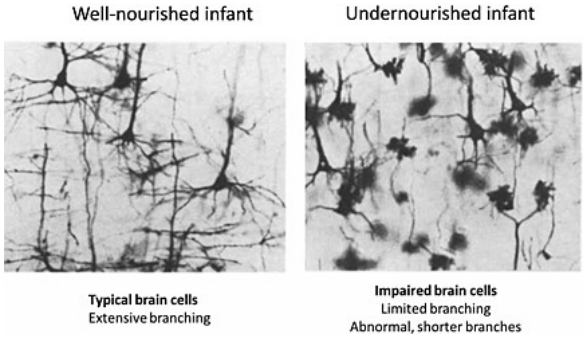

Figure 1. The effect of poor nutrition on brain development (adapted from Cordero et al.[ref]).

Measuring the functional status is a way to objectively describe a person's abilities and limitations to perform various skills including daily, recreational and vocational activities; social interactions; and other habits. If a therapeutic outcome can be measured, then it will be easier to determine the next management programme. Some factors require special attention when measuring the functional status in children, including how to assess developmental milestones, interacting with children during the measurement process and reporting information from parents. We used the modified WeeFIM, which has been widely used in previous research.[4,16,20,21] In a medical rehabilitation programme, measuring the functional status is useful for the following:[16]

1. to plan a therapy programme, because a functional status measurement tool can systematically record the problem of functional delays in subjects;
2. to assess the results or progress of the therapy given;
3. to determine the effectiveness and efficiency of therapy by assessing the patient's clinical changes after being given therapy with a certain dose, to compare the function before and after therapy and to determine the effectiveness of therapy relative to the costs incurred;
4. to identify patterns of disability and cure;
5. to determine the therapeutic programme based on previous evaluations; and
6. to improve the quality of patient care and patient functioning.

Numerous studies have documented the connection between stunting and long-term development, including functional impairment. Because stunting affects the growth of children and can affect future generations, this issue requires considerable attention. Functional disorders necessitate sophisticated interdisciplinary management and can further affect quality of life.[20]

CONCLUSION

Toddlers with stunting are at risk of experiencing functional disorders. We noted impaired control of defecation and urination, hearing loss, eating disorders, grooming disorders, bathing disorders, dressing disorders, toileting and ambulation disorders in children with stunting. Stunting is associated with developmental delays in toddlers, mostly in motor function. Improved nutrition and

education related to stunting are required. Regular screening is necessary, especially for children under 5 years of age. A stunting prevention programme must be a main priority for health workers in basic health services.

There are some limitations to our study. We did not evaluate motor ability in children throughout their early years of life. Maternal health, lack of child stimulation, exposure to violence and certain environmental factors should be measured in future research.

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