Introduction

Quality of life is key for primary healthcare providers and family physicians. Quality of sleep and nutrition are major factors determining quality of life during toddlerhood. Happiness is considered a positive feeling of enjoying life and wanting this feeling to be maintained. Happiness is interchangeable with "life satisfaction" or "well-being". The overall health status of an individual person will have an impact on the feeling of happiness, life satisfaction or well-being, and the other way around.[3]

Regarding children, the relationship with their family, especially with their parents, will have a greater impact on their happiness than a relationship with peers.[3,4] Young children spend more time with family than with peers than older children. Interaction between children and parents through playing creates bonding and results in an increased score of couple satisfaction index (CSI) (p < 0.001) for both parents. Social interactions within a family and with friends or social relationships are associated with the happiness of children.[3] For example, when

Abstract

Introduction: This study aimed to evaluate the relation between happiness perception of children and quality of sleep, appetite, dietary intake and nutritional status. Materials and Methods: A cross-sectional study evaluating happiness, quality of sleep, appetite, dietary intake and nutritional status in 296 Indonesian children less than five-years of age. Results: There was no significant difference on perceived happiness between urban and rural areas (P = 0.087). The proportion of children that are perceived as happy by mothers (55.1%) is significantly higher (p < 0.001) as perceived as happy by fathers (50.7%). A significant lower dietary energy intake with a higher percentage of dietary protein to total energy intake was observed among those children that are perceived as happy. However, after adjusted to body weight, there was no significant difference in the amount of protein intake between those perceived as happy and unhappy. Amongst the nutritional status indicators, this study found a significantly higher Height-for-Age Z score among the children that perceived as happy. Conclusion: Height-for-age Z score and dietary protein intake in children aged 2-5 years are associated with quality of sleep and appetite, and may therefore affect children's happiness. Not only parental care but also appropriate nutrient intakes influence the child's happiness.

Keywords: Nutrition, protein, quality of life, sleep quality, toddler

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a child perceived himself to be important as family member, the number of friends visits will increase. The number of siblings, age of parents, and marital status of parents correlate weakly with children's happiness.\(^6\) In this study, we assessed the association of the happiness perception of children in relation to their quality of sleep, appetite, dietary intake and nutritional status.

**Methods**

A cross-sectional study was performed to evaluate the association between maternal and paternal perceived children's happiness (determined by pre-tested structured validated questionnaires with Cronbach's alpha ranging from 0.676 to 0.769 to indicate that the child felt happy every day during the past week) and i) sleep quality of the child, determined by Sleep Disturbance Scale for Children (SDSC); ii) appetite, measured using visual analogue scale; iii) dietary macronutrients intake, analyzed using one day 24-hour food recall; iv) nutritional status indicators, such as weight-for-age, height-for-age and weight-for-height Z-scores.

The study took place in several big cities and neighboring smaller cities across Indonesia, representing urban and rural areas, namely, Medan and Balige-Toba in Sumatera; Jakarta and Cirebon in Java, and Makassar and Makale Tana Toraja in Sulawesi. Data collection was done between March and April 2018. The study population consisted of parents with children aged 2–5 years old who were living in the indicated areas and willing to participate in the study by signing the informed consent prior to their participation. Using the information from a previous study by Bardosono et al.\(^6\) that 80% of the families have a good happiness score, with assumption of 5% relative precision, a power of 95% and anticipating a 20% lack of response rate, the number of family needed was calculated to be 296. The study applied a multistage cluster sampling to recruit the subjects, that is, purposively selected the cities and chose randomly the cluster of kindergarten and/or early education center that had more than 50 children.

The study protocol was approved by the Ethical Committee, Faculty of Medicine, Universitas Indonesia prior to the commencement of the study (No. 0129/UN2.F1/ETIK/2018, dated on February 12, 2018). General information and procedures described in the study protocol were explained to the parents, and individual informed consent was obtained prior to data collection.

**Results**

Data were obtained from 296 children. Table 1 shows the proportion of children perceived as happy.

There is no significant difference on perceived happiness between urban and rural areas \((P = 0.087)\). It was then decided that for further analysis, this study will not differentiate between urban and rural areas. The proportion of children that are perceived as happy by mothers (55.1%) is significantly higher \((p < 0.001)\) as perceived as happy by fathers (50.7%). For further analysis, this study used children's happiness figures based on mother perception, because it is common that children are more intimate to their mothers than to their fathers.\(^6\)

Table 2 shows a significantly lower score of child sleep disturbance scale if the child is not perceived as happy but not a significantly higher visual analogue scale for appetite among the children's happiness subjects. A significant lower dietary energy intake with a higher percentage of dietary protein to total energy intake was observed among those children that are perceived as happy. However, after adjusted to body weight (kg), there is no significant difference in the amount of protein intake between those perceived as happy and unhappy children. Amongst the nutritional status indicators, this study found a significantly higher Height-for-Age Z score among the children that perceived as happy.

**Discussion**

In this study we found a significant lower score of SDSC among children that are perceived as happy. As stated by Foley and Weinraub\(^8\) insufficient sleep might interfere the capacity to regulate behavior and emotion. This shows that there is a relationship between sleep quality and daily mood or emotion, that is, being happy, which is in line with the statement that there is a bi-directional link between sleep and emotions.\(^9\)

Furthermore, poor sleep quality is also associated with poor quality diets.\(^10\) The non-significant but higher child appetite visual analogue scale in children perceived as happy children found in this study could be related to the theory that mood or emotion could affect food choice through physiological responses that trigger appetite and results in dietary nutrients intake.\(^11\)

As shown in this study, the children perceived as happy have a significantly lower dietary energy intake but higher in dietary protein intake although there is no difference after adjustment to the body weight. A study among children in Ethiopia concluded that improved protein quantity and quality may enhance child linear growth which is in line with the finding of this study that shows significantly higher height for age Z-score among the children that are perceived as happy.\(^12\) Adequate nutrition of a toddler will improve quality of sleep what on its turn will improve

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**Table 1: Children perceived as happy by mothers and fathers according to urban or rural areas**

| Children's happiness perceived | All n (%) | Urban areas n (%) | Rural areas n (%) | \(P\) |
|-------------------------------|-----------|-------------------|------------------|-----|
| By mothers                    | 163 (55.1)| 87 (60.0)         | 76 (50.3)        | 0.095|
| By fathers                    | 150 (50.7)| 80 (55.2)         | 70 (46.4)        | 0.129|
| \(P\)                         | <0.001    |                   |                  |     |
| By both parents               | 108 (36.5)| 60 (41.4)         | 48 (31.8)        | 0.087|

Legend: Statistics: Chi-square test

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Table 2: Association between children perceived as happy to sleep disturbance scale for children (SDSC), appetite visual analogue scale, dietary macronutrients intake and nutritional status indicators

| Dependent Variables                                      | All (296) | Children perceived as happy | P   |
|-----------------------------------------------------------|-----------|----------------------------|-----|
| Sleep and suspected sleep disturbance score              | 37.5 (25-76)* | 36 (25-71)* | 38 (27-76)* | 0.001MW |
| Suspected sleep disturbance, n (%)                       | 35 (11.8) | 15 (9.2) | 20 (15.0) | 0.122MW |
| Appetite VAS                                             | 7.5 (1.8-10)* | 7.5 (1.8-10)* | 6.8 (1.9-10)* | 0.147MW |
| Energy intake (kcal)                                      | 1211.1 (535.6-2444.5)* | 1186.8 (539.2-2380.5)* | 1321.3;351.1^ | 0.015MW |
| Carbohydrate to total energy intake (%)                  | 52.9±9.0^ | 52.2±8.8^ | 53.6±9.0^ | 0.176^ |
| Protein to total energy intake (%)                       | 15 (8-34)^ | 15 (8-34)^ | 14 (8-31)^ | 0.111MW |
| Protein to kg BW (g)                                     | 2.7 (1-0-7.8) | 2.6 (1-0-7.8) | 2.8 (1-0-6.0) | 0.649^ |
| Fat to total energy intake (%)                           | 31.5 (14-66)^ | 31 (14-66)^ | 31.8±7.9^ | 0.901MW |
| Weight-for-age Z-score (WAZ)                             | -0.75 (-4.20-7.34)^ | -0.63 (-4.20-7.34)^ | -0.85 (-2.99-5.21)^ | 0.136^ |
| Underweight, n (%)                                       | 27 (9.3) | 14 (8.7) | 13 (10.1) | 0.922^ |
| Overweight, n (%)                                        | 18 (6.2) | 10 (6.2) | 10 (6.2) | 0.751 |
| Height-for-age Z-score (HAZ)                             | -0.70±1.11^ | -0.58±1.09^ | -1.02 (-3.16-2.88)^ | 0.007MW |
| Stunted, n (%)                                            | 35 (12.1) | 17 (10.6) | 18 (14.0) | 0.378^ |
| Weight-for-height Z-score (WHZ)                           | -0.33 (-4.01-8.43)^ | -0.32 (-4.01-8.43)^ | -0.36 (-2.80-5.79)^ | 0.959^ |
| Wasted, n (%)                                             | 15 (5.2) | 11 (6.8) | 4 (3.1) | 0.358^ |
| Overweight/Obese, n (%)                                  | 25 (8.6) | 14 (8.7) | 11 (8.5) | 0.463 |

VAS: Visual analogue scale; *median (minimum-maximum); ^mean (standard deviation); chi, Chi-square test; MW, Mann-Whitney test; t, independent t-test

Key Points

• Quality of sleep and appetite dietary protein intake in children aged 2–5 years are associated with physical growth and children's happiness.
• Appropriate nutrient intake and parental care influence the child's happiness.

Conclusion

This study shows how children perceived to be happy could affect the quality of dietary intake and nutritional status through good quality of sleep and appetite. The improvement of familial quality of life is a key priority of primary healthcare providers and family physicians.

Declaration of patient consent

General information and procedures described in the study protocol were explained to the parents, and individual informed consent was obtained prior to data collection.

Ethical approval

The study protocol was approved by the Ethical Committee, Faculty of Medicine, Universitas Indonesia prior to the commencement of the study (No. 0129/UN2.F1/ETIK/2018, dated on February 12, 2018).

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Conflicts of interest

There are no conflicts of interest.

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