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ORIGINAL ARTICLE

Fatigue and Functional Ability in Patients Undergoing Upfront Surgical Treatment for Solid Malignancies

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Abstract

Fatigue is an underassessed and underreported aspect of cancer patients undergoing treatment. In patients being treated with surgery, its extent and manifestations may be varied but it affects their functional quality of life. This study was designed to evaluate the level of fatigue in pre- and post-surgery period and its relation with the functional disability in patients undergoing upfront surgery for solid malignancies. A prospective observational study was conducted between 2016 and 2017. A total of 71 patients with malignant solid tumors (up to stage III) undergoing upfront surgery were included. The fatigue and functional disability were assessed in pre- and post-surgery period using Multidimensional Fatigue Inventory-20 (MFI-20) and Functional Assessment of Chronic Illness Therapy (FACIT-F) questionnaires respectively. The mean age was 42.4 years. The post-operative fatigue levels were significantly higher compared with the pre-operative levels ($p = 0.001$). The maximum levels of fatigue and loss of functional ability were seen at the time of discharge that recovered up to some extent after 30 days of surgery. Operative duration > 8 h, hospital stay > 9 days, and blood loss of > 200 ml were associated with increased fatigue level. Mental fatigue and limitation of physical activity were the most significant domains in pre- and post-surgery period respectively. This study concludes that cancer-related fatigue is present in both pre- and post-surgery period and it correlates with functional disability. Assessment of different dimensions of fatigue is important and patients need to be made aware about them for planning any specific intervention including life style modification to help them cope up with these practical issues.

Keywords Fatigue · Functional ability · Cancer · Surgery

Introduction

Fatigue is a common problem in cancer patients, resulting from the disease condition, during the course of treatment and even after completion of the treatment. Cancer-related fatigue (CRF) is defined as a distressing, persistent, subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning [1]. It is reported by patients as the most distressing and more disruptive than pain to normal routines and affects quality of life [2]. It can have an impact on patient's life in terms of socially and economically untoward consequences [3]. In majority of the patients, it is underreported, underdiagnosed, and undertreated. Therefore, routine screening to identify the fatigue is essential to improve the quality of life of the patients living with cancer. For solid tumors, surgery is the main modality of treatment and sometimes recovery can be prolonged. It may be associated with fatigue and functional disability for a variable period and patients can take long time before they return to their baseline energy levels. The aim of this study was to assess the level of fatigue and its relationship with the functional deficit in patients with solid malignant tumors undergoing surgery in the pre- and post-surgical period.

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Materials and Methods

This prospective observational study was conducted as a collaborative study between Departments of Nursing and Surgical Oncology from June 2016 to June 2017. A total of 71 patients with malignant solid tumors (up to stage III) undergoing upfront surgery and willing to participate in the study were included. Patients with comorbidities (like coronary artery diseases, diabetes, chronic obstructive pulmonary diseases) and those receiving neo-adjuvant chemotherapy/radiation therapy/hormone therapy/targeted therapy or on anticonvulsants/antidepressants were excluded.

Data Collection Tools

A structured questionnaire was prepared and after taking the informed consent, data were collected by a team of nurses through patient interviews. All demographic and clinical variables like age, sex, education, the occupation of the subject, marital status, income, body mass index (BMI), tumor site, cancer stage, nature of surgery, duration of surgery, duration of ICU stay, duration of hospital stay, estimated blood loss, and number of blood transfusion were included. The fatigue and functional disability were assessed using Multidimensional Fatigue Inventory-20 (MFI-20) and Functional Assessment of Chronic Illness Therapy (FACIT-F) tools respectively. The MFI-20 tool has been developed for assessment of different dimensions of fatigue. Each subscale scores from 1 to 5 [4]. FACIT-F is a 52-item scale which consists of 13-item fatigue subscale and 47 items for the functional assessment [5]. Informed consent was obtained from all individual participants included in the study. The study was approved by the Institutional Ethics Committee. The structured questionnaires were administered at three points of time, base line (at the time of admission or within 7 days prior to surgery), at the time of discharge and after 30 days of the surgery.

Data Management and Statistical Analysis

Inferential statistical analysis was done with SPSS software (version 24; SPSS Inc., Chicago, IL, USA). Independent *t* test, Pearson's correlation coefficient, and Kruskal-Wallis test were used to determine the strength of association. All the *p* values were two sided and level of significance was set at $p < 0.05$.

Results

The demographic profile, tumor, and surgical details are described in Table 1. The mean age was 42.4 years (19–62 years). The median duration of the surgical procedure, blood loss, and hospital stay were 3.5 h, 100 ml, and 6 days respectively. The prevalence of fatigue is described in Table 2. The fatigue levels in post-surgery period (both at the time of discharge and after 30 days of surgery) were significantly higher (mean fatigue score ± standard deviation 23.19 ± 9.2 and 32.09 ± 10.94 respectively) compared with pre-operative baseline (36.37 ± 11.09, $p = 0.001$). Fatigue level was seen maximum at the time of discharge, which recovered partially after 30 days of surgery but did not reach up to the level of fatigue at the time of admission. Similar findings were observed for the level of functional ability which decreased significantly after surgery. Significant correlation was found between fatigue and

Table 1 Demographic profile, tumor, and surgical details ($n = 71$)

Variables	Frequency (percentage)
Sex	
Male	36 (50.7)
Female	35 (49.3)
Age (years)	
18–35	24 (33.8)
36–55	33 (46.5)
> 55	14 (19.7)
Diagnosis	
Head and neck cancer	25 (35.2)
Abdominal	22 (30.9)
Breast	11 (15.4)
Thoracic	8 (11.3)
Appendicular skeleton	5 (7.0)
Tumor stage	
Stage I	5 (7.0)
Stage II	32 (45.1)
Stage III	34 (47.9)
Surgery duration (hours)	
1–3	38 (53.5)
4–6	20 (28.2)
7–9	8 (11.3)
10–12	5 (7.0)
Hospital stay (days)	
1–3	22 (30.9)
4–6	24 (33.8)
7–9	15 (21.2)
> 9	10 (14.1)
ICU stays (days)	
0	34 (47.9)
1	19 (26.7)
2	9 (12.7)
> 2	9 (12.7)
Operative blood loss (ml)	
1–200	48 (67.6)
201–400	16 (22.5)
> 400	7 (9.9)

Table 2 Level of fatigue at different points of assessment

Pre-operative (baseline)	
Having fatigue	47 (66.1)
Not having fatigue	24 (33.9)
At the time of discharge	
Having fatigue	68 (95.8)
Not having fatigue	3 (4.2)
30 days after surgery	
Having fatigue	56 (78.8)
Not having fatigue	15 (21.2)

functional ability at all the three points of time with stronger correlation at the time of discharge and at 30 days after surgery ($p = 0.01$). Patients who had fatigue also had significantly lower level of functional ability (score of 81.6 in non-fatigued vs 68.5 in fatigued, $p = 0.001$). Analysis of impact of the demographic variables on the level of fatigue and functional ability showed that age, sex, clinical diagnosis, and BMI did not have any statistically significant impact. Disease stage was found to be a significant impact on functional ability at the time of admission and at the time of discharge, but not after 30 days of surgery. The patients, who had a longer hospital stay (> 9 days), had a significant increase in their fatigue levels after surgery (at discharge and at 30 days after surgery $p = 0.012$ and 0.015 respectively). Non-significant decrease in the functional ability was noted for longer stay at the time of discharge ($p = 0.12$) and after 30 days of surgery ($p = 0.16$). In case of blood loss (> 200 ml), no impact was found on fatigue level at the time of discharge, but after 30 days of surgery it was positively correlating with the fatigue level ($p = 0.002$). Patients receiving blood transfusion had a decreased level of fatigue. Blood loss was also found to have a positive correlation with the functional disability at 30 days after surgery ($p = 0.002$). Longer duration of surgery (> 8 h) was found to increase the fatigue level (both at the time of discharge and at 30 days after surgery, $p = 0.012$ and 0.015 respectively). Similar findings were present in case of functional ability as well (Fig. 1).

Analysis of different dimensions of fatigue showed that significant increase in level of fatigue was observed across all the dimensions at the time of discharge and also at 30 days after surgery except in the dimension of reduced motivation (Fig. 2) which was found to improve at 30 days after surgery (score of 7.34 vs 7.04). At the baseline (pre-operative), the highest level was observed for mental fatigue (score of 11.15) while in post-operative period the highest level was observed for decreased activity (score of 12.48).

Discussion

Fatigue is a concept with multiple modes of expression like physical (e.g., diminished energy), cognitive (e.g., diminished concentration or attention, the effect on prospective memory), and affective (e.g., decreased motivation or interest) [6]. Fatigue can be subjective, objective, or both but primarily it is subjective and complex but has a profound impact on a patient's quality of life [7].

Cancer-related fatigue (CRF) is different from the fatigue of daily life. Daily fatigue usually does not last long and gets relived after having rest. CRF is worse than daily fatigue and it causes more distress. CRF is multidimensional subjective phenomena which affects majority of the cancer patients and it also gives physical, emotional, and mental trauma to them. The type of treatment may be an important factor in changes in the levels of fatigue post-treatment. Surgery being a short duration (and many a times) the only treatment, may reflect the changes very quickly albeit more clearly. This study demonstrated that fatigue is a persistent symptom in patients with cancer which was present in almost half of the patients before treatment and was at its peak at the time of discharge (95.8%). It improved after 30 days of the surgery, but persisted in the majority. A hospital-based study involving patients admitted for diagnosis or treatment of cancer reported that 32% of the patients were fatigued at baseline. At the time of discharge, the overall prevalence rate was 40%, and after 6 months, it was 34% [8]. Different socio-economic backgrounds of the patients and nature of treatment may play a role in differences found in results of various studies.

A study done on gynecological patients found that the cancer patients had worse fatigue than the non-cancer individuals before, during, and after anticancer treatment [9]. Similar results were reported in a meta-analysis. The patients, who were fatigued, were found to have more functional deficits than those who were not fatigued and there was a negative relationship between physical activity and fatigue [8]. The dimension of decreased activity was found to be the most prominent one in our study which may also be a reflection of effect of surgical treatment.

Fatigue and functional disability have been found to be related. A study done on breast cancer patients undergoing surgery reported worsening fatigue after surgery associated with a decrease in physical functioning [10]. These effects may have a daily variation which was evident in a study on the cancer survivors, where a decline in physical activity from afternoon to evening was reported [11]. The findings of the current study indicate this strong correlation as well and cancer survivors need to be made aware about these long-term effects so that they can plan their schedule better.

There are contrasting reports about effect of demographic variables on fatigue with some studies suggesting that fatigue appeared to be unrelated to disease variables while others show that prevalence of fatigue differed according to tumor stage, site, age, and sex of the patients [8, 12]. These variables have minimal or no effects in patients with advanced cancer as well, indicating this to be a broader phenomenon [13]. In our study, age, sex, site of malignancy, disease stage, and BMI

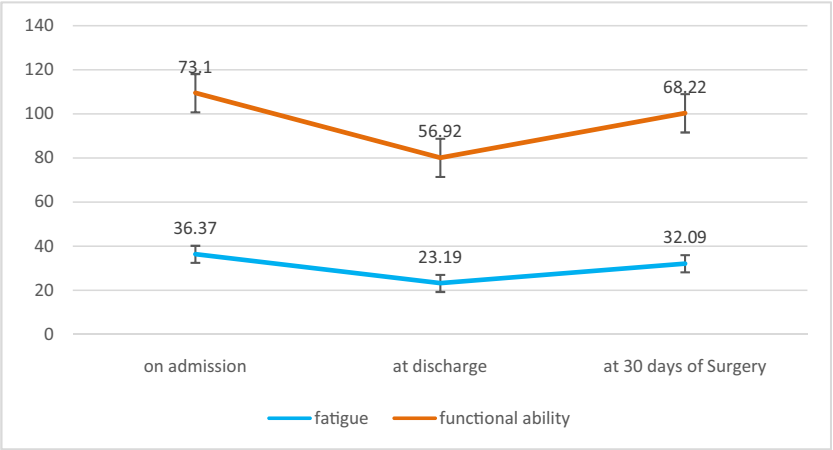

Fig. 1 Pre-operative and post-operative mean level of fatigue and functional ability in patients with solid malignant tumors

were found to have no statistically significant impact on fatigue, but the duration of surgery, hospital stay, blood loss, and blood transfusion impacted the fatigue level significantly. There was no difference in fatigue levels of males and females but females were found to have higher level of functional ability than males at the time of admission although in post-surgical period no statistical difference was found indicating greater level of loss of functional ability for females.

Fatigue, being a multifaceted problem for cancer patients, can have different dimensions and some of them may be more prominent at different phases of treatment and in post-treatment survivors. As we observed, mental fatigue was found to be the most prominent dimension in pre-operative phase, probably reflecting the apprehensions of the patients. Assessment of these dimensions should be made at the very first interaction with the healthcare providers for periodic follow-up.

Healthcare workers may play an important role in assessment of fatigue level and functional ability. Through some practical interventions like modification of nature and timing of daily activities, patients may be helped to cope with their fatigue and decreased functional ability. They can maintain a diary for self-monitoring of their fatigue to plan their day accordingly. Both patients and their caregivers need support and encouragement as well as guidance throughout the course of the treatment [14]. Same holds true for survivors as the time passes and they need to be enquired systematically by oncology nurses and healthcare providers to assess their fatigue and functional ability levels for effective interventions.

There are a few limitations of this study as it was a single-center study which included patients undergoing single modality treatment, i.e., surgery. Also, the patients with significant comorbidities were excluded. Although the multimodality treatment and comorbidity will be expected to worsen the effect on fatigue and functional ability, still that needs to be evaluated in further studies.

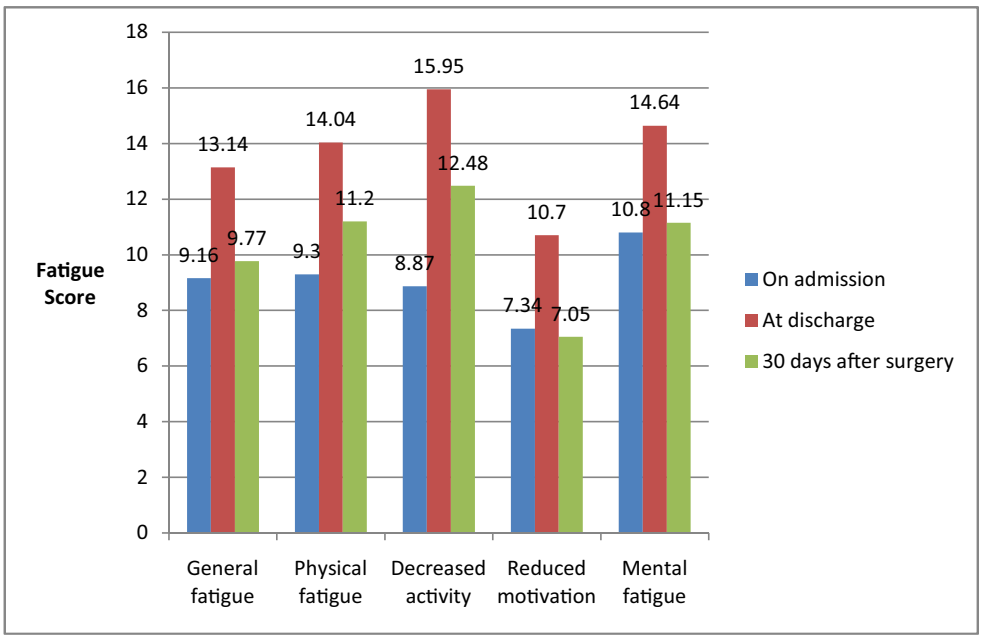

Fig. 2 Performance of patients in different dimensions of fatigue

Conclusions

Cancer-related fatigue was present in pre-operative stage; increasing significantly at the time of discharge. It improved after 1 month of surgery but did not reach the baseline level. A similar pattern was observed for functional ability. The patients who were fatigued were found to have more functional deficits and with increase in fatigue level, functional deficit increased as well. Fatigue was also found to have a correlation with duration of surgery, duration of hospital stay, blood loss, and blood transfusion. Cancer survivors need to be made aware about fatigue and functional disabilities to help them cope up with these practical issues.

Compliance with Ethical Standards

Informed consent was obtained from all individual participants included in the study. The study was approved by the Institutional Ethics Committee.

Conflict of Interests The authors declare that they have no conflict of interest.

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