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Intensity of Side Effects Associated with Chemotherapy and Coping Strategies Adopted by Cancer Patients in India

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Abstract

Chemotherapy is a widely used cancer treatment method that involves the use of medications to target and kill cancer cells or slow down their growth. However, chemotherapy often comes with various side effects that can significantly impact the quality of life of cancer patients. This study aimed to evaluate the side effects experienced by cancer patients undergoing chemotherapy and the coping strategies they employ to manage these side effects. A descriptive research design was utilized, and questionnaires were designed to collect socio-demographic information, assess chemotherapy's side effects, and evaluate cancer patients' coping strategies. Two hundred cancer patients aged 18 to 75 were recruited using a stratified random sampling technique. The study revealed that patients experienced various side effects, varying frequencies between 84 (42.5%) and 110 (55%). The intensity of these side effects, measured on a chemotherapy side effects scale, showed significant variation: 89 patients (44.5%) reported mild side effects, 43 patients (21.5%) reported moderate side effects, and 68 patients (34%) experienced severe side effects. The side effects were also significantly associated with coping strategies, with 89 patients (44.5%) displaying poor coping strategies, 16 patients (8.5%) showing average coping strategies, and 94 patients (47%) demonstrating good coping strategies. The study concludes that educating patients about potential side effects and offering coping strategies can enhance their treatment experience.

Keywords: Cancer, Chemotherapy, Coping Strategies, India, Patients, Side Effects.

Introduction

Cancer stands as the second most prevalent non-communicable disease globally, affecting approximately 10 million individuals each year, with projections indicating a rise to 15 million cases by 2020 (1). Its impact extends significantly, contributing to about 12 % of global mortality rates. Among the primary modes of cancer treatment are surgery, radiotherapy, chemotherapy, and biological therapy (2). Chemotherapy, whether administered alone or in conjunction with other modalities, has shown promise in extending the life expectancy of cancer patients. However, this potential increase in survival often comes with a downside - the heightened risk of treatment-related morbidity due to chemotherapy's side effects (3). Upon receiving a cancer diagnosis, individuals may experience profound feelings of upheaval and distress, as if their world has been turned upside down (4). Coping with cancer presents formidable challenges, yet there are avenues for managing both the diagnosis and the side effects of treatment (5). By seeking support, adopting healthy coping mechanisms, and leveraging available resources, cancer survivors can navigate their journey with greater resilience and improved quality of life (5–7). In India, the detection of over a thousand new cases per 100,000 population annually across all cancer types underscores its significant status as a pressing public health issue(4). Cancer is often considered synonymous with hopelessness, unbearable pain, fear, and certain death among cancer patients (8). As advancements in cancer detection and treatments continue, more cancer patients are surviving for extended periods, albeit often with disabilities. While the public health system in India has helped mitigate some economic burdens associated with different cancers, challenges persist (9). Coping encompasses alleviating distress from adverse life events (10). Cancer patients' coping strategies

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reflect their ability to confront their circumstances and develop adaptive responses (11). Stressful experiences like cancer diagnosis can contribute to cognitive changes, underscoring the importance of adaptive coping mechanisms for maintaining a positive outlook despite health challenges (4). Maladaptive coping in cancer patients may stem from difficulties in establishing diagnostic criteria, as symptoms can overlap between depression and physical illness (4,12). Increasing attention is being devoted to understanding psychosocial concerns, depression, and coping strategies among cancer patients (3). Many cancer patients struggle with the psychological aftermath of their illness, grappling with existential issues such as fear of death, isolation, and questioning the meaning of life. While some patients navigate these challenges more effectively, others may experience significant psychological distress. These factors can serve as strong predictors of mental health issues among cancer patients (3,8). It's crucial to emphasize that addressing the psychological effects of cancer treatment, particularly chemotherapy, is nearly as vital as administering the medication itself (5). A patient grappling with depression and anxiety may struggle to respond positively to the treatment (4,12). It's worth noting that counselling for the patient's family members is equally significant, as they must navigate their fears and anxieties. Unlike numerous other illnesses, coping with cancer entails strategies that involve not only the patient but also their close family members (6,11). Ultimately, adequate medical care, coupled with exceptional support from family members, plays a pivotal role in helping the patient confront this daunting disease (13). Coping is an individual's effort to control stress and adjust to the needs of added problems (7). Using different coping mechanisms relieves the effects of stress on an individual's physical and psychological symptoms in light of results from the literature, personal experiences, the rising need, and the researcher's interest. Therefore, we performed this study to determine the Side effects associated with chemotherapy and the coping strategies adopted by cancer patients in India and investigate the correlation between side effects and coping strategies among cancer patients.

Methodology

A cross-sectional study was conducted at the oncology wards and outpatient departments of IMS and SUM Hospitals in Bhubaneshwar, Odisha, spanning six months from April 2023 to September 2023. The sample size was determined based on a previous study's pooled standard deviation, considering a 20.5% prevalence of depression among head and neck cancer patients with a margin of error of 5%. Using Slovin's formula, the estimated sample size was 200. A stratified random sampling method was employed to select participants among cancer patients who met specific criteria: those admitted to the wards and outpatient departments who consented to participate in the study. Exclusion criteria comprised patients hospitalized in the emergency department, those on mechanical ventilation, and those with neurological abnormalities. Three pre-tested semi-structured research instruments were utilized to evaluate side effects and coping strategies among cancer patients. The first instrument comprised a structured questionnaire focusing on demographic variables such as age, gender, education, marital status, dietary habits, food preferences, occupation, and housing type. The second instrument included structured questionnaires addressing chemotherapy side effects, encompassing 12 common side effects like hair loss, nausea, and vomiting, loss of appetite, diarrhea and constipation, dry and darkened skin, serpentine hyperpigmentation, infections due to low white blood cell count, types of anemia, fatigue from low red blood cell count, bruises and gum bleeding from low platelet count, numbness and changes in sensation, mucositis, and chemotherapy extravasation. The third instrument contained cancer coping questionnaires featuring a 21-item version to assess the level of coping strategies employed by patients. Before the commencement of the study, we obtained written informed consent from each patient, ensuring they were informed about the study's benefits and risks. Every effort was made to uphold the confidentiality of the participants, and their involvement in the study was entirely voluntary. We safeguarded their anonymity by refraining from recording their names or personal information. The study commenced following approval from our Institutional Ethics Committee (SNC, SOA University- Reg. No.

[SOADU/SNC/IRB/429/2023]). Data were collected through interviews lasting no more than 20 minutes per patient. Subsequently, all data were entered into a Microsoft Excel spread sheet and analysed using SPSS version 22 (Armonk, NY: IBM Corp.). Descriptive and inferential analyses were conducted, including frequency, percentage, mean, and standard deviation. Additionally, inferential statistics such as t-tests, Chi-square tests, and one-way analysis of variance were utilized for group comparisons, with a significance level set at $p<0.05$.

Results

Demographic Proforma

The socio-demographic data from a sample of 200 individuals revealed significant findings across various parameters. Regarding age distribution, most participants (36.5%) fell within 15-30 years. Regarding gender distribution among chemotherapy patients, 69% were female, whereas 31% were male. Educational status showed that 52.5% had primary education, 47% had secondary education, and a marginal 0.5% were illiterate. Marital status indicated that 79.5% were married, with the remaining 20.5% being unmarried. Occupational distribution showed that 15.0% were employed in the private sector, 57.5% were self-employed, and 15.0% were in government jobs. Habits such as smoking, alcohol consumption, and tobacco chewing were reported at frequencies of 4.0%, 7.5%, and 5.0%, respectively. The majority, 83.5%, reported having no such habits. Regarding housing, 42.5% resided in kacha houses, 37.0% in pukka houses, and 20.5% in flats (Table 1).

Table 1: Demographic Proforma

Variables	Frequency (f)	Percentage (%)
Age in Year		
15-30	73	36.5
31-45	48	24
46-60	44	22
61-75	35	17.5
Gender		
Male	62	31
Female	138	69
Educational Status		
Illiterate	1	0.5
Primary	105	52.5
Secondary	94	47
Marital Status		
Married	159	79.5
Unmarried	41	20.5
Diet		
Vegetarian	1	0.5
Non-vegetarian	86	43
Both	113	56.5
Habits		
Smoking	8	4
Alcoholic	15	7.5
Tobacco chewing	10	5
No	167	83.5
Food Preference		
Oily food	34	17
Spices	37	18.5
Bland	34	17
Boiled	95	47.5
Occupation		

Government	30	15
Private	55	27.5
Self-employed	115	57.5
Type of House		
Kacha house	85	42.5
Pakka house	74	37
Apartment	41	20.5

Type of Chemotherapy Regimens Used

Chemotherapy regimens commonly used include protocols tailored to the type and stage of cancer, with a significant proportion of patients receiving platinum-based regimens. For instance, cisplatin and carboplatin-based regimens are frequently used for cancers such as ovarian, lung, and head and neck cancers, covering approximately 40-50% of patients. Anthracycline-based regimens, such as doxorubicin combined with cyclophosphamide, are predominantly utilized in breast cancer management, accounting for 20-30% of cases. Additionally, taxane-based regimens, including paclitaxel and docetaxel, are used in combination therapies, especially in breast and ovarian cancers, contributing to 15-20% of the total. A smaller proportion, around 10%, undergoes targeted therapies or novel chemotherapy agents depending on the availability and the specific cancer subtype.

The Side Effects of Chemotherapy

Figure 1 represents the types of side effects experienced by the participants during chemotherapy. Among 200 participants, the following prevalence rates of side effects among cancer patients were observed: hair loss (42.5%), nausea and vomiting (47%), loss of appetite (55%), diarrhea or constipation (54%), dry and darkened skin (50.5%), serpentine hyperpigmentation (52%), low white blood cell count (46.5%), fatigue due to low white blood cells (50%), bruises and gum bleeding due to low red blood cells (42.5%), numbness and changes in sensation (51%), mucositis (44.5%), and chemotherapy extravasation (50.5%) (Figure 1).

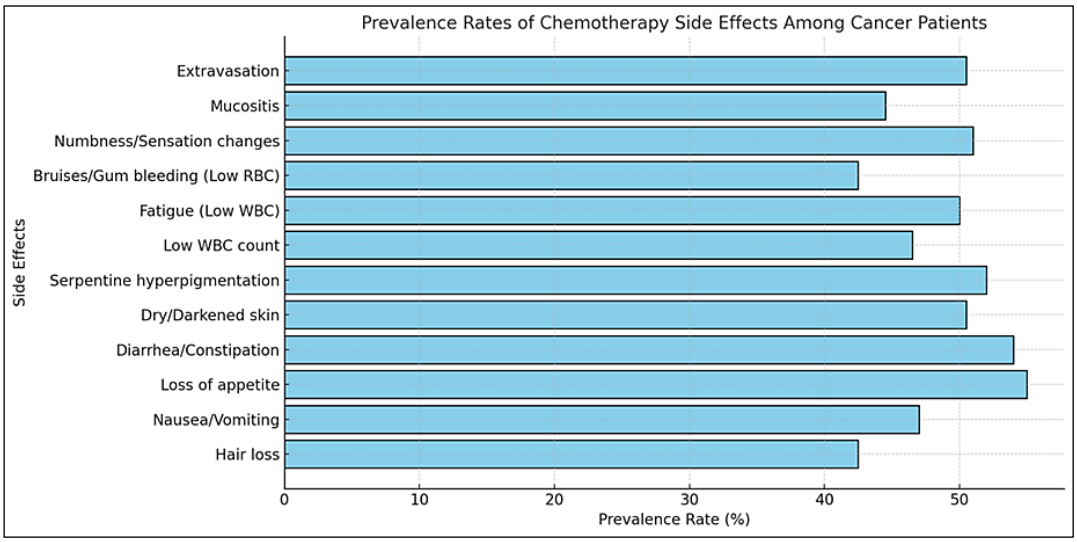

Figure 1: The Side Effects of Chemotherapy

The Intensity of Chemotherapy Side Effects

Table 2 represents the intensity of chemotherapy side effects, which varied: 89 cases (44.5%) experienced mild intensity (below the median), 43 cases (21.5%) experienced moderate intensity, and 68 cases (34%) experienced severe intensity (above the median). These findings underscore the diverse impact of chemotherapy on cancer patients (Table 2).

Coping Strategies

The study revealed varying levels of coping strategies among cancer patients. Specifically, 89 individuals (44.5%) demonstrated good coping strategies, while 16 patients (8.5%) exhibited an average level. Conversely, 94 patients (47%) displayed poor coping strategies (Table 3).

Table 2: Intensity of Side Effects

Intensity of Side Effects	Frequency *(f)*	Percentage *(%)*
Mild	89	44.5
Moderate	43	21.5
Severe	68	34

Table 3: Level of Coping Strategies

Level of coping strategies	Frequency *(f)*	Percentage *(%)*
Good	89	44.5
Average	16	8.5
Poor	94	47

Association between Chemotherapy Side Effects and Demographic Variables

Table 4 represents the association between chemotherapy side effects and demographic variables. The relationship between the intensity of chemotherapy side effects and educational status yielded a statistically significant association (p <.019). However, no statistically significant associations were observed with age (p =.786), gender (p = .543), marital status (p = .136), diet (p = .985), habits (p = .831), food preference (p = .787), occupation (p = .495), or type of house (p = .870) (Table 4).

Table 4: Association between Chemotherapy Side Effects and Demographic Variables

Demographic Characteristics	Frequency of Intensity of Side Effects			x^2	*df*	*P* value
	Mild *(f)*	Moderate*(f)*	Severe*(f)*			
Age in Year						
15-30	36	12	25			
31-45	20	11	18	1.72	4	.786
46-75	32	18	28			
Gender						
Male	29	10	24	1.22	2	.543
Female	59	31	47			
Educational Status						
Primary	38	28	41	7.88	2	.019*
Secondary	50	13	30			
Married Status						
Married	74	34	51	3.99	2	.136
Unmarried	14	7	20			
Diet						
Non-vegetarian	38	18	30	0.03	2	.985
Vegetarian	50	23	41			
Habits						
Other bad habits	13	7	13	0.36	2	.831
N0	75	34	58			
Food Preference						
Oily food	14	6	14			
Spices	13	8	15	3.16	6	.787
Bland	19	6	10			
Boiled	42	21	32			
Occupation						
Government	16	5	9	3.39	4	.495
Private	20	15	20			

Self-employed	52	21	42			
Type of House						
Kacha house	35	18	31			
Pukka house	32	15	28	1.25	4	.870
Flat	21	8	12			

Chi-square test; ('p' values)

Association between Level of Coping Strategies and Demographic Variables

Table 5 represents the Association between the level of coping strategies and demographic variables. Regarding the level of coping strategies among cancer patients, statistically significant associations were found with age (p <.011) and gender (p <.019). Conversely, no statistically significant associations were noted with educational status (p = .136), marital status (p = .292), diet (p = .640), habits (p = .167), food preference (p =.554), occupation (p = .385), or type of house (p = .283) (Table 5).

Table 5: Association between Level of Coping Strategies and Demographic Variables

Demographic Characteristics	**Frequency of level of Coping Strategies**			x^2	***df***	***P* value**
	Mild *(f)*	**Moderate*(f)***	**Severe*(f)***			
Age in Year						
15-30	29	7	37			
31-45	18	7	24	13.03	4	.011*
46-75	48	2	28			
Gender						
Male	26	10	27	7.93	2	.019*
Female	69	6	62			
Educational Status						
Primary	52	12	43	3.99	2	.136
Secondary	43	4	46			
Married Status						
Married	80	12	67	2.46	2	.292
Unmarried	15	4	22			
Diet						
Non-vegetarian	43	8	35	1.0	2	.604
Vegetarian	52	8	54			
Habits						
Other bad habits	18	10	15	3.58	2	.167
NO	72	16	69			
Food Preference						
Oily and spicy food	35	19	30			
Bland	16	6	13	4.92	6	.554
Boiled	44	6	45			
Oily and spicy food	35	19	30			
Occupation						
Government	15	9	10	4.16	4	.385
Private	24	13	26			
Self-employed	42	12	49			
Type of House						
Kacha house	36	8	40	5.03	4	.283
Pukka house	42	3	30			
Flat	17	5	19			

Chi-square test; ('p' values)

Discussion

Among 200 participants, various side effects were noted among cancer patients: hair loss, nausea and vomiting, loss of appetite, diarrhoea or constipation, dry and darkened skin, serpentine hyperpigmentation, low white blood cell count, fatigue, bruises and gum bleeding, numbness and changes in sensation, mucositis, and chemotherapy extravasation. Moreover, a prospective cohort study in Australia involving 499 participants with a median follow-up of 5.64 months revealed significant findings. During the study period, 86% of participants reported at least one side effect, with 27% experiencing a grade IV side effect, most commonly fatigue or dyspnoea. Fatigue emerged as the most prevalent side effect overall (85%), followed by diarrhoea (74%) and constipation (74%). Prevalence and incidence rates remained consistent across various side effects and cancer types. Interestingly, age emerged as the sole demographic factor associated with side effect incidence, with older individuals less likely to report side effects (14). A subsequent study conducted on cancer patients revealed a correlation between mental health issues like depression and anxiety and the duration since cancer diagnosis. The study suggested that periodic screening for depression, followed by psychological counselling for affected patients, should be integrated into the treatment regimen (12). Similarly, another study emphasized that chemoradiation treatment exerted a significant impact on depression scores, which tended to worsen throughout therapy due to side effects like pain, mucositis, breathing difficulties, and communication challenges (15). Regarding coping mechanisms, the current study findings revealed that cancer patients with primary and secondary education backgrounds exhibited higher coping scores with chemotherapy side effects. In the positive focus coping subdomain, female patients from rural backgrounds with secondary education demonstrated heightened coping strategies. Conversely, the diversion domain showed no significant differences in coping strategies between rural and urban cancer patients (p<.05). This highlights the need for healthcare providers to tailor communication and educational interventions to meet the individual needs of patients, particularly those with lower educational backgrounds (16). Providing simplified, culturally appropriate educational materials and engaging in shared decision-making may help mitigate the intensity of side effects by improving patients' ability to manage and report symptoms effectively (13). These findings suggest integrating personalized patient education into treatment plans could enhance overall care and well-being during chemotherapy (7,17). In India, cultural factors play a significant role in shaping cancer patients' experiences and coping strategies (13). Family support is a cornerstone of Indian culture, and many patients rely heavily on their families for emotional, financial, and physical assistance during treatment. This substantial family network can provide comfort and resilience but may also impose pressure, as families often take on the responsibility of decision-making and caregiving (18). Additionally, societal stigma surrounding cancer can affect how patients perceive their illness and how others treat them. The fear of social isolation or discrimination may lead to delays in seeking treatment or reluctance to discuss their diagnosis openly (19). These cultural factors highlight the need for culturally sensitive care that recognizes the interplay between traditional beliefs, family dynamics, and the healthcare system (18). Overall findings of the study revealed that, out of the 200 patients, 44.5% encountered mild side effects, 21.5% experienced moderate intensity, and 34% faced severe intensity. Regarding coping strategies, 44.5% demonstrated good levels, 8.5% displayed average levels, and 47% exhibited poor levels. Our findings indicated a significant association between coping strategies and the severity of chemotherapy side effects, as evaluated through a structured questionnaire. The study highlighted that 44.5% of participants exhibited a notable level of coping strategies despite facing severe chemotherapy side effects. Analysis revealed a statistically significant association between the intensity of chemotherapy side effects and coping strategies across selected demographic variables (p<.05). Notably, higher intensity side effects were linked to improved coping strategies among participants. Furthermore, the research identified that 59.3% of subjects experienced high levels of distress, with 60% demonstrating moderate coping mechanisms. Correlation analysis indicated a weak negative correlation (r =.083)

between distress levels and passive coping strategies, while a weak positive correlation (r = .238) was observed with active coping strategies. Similarly, another study conducted in India reported that several factors were significantly associated with distress, including gender, financial source for treatment, diagnosis, type of chemotherapeutic drug, number of treatment cycles, and the primary coping strategy adopted by patients (p<.05) (10). Considering mental health is crucial for cancer patients, as chemotherapy can significantly affect their cancer experience, treatment adherence, overall well-being, and ability to cope with the side effects of treatment. Lewandowska *et al.,* in 2020 study with Polish cancer patients undergoing chemotherapy highlighted the profound negative impact cancer has on various aspects of health (20). This impact is associated with the nature of the disease, the treatments administered, the duration of treatment, and the illness. Somatic symptoms are prevalent throughout the stages of cancer and are closely associated with increased disability (20). The factors influencing symptom occurrence significantly depend on the disease stage, the number of chemotherapy cycles undergone, and the duration of the illness (6). Coping strategies play a pivotal role in mitigating the impact of life's stressful events. Coping with cancer encompasses a spectrum of attitudes and practices adopted to uphold health, well-being, and contentment while navigating the challenges of the disease (21). An analogous study conducted on Indian patients revealed higher levels of disengagement, such as avoiding problems or ceasing attempts to cope, among cancer patients. These individuals primarily resorted to maladaptive strategies like self-blame and behavioral disengagement, with psychological distress emerging as a significant predictor (17). Research has demonstrated a clear relation between experiencing of the intensity of chemotherapy side effects and the enhancement of coping strategies, skills, and mental well-being among cancer patients. Psychosocial interventions, in particular, can provide valuable support to individuals undergoing chemotherapy, as they may not have previously received such targeted assistance to address their emotional and problem-focused coping needs (2). Interventions administered before or at the outset of chemotherapy, even shortly beforehand, have shown significant potential to improve mental health outcomes and facilitate effective coping mechanisms during the challenging treatment period. Furthermore, a systematic analysis highlights various health interventions, including educational, psychosocial, physical, and psychological symptom management approaches, as well as mindfulness, pharmacologic therapy, exercise, and telemedicine, all of which contribute positively to the overall health of cancer patients. These interventions play a crucial role in enhancing the quality of life for individuals undergoing chemotherapy (16). On the flip side, a different study conducted in India revealed that individuals with head and neck cancer utilized both emotion-oriented and problem-oriented coping strategies consistently throughout their experience with the illness. This pattern persisted regardless of variables such as the location of the cancer, type of treatment received, age, level of education, or prognosis (22). Similarly, research involving chemotherapy patients in Iran discovered no statistically significant correlation between coping mechanisms and factors like age, gender, cancer stage, treatment type, or duration of the disease (23). Despite the significant psychological and functional impact of chemotherapy side effects on cancer patients, this aspect often goes unaddressed by the physicians providing treatment (24). This gap in care highlights the necessity for collaboration with mental health professionals and underscores the importance of institutions exploring innovative approaches to bolster patient support and provide comprehensive care (7).

Study Strengths and Limitations

The strength of this study lies in its use of a validated tool to assess the intensity of chemotherapy side effects and coping mechanisms among cancer patients across various settings and cancer types. This approach provides a comprehensive evaluation of the relationship between side effects and coping strategies in a diverse patient population. However, this study has several limitations. The quantification of chemotherapy-related symptoms covers a broad spectrum but does not specify the underlying causes for each side effect. Additionally, while coping strategies for individual symptoms can significantly impact mental health

outcomes, they were not fully explored in this study. The cross-sectional design further limits the ability to assess the long-term impact of chemotherapy side effects and coping strategies on patients' well-being. Conducting the study at a single hospital may introduce selection bias, limiting the generalizability of the findings to other regions and populations. The absence of a control group of cancer patients not receiving chemotherapy also hinders direct comparisons, making it difficult to isolate the specific effects of chemotherapy on side effects and coping mechanisms. These limitations should be considered when interpreting the findings and in planning future research. To address these gaps, future studies could adopt a mixed-methods approach, incorporating qualitative research such as focus group discussions and key informant interviews. Such methods would provide deeper insights into cancer patients' coping strategies, enriching our understanding and facilitating the development of more tailored and comprehensive support systems.

Advances in Knowledge

The study's findings will be a valuable resource for healthcare professionals, particularly nurses, aiding in their understanding of patients' situations and the coping strategies they can employ to manage chemotherapy side effects.

Application to Patient Care

The study emphasizes the importance of educating healthcare professionals, particularly nurses, about the significance of counselling cancer patients undergoing chemotherapy and providing them with support during their treatment journey.

Conclusion

This study reveals a statistically significant relationship between coping strategies and the intensity of chemotherapy side effects. Patients with more effective coping strategies tend to experience lower-intensity side effects, highlighting the importance of empowering patients with adaptive coping mechanisms. The findings suggest that addressing coping strategies and managing side effects can enhance patient well-being during chemotherapy. Therefore, healthcare providers should focus on integrating coping skills training and mental health support into chemotherapy care to help patients better manage side effects and improve their treatment experience.

Abbreviation

None.

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Author Contributions

Das S and Siva N conceived the research topic and formulated the research concepts, questions, and objectives. Itishree P, Hema M, and Karishma S prepared the protocol and proceeded with the IEC process, obtaining permission from authorities. Hema M, Karishma S, and RNP collected the data. Das S and Siva N assisted with the data analysis. Hema M, Karishma S and Ram NP prepared the manuscript with assistance from Itishraa P, Siva N and Das S edited and finalised the manuscript. All authors reviewed and approved the final manuscript.

Conflict of Interest

All authors declare no conflict of interest regarding this research.

Ethics Approval

The study commenced following the Institutional Ethics Committee of SUM Nursing College, Siksha 'O' Anusandhan University (Reg. No. [SOADU/SNC/IRB/429/2023]).

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