

Assessment of Malnutrition and Nutritional Status of Hospitalized and Treated Children Aged between 12 and 60 Months

12-60 Aylık Hastanede Yatan ve Tedavi Gören Çocuklarda Malnütrisyon ve Beslenme Durumunun Değerlendirilmesi

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ABSTRACT

Objective: This study aimed to evaluate malnutrition, breastfeeding, introduction to complementary feeding, and nutritional status of hospitalized children aged between 1 and 5 years.

Methods: Along with their mothers, a total of 484 children aged between 1 and 5 years without underlying chronic diseases were included in this study. The mothers were questioned about breastfeeding, introduction to complementary feeding, and nutritional status of their children. Anthropometric measurements including body weight and height of the children were evaluated using the WHO Anthro Program. The interpretation of measurements was done by using the z-score [standard deviation (SD)] cut-points.

Results: The mean age of the patients was 2.27 years. The rate of mothers who breastfed for less than 6 m was 19.6%; among breastfed children aged between 12 and 24 m, the rate was 42.4%. The mean age to start complementary feeding was 6.8±3.01 m. The first complementary food given was yogurt in 45.6% of the babies and vegetable soup in 29.4%. The rates of acute malnutrition, chronic malnutrition, and obesity were 13.6%, 5.2%, and 7.2%, respectively.

Conclusion: Malnutrition is a major health problem. It is multifactorial and includes timing of introduction of complementary feeding, preparation techniques of food, and socioeconomic and cultural factors. To eliminate the adverse effects of nutrition on health problems, the nutritional status of individuals should be closely monitored, and necessary precautions should be taken.

Keywords: Breast milk, complementary feeding, malnutrition, obesity

ÖZ

Amaç: Bu çalışmada hastaneye yatırılan 1-5 yaş arası çocukların malnütrisyon, anne sütü alımları, tamamlayıcı beslenmeye geçiş zamanları, tamamlayıcı beslenmede verilen besinler ve beslenme durumları değerlendirildi.

Yöntemler: Bu çalışmaya altta yatan kronik hastalığı olmayan 1-5 yaş arası 484 çocuk ve anneleri alındı. Hastaların annelerine anne sütü verme, tamamlayıcı beslenmeye geçiş ve çocukların beslenme durumları ile ilgili sorular sordu. Çalışmaya alınan çocukların antropometrik ölçümleri (vücut ağırlığı ve boy uzunluğu) DSÖ Anthro Programı ile değerlendirildi. Ölçümler Z-skor (SD) kesişim noktalarına göre yorumlanmıştır.

Bulgular: Hastaların yaş ortalaması 2,27 yıl idi. Altı aydan az süreyle emziren annelerin oranı %19,6 iken, 12-24 ay arası olan çocuklarda emzirme oranı %42,4 idi. Tamamlayıcı beslenmeye başlama zamanları ortalaması 6,8±3,01 aydı. Annelerin ilk verdikleri besinlerden %45,6'sı yoğurt olurken, %29,4'ü sebze çorbası idi. Hastalarda akut malnütrisyon %13,6, kronik malnütrisyon %5,2 ve obezite %7,2 olarak bulundu.

Sonuç: Malnütrisyon önemli bir sağlık sorunu olmakla birlikte, anne sütü alımı, tamamlayıcı besinlere başlama zamanı ve besin çeşitleri, besinleri hazırlama yöntemleri, sosyoekonomik ve kültürel faktörler gibi birçok etmen malnütrisyon gelişmesine neden olmaktadır. Beslenmenin sağlık sorunları üzerinde oluşturabileceği olumsuz etkileri ortadan kaldırmak için beslenme durumları yakından takip edilmeli ve gerekli tedbirler alınmalıdır.

Anahtar kelimeler: Anne sütü, obezite, malnütrisyon, tamamlayıcı beslenme

INTRODUCTION

The World Health Organization (WHO) recommends that infants should be exclusively breastfed for the first 6 m, with continued breastfeeding along with appropriate complementary foods up

to 2 years of age. In developing countries, exclusive breastfeeding in the first 6 m of life reduces mortality and morbidity rates. Therefore, timely introduction of complementary feeding with adequate safe and appropriate foods is essential (1, 2). The appropri-

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ate time to introduce complementary foods should be around 6 m of age, but not before 17 weeks, and should not be stopped after the 26th week we have formulated these conclusions: Exclusive or full breast-feeding for about 6 months is a desirable goal (3). Complementary feeding (ie, solid foods and liquids other than breast milk or infant formula and follow-on formula.

Malnutrition is defined as a condition in which a deficiency, excess (or imbalance) of energy, protein, and other nutrients causes measurable adverse effects on tissue/body form, function, and clinical outcomes (4). Growth and developmental delay occurs in infants and children because of inadequate and unbalanced nutrition, which also causes mortality (5). Malnutrition and its causes are associated with one third of the global disease burden, mostly in developing countries, for children aged less than 5 years (6). Anthropometric measurements are directly associated with the nutritional status of young children that affects the risk of illness and mortality. The data obtained from infants and children reflect general health status and dietary adequacy. Nutritional status affects the risk of illness and death in young children. Recently, the problem of obesity in children has considerably increased in Turkey. Several studies have demonstrated that this problem will continue to increase, unless preventive measures are taken in the near future (7, 8).

This study aimed to evaluate malnutrition, breastfeeding, introduction to complementary feeding, and nutritional status of hospitalized children aged between 1 and 5 years.

METHODS

This study was conducted at Gaziantep Cengiz Gökçek Maternity and Children’s Hospital between September 2015 and March 2016 with a total of 484 hospitalized patients aged between 1 and 5 years. Patients who were hospitalized in the intensive care or the emergency unit and those with neurological or genetic disorders were excluded from the study. The mothers were questioned about breastfeeding, introduction to complementary feeding and nutritional status of their children. A total of 484 mothers provided consent to participate in the study and filled the data collection form, which was developed by the researchers. The study protocol was approved by the Gaziantep University Clinical Research Ethics Committee (Decision no. 2015/301). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Anthropometric measurements including body weight and height of the children were made by a single researcher. The obtained data

were evaluated based on the age group (12-24, 25-36, 37-48, and 49-60 months). The obtained data were evaluated with the WHO Anthro Program (www.who.int/childgrowth/software/en/). The interpretation of measurements was performed using the z-score [standard deviation (SD)] cut-points. A weight-for-height z-score lower than -2 SD indicates acute malnutrition, a height-for-age z-score lower than -2 SD indicates chronic malnutrition, and body mass index z-score for age above +2 SD indicates those who are considered obesity.

Statistical Analysis

Statistical analyses were performed using the MedCalc Statistical Software version 12.7.7 (MedCalc Software bvba, Ostend, Belgium; <http://www.medcalc.org>; 2013). Continuous variables were expressed as mean±SD and median (minimum-maximum). Categorical variables were expressed as frequency (n) and percentage (%). p=0.05 was considered statistically significant.

RESULTS

Of the 484 patients included in the study, 208 (43%) were female and 276 (57%) were male. The mean age was 2.27 years (range, 1-5 years), and the mean birth weight was 3092 grams. Complementary feeding was introduced with a mean duration of 6.8±3.01 months (range, 1-40 months). The rates of acute malnutrition, chronic malnutrition, and obesity in the patients were 13.6%, 5.2%, and 7.2%, respectively (Table 1).

Distribution of malnutrition by age group is presented in Table 2. Acute malnutrition (40%), chronic malnutrition (44%), and obesity (48.6%) were the highest among children aged 12- 24 months. On the basis of the breastfeeding duration (never breastfed, less than 1-6 months, 1-6 months, 7-12 months, and longer than 13 months), no significant difference in the rate of acute malnutrition was observed. However, there was a significant difference

Table 1. Malnutrition status of patients

		n	%
Acute malnutrition	No	418	86.4
	Yes	66	13.6
Chronic malnutrition	No	459	94.8
	Yes	25	5.2
Obese	No	449	92.8
	Yes	35	7.2

Table 2. Malnutrition status according to age groups

		12–24 m	25–36 m	37–48 m	49–60 m
Acute malnutrition, n (%)	No	220 (54.9)	100 (24.9)	55 (13.7)	26 (6.5)
	Yes	26 (40.0)	23 (35.4)	10 (15.4)	6 (9.2)
Chronic malnutrition, n (%)	No	235 (53.3)	114 (25.9)	60 (13.6)	32 (7.3)
	Yes	11 (44.0)	9 (36.0)	5 (20.0)	0 (0.0)
Obese, n (%)	No	229 (53.1)	112 (26.0)	58 (13.5)	32 (7.4)
	Yes	17 (48.6)	11 (31.4)	7 (20.0)	0 (0.0)

m: months

in the rate of chronic malnutrition, showing the highest rate in infants who were never breastfed. No significant difference was observed in the rates of acute and chronic malnutrition between those who were breastfed for less than 6 months and those who were breastfed for longer than 7 months. In babies aged 12-24 months who were still breastfed, no significant difference was observed in the breastfeeding status of the mother and the chronic and acute malnutrition rates.

A total of 93.6% mothers breastfeed immediately after birth, whereas 88.2% of those who do not breastfeed fed sugar water.

Of the children aged 12-24 m, 42.4% were still breastfed. While 9.4% children were never breastfed, 19.6% were breastfed for less than 6 m and 70.9% were breastfed for more than six months. A total of 40% mothers discontinued breastfeeding because of low milk supply and 53.2% because their babies were unable to suck milk. Additionally, 45.6% mothers fed yogurt as the first food, whereas 29.4% fed vegetable soup. Mothers used water more frequently (90.6%) while preparing the formula. Of the mothers who had picky-eating children, 45.2% force-fed their children, whereas 21.9% did not hassle. Details regarding breastfeeding and the nutritional status of children are presented in Table 3.

Table 3. Breastfeeding and nutritional status of children

		n	%
How soon after birth did you breastfeed your child?	Immediately after birth	412	93.6
	within 6–12 hours	2	0.5
	within 12–24 hours	0	0.0
	After a day	26	5.9
If you did not breastfeed your child right after birth, what did you feed your child?	Sugar water	15	88.2
	Water	2	11.8
Are you still breastfeeding? *(children aged 12–24 m)	Yes	104	42.4
	No	141	57.6
For how long did you breastfeed?	Never breastfed	41	9.4
	Less than 1–6 months	57	13.0
	1–6 months	29	6.6
	7–12 months	60	13.7
	13 months and more	250	57.2
Why did you cut down breastfeeding before six months?	Lack of milk	44	40.4
	Introduction of complementary foods	3	2.8
	Baby did not suck milk	58	53.2
	Re-pregnancy	4	3.7
What was the first complementary food you gave?	Baby formula in jar	53	11.0
	Yogurt	219	45.6
	Cow's milk	13	2.7
	Fruit juice	18	3.8
	Vegetable soup	141	29.4
	Pudding	36	7.5
What did you use while preparing formula at home?	Water	230	90.6
	Milk	16	6.3
	Water and milk	8	3.1
What do you do when your child gives you trouble while feeding?	Force-feed	217	45.2
	Do not hassle	105	21.9
	Give a break and try later	56	11.7
	Give appetizing syrup	2	0.4
	No eating problems	100	20.8

According to the time of introduction of complementary foods in infants, cow's milk, yogurt, and pudding were commonly fed at the age of 4-6 months. In addition, white cheese, egg, meat, rice pilaf, bulgur pilaf, pasta, lentil soup, tarhana soup (i.e., a mixture of wheat flour, yogurt, baker's yeast, salt, various vegetables, spices, and seasonings), bread, biscuit, fruit juice, fruit puree, jam-honey, and molasses were commonly fed at the age of 7-9 months. Vegetable recipes and vegetable soup were commonly fed at the age of 10-12 months (Table 4).

DISCUSSION

Malnutrition is a major health problem and is closely associated with early-stage nutrition and growth development. Healthy growth and development in the early stages of life has a great impact on the child's future. One of the most important indicators of a child's health is growth. Additionally, considering the benefits of breastfeeding on health and nutrition, the correct interpretation of the growth pattern of healthy breastfed infants is of utmost importance in terms of community health (9, 10). In a study conducted in Van province (a city in Turkey), acute malnutrition among participants was found to be 16.2% and chronic malnutrition was found to be 17.7% (11). In a study conducted by Çinar et al. (12), acute malnutrition among participants was found to be 15.2% and chronic malnutrition was found to be 4.9%. On the basis of the data of the Turkish National Nutrition and Health Survey (TBSA) 2010, these rates were shown to be 5.2% and 11.5%, respectively (7). In our study, the rate of acute and chronic malnutrition among patients was 13.6% and 5.2%, respectively. The results of previous studies conducted in various regions of Turkey have shown varied results. Malnutrition is caused by multiple factors, such as inadequacy of nutrient intake, lack of knowledge and frequent infections; however, it is mainly related to psychosocial, economic, cultural, and geographical factors.

In Turkey, obesity has been increasingly recognized as an important health issue. The rate of obese patients in our study was found to be 7.2%. According to the TBSA 2010 data, the obesity rate was 8.5% in the age group 0-5 years (7). Several factors such as inadequate breastfeeding, early start of complementary feeding and inappropriate food intake contribute to obesity. Further studies are required in this age group to reduce the risk of developing chronic illnesses in older age.

Although breastfeeding is common in Turkey, the rates fall within the first 6 months. In a study conducted by Bakiler et al. (13), the rates of mothers who breastfed for less than 6 months were 32.1%, while those who never breastfed were 4.9%. In our study, these rates were 19.6% and 9.4%, respectively. As an answer to the question "Why did you stop breastfeeding before six months?," 40.4% mothers reported insufficient breast milk, whereas 53.2% reported that their babies refused sucking milk. In another study, similar results were obtained, wherein 42.1% mothers discontinued breastfeeding because of lack of milk and 40.5% reported that their babies refused sucking milk (14). On the basis of the data of the TBSA 2010, the main reason for stopping breastfeeding was insufficiency/lack of breast milk in 47.6% mothers and refusal of sucking milk in 22.3% mothers (7). Despite consistent results, milk insufficiency is the main reason for mothers to discontinue breastfeeding. Additionally, it has been shown that, when it is about milk adequacy, mothers do not have sufficient knowledge about themselves and their babies. There-

fore, mothers should be informed about proper breastfeeding techniques to ensure the continuity of the babies' breastfeeding.

On the basis of the data of the Demographic and Health Surveys (TNSA) program of Turkey in 2008, the rate to start complementary feeding before the age of 6 months was 8%; however, in 2013, this rate increased to 12%. In addition, the foods given were not appropriate for the children's age group (8). Although the time point of starting the complementary foods in our study was approximately 6 months, the nutrition that was first started generally not suitable for the sixth month of the child. As these foods add to the baby's nutrition, the rate of breastfeeding drops. Among the children aged 12-24 months, the rate of receiving breast milk was 42.4%. On the basis of the data of the TBSA 2010, this rate was 24% (7). These rates were significantly lower than that of the WHO recommendation that infants be breastfed up to 2 years of age. Timely introduction of the complementary feeding with appropriate food is important to meet the infant's needs and to ensure proper growth and development. Mothers seem to lack information regarding the introduction of complementary feeding and the continuity of breastfeeding.

The rates of starting breastfeeding after birth vary depending on regions. In a study conducted by Kutlu et al. (15), the rate of breastfeeding within the first 1-2 hours was 78.9%. In a study conducted by Akova et al. (16), the mean time taken to initiate complementary feeding was 5.79 ± 1.5 months, whereas in another study conducted by Telatar et al. (17), the mean time was 5.37 ± 0.8 months. In a study conducted by Gün et al. (18), the rate of breastfeeding within the first hour was 80.5%. In another study conducted in the Mersin province of Turkey, this rate was 69.6% (19), whereas it was reported to be 59.1% in the TBSA 2010 (7). In our study, this rate was 93.6%, whereas the mean time of introduction of complementary feeding was 6.8 ± 3.1 months. High rates of breastfeeding after birth are related to the policies of baby-friendly hospitals that are implemented in Turkey. Although this rate continues to increase over years, it is still not at the desired level.

To support the healthy growth and development of the baby in case of inadequate breastfeeding, necessary trainings should be provided to use formula milk at the right time and with appropriate preparation/techniques, rather than early introduction of complementary feeding, which is one of the incorrect and frequent practices of mothers. In our study, the rate of mothers who provided formula milk to their babies was 51.6%, and for the methods used to prepare formula milk, 90.6% mothers used water, whereas 6.3% used milk and 3.1% used milk and water. By the education programs that would be given by health care providers, misconceptions regarding the preparation of formula milk may be avoided and related nutritional problems may be prevented.

In our study, 45.2% mothers who experienced difficulties in feeding force-fed their children. In a study conducted by Sanlier et al. (20), 27.2% mothers discontinued feeding and attempted later and 13.4% force feed. Methods such as coercion, intimidation, and punishment of children without appetite have been shown to fail and to make children more irritable (21).

Complementary feeding refers to giving other foods and liquids along with breast milk to meet the nutritional requirements of infants, when breast milk alone is no longer sufficient. However, baby formulas are not included in the definition of complemen-

tary foods (22). Complementary foods which are introduced may vary. When introducing complementary feeding, the first food to be given at 6 m of age should be yogurt, fruit juice, fruit puree, vegetable soup, and egg yolk. At 7-8 months, veal, chicken meat, fish, and cheese should be given. At 8-9 months, rice, pasta, and whole eggs should be given, and at 12 months, transition to family food is allowed (23, 24). In our study, the first complementary food given was yogurt in 45.6% and then vegetable soup in 29.4% and spoon/jar formula in 11% babies. In a study conducted by Kaya et al. (25), 28.4% mothers started complementary foods with soup, 24% with readymade yogurt, 12.4% with house yogurt, 10% with fruit, and 8.8% with ready spoon/jar formula. In a study conducted by Aydin et al. (26), ready formula was given as a complementary food in 80.2% and yogurt and fruit puree were given in 15.2% and 4.6%, respectively. On the basis of the complementary foods according to the starting time, the introduction of cow's milk, yogurt, and milk pudding were mostly introduced at 4-6 months, whereas white cheese was started at 7-9 months. On the basis of the data of the TBSA 2010, the introduction of cow's milk, yogurt, milk pudding, and white cheese was at 8.4, 6.7, 7.6, and 8.6 months, respectively (7). However, there are some misapplications, particularly about the early start of cow's milk and milky pudding. The WHO does not recommend the use of cow's milk before 12 m of age. The reasons for this are its high protein content, which may cause renal and autoimmune diseases in the elderly. Also, the calcium/phosphorus balance is inappropriate, it has poor contents of linoleic acid and nucleotides, bad iron absorption, and also causes intestinal microbleeding and constipation besides renal solute load (24). In our study, red meat, egg, tarhana soup, and lentil soup were started predominantly at 7-9 months of age. On the basis of the TBSA 2010 data, red meat was started at 10.5 months, egg

at 11 months, tarhana soup at 7.9 months, and lentil soup at 8.8 months (7). Our study results support the recommendations regarding the introduction time of these food groups. Grains such as wheat, rye, and barley contain gluten. Introducing gluten before the third and after seventh month increases the risk of celiac disease. The introduction of less amounts of gluten-containing foods between 4 and 7 months of age can be protective against celiac disease. We have formulated these conclusions: Exclusive or full breast-feeding for about 6 months is a desirable goal (3). Complementary feeding (ie, solid foods and liquids other than breast milk or infant formula and follow-on formula). When the introduction time of grains was evaluated, rice pilaf, bulgur pilaf, pasta, bread, and biscuits were observed to be commonly started at the ages of 7-9 months. On the basis of the TBSA data, pasta/rice was started at 10 months, bread at 8.3 months, and biscuits at 8.9 months (7). According to the study results, the introduction of grains is delayed and that increases the risk of celiac disease in later stages of life. As the introduction time of vegetables and fruits, which are complementary foods that should be started in the early stages of life are evaluated; vegetable soup is mostly started at 10-12 months, whereas fruit juice is started at 7-9 months. On the basis of the TBSA 2010 data, the mean time of the introduction of these foods is 8.2 and 7.5 months, respectively (7). Early initiation of sugary tastes such as jam and honey in baby feeding increases the likelihood of these tastes in later stages of life. Additionally, honey should not be given before one year of age as it may cause infantile botulism (3) we have formulated these conclusions: Exclusive or full breast-feeding for about 6 months is a desirable goal. Complementary feeding (ie, solid foods and liquids other than breast milk or infant formula and follow-on formula). Jam-honey is mostly started at 7-9 months, and on the basis of the TBSA 2010 data, jam

Table 4. Time of introduction of complementary foods

Time of introduction of complementary foods	0–3 m	4–6 m	7–9 m	10–12 m	13 m and more	Not given
Cow's milk	5 (1)	128 (26.5)	103 (21.3)	33 (6.8)	86 (17.8)	128 (26.5)
Yogurt	11 (2.3)	229 (47.4)	164 (34)	27 (5.6)	15 (3.1)	37 (7.7)
Pudding	5 (1)	145 (30)	106 (21.9)	13 (2.7)	11 (2.3)	203 (42)
White cheese	2 (0.4)	145 (30)	168 (35)	26 (5.4)	18 (3.7)	123 (25.5)
Egg	1 (0.2)	69 (14.3)	253 (52.4)	95 (19.7)	31 (6.4)	34 (7)
Meat	0	29 (6)	245 (50.8)	130 (27)	37 (7.7)	41 (8.5)
Rice pilaf	1 (0.2)	8 (1.7)	248 (51.3)	168 (34.8)	35 (7.2)	23 (4.8)
Bulgur pilaf	1 (0.2)	9 (1.9)	244 (50.5)	169 (35)	36 (7.5)	24 (5)
Pasta	1 (0.2)	9 (1.9)	229 (47.5)	171 (35.5)	39 (8.1)	33 (6.8)
Lentil soup	4 (0.8)	61 (12.6)	204 (42.2)	140 (29)	27 (5.6)	47 (9.7)
Tarhana soup	4 (0.8)	46 (9.5)	190 (39.3)	134 (27.7)	29 (6)	80 (16.6)
Vegetable soup	1 (0.2)	17 (3.5)	99 (20.5)	173 (35.8)	52 (10.8)	141 (29.2)
Bread	1 (0.2)	62 (12.8)	201 (41.6)	146 (30.2)	46 (9.5)	27 (5.4)
Biscuit	1 (0.2)	60 (12.4)	190 (39.3)	40 (30)	43 (8.9)	49 (10.1)
Fruit juice	1 (0.2)	125 (25.9)	170 (35.2)	104 (21.5)	38 (7.9)	45 (9.3)
Jam-honey	0	100 (19.9)	134 (26.5)	84 (17)	31 (6.8)	134 (29.8)

m: months

is started at 9.1 months and honey at 10.1 months (7). For infants to have adequate energy, macronutrient and micronutrient intake and the balance between breast milk and complementary foods must be maintained (27). The wrong food choices made during the introduction of complementary foods may also cause problems with the progress of the healthy growth and development of the infants.

CONCLUSION

In conclusion, these days, excessive nutrition (overnutrition) as well as deficient nutrition (undernutrition) are major health problems. As inadequate and unbalanced nutrition may lead to many diseases and health problems also have negative effects on nutrition. To eliminate these effects, the nutritional status of individuals should be closely monitored, medical nutrition treatment should be initiated after the nutritional status is evaluated and necessary precautions should be taken. Besides training on the importance and techniques of breastfeeding, more detailed information should be given to families about when to introduce complementary feeding and the types and the right ways to prepare food. In this way, the misconceptions regarding breastfeeding and/or complementary feeding may be avoided and related malnutrition can be prevented.

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