



EFFICACY OF BOARD GAME AS NUTRITION EDUCATION TOOL FOR PEDIATRIC CANCER PATIENTS: A PILOT STUDY

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Abstract: Pediatric cancer patients are vulnerable to malnutrition. They exhibit increased needs during disease and treatment. Pediatric friendly nutrition education tool for cancer patients in vernacular medium could address nutritional issues and compliance. Vernacular board game focusing on neutropenic diet was developed, validated for content and approved by practicing dietitians. Questionnaires in local languages to test efficacy, acceptance and relevance were also developed. The Hindi translated board game was tested on 10 pediatric cancer patients (7-10 years) with no specificity to the type of cancer. Responses were taken before and after the intervention and analyzed by T-test and percentages. Statistical significance was considered when p value was < 0.05. Study showed that patients were aware of neutropenic diet and its benefits, but lacked information about complications of noncompliance, and approved food lists. Post intervention, all patients' knowledge about neutropenic diet improved. The results found were statistically significant (p value 0.00). All patients liked the tools and agreed that it helped in understanding nutrition. Characteristics, appearance (100%), informative (60%), interactive (90%) and enjoyable (90%) were rated highest by patients. Nutrition education has positive effect in improving knowledge about nutrition among pediatric cancer patients. Further research is required to bring about a greater change in the health of pediatric cancer patients in the languages understood by them.

Index Terms - Nutrition education, Pediatric cancer, Board game, Neutropenic diet, Regional languages.

I. INTRODUCTION

In India, approximately 40,000 new cases of cancer in children are diagnosed each year (Shah P. et.al, 2015). The nutritional status of children with cancer is highly relevant, since a good nutritional status enables them to cope better with the intensive cancer treatment (Donaldson S, 1981; Lange B, 2005; Lobato-Mendizabal E, 2003). Adequate nutrition plays an important role on several clinical outcome measures such as treatment response, quality of life, and cost of care (Jacqueline B, 2011). Thus, their nutritional status on diagnosis is very important because it has an impact on their outcome (Alvin. M, 1990).

A study on nutritional issues and strategies that can benefit patients with cancer was reviewed and it was found that there is a need for early and ongoing nutrition interventions (Sandra C, 2001). Nutrition education has brought about positive changes among healthy children as well as children suffering from chronic conditions like celiac disease and respiratory infections (Shelly C, 2005; Teerda S, 2002). Thus the same response can be brought with nutrition education for pediatric cancer patients as well. Studies on nutrition education for oncology are focused on prevention and making awareness among people about cancer. Very few studies report nutrition education done on children already suffering from cancer. One such study in India stated that though nutrition education was provided routinely, there was a lack of education materials and a need for improvement (Sharma A, 2015)

At present there are no universally agreed criteria, timings and duration of nutritional interventions that exists in pediatric oncology (Han-Markey T, 2000; Mehta NM, 2009; Fusch C, 2009). Nutrition education material should be such that help children make changes. Thus tools that are better understood, in languages they are comfortable with and in a mode that grabs their attention for a longer time should be made. Studies using board games as a tool for nutrition education have shown positive improvement in children's knowledge about nutrition and helped making healthier food choices (Powers A, 2005; Amaro A, 2006). This study is thus an approach to develop a standardized vernacular board game for nutrition education to assure optimum nutrition, knowledge and care for pediatric cancer patients.

II. METHODOLOGY

2.1 Development of Tools

Children with cancer are particularly vulnerable to malnutrition, because they exhibit increased needs due to the disease and its treatment (Han-Markey T, 2000). Infection and malnutrition are always linked together. A malnourished child is more susceptible to infections, which further deteriorates the nutritional status. It's a vicious cycle. Children on cancer therapy have more chances of being malnourished as the therapy reduces the immune cells in the body thus causing infections (Rodgers P.C, 2016). It is thus necessary for the patients to know and follow a low bacterial diet.

Keeping that in mind, a vernacular board game was developed for pediatric cancer patients so as to improve their understanding about low bacterial diet as well as make them aware of the importance of nutrition before, during and after treatment.

The topics included in the board game were as follow: Benefits of following a neutriopenic diet during treatment; Foods that are allowed in a neutropenic diet; Foods that should be avoided and/or restricted in a neutropenic diet along with explanations or justifications.

2.1.1. Board Game

The board game was developed keeping the following points in mind:

Nutrition Education – the board game tackled the topics mentioned above in a manner that would seem interesting and easy to remember. There were positive and negative re-enforcements that would help the patients understand about neutropenic diet better along with motivational statements that would re-enforce a positive effect.

Positive re-enforcements:

- The board game included different stops of treatments like chemotherapy and radiation in which the patients were asked to pick a food from the food trunk. If the foods picked were healthier options they could play along. This was done to make the patients understand that the right choices of foods during treatment will help in better recovery and tolerance for the treatment.
- There were also stops of different neutropenic diet guidelines, in which if the patients get bonus cards if landed on correct guidelines. These bonus cards would tally up in the end of the game to declare the winner. This was done to make the patients focus on the main features of the neutropenic diet guidelines. The bonus card would act as a token of correct choices.
- One of the steps also focuses on weight changes in which if the patient has acquired the ideal weight, they get to pass through a bonus route. This was done to explain the patients the importance of weight during treatment and achieving ideal weight would help sustain treatment better.

Negative re-enforcements:

- The food trunk also comprised of unhealthy food options. If the player gets the unhealthy food card, they have to skip a turn. The reason to skip a turn was to make them understand that unhealthy foods will put a halt to their treatment as well.
- There were other stops that included instructions not to follow while on a neutropenic diet. If the player lands on those stops, they will have to skip a turn. Some stops like for e.g. ‘drinking tap water’ would put the players on start again. This was done to remind the patients that episodes of infection can put their treatment plan either on a standstill or bring them back to where they started.

Motivational statements:

Key words like ‘Recovery’ were used at the end of the game so that children feel that if the guidelines of neutropenic diet are followed as per given, they will be victorious in tackling the disease condition and preventing any further complications. Motivational words have an important role in rehabilitation outcomes (Niall M, 2002).

Acceptability - A board game should be interactive, simple to understand, help in meaningful decision making, not time consuming and most of all no participant elimination (Kai H, 2013). The board game was made colorful and child friendly that involves various steps and is to be played with a dice and tokens by 4-5 players. It was developed in English, Hindi and Marathi to reach out to children where language may be a barrier. The English translation of the board game is depicted in Figure 1.

2.1.2. Questionnaire

Two questionnaires in vernacular languages (English, Hindi and Marathi) were developed, of which one included 19 questions on the topics that were dealt in the board game. This was done to test the efficacy of the board game. The other questionnaire included 5 questions to test the acceptance and relevance of the board game. In this questionnaire, a smileyometer was used to rate the characteristics of the board game. A smileyometer has been widely used for children to measure satisfaction and fun as it is easier and involves no writing. (Gavin S, 2013).

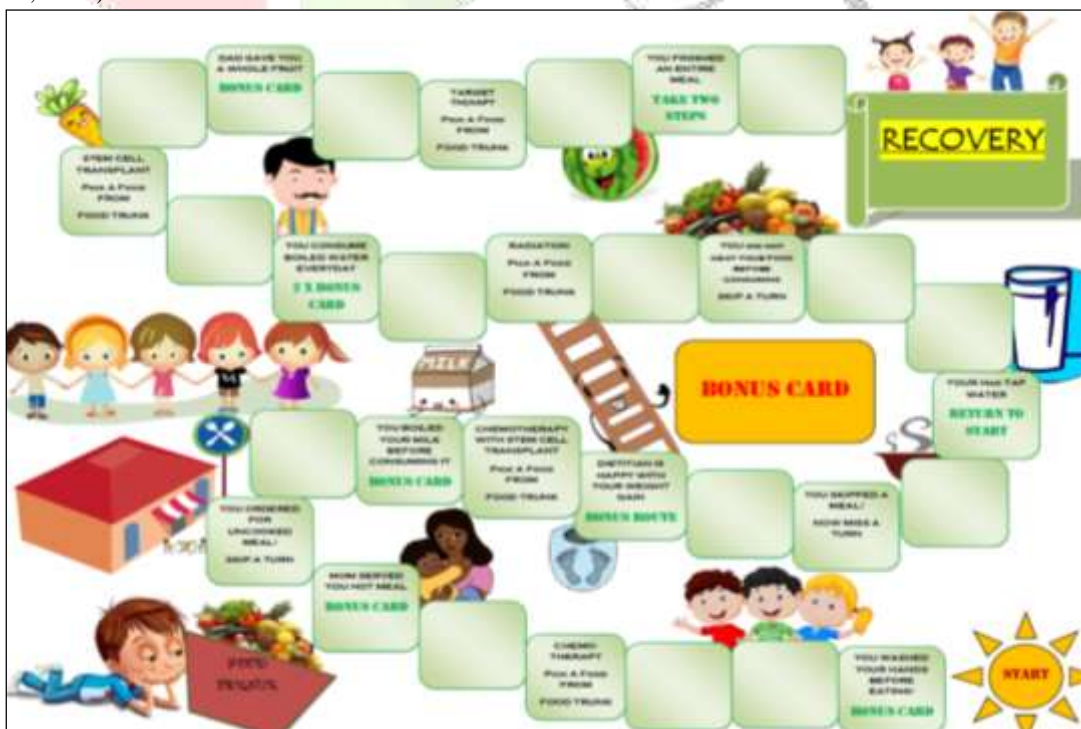


Figure 1. Board Game (English)

2.1.3 Content Validation

The board game and the questionnaires to test the efficacy, acceptance and relevance of the tools were all validated for content by two practicing pediatric dietitians in Mumbai, India.

2.2 Population and Sample

A pilot study was carried out with 10 pediatric cancer patients from ages 7-10 years old with no specificity to the type of cancer at Shri Gadge Maharaj Daramshala Trust in Dadar, Mumbai. Shri Gadge Maharaj Daramshala Trust provides accommodation and food to people seeking treatment for cancer at Tata Memorial Hospital, Lower Parel, Mumbai.

2.3 Conducting Intervention

The Hindi translated board game; questionnaires and consent form were used based on the common language known by the participants and their caretakers. The description and purpose of the study was read to the caretakers and a consent form was signed for participation in the study. A questionnaire to test the efficacy was given to the patients to fill before starting the nutrition education intervention. This was done to see their knowledge about the topics dealt in the board game. Once everybody filled out the questionnaire, the rules of the game were read out. The patients were divided in two groups with 5 players each. Every step was explained while playing. Post intervention, a questionnaire delivering the same questions was given to them to check how much have they understood or learnt from the board game. Another questionnaire was given to the patients to rate the board game for acceptance and relevance.

2.4 Statistical analysis

Descriptive analysis was analyzed by percentages. Paired sample T-test has been used in pilot studies on nutrition education interventions and thus for comparing the knowledge of patient's pre and post intervention, paired sample T-test was used in this study as well (Patton SR, 2014). The null hypothesis H₀ was taken as: There is no difference in mean for pre and post-intervention and the alternative hypothesis H₁ was taken as: There is a difference in mean for pre and post-intervention. Statistical significance was considered when p value was < 0.05.

IV. RESULTS AND DISCUSSION

From the questionnaire given before the nutrition education intervention, the following responses were received from the patients (Fig. 2): 9 out of 10 patients already knew that neutropenic diet prevents against infectious bacteria whereas only 5 patients were aware to whom neutropenic diet is actually given. Only 3 patients were aware of the importance of following a neutropenic diet. However 4 patients knew the key guidelines of a neutropenic diet. Half of the patients (5) did not know what forms or types of meat/poultry/fish or dairy products are safe to consume. Though 7 patients were aware of the importance of consuming cooked food, 3 patients were not fully aware types of fluids/beverages and forms fruits and vegetables that are allowed to consume. All the patients in the study were aware that dried fruits and nuts are not to be consumed. 6 patients were aware that packaged bread and cooked ready to eat cereals can be consumed. Out of 10, 6 patients were not aware of the complications of not following a neutropenic diet but 9 patients were aware that it can affect nutritional status. Though 8 out of 10 patients knew what hygienic measures are required before handling food only 5 patients were aware of the importance of washing hands before handling food. Also all patients agreed that neutropenic diet is beneficial and improves health but only 7 out of 10 patients knew how neutropenic diet benefits them. None of them were aware of the amount of fluid to be consumed in a day. After nutrition education was given, all patients (100%) were able to answer the questions correctly.

From the study it was seen that though patients were aware of neutropenic diet and its benefits, they lacked information about criteria of giving a neutropenic diet, complications if neutropenic diet is not followed, and different foods allowed and excluded from neutropenic diet. Their knowledge about hygiene also needed to be improved. After nutrition education was given, all patients' knowledge about neutropenic diet and hygiene improved. The paired t-test result seen in Table 1 further concludes the statistical significance between mean of the pre and post-intervention responses. The null hypothesis was thus rejected as p value was 0.00. This statistical analysis may serve as a proof that creative nutrition education does positively improve the patient's knowledge (Patton SR, 2014).

Due to the lack of time, an immediate response after the nutrition education was taken which may be a reason for limitation. Response taken after a period of time would show a better and accurate result. In one study it was seen that board game about healthy eating when introduced to children and adolescents, improved their knowledge about nutrition as well as their dietary behavior in 6 months (Viggiano A, 2015). It also had an effect on their BMI z-score which can be helpful and prove effective in obesity prevention programs. Thus response taken after a certain period of time may show better and more accurate result.

Board game was also tested for acceptance and relevance (Fig. 3) by the patients. All the patients liked the board game and agreed that the tool was helpful in understanding about nutrition while none of them found any information lacking. Different characteristics namely: Appearance (100%), Informative (60%), Enjoyable (90%) and Interactive (90%) were scored highest with a happy smiley on a smileyometer to know the overall acceptance of the board game. It is important to understand the acceptance of a nutrition education tool by the target population so that it can be used in further reference. The patients enjoyed the game and were eager to learn in this manner. Such nutrition education tools can thus be used in order to grab attention of pediatric patients. It is seen that when a game is made for children, testing for usability and user experience is a credible option.

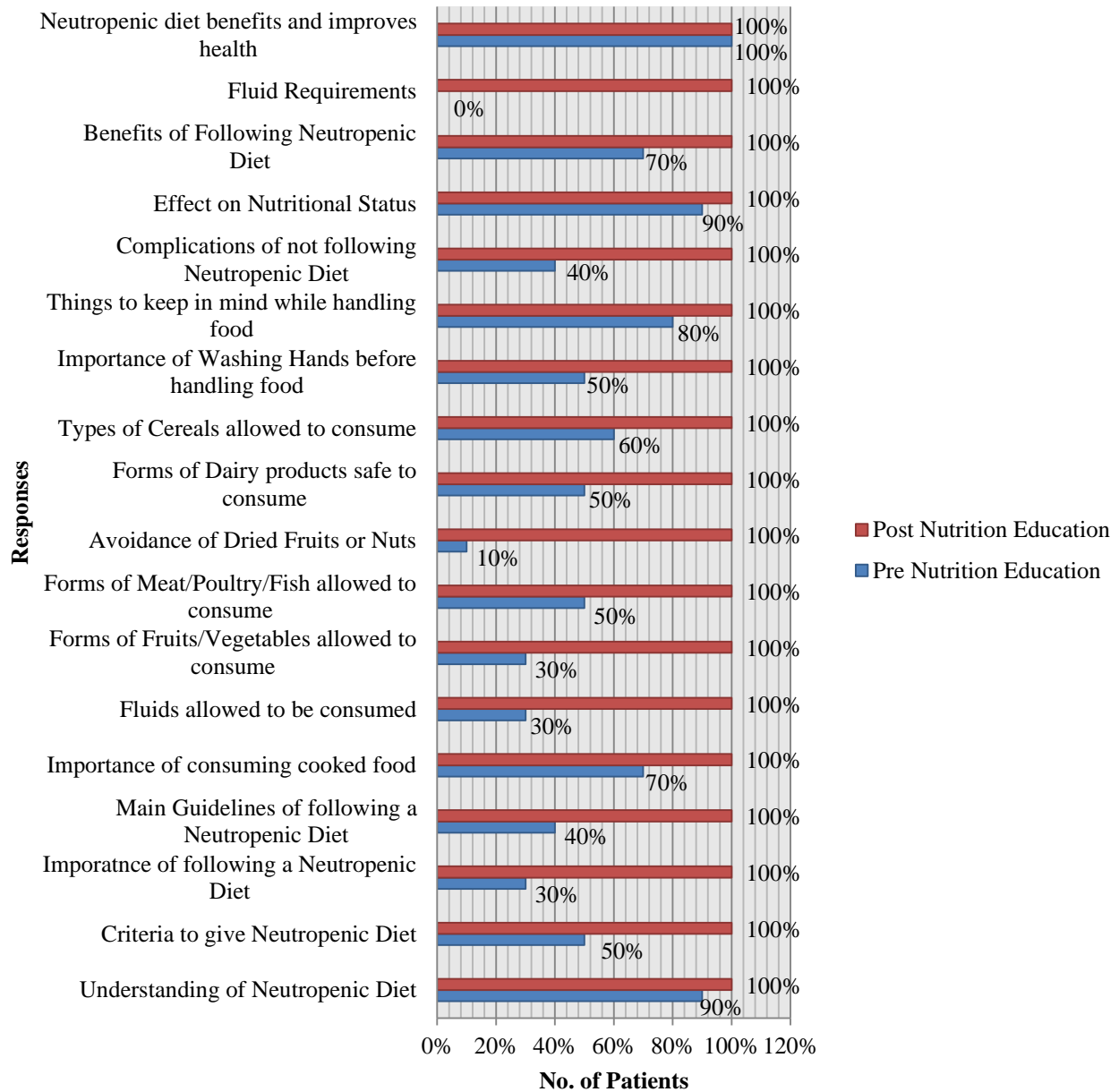


Figure 2: Patient Responses for Board Game (Pre and Post Intervention)

Table 1: Result of Paired Sample T-test

T-test Results	
Mean (%)	38.42
Standard Deviation (%)	27.74
Significance (2-tailed)	0.00

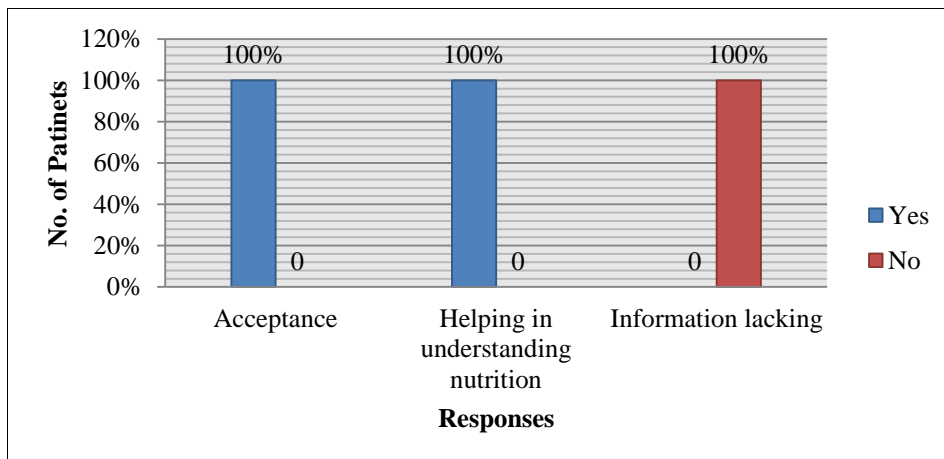


Figure 3: Acceptance and relevance of board game rated by patients

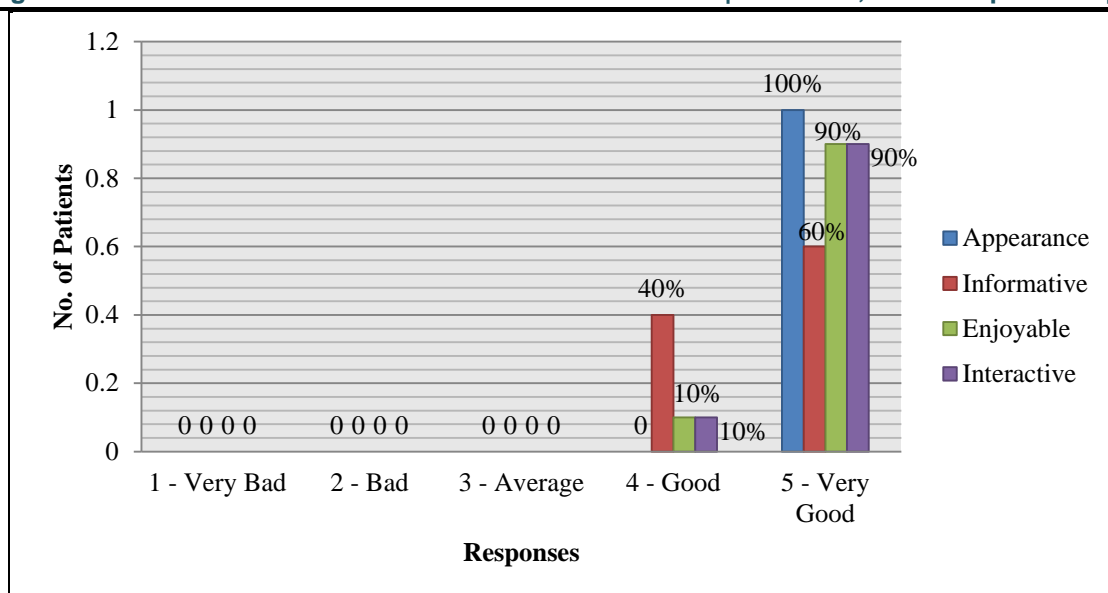


Figure 4: Characteristics of board game rated by patients

V. SUMMARY AND CONCLUSION

Nutrition education is more than just distributing knowledge. It needs to bring about a behavioral change in order to be effective. The aim of the study was to develop a board game for pediatric cancer patients so as to assure optimum nutrition, knowledge and care.

From the study it was seen that though patients were aware of neutropenic diet and its benefits, they lacked information about criteria of giving a neutropenic diet, complications if neutropenic diet is not followed, and different foods allowed and excluded from neutropenic diet. Their knowledge about hygiene also needed to be improved. After nutrition education was given, all patients' knowledge about neutropenic diet and hygiene improved.

A study used interactive food games that included card games and board games on children in an outpatient clinic and found that interactive food games is a successful tool to increase food intake in children with chronic food refusal (Gillis L, 2003). This study aimed at behavior change along with increase in knowledge. It was seen that the change in eating habits in children were maintained for one year. Therefore, it can be said that interactive games not only can improve knowledge among children but can also translate into behavior change.

Another board game namely 'Pizza Please' was evaluated to bring about behavioral change in the diet along with increase in nutrition education. After an 8 week intervention, the dietary behavior and nutrition knowledge among children effectively improved. It was also seen that dairy consumption increased in experimental group while control group had decreased dairy consumption (Mehta N.M, 2009). Thus, it can be stated that board games do bring about a significant change in eating behaviors among children. Similar results are seen in this study where an increase in knowledge about neutropenic diet is reported by the patients. A change in eating behavior can be explored further.

In conclusion, nutrition education does have a positive effect in improving the knowledge about nutrition among pediatric cancer patients. Such interactive and creative nutrition education games can help the patients understand and learn more about their health and how to improve it. As it was uncertain that the intervention translated into behavior change, further research is thus required so as to bring about a greater difference in pediatric cancer patients and may also help improve their health and survival rates.

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