

A Review on the Importance of Nursing Approaches in Nutrition of Children with Cancer

Ş. Çiftcioğlu, E. Efe

Abstract—In recent years, cancer has been at the top of diseases that cause death in children. Adequate and balanced nutrition plays an important role in the treatment of cancer. Cancer and cancer treatment is affecting food intake, absorption and metabolism, causing nutritional disorders. Appropriate nutrition is very important for the cancerous child to feel well before, during and after the treatment. There are various difficulties in feeding children with cancer. These are the cancer-related factors. Other factors are environmental and behavioral. As health professionals who spend more time with children in the hospital, nurses should be able to support the children on nutrition and help them to have balanced nutrition. This study aimed to evaluate the importance of nursing approaches in the nutrition of children with cancer. This article is planned as a review article by searching the literature on this field. Anorexia may develop due to psychogenic causes or chemotherapeutic agents or accompanying infections and nutrient uptake may be reduced. In addition, stomatitis, mucositis, taste and odor changes in the mouth, the feeling of nausea, vomiting and diarrhea can also reduce oral intake and result in significant losses in the energy deficit. In assessing the nutritional status of children with cancer, determining weight loss and good nutrition is essential anamnesis of a child. Some anthropometric measurements and biochemical tests should be used to evaluate the nutrition of the child. The nutritional status of pediatric cancer patients has been studied for a long time and malnutrition, in particular under nutrition, in this population has long been recognized. Yet, its management remains variable with many malnourished children going unrecognized and consequently untreated. Nutritional support is important to pediatric cancer patients and should be integrated into the overall treatment of these children.

Keywords—Cancer treatment, children, complication, nutrition, nursing approaches.

I. INTRODUCTION

NUTRITION in children with cancer is a subject that should be meticulously dealt with in terms of the success of cancer treatment and reducing the risk of the development of complications. Sufficient and balanced nutrition is important for the prognosis and treatment of pediatric oncology patients. Malnutrition in children has various negative effects such as growth and development retardation, an extension of the recovery period, a decrease in drug efficacy, predisposition to infection and loss of morale. These negative effects prolong the hospitalization period of a child and increase the mortality and morbidity rates [1]-[3].

Good nutrition and nutritional therapy are important for cancer patients before, during and after treatment. Providing a child with proper nutrition at the hospital reduces the

complication rate by increasing the efficacy of medical treatment and provides the child and his/her family with psychological and economic profit by shortening the hospitalization period [2], [4], [5]. Providing proper nutrition is important in order to increase the success of cancer treatment and to reduce the complications originating from the disease [5].

Various difficulties are experienced in providing nutrition to children with cancer. The first one of these is the factors related to cancer. The other factor is the factors specified as environmental and behavioral factors (the child's being away from the environment to which he/she is used to, the parents' attitude, punishing the parents due to the disease, eating environment, hospital room, their dislike of hospital food, eating hours which are not suitable for their routines, adapting to the diet) [4], [6]. Furthermore, side effects related to treatments such as a decrease in food intake, nausea, vomiting, constipation, diarrhea, malabsorption, oral mucositis and taste changes cause nutrition disorders, weight loss and malnutrition in children with cancer in subsequent periods [5]-[9]. Providing sufficient and balanced nutrition increases tolerance to treatment, decreases the side effects of the treatment, prevents weight loss and increases response to the treatment. Thus, the healthy and proper nutrition of a child during cancer treatment bears great importance [10].

Defining the risk factors initially may help to determine the level of nutritional support [27]. It is required to assess nutrition and arrange it together with the dietician by performing biochemical and anthropometric assessments in children with cancer. In addition to the medical treatment aimed at minimizing the problems specified in the medical history, enteral, oral and parenteral nutritional support should be given [10], [11]. Enteral nutrition is determined in accordance with the condition and need of the child. Children whose oral intake is insufficient can be supported with continuous infusion. The amount that they should take in total daily can be given to the children without oral intake by means of continuous infusion or intermittent bolus; moreover, product selection is arranged according to the patient. Polymeric formulae which contain protein, carbohydrate, and long-chain fatty acids can be preferred for children whose digestive functions are suitable and products containing fiber can be preferred for children with constipation [12].

Nutritional intervention for children with cancer is challenging and is compounded by an incomplete understanding of the etiologies of suboptimal nutritional states in this population and a paucity of evidence regarding the clinical efficacy of interventions. Despite a number of

Şule Çiftcioğlu is with the Akdeniz University Nursing Faculty, Turkey (e-mail: sulesenol@akdeniz.edu.tr).

publicized guidelines suggesting effective approaches to nutritional support, pediatric care centers nationwide vary widely with respect to nutritional practice and management, which are frequently based on opinion instead of evidence [28]. Guidelines for care to be applied to solve nutritional problems are needed. However, the evidence-based guidelines used in the clinical management of nutritional problems in children receiving chemotherapy are scarce and there is a need to develop national guidelines for the resolution of nutritional problems [21], [22]. Children who are treated with cancer need to be assessed for nutritional status at the time of diagnosis and diet should be regulated in cooperation with a dietitian. In children there are schemes showing the need for protein and energy according to age and weight. However, the additional requirement of active tumor metabolism in the cancer patient should be considered. In addition, the need for calories increases in cases of fever and infection, which are common in these patients [23].

Another important point to be considered in the nutrition of children with cancer is neutropenic nutrition. Neutropenic nutrition; It is the type of diet applied to prevent the entry of microbes in certain foods and beverages into the body in weakened immune system neutropenic patients [24]. The application of chemotherapy causes the increase of risk of infection due to suppression of the immune system in patients, low intake of foods, loss of appetite, vomiting and diarrhea and causes some nutrients not to be used. For this reason, all hygiene rules must be observed and foods not recommended in case of neutropenia should not be given [25].

Cooperation with the family is necessary for providing nutrition in children with cancer. In order to reduce the loss of appetite in children caused by the treatment, attention should be paid to the fact that food distribution hours do not coincide with treatment hours [11]. The child's eating together with his/her parent increases nutrition satisfaction of the child [13].

The nutrition of children with cancer should be attempted to be enriched with foods they like with a high nutritional value in accordance with their needs. Furthermore, using antiemetic medication for nausea and vomiting related to the treatment, giving food containing fiber and liquid to those with constipation, performing suitable oral care in addition to soft food in patients with mucositis, and using analgesic medication for those experiencing pain are among other approaches that should be implemented. Solutions should be produced in cooperation with the family for the reasons that reduce nutrient intake in children with cancer. A variety of foods can be used for taste change. For example, lemon juice, vinegar and sugar with acidic taste are beneficial for metallic taste. for dry mouth by stimulating the salivary gland is peppermint-lemon candies, fluid foods and sauces are useful easier to swallow. Antiemetic drugs can be used in chemotherapy-induced nausea and vomiting. In constipation those with fibrous food and plenty of liquid are recommended. In patients with mucositis, proper oral care, analgesic and local anesthetics are required as well as soft and liquid foods. Parenteral nutrition, antibiotics and antifungal treatment are necessary in severe cases [14], [17].

In children with cancer, nutritional disorders are a common clinical picture and the nutritional methods and products used are important [26]. Anorexia may develop due to psychogenic causes or chemotherapeutic agents or accompanying infections and nutrient uptake may be reduced. In addition, stomatitis, mucositis, taste and odor changes in the mouth, the feeling of nausea, vomiting and diarrhea can also reduce oral intake and result in significant losses in the energy deficit. Nurses play the primary role in maintaining the nutrition of children with cancer. Therefore, they should know the importance of nutrition and the efficiency of nursing care in cancer treatment, determine the needs of the child in accordance with the nursing period, plan suitable interventions and evaluate the result of the care. The evaluation related to nutrition is made in order to determine the nutritional status of a child or how much of the food requirement and energy is met with the current nutrition. Determination of nutritional disorders bears great importance for children who undergo cancer treatment.

After anthropometric and biochemical evaluations are made in children with cancer, the nutritional status of the patient is assessed. Oral, enteral and parenteral nutritional support is given in case of necessity as well as supportive and medical treatment for eliminating the factors causing decrease in nutrient intake determined in the anamnesis [4]. The aim is to determine the nutrition strategy. Assessment of nutrition is done to determine the nutritional status of the child or the nutritional needs and the extent to which the energy meets the available nutrients. Detection of malnutrition is of great importance for children who receive cancer treatment. Nutritional support is provided in four stages in cancer patients. These steps are:

- Diet adjustment,
- Additional oral nutrition,
- Providing enteral support
- Parenteral nutrition.

The level of nutritional support depends on the nutritional status of the patient, course of the disease and antineoplastic treatment applied. With the arrangement of nutrition, the patient's response to the treatment and tolerance increase, the quality of life increases as well [14]. Patients should be informed about the course of their diseases and the importance of nutrition, suggestions for balanced nutrition with a high nutritional value should be made. The doctor or nurse should make some suggestions about oral nutrition to the patient and to those in the patient's environment regarding the complaints of the patient. An increase in the oral intake of patients can be rendered easier with the simple changes made [15]. Some of the problems most frequently encountered in relation to nutrition in children who undergo cancer treatment and nursing approaches to them are as follows:

Lack of Appetite: Tumors cause patients to lose their senses of taste and interest in food by synthesizing the proteins that suppress appetite. Many chemotherapeutic medications, especially radiotherapy and anesthesia applied to the abdominal region, cause the loss of appetite. The factors which cause the loss of appetite in the patient are studied, and

treatment is arranged in accordance with this. The nursing approaches in case of the loss of appetite and fatigue are as:

- Calorie rich food that the patient likes should be prepared. A small quantity of food should frequently be given. Liquid intake during eating should be limited.
- It should be encouraged that the patient eats together with his/her family circle or friends. It should be suggested that the patient should not enter the kitchen in the process of cooking.
- The patient should do exercise for 5-10 minutes at least half an hour before the meal. While eating, the patient should stay away from every kind of stress.
- The most nutritional food should be given in the morning.
- Food should not be given right after the treatment [15].

Change of Taste: Tumors and treatments such as chemotherapy and radiotherapy cause serious damage in the cells which contain taste and smell. Taste is usually discerned by the tongue, cheek mucosa, lips, and cheeks. The substances similar to amino acids are emitted from tumor cells which alter the senses of taste (sweetness, bitterness, saltiness, and sourness). Some chemotherapy-related medications have an effect on the sense of taste. In the evaluation of the change of taste, starting time, frequency, duration, degree of the change of taste, the period of time when it takes place at least or at most during the day, the variety of food that renders it better or worse, the effect of the change of taste on the nutritional status and accustomed lifestyle, the factors that cause or contribute to the change of taste, oral hygiene applications should be known [15], [16]. Nursing approaches to the change of taste are as follows:

- Fragrant food should be prepared. The food that the patient wants should be given. The spices that the patient prefers should be added to his/her food as flavoring.
- It can be suggested to patients that they should suck mint or lemon candy in order to ensure salivation.
- The mouth should be rinsed before and after meals.
- Eggs, cheese varieties, and yogurt should be used to give a high amount of protein to the patient [14].

Nausea-Vomiting: They are one of the most common symptoms related to chemotherapy. The frequency and continuity of nausea and vomiting after chemotherapy greatly affect the patient's quality of life. The factors that affect chemotherapy-related nausea and vomiting can be grouped as those related to the patient, and to the chemotherapy protocol and antiemetic medication [14]. Nursing approaches to deal with nausea and vomiting are as follows:

- Antiemetic medication should be given at least half an hour before the meal.
- Oral care should frequently be applied; the importance of breathing through the mouth during nausea-vomiting should be explained.
- Since even considering chemotherapy may cause nausea, the use of relaxation techniques prior to and during the treatment is suggested and taught. Every patient may have some unique coping methods, taking these into consideration, drawing attention to something else, massage, and pressure bandages can also be useful.

- Attention should be paid that the physical environment is clean and odorless.
- Cold pad application on the eyes can be performed prior to and during the treatment.
- Meals should be planned in a way that they will be taken in small quantities and frequently.
- Liquid intake should be avoided during meals.
- The patient should rest after each meal.
- Cold and soft food should be preferred since they are well-tolerated.
- The child should be monitored in terms of dehydration and malnutrition.
- Extremely fatty and sweet food should not be given, and the agents that regulate intestinal motility should be given.
- Oral hygiene should be ensured [15], [17].

Mucositis: All gastrointestinal system mucosa may be damaged following chemotherapy, and usually oral mucosal damage is observed. Mucositis in the intestines emerges as noninfectious diarrhea. Nursing approaches in mucositis are as:

- Granular, raw, acidic, very hot, very cold, bitter, sour, and spicy food should be avoided. Soft textured food should be given.
- Solutions which contain local anesthetic should be applied as mouthwash prior to the meal.
- Good oral hygiene should be provided for the patient; the mouth should be kept clean, soft and wet.
- Oral care should be given before and after the meals.
- If the lips are dry, softeners should be used.
- Plenty of liquid should be given to the patient.
- Care sponge or very soft toothbrushes should be used in order not to cause pain and trauma in the mouth mucosa.
- The child's nutrition should be maintained with soft food; feed that is not bitter, sour, spicy, hot should be preferred.
- Parenteral and enteral nutrition should be continued if necessary [17], [18].

Diarrhea: It is an increase in the liquid content or amount of stool, which is different from the ordinary way of the intestinal habit. Nursing approaches in diarrhea are as follows:

- A diet plan should be made by avoiding the food that the child cannot tolerate.
- Fibrous and hard foods should be minimized, frequent and small quantity is suggested.
- Monitoring the liquid intake and removal and replacing the lost liquid should be ensured.
- A high calorie and protein diet should be given. Grains, nuts, fatty nutrition, large-grained fruit juice, raw vegetables, bitter, spicy and flatulent food, tea and coffee that can stimulate and irritate the gastrointestinal system should not be given.
- Fat-free cheese, yogurt, rice porridge, bananas, apples, ayran (yoghurt drink), fish, chicken, boiled potatoes, white bread should be suggested.
- Food and liquids should be of room temperature [14], [19].

Constipation: Inactivity or the changes in eating habits may cause constipation. Another reason for constipation is the

opioids used for pain control. Nursing approaches in constipation are as follows:

- Fibrous foods are suggested (vegetables, fruit, oat, etc.)
- The child is provided with the liquid intake that will meet the body's needs.
- Activity at a level that the child can tolerate is suggested.
- Laxatives can be given when non pharmacological benefit cannot be provided [15].

II. CONCLUSION

The assessment of the nutrition of children who undergo cancer treatment should be performed by a multidisciplinary team which includes doctors, nurses, dieticians and social services. Nutritional treatment should be carried out specific to the child in the hierarchical period; it should start from the simplest step and continue to the next one when no response is obtained [14].

Not realizing the problems related to nutrition while dealing with the problems regarding the treatment in the process of the cancer treatment of children, not recognizing or underestimating malnutrition, not giving sufficient importance to nutrition in the process of treatment, allowing the child to continue losing weight, not benefiting from the knowledge and experiences of the nutritional support team sufficiently, using the parenteral way without trying the oral-enteral way sufficiently, implementing hypercaloric nutrition with the idea that it will be more useful for the child, not obeying hygienic rules and not monitoring nutrition after the discharge are the mistakes and failures made with regard to the child's nutrition. These deficiencies should be considered, and the problems that continue in relation to nutrition should not be overlooked [16], [20].

REFERENCES

- [1] J. M. Argiles, "Cancer-associated malnutrition", *European Journal of Oncology Nursing*, 2005, 9: 39-50.
- [2] A. Korkmaz, F. Arslan, S. Uzun, "Hastanede sağlığı geliştirme uygulamaları: Hasta çocukların beslenme durumlarının incelenmesi", *TAF Preventive Medicine Bulletin*, 2008, 7: 323-332.
- [3] A. Brinksma, G. Huizinga, E. Sulkers, W. Kamps, P. Roodbol, W. Tissing, "Malnutrition in childhood cancer patients: A review on its prevalence and possible causes", *Critical Reviews in Oncology/Hematology*, 2012, 83: 249-75.
- [4] T. Yıldırım, "Kanserli çocuklarda beslenme durumunun değerlendirilmesi", Unpublished thesis of expertise, Kartal Education and Research Hospital Child Health and Diseases, 2004, pp. 40-53. İstanbul.
- [5] K. Selwood, E. Ward, F. Gibson, "Assessment and management of nutritional challenges in children's cancer care: A survey of current practice in the United Kingdom", *European Journal of Oncology Nursing*, 2010, 14: 439-46.
- [6] J. J. Groben, "The Child with Cancer. In: Wong's nursing care of infants and children", Hockenberry MJ, Wilson D (eds). 9th ed. America, Elsevier Saunders, 2011, pp. 1417-1461.
- [7] F. Taş, H. Bal Yılmaz, "Pediatrik onkoloji hastalarında yaşam kalitesi kavramı", *Türk Onkoloji Dergisi*, 2008, 23: 104-107.
- [8] C. M. Ruland, G. A. Hamilton, B. Schjødt-Osmo, "The complexity of symptoms and problems experienced in children with cancer: a review of the literature", *Journal of Pain and Symptom Management*, 2009, 37: 403-418.
- [9] S. R. James, K. A. Nelson, J. W. Ashwill, "Nursing care of children: Principles and practice", Chine, Elsevier Saunders, 2013, pp. 596-611.
- [10] Ö. Muhsiroğlu, "Beslenme ve kanser", Gulhane Military Medical

Academy Command Medical Oncology Department, Ankara, Gata Printery, 2007, pp. 17-25.

- [11] T. Han-Markey, "Nutritional considerations in pediatric oncology", *Seminars in Oncology Nursing*, 2000, 16: 146-151.
- [12] H. Özen, "Enteral ve parenteral beslenmede yenilikler", *Katkı Pediatri Dergisi*, 2006, 28: 235-256.
- [13] R. Williams, P. S. Hinds, W. Ke, X. J. Hu, "A comparison of calorie and protein intake in hospitalized pediatric oncology patients dining with a caregiver versus patients dining alone: A randomized, prospective clinical trial", *Journal of Pediatric Oncology Nursing*, 2004, 21: 223-232.
- [14] G. Ertem, "Kanser Hastalarında beslenme ve hemşirelik yaklaşımı", *Dirim Tıp Gazetesi*, 2008, 83: 56-63.
- [15] J. M. Yasko, "Nursing Management of Symptoms Associated With Chemotherapy", 5th ed. USA, Pharmacia Oncology, 2001, pp. 15-21.
- [16] B.M. Svahn, M. Remberger, K.E. Myrbäck, K. Holmberg, B. Eriksson, P. Hentschke, et al., "Home care during the pancytopenic phase after allogeneic hematopoietic stem cell transplantation is advantageous compared with hospital care", *Blood*, 2002, 100 (13): 4317-4324.
- [17] B. J. Wilson, "Dietary recommendations for neutropenic patients", *Seminars in Oncology Nursing*, 2002, 18 (1): 44-49.
- [18] F. Erdemir, F. Taş Arslan, "Onkolojik sorunu olan çocuk ve hemşirelik bakımı" in *Pediatric Hemşireliği* (eds: Z. Conk, Z. Başbakkal, H. Bal Yılmaz, B. Bolşık), İstanbul, Akademisyen Medical Publication, 2013, pp. 783-787.
- [19] D. DeMille, P. Deming, P. Lupinacci, L.A. Jacobs, "The effect of the neutropenic diet in the outpatient setting: a pilot study", *Oncology Nursing Forum*, 2006, 33(2): 337-343.
- [20] S. Regina, C. Bell, R. Bell, "Nutrition in Cancer: An Overview", *Seminars in Oncology Nursing*, 2000, 16 (2): 90-98.
- [21] Linder LA, "Developmental diversity in symptom research involving children and adolescents with cancer", *Journal of Pediatric Nursing*, 2008, 23: 296-309.
- [22] Shipway L, "Providing nutritional support for patients during cancer treatment", *Paediatric Nursing*, 2010, 22: 20-25.
- [23] Moody K, Finlay J, Mancuso C, Charlson M, "Feasibility and safety of a pilot randomized trial of infection rate: neutropenic diet versus standard food safety guidelines", *Journal of Pediatric Hematology/Oncology*, 2006, 28(3): 126-133.
- [24] Moody K, Charlson ME, Finlay J, "The neutropenic diet: what's the evidence?.", *Journal of Pediatric Hematology/Oncology*, 2002, 24 (9): 717-721.
- [25] Larson E, Nirenberg A, "Evidence-based nursing practice to prevent infection in hospitalized neutropenic patients with cancer", *Oncology Nursing Forum*, 2004, 31(4): 717-725.
- [26] Akdeniz Kudubeş A, Bektaş M, "Nutrition in Pediatric Oncology Patients: A Systematic Review", *The Journal of Pediatric Research*, 2016, 3(1): 1-6.
- [27] Atasoy BM, Özgen Z, Yüksek Kantaş Ö, Demirel B, Aksu A, Dane F et al., " Interdisciplinary Collaboration in Management of Nutrition during Chemoradiotherapy in Cancer Patients: A Pilot Study", *Marmara Medical Journal*, 2012, 25: 32-36.
- [28] Co-Reyes E, Li R, Huh W, Chandra J, "Malnutrition and obesity in pediatric oncology patients: causes, consequences, and interventions", *Pediatr Blood Cancer*, 2012, 15, 59 (7): 1160-1167.

Şule Çiftcioğlu-was born in Antalya/Turkey in 1987. She completed her nursing undergraduate education at Dokuz Eylül University Nursing Faculty. She is a PhD student and she is a research assistant at Pediatric Nursing Department, Akdeniz University Nursing Faculty in Antalya/TURKEY. Her areas of interest are children's oncology and hematology, newborn and their families. Her master thesis is about adapting The Oral Assessment Guide in Children and Young People into Turkish and assess its validity and reliability.

Emine Efe-was born in Burdur/Turkey in 1970. She is a Professor in Pediatric Nursing Department of Akdeniz University Nursing Faculty. She is educated as nursing and her major topics at the moment are pediatric nursing, newborn and their families, complementary therapies in nursing. She has worked as a tutor for more than 20 years. She has many scientific studies which has been submitted and published in the national and international scientific journals, author of books. She has been organized and gave lectures, speeches, conferences and presentations in congresses and symposiums and had organized congress and symposiums.