

The Dietary Habits in Patients after the Allogeneic Bone Marrow Transplantation (Allo-BMT)

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Abstract

Introduction: The proper nutrition is an inherent element of treatment after allo-BMT. The patients, who underwent allo-BMT are recommended high-protein, digestible and "low-bacteria" diet and according to the dietary recommendations should rely on fresh-cooked food, eaten immediately after the preparation.

Objective: The aim of this paper was to examine the dietary habits in patients after the allo-BMT and to compare it with the existing dietary guidelines.

Methods: The participants were 9 randomly selected patients, treated at Dolnoslaskie Center of Cell Transplantation in Wroclaw, Poland: 6 women and 3 men. The questionnaire was administered to examined patients and body weight was estimated before and after the transplantation.

Results: The most frequently consumed vegetables were potatoes, carrot and beetroots. The most popular fruit, consumed by the patients was the apple. The most frequently the coffee, strong tea, or coffee and strong tea were consumed.

Conclusions: All the patients after allo-BMT underwent the dietary education, however the effect on the change dietary habits was marginal. The most frequent failures were: consumption of instant food, insufficient fluid, fruit and vegetable intake, sweets and fried food. Reduction in BMI after bone marrow transplantation argues for the influence of catabolic processes, comprehensive therapeutic regimen and increasing energy demand during this period.

Keywords: Bone marrow; Transplantation; Diet; Guidelines; Dietary education; Nutrition; Clinical condition

Abbreviations: Allo-BMT: Allogeneic Bone Marrow Transplantation; BMI- Body Mass Index; GVHD- Graft Versus Host

Introduction

An acknowledged curative method of altered hematopoiesis is the allogeneic bone marrow transplantation (allo-BMT) [1]. Patients during the treatment tend to be faced with the immunity deficiency, graft-versus-host disease (GVHD), infections, gastrointestinal disorders, anemia and malnutrition. The high doses of chemo and radiotherapy generates the increased need for proteins and increased need for energy [2]. The proper nutrition is an inherent element of treatment after allo-BMT [3,4]. The patients, who underwent allo-BMT are recommended high-protein, digestible and "low-bacteria" diet and according to the dietary recommendations should rely on fresh-cooked food, eaten immediately after the preparation. The high protein diet is characterized by the delivery of 1.5 to 2.0 grams of protein per kilogram of patient body weight [5]. "Easily digestible diet" is based on reduction of consumption of fatty, fried and baked, fat products, hot and long overdue in the stomach. The diet limits intake of dietary fiber to 25 grams per day by appropriate selection of delicate fruits and vegetables, cooking or the use of the cleaned cereal. The technique of preparing food is important. Patients after allo-BMT should rely only on freshly cooked dishes, consumed immediately after preparation (Table 1). It is recommended to boil in the water and steaming. Braising is permitted as well as cooking in aluminum foil or in parchment. Frying and baking fat is totally prohibited [6]. In the first months after allo - BMT immune system is not functioning properly. The safest form of protection against infection is the patient's diet called "low bacteria". It is used from the start of treatment in preparation for transplantation and is continued for at least 6 months after bone marrow transplantation. The aim of the "low bacteria" diet is to reduce the risk of food poisoning by limiting contact with potential threats (bacteria, fungi, viruses). In addition, it is relieving the immune system, and allowing for greater mobilization for the regeneration of the body [5,6]. During the

first year after allo-BMT the raw fruits and vegetables consumption is not recommended. Drinking water consumption which has not been studied coming from the unknown source is absolutely prohibited [5,7,8]. During the meal preparation the presence of microorganisms should be minimized by thorough hand washing, cleaning the place and utensils and use only equipment that is subjected to a thorough hygiene, compliance of washing and scalding of fruit and vegetables and defrosting the refrigerator. The heat treatment should last at least 60-70 minutes and baking temperature should not be lower than 150°C [5]. The nutritional problems in patients, who underwent the hematologic treatment are mainly iatrogenic. In those patients reason for malnutrition is not the hematologic disease but the side effects of treatment which determines the way of nutrition and general nutritional status [5,6].

Table 1 The list of foods recommended and not recommended for patients after allogeneic bone marrow transplantation (own compilation based on the "Guide for patients after bone marrow transplantation"[5]).

Product type	Not recommended
Beverages	Tap water, alcohol, freshly squeezed fruit and vegetable juices.
Dairy	Fresh and pasteurized milk, cottage cheese, blue cheese, raw egg and containing them desserts, meringues, mayonnaise.
Meat and fish	Meat / sausage / fish: raw, dried, smoked meat sliced when buying, hot dogs, hamburgers, casseroles, meat sauces and dishes of fast food, pizza restaurants, meat or fish preserved in the house, seafood for a period 2 years.
Fruits and vegetables	Raw fruits - those that can not be peeled, chopped oleaginous fruits, dried fruits, lettuce and carrot tart to 6 months after transplantation, cucumbers and sauerkraut, marinated mushrooms, salads or casseroles, potato, pasta, rice containing raw vegetables and mayonnaise, fruits and vegetables preserved in the house, not cooked soup for example fruit.
Bread and cereal products	Products sold without packaging, sweet rolls, cakes, pastries, cookies with a creamy filling.
Fats	Products sold without packaging, sweet rolls, cakes, pastries, cookies stuffed with cream.

Objective

The aim of this paper was to examine the dietary habits in patients after the allo-BMT and to compare it with the existing dietary guidelines.

Methods

The participants were 9 randomly selected patients, treated at Dolnoslaskie Center of Cell Transplantation with the National Bank of Bone Marrow Donors in Wroclaw, Poland: 6 women and 3 men. The study enrolled patients were currently staying in the Department of Transplantation (after transplantation process) on nutritional interview. The questionnaire was administered to examined patients and

body weight was estimated before and after the transplantation. The study used original, anonymous questionnaire, because the available questionnaires are not designed for a select group of research and do not reflect the nutritional recommendations for patients after bone marrow transplantation. The questionnaire was divided into three parts: the first - basic data, the second- nutrition information to patients, their habits and food preferences, the third- additional section used to maximize patient information. The questionnaire contained both open and closed questions. The survey was carried out in direct contact with the respondents. The data obtained was confronted with the recommendations available in the public nutritional guide for patients after bone marrow transplant in 2005 created the leaders of transplantation in Poland. In case of most surveyed patients nutrition education took place many times during the entire treatment period - 5 patients (55,6 %): 2 women and 3 men. 4 subjects –women (44,5 %) have been educated only to the allogeneic bone marrow transplantation. In the Lower Silesian Cell Transplant Centre of the National Bank of Marrow Donors in Wroclaw standard nutrition education and work with the patient in this regard performs doctor or dietician. 6 patients underwent the nutrition education by a hospital dietician and in case of 3 patients the nutrition education was conducted by a physician (Table 2).

Table 2 Timing of nutrition education and the person who was responsible for education

Education	Women	Men
During the entire treatment period (multiple meetings with the patient)	22.2%	33.3%
Before allogeneic bone marrow transplantation	44.5%	0
Dietician conducting education	44.5%	22.2%
Physician conducting education	22.2%	11.1%

After the dietary consultations 4 patients were administered special diet: in case of 1 person it was the high-protein, digestible and "low-bacteria" diet, in 1 patient the digestible diet with limitation of fat, elimination of milk and gluten was ordered, in case of 1 patient protein-rich and "low-bacteria" and in 1 person digestible diet was administered. Change of diet was contracted on the basis of symptoms reported by patients in the period following transplantation, as well as analysis of the results of research and clinical status. An analysis of body weight and calculated BMI was carried out including calculation of- body mass index of the subjects prior to treatment and after bone marrow transplantation.

Results

The patients reported eating mostly boiled meals (4 patients), 1 patient preferred raw meals, 1 person declared that prefers fried meals. Only 1 person declared that prefers all form of meals. The daily consumption of poultry meat was declared by 2 patients. Among examined patients 8 declared consumption of dairy products, like kefir, buttermilk or

yoghurt, 7 respondents declared consumption of white cheese, and 6 patients declared consumption of yellow cheese. The most frequent cereals eaten in the surveyed group were white bread and rice. Among examined patients 8 patients reported consumption of white bread. The least frequent product eaten by a patients was the bran and the consumption was reported only by one patient 3 times a week. The most frequently consumed vegetables were potatoes, carrot and beetroots. All examined patients declared potato consumption and among surveyed patients 8 have eaten potatoes daily and 1 person 3 times a week. The most rare vegetable consumed by examined group were green vegetable, like spinach and broccoli. The form of fruit recommended for patients after the bone marrow transplantation are fruits undergoing the heat treating or consumption of fresh fruits without skins. The most popular fruit, consumed by the patients was the apple. In the examined group 8 patients declared apple consumption, 3 patients consumed apples daily. The rare fruits consumed by the patients in the surveyed group are grapefruits, raspberries, grapes, oranges and strawberries. The preferred form of fruits according to 4 respondents was the raw fruit without skin. Fruits undergoing the heat treating were consumed by 2 patients, whereas 2 respondents preferred raw fruits with skins. One person declared fruit consumption without any technological restrictions. The consumption of stodgy food was also examined in the group of patients. Onion and garlic consumption was declared by 4 patients and among them 3 reported daily consumption. Beans and peas consumption was declared by 3 patients with the frequency once a week. Fast food is not recommended for the patients who underwent the bone marrow transplantation. In the examined group 2 patients declared instant soup consumption; pizza consumption was declared by 1 person once a week. The French fries were consumed by 1 person once a week. Among surveyed patients 3 consumed soured food, in case of 2 patients once a week and in case of 1 person daily. The smoked products were eaten by 2 patients, 1 person consumed smoked products once a week and 1 person twice a week. One person declared consumption of canned food twice a week. Analysis of sweets consumption revealed that daily consumption of sweets was declared by 3 patients; 2 patients declared such consumption once a week and 2 patients 2-3 times a week. Only 2 patients did not eat sweets. Also the

sweetening of liquids by a white sugar in the examined group was analyzed. Five patients did not put the sugar. Two sugar spoons for sweetening used 2 patients, 1 person one and half of sugar spoons and 1 person one sugar spoon. Nuts and dried tropical fruits are no also recommended for the patients after the bone marrow transplantation because of contamination and fast fungi proliferation. In the surveyed group 2 patients declared nut consumption. Dried tropical fruits were consumed by one person once a month.

The quantity of liquids which was consumed by the examined patients was also analyzed. In case of 5 patients consumed the quantity of liquids which in insufficient (below 2.0 l a day). The most popular consumed liquid was juice. The juice consumption was declared by 4 patients, 2 patients consumed tea. The mineral water consumption was declared by 2 patients. Only 1 patient was not able to determine the exact quantity of liquids consumed per day.

Also the usage of stimulants was analyzed in the examined group and 3 patients did not give in history any stimulant consumption. The most frequently the coffee, strong tea, or coffee and strong tea were consumed. Among surveyed patients 3 consumed coffee, strong tea consumption was declared by 1 patient, whereas 2 patients reported consumption of coffee and strong tea. Three patients did not give in history any stimulant consumption. The most rare food products selected by a patients were liver, conserved ham and pate. Consumption of frutti di mare which are not generally recommended for such patients was declared by a one person. Body weight before and after allogeneic bone marrow transplantation subjects was analyzed. The decrease in body weight after allo-BMT was observed in 7 patients out of which 4 were women and 3 men. The largest decline in body weight 40.7 kg counted and the smallest 2 kg (Table 3). Analysis of BMI in a study group before transplantation of bone marrow indicated that normal weight remained 5 to 9 persons, of which 4 people were women and one was a man. Overweight was observed in 3 people: 1 woman and 2 men, and grade III obesity affected one person that was a woman. After the procedure of allogeneic bone marrow transplantation only 4 patients had normal weight value (women). A increase of underweight was observed in case of 2 patients: 1 female and 1 male. The- overweight was observed in 3 patients: 1 woman and 2 men.

Table 3 Percentage distribution of BMI in the study group before and after allogeneic bone marrow transplantation by sex.

Before allogeneic bone marrow transplantation	Sex	Underweight	Normal weight	Overweight	Third degree obesity
	women	0	44.5%	11.1%	11.1%
men	0	11.1%	22.2%	0	
After allogeneic bone marrow transplantation	Sex	Underweight	Normal weight	Overweight	Third degree obesity
	women	11.1%	44.5%	11.1%	0
men	11.1%	0	22.2%	0	

Discussion

The small size of the examined group was the result of difficult access to the patients and small number of transplantations performed in the transplant center. Also, the literature data on this topic is restricted. Most of the patients after allo-BMT experience loss of body weight and other nutritional alterations which are the effect of the conditioning regimen [4]. The other reason for the nutritional problems in patients, who underwent the hematologic treatment is the aggressive treatment which determines the way of nutrition and general nutritional status. In patients after allo - BMT the malabsorption which is the consequence of alimentary intolerance, or gastrointestinal damage after the treatment of GVHD occurs [6]. Those disturbances could contribute to the existing malnutrition or strengthen it. In a retrospective study of a sixty four patients after allo-BMT from Brazil a significant loss of body weight on admission and discharge was observed [7]. Change of clinical parameters reported after 100 days after transplantation included levels of serum protein and C-reactive protein. The most frequent gastrointestinal symptoms reported by a patients during the hospitalization were nausea, vomiting and mucositis. Moreover, the presence of GI symptoms affected the food intake. The conclusion from this study was that the impairment of nutritional status in patients after the allo-BMT was iatrogenic, as the result of the treatment toxicity. The nutritional advice performed by a nutritionist could potential have the substantial effect on level of nutritional knowledge in patients, their way of nutrition and fast recovery. After the conditioning treatment the patients are exposed to iatrogenic factors associated with nutritional status. The eminent role is assigned to dietary education and to monitoring of nutritional status and to supplementary nutrition during the whole treatment process in patients after allo-BMT [8]. Professional care of the hospital nutritionist could prevent dietary abnormalities and to reduce the costs of treatment during the hospitalization. Deliverance of the proper quantity of nutrition factors adequate for requirements and clinical condition of a patient contributes to the reduction in frequency of complications and reduction in mortality.

Conclusions

1. All the examined patients after allo-BMT underwent the dietary education, however the effect on the change of their dietary habits was marginal.

2. The most frequent dietary failures among the examined patients were: consumption of instant food, insufficient fluid, fruit and vegetable intake, sweets and fried food overfill.

3. In view of the negligible percentage of respondents applying to dietary recommendations, reduction in BMI after bone marrow transplantation argues for the influence of catabolic processes, comprehensive therapeutic regimen and increasing energy demand during this period.

4. It is difficult to assess if the way of nutrition affected the general health status of patients after allo-BMT because fluctuations in body weight could be the result both of the toxicity of conditioning treatment and GVHD.

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