Implications Of Nutritional Status In Breast Cancer In Nepal

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Abstract
This study aimed to assess the nutritional status of patients with breast cancer at Bhaktapur Cancer Hospital and its implications for food management during chemotherapy treatment. Nutritional status refers to the body condition resulting from food intake. It assists in developing a dietary treatment plan that may involve either reducing or increasing energy consumption to maintain a healthy nutritional status, which in turn strengthens the immune system. It can be measured by anthropometric measurements such as height, weight, hip circumference, and waist circumference, and finally, BMI can be calculated. Body Mass Index (BMI) is the simplest and easiest method to assess nutritional status. Higher nutrition indicates overweight and obesity, which creates a high risk of non-communicable diseases and complicates cancer treatment. Twelve patients with breast cancer as case studies were adopted for the study to assess the nutritional status. Additionally, a review of secondary literature was conducted. Assessment was done twice- first assessment (at the first visit to the hospital) and second assessment (after three months) of treatment. The mean age of the respondents was 44.6 years. There was a little improvement in nutritional status in the second assessment. Moreover, 50 % of the case studies acknowledged a balanced diet. The nutritional status examination enabled a nutritional plan that improved nutritional status and quality of life following chemotherapy treatment.
Keywords: *Nutritional status, breast cancer, malnutrition, recurrence, quality of life*

I. Introduction

A healthy lifestyle is mostly dependent on one's diet. Another name for it is a balanced diet. A person's health, nutrient usage, and the results of their dietary decisions are all considered aspects of their nutritional status [1]. It is related to an individual's health in terms of diet, body weight, and height (height < 16 years). A higher status refers to overweight and obesity, and a lower status refers to malnutrition. Furthermore, malnutrition can be classified as under- or over-nutrition. Overweight and obesity are associated with a high risk of non-communicable diseases, such as cardiovascular disease, heart attack, and high blood pressure. Additionally, it has been commonly noted in those with type II diabetes. A weakened immune system combined with malnutrition (undernutrition) can lead to infections, higher morbidity, and death. Nutrition-related diseases are implicated as both direct and indirect causes of morbidity and mortality in communicable and non-communicable diseases, such as breast cancer.

Breast cancer is a non-communicable disease in which nutritional status is assessed to identify malnutrition (over- and under-nutrition). Malnutrition is a common phenomenon in chronic non-communicable diseases like cancer. Nepal faces malnutrition; 3.4% of adult men and 6.7% of women have been facing obesity [2]. The number of breast cancer cases in Nepal is 2255 [3]. The literature suggests that overnutrition is a high-risk factor for breast cancer. Malnutrition, both under- and over-nutrition, is a cancer problem that affects all aspects of the patient's life and increases the risk of infection [4]. Cancer treatment affects nutritional status by altering the metabolic system, altering food taste, and reducing food intake [5]. In the end, it affects breast cancer patients' quality of life. A quality of life is improved by maintaining optimal nutritional conditions.

The rate of cancer recurrence and metastasis in patients with breast cancer is strongly associated with overweight or obesity, compared to normal weight, increasing with BMI [6]. Obesity was defined as a body mass index greater than 30 kg/m2. Malnutrition is assessed through BMI values and is calculated by height and weight using the formula weight in kg/ height in meters squared. Lower and higher BMIs are associated with malnutrition, which indicates poor nutritional status. Body Mass Index (BMI) can be used for nutritional assessment. Physical measurements of height and weight are vital indicators for assessing nutritional status by calculating BMI. BMI can be calculated by ordinary people with a short course of orientation. Food

management for cancer patients largely depends on their nutritional status, and it is also true that nutritional care can maintain a lower or higher level of nutritional status. Both low and high nutritional statuses can impact cancer treatment, necessitating additional precautions for patients with higher or lower BMI. Consequently, the effects of nutritional status on individuals with cancer are obvious.

II. Objective And Methods

The major objective of this study is to assess the nutritional status in terms of higher and lower nutritional statuses among cancer patients. Higher nutritional status refers to being overweight or obese, whereas lower nutritional status includes malnutrition. Both are harmful to cancer patients during treatment. A qualitative research method was adopted in this study. Twelve patients with breast cancer were purposively enrolled as case studies at Bhaktapur Cancer Hospital. It is a governmental hospital located in the Bhaktapur District of Bagmati Province. Semi-structured questionnaires and checklists were used to collect the primary data. The secondary data were taken from the related academic literature. The patients' physical data were obtained from their health records in mid-2022. The data were collected in two phases: at the first visit to the hospital (first assessment), and after three months (second assessment). BMI was calculated using height and weight. BMI is categorized as 'underweight, healthy weight, overweight, or obese, according to the World Health Organization. There was a cut-off point for BMI categories. Under 18.5 kg/m² is considered underweight and malnourished. The BMI range between 18.5 - 24.9 kg/m² is considered a healthy weight for young and middle-aged adults, and over 25-29.9 kg/m² BMI value is considered overweight. Obesity is defined as a BMI above 30 kg/m2. Conclusions were drawn with the aid of the comparison between the initial visit and the three months of data.

III. Finding And Discussion

Profile of Respondents:

The profile of respondents included age, waist-hip ratio, and weight of the 12 cancer patients. Table 1 presents the cancer patients' age, weight, and height information in the first and second phases after 3 months. Age and weight are the major features of BMI calculations. The minimum age of the respondents was 32 years, and the maximum was 58 years. Most cancers are diagnosed between the ages of 40 and 50 years. Similarly, the minimum weight of the respondent was 39 kg, whereas the maximum weight was 90 kg. After three months of evaluation, the minimum weight was 37 kg, whereas the maximum weight was 85 kg. This reveals that during the treatment of breast cancer, patients lose body weight unintentionally. Similarly, the minimum BMI during the first treatment was 16.79 kg/m², whereas the maximum was 33.08 kg/m². BMI's range is found between 15.63 kg/m² and 31.25 kg/m². After three months of treatment, it was found that there was an improvement situation in BMI as five cases had a normal BMI.

Table 1: BMI with age

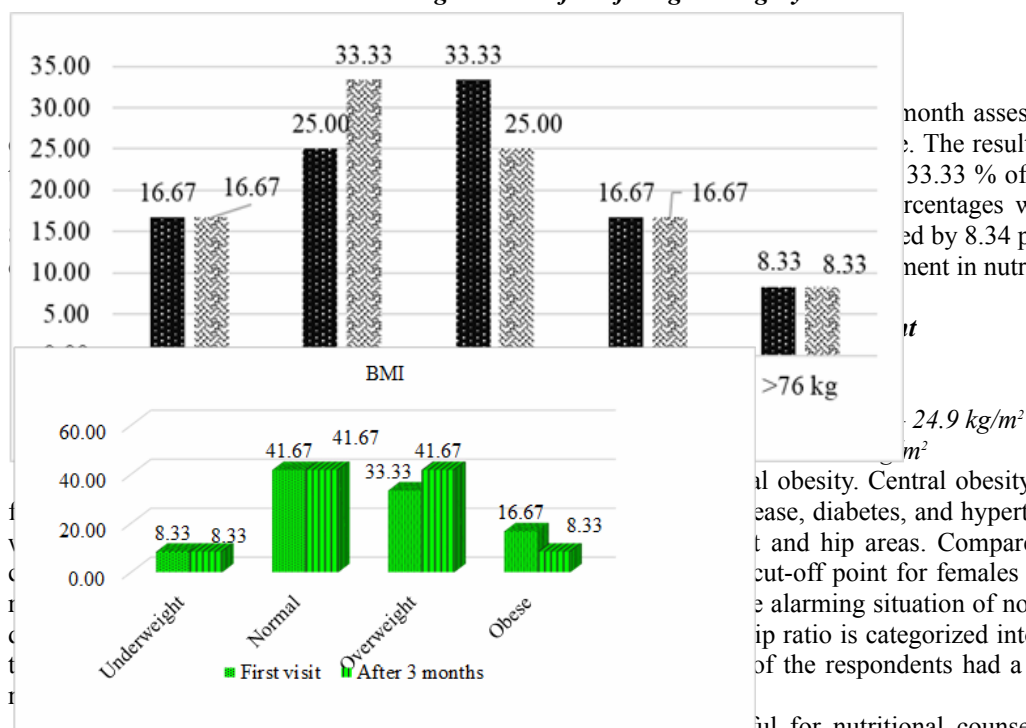| Cases	Age	First assessment			Second assessment		
		Weight	Height	BMI	Weight	Height	BMI
1	40	39	137	20.74	37	137	19.68
2	58	63	150	28.00	59	150	26.22
3	52	65	157	26.42	62	157	25.20
4	54	71	157	28.86	66	157	26.82
5	37	56	153	23.93	51	153	21.79
6	49	90	165	33.08	85	165	31.25
7	38	52	155	21.66	49	155	20.41
8	41	65	156	26.74	60	156	24.65
9	41	43	160	16.79	40	160	15.63
10	32	55	157	22.35	52	157	21.13
11	45	70	157	28.45	75	157	30.48
12	48	50	148	22.83	46	148	21.00

Source: Case study, 2021/22

Age is an irreversible factor that affects breast cancer. Ages were further classified into three groups: 30-40, 41-50, and 51-60 years of age. The number of breast cancer patients was higher in the age group of 41-50 years, followed by the 30-40 age group (33.33 %) and the 51-60 years (25 %) age groups. The results showed that the risk of breast cancer was 41–50 years. The risk of breast cancer in Asian countries is 40-50 years of age [7].

The height was the same during the months of evaluation. The weight change affected BMI values. Weight was further categorized into five groups: 35–45, 46 – 55 kg, 56-65 kg, 66-75 kg, and >76 kg (Figure 1). The comparison of the results of the first visit and after three months of assessment shows that the weight between 35 and 45 kg accounts for 16.67% of the total weight. In the 46 -55 weight group, there was a slight 8.33 % %increase in weight. However, weight decreased by 8.33 percent in the 56–65 kg group. The group 46-55 weight and 56-65 weight were found to be constant in the first and second visits.

The difference between the first visit and the month's visit was 3.33 %. Similarly, the weight group between 56 and 65 kg at the first visit was 33.33 %, whereas the value was 25 % after three months. The percent change was 8.33% higher on the first visit. Likewise, the weight between 66 -75 kg belongs to the same percentage of 16.67 in the first and after three months of visits. The weight above 76 kg also showed the same percentage in the first and after three months of visit, as 8.33 percent (refer to Figure 2).

According to Pati [8], approximately 4–8% of all cancers are attributed to obesity, which is a reversible risk factor for developing breast cancer. In Nepal, 35 % of women and 6% of adolescent girls are obese [9]. A study showed that obese patients with breast cancer are at risk of developing cancer [10]. This may be more complicated in cancer treatment. According to Lee [11], the effectiveness of breast cancer treatment is low in obese breast cancer survivors. Breast cancer treatment is more challenging for obese patients than for normal-weight breast cancer patients.

Figure 1: Profile of weight category

month assessment. BMI was e. The results showed that in 33.33 % of overweight, and rcentages were the same at ed by 8.34 percent, while the ment in nutritional status.

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- 24.9 kg/m²
- m²

al obesity. Central obesity is an equal risk ase, diabetes, and hypertension. A higher t and hip areas. Compared with a higher cut-off point for females for the waist-hip e alarming situation of non-communicable ip ratio is categorized into two groups: up of the respondents had a higher waist-hip

Nutritional knowledge was also assessed, which was useful for nutritional counseling. Nutritional knowledge refers to energy-based foods or a balanced diet. It helps people build their nutritional status with daily food intake based on their height, weight, and physical condition. People need to avoid rich carbohydrates to maintain their body weight. The data revealed that 50 % of patients did not have nutritional knowledge (balanced diet).

IV. Implications

The nutritional status and food management are interlinked. Food management can not be well planned without an assessment of nutritional status. Patients with low and high nutritional statuses need to undergo different types of food modification. Proper food management helps to maintain nutritional status. A normal nutritional status indicates good health. Comparing the findings of the first and second assessments, the BMI data (Table 2) demonstrated that nutritional status was maintained because the second evaluation showed a normal BMI compared to the first assessment.

In the case of higher and lower nutritional status, the chances of recovery during treatment may be longer and require more precautions and care. Therefore, a balanced diet in terms of nutritious food is important for maintaining a good nutritional status. The role of nutrition is eternal in human life until death. Micro-nutrients are important for the immune system, and generally, there is less noticeable loss of micro-nutrients

during food preparation. For instance, micro-nutrients may be lost during the washing, cutting, and cooking of vegetables. In clinical nutrition, various nutrient imbalances, and inadequate and significant signs and symptoms, such as deficiencies of iron, magnesium, sodium, potassium, calcium, vitamin B12, and vitamin D. Being healthy and disease recovery is a vital role of nutrition in the human body. Poor and lower-middle-class patients need to be aware of their nutritional status and knowledge to prevent non-communicable diseases. Nutrition management is cost-effective in treatment, supporting the minimization of treatment side effects and improving the strength of breast cancer patients in maintaining nutritional status. In the absence of this, malnutrition could also happen.

Malnutrition is defined as an imbalance in nutrition, either in excess or a deficit status. The number of overweight and obese individuals increases in developed countries, whereas in developing countries, the number of undernourished individuals is high. Both low and high nutritional status are responsible for mortality and morbidity rates. However, malnutrition among breast cancer patients has adverse implications, such as infection, weakness, and prolongation during and after breast cancer treatment. A study by Adam [12] showed that malnutrition creates problematic situations and directly affects nutritional status related to quality of life.

Malnutrition states, such as under- and over-nutrition conditions, harm the regular biological function of health. In undernutrition, the inadequacy of nutrients depletes tissues, where signs of deficiency and symptoms are observed. To improve of quality of life for patients with breast cancer, balanced nutrition is necessary to prevent undernutrition or overnutrition. The major objective of nutritional management is to meet the optimum daily requirements for maintaining a good nutritional status. There may be multi-factorial nutritional problems; however, poor nutrition is associated with a negative prognosis. The study showed that BMI, weight change, and tumor prognosis were significantly correlated with nutritional status and effective oncology treatment protocols. Poor nutrition or under-nutrition in breast cancer treatment causes weakness, inability to fight infections, decreased quality of life, and life-threatening moments. The literature shows that a poor diet promotes malnutrition and affects treatment conditions. The effective and implementable strategies to promote health status and prevent breast cancer are crucial [13]. However, loss of appetite contributes to weakness, and nutritional input is important. In breast cancer, proper nutrition helps to heal side effects such as mouth sores, lack of appetite, nausea, and vomiting. A nutritious diet facilitates the maintenance of body weight and keeps body tissues healthy.

According to case studies, nutritional management relies heavily on the evaluation of nutritional status. According to the case of Tika Kumari Phuyal, 'I faced some symptoms during treatment, such as diarrhea and a continuous cough. I used regular food according to instructions from doctors and dietitians. I had a normal BMI and homemade, balanced foods, along with clinical treatment. I found recovery after using nutritious food and medicines for three months (personal conversation on March 19, 2021).

Similarly, being underweight is a risk factor for breast cancer. The inadequacy of macro-and micronutrients results in nutritional deficiency health issues regarding rickets, scurvy, and protein-energy malnutrition. It is familiar to children, adult females, and males of all age groups. Globally, 149 million children under 5 years of age are short, while 45 million are too thin for their height. Similarly, 390 million adults are underweight ([14]. Under conditions of undernutrition, the body's immune system becomes poor and prone to infection. Viruses, bacteria, or other microbes create a favorable environment in the human body and start to multiply. Clinical and nutritional management are needed to overcome illnesses associated with poor nutritional status. A study carried out by Mohsen [15] states that 80% of the cases had 70% nausea and 63% vomiting issues among underweight breast cancer patients. Undernutrition was found to be a risk factor for digestive health.

According to Mina Rana, as a case study,

"I had a lower BMI value of 16.79 kg/m^2. During chemotherapy treatment, I experienced severe side effects such as appetite loss, vomiting, fever, weakness, and back pain. I used to eat these foods, sometimes mutton, boiled fruits, soups, and milk, with regular meals. I avoided raw food and curds. Doctors prescribed formula protein supplements along with regular homemade food. I found it to be better in treatment recovery and felt the importance of nutrition awareness in maintaining nutritional status. Nutritional food management can be effective if the nutritional status is properly identified (personal conversation on June 24, 2022)."

Likewise, overweight and obesity are risk factors for mortality and morbidity. It causes other non-communicable diseases such as hypertension, diabetes, and cardiac diseases. According to the WHO and GRN, the number of obese children is 37 million, and the number of adult males and females is 890 million. In Nepal, the prevalence of overweight–obesity increased from 1.8% to 19.7%, at the same time, the prevalence of obesity increased from 0.2% to 4.1% between 1996 and 2016 [16]. It contributes to increasing mental and physical stress and affects individuals' capabilities. Obesity has been linked to breast cancer, which requires complex cancer treatment and increases the risk of dying from cancer. Similarly, the study carried out by Ohno [17] showed that the average cereal intake among males and females aged 10-68 years was 483± 92 and 433± 115 g per day, respectively, which could be higher for a sedentary lifestyle. Diet, exercise, and therapy are the

mainstay of interventions. Obesity may also increase the treatment-related adverse effects. Overweight or obesity, compared to normal weight, was a risk factor for cancer [18]. Malnutrition in various forms is a worldwide concern, particularly in developing nations. Evaluating nutrition is essential for creating an effective nutritional strategy [19].

According to Meena Bhuju (48 years old had a higher nutritional status and BMI of 33.08 kg/m²),
"During treatment, some symptoms, like appetite, were decreased, and weight was lost. I used to eat only a homemade, balanced diet, as per recommendations and based on nutritional status. I felt the importance of nutritional values in maintaining hemoglobin levels during the treatment period." Chemotherapy may reduce hemoglobin levels and cause life-threatening situations. In this case, a balance in nutritional status is needed (personal conversation on May 18, 2022)".

To maintain nutritional status, current food practices need to be modified, considering a balanced diet. Locally available food should be emphasized, as most people can afford it. There are many dishes containing high carbohydrates in Nepali cuisine. However, it will be healthy and economical if it follows the healthy nutritional guidelines developed by the Indian Council of Medical Research(ICMR)[20], which is called "My Plate for a Day". It includes all the essential macro- and micro-nutrients to fight diseases, the food and quantity demo as 240 g of cereals such as rice, wheat, maize, and millet, which are rich in carbohydrates, and micronutrients, such as thiamine, are energy-providing foods. The body gets the necessary amount of protein from a mix of nutrients derived from plants and animals. It replaces dead cells and aids in bodily upkeep as well as growth and development. It includes 350 g of seasonal vegetables such as green leafy, bottle gourd, French beans, Lady's finger, brinjal, radish, beetroot, and turnip, and 150 g of fruits. It is a source of vitamins, minerals, and antioxidants that boost the immune system. Similarly, 300 ml of milk and milk products are required for a day. It is a source of proteins and minerals, such as calcium and phosphorus. Likewise, the nuts and seeds contribute to the provision of magnesium, selenium, healthy fats, and protein. This aids in the computation of food's energy content. It is the source of fat to maintain body temperature and helps absorb fat-soluble vitamins such as vitamins A, D, E, and K. It is also a source of energy-producing food.

As per the NDHS, 34% of women aged between 15 and 49 years (non-cancer cases) experience anemia. Women who are diagnosed with breast cancer may experience anemia during their treatment if they do not receive adequate nutritional support. Healthy eating and a balanced diet are vital in reducing and preventing breast cancer and can be easily applied in the context of Nepal [21]. Mohammad emphasized the importance of balanced nutrition during breast cancer treatment. The Ministry of Health and Population (Nepal) states that the average fruit and vegetable consumption is only 0.5 and 1.5 servings per day[22]. The prevalence of inadequate intake of fruits and vegetables (WHO: <5 servings ~ 400 g per day) was 96.7 %, that is, 96.3% among females and 97.0% among males.

Moreover, the risks associated with pesticide use in cultivating fruits and vegetables in Nepal are often highlighted in the news. It's important to consider the negative impacts that pesticides can have on the health of farmers [23].

V. Conclusion

Nutritional management is crucial for breast cancer, a non-communicable disease. Nutritional care plays an important role in cancer treatment. Nutritional intake is necessary because there is a considerable risk of malnutrition and a variety of side effects that may occur during therapy. In breast cancer, the BMI value determines the degree of malnutrition and assists in the recommendation of appropriate nutritional intervention. Nutritional balance of macro-and micronutrients is important for the planning of a balanced diet. In cases of breast cancer, maintaining proper nutrition plays a crucial role in successfully undergoing treatment and improving overall quality of life. It is essential to suggest balanced nutritional choices tailored to individual nutritional needs, ideally with guidance from a dietitian or by adhering to standard serving sizes outlined in 'My Plate for a Day.' The 'My Plate for a Day' tool is a useful food management tool that reduces both macro and micronutrient deficiencies and hidden hunger.

In Nepal, nutritional guidelines are crucial for making clinical treatment more effective and ensuring target completion on time. Additionally, to strengthen the immune system and combat non-communicable diseases, this necessary quantity should be fulfilled. The advocacy of balanced nutrition plays a vital role in maintaining nutritional status and controlling noncommunicable diseases. Understanding nutrition is vital, and it is important for a nationwide awareness campaign. The balanced diet calculation and required food quantity are also transparent in the country's food budget sheet. It not only supports individual health, but also the country's food requirements. Dietary and nutrition-related programs and regulations are necessary because lifestyle-related diseases have become more prevalent. Thus, it is imperative that nutrition policies and strategies be changed to allow for the widespread use of locally sourced foods as part of a balanced diet. Dietitians and

nutritionists are essential in educating people and assessing nutritional status in relation to a balanced diet and nutrient-dense foods in order to fight malnutrition.

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