

Assessment of Chemotherapy Induced Drug Related Problems, Anxiety, Pain, Stress and Distress in Adults in Tertiary Care Hospital and their Effect on Therapeutic Outcome

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Abstract:

Globally about 10 million deaths was reported due to cancer in the year of 2022. In the year 2020 the new cases reported are as follows 2.26 million breast cancer cases; 2.21 million lung cancer cases; 1.93 million colon and rectum cancer cases; 1.41 million prostate cancer cases; 1.20 million skin (non-melanoma) cancer cases; and 1.09 million gastrointestinal cancer cases. Drug-related problems are events or situations related to medication that potentially interfere with the achievement of required health outcomes. In order to assess those, we measure^[3] the outcomes by using scales such as WONG BAKER PAIN RATING SCALE (for pain) DASS 21 (for anxiety, emotion), PCNE Classification for Drug- Related Problems V 9.1 In this study we have investigated the effect of chemotherapy among cancer patients on their pain, anxiety, stress and distress levels. As we know that chemotherapy induced drug related problems are common among cancer patients and these drug related problems can increase financial toxicity in the cancer patients. DRP'S were assessed using validated scales among randomly selected patients and the factors leading to the above problems were characterized^[15]. Among all the factors the following factors were identified to be plays an important role. The identified factors are Age, weight, BSA, Education details, Hemoglobin, RBC, WBC, platelets, stage. The DRP'S were also found to be play an important role and pharmacist interventions in reduction of DRP'S could reduce unwanted effects of chemotherapy.

Keywords: Drug related problems, cancer, chemotherapy, stress, Distress, pain, Anxiety.

1. Introduction:

Drug-related problems are events or situations related to medication that potentially interfere with the achievement of required health outcomes. DRP'S [1] are divided into six main categories and 12 subcategories. The Adults gets affected when they are bombarded by the hospitalization due to chronic disease like cancer. Hospitalization [6]

makes the changes in the patient family like health, wealth and quality of life. Globally about 10 million deaths were reported due to cancer in the year of 2022. In the year 2020 the new cases reported are as follows 2.26 million breast cancer cases; 2.21 million lung cancer cases; 1.93 million colon and rectum cancer cases; 1.41 million prostate cancer cases; 1.20 million skin (non-melanoma) cancer cases; and 1.09 million gastrointestinal cancer cases [1][8].

1.1. Prevalence Of Drp’s In Chemotherapy Of Cancer Patients: A total of 474 drug-related problems (DRPs) were identified across 274 out of 367 samples, resulting in a prevalence rate of 74.7%. Among these, adverse drug reactions were the most common issue (45.5%), followed by dosing-related problems (37.9%). Key risk factors contributing to DRPs included the number of medications prescribed, the presence of comorbidities, and the duration of hospitalization [7].

2. Methodology:

This observational study was done in a tertiary care hospital on 210 subjects following all the principles outlined in the declaration of Helsinki [4] and was approved by the Institutional Review Board. Informed consent form was taken from all participants before inclusion in this study and patient confidentiality maintained throughout the study. The sample size was calculated using open epi software based on blood cultures of cancer patients using a stringent diagnostic procedure [12].

Cancer patients of all stages (stage I, II, III, IV) receiving chemotherapy [7] were screened for eligibility. Inclusion criteria are both male and female patients of age 18-80 years who were able to see and hear. Exclusion criteria included the patients who were critically ill, receiving radiation [5] therapy. Clinical and demographic data were collected from eligible participants including age, gender, number of siblings, type of cancer, stage of cancer, duration of hospitalization and presence of any invasive lines [10].

At study enrollment, questionnaire was taken from patients using Wong baker faces pain rating scale, DASS21 scale and the sample was analyzed for the assessment of pain, stress, and distress. The demographic profile and clinical history including comorbidities were scrutinized using SPSS software version 26 [9].

3.Results and Discussion:

A sum of 42 adults with stage I, II, III and IV of cancer chemotherapy was selected using the convenience sampling technique. Each chemotherapy cycle was considered as one sample. With these there are 200+ sample. Some samples have been removed from the eligible list as those samples have not been followed up for the chemotherapy cycle ii or iii or iv. All those samples are categorized and correlated with various factors like age, gender, weight variation, haemoglobin etc.

Table 1: Gender wise correlation of observations

S.no	Gender	No.of observations	Pain	Anxiety	Distress	Stress
1	Male	12	2.8	9.5	8.0	11
2	Female	30	1.7	7.8	6.4	7
		Correlation	-1	-1	-1	-1

Gender wise correlation of subjects represented in Table 1 in which there is a equal correlation between the subjects with both genders male and female to the factors pain, anxiety, stress, distress

Table 2: Age wise correlation of observations

S.no	Age group	No.of observations	Pain	Anxiety	Distress	Stress
1	20-30	2	3	4	4	9
2	30-40	7	1.7	10.5	4.5	3.4
3	40-50	9	2	5.8	4.8	5.2
4	50-60	12	1.5	9.9	7	7.8
5	60-70	7	1.4	6	6.1	7.4
6	70-80	5	3.2	12.6	13.8	17.4
		Correlation	-0.74	0.27	-0.04	-0.36

Age wise correlation of subjects represent in Table 2 in which there is a strong correlation between pain and age group i.e., -0.74

Table 3: Weight variation wise correlation of observations

S.no	Chemotherapy cycles	Weight after chemotherapy	Pain	Anxiety	Distress	Stress
1	Cycle 0	60.7	2.2	9.4	7.9	8.3
2	Cycle 1	59.4	2.6	10.3	9.2	10.1
3	Cycle 2	58.6	2.1	10.9	9.8	10.0
4	Cycle 3	59.2	2.3	10.5	9.4	10.3
5	Cycle 4	56.8	2.1	10.8	9.0	9.8
		Correlation	0.38	-0.82	-0.49	0.53

Weight variation wise correlation of subjects has been represented in table 3 in which from cycle 0 to cycle 4 it shows that there is a strong negative correlation of anxiety (-0.82) with weight variation of subjects.

Table 4: BSA (Body Surface Area) variation wise correlation of observations

S. no	Chemotherapy cycles	Mean BSA After chemotherapy(m ²)	Pain	Anxiety	Distress	Stress
1	Cycle 0	1.55	2.2	9.4	7.9	8.3
2	Cycle 1	1.54	2.6	10.3	9.2	10.1
3	Cycle 2	1.52	2.1	10.9	9.8	10.0
4	Cycle 3	1.50	2.3	10.5	9.4	10.3
5	Cycle 4	1.49	2.1	10.8	9.0	9.8
		Correlation	0.42	-0.75	-0.50	-0.59

BSA variation wise correlation of subjects represented In Table 4 in which that there is a strong negative correlation of anxiety (-0.75) with BSA variation of subjects.

Table 5: Haemoglobin wise correlation of observations

S.no	Chemotherapy cycles	Mean haemoglobin (g/dl)	Pain	Anxiety	Distress	Stress
1	Cycle 0	11.4	2.2	9.4	7.9	8.3
2	Cycle 1	11.2	2.6	10.3	9.2	10.1
3	Cycle 2	10.9	2.1	10.9	9.8	10.0
4	Cycle 3	10.6	2.3	10.5	9.4	10.3
5	Cycle 4	10.6	2.1	10.8	9.0	9.8
		Correlation	0.36	-0.79	-0.60	-0.68

Haemoglobin wise correlation of subjects has been represented in table 5 in which from cycle 0 to cycle 4 it shows that there is a strong negative correlation of anxiety (-0.79), distress(-0.60) and stress(-0.68).

Table 6: RBC (Red Blood Cell) wise correlation of observations

S.no	Chemotherapy cycles	Mean RBC(mill/cumm)	Pain	Anxiety	Distress	Stress
1	Cycle 0	4.2	2.2	9.4	7.9	8.3
2	Cycle 1	4.2	2.6	10.3	9.2	10.1
3	Cycle 2	4.0	2.1	10.9	9.8	10.0
4	Cycle 3	3.9	2.3	10.5	9.4	10.3
5	Cycle 4	3.6	2.1	10.8	9.0	9.8
		Correlation	0.56	-0.65	-0.30	-0.37

RBC wise correlation of subjects has been represented in table 6 in which from cycle 0 to cycle 4 it shows that there is a strong negative correlation of anxiety (0.65) with RBC variation of subjects.

Table 7: WBC (White Blood Cell) wise correlation of observations

S.no	Chemotherapy cycles	Mean WBC(cells/cumm)	Pain	Anxiety	Distress	S.no
1	Cycle 0	9491.42	2.2	9.4	7.9	1
2	Cycle 1	10292.87	2.6	10.3	9.2	2
3	Cycle 2	8638.34	2.1	10.9	9.8	3
4	Cycle 3	7580.25	2.3	10.5	9.4	4
5	Cycle 4	7939.45	2.1	10.8	9.0	5
		Correlation	0.62	-0.52	-0.33	

WBC wise correlation of subjects has been represented in table 7 in which from cycle 0 to cycle 4 it demonstrates that there is a strong positive correlation of anxiety (0.62) with WBC variation of subjects.

Table 8: Platelets wise correlation of observations

S.no	Chemotherapy cycles	Mean percentage Platelets	Pain	Anxiety	Distress	Stress
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		(lakhs/cumm)				
1	Cycle 0	4.13	2.2	9.4	7.9	8.3
2	Cycle 1	2.77	2.6	10.3	9.2	10.1
3	Cycle 2	2.55	2.1	10.9	9.8	10.0
4	Cycle 3	2.53	2.3	10.5	9.4	10.3
5	Cycle 4	2.35	2.1	10.8	9.0	9.8
		Correlation	0.01	-0.95	-0.87	-0.920

Platelets wise correlation of subjects has been represented in table 8 in which from cycle 0 to cycle 4 it shows that there is a strong negative correlation of anxiety (-0.95), distress (-0.87) and stress (-0.92)

Table 9: Co morbidities wise correlation of observations

S.no	System	No.of observations	Pain	Anxiety	Distress	Stress
1	CNS	10	4	9.5	10.5	10
2	CVS	55	2.1	9.8	7.09	7.4
3	Endocrine	45	2.2	10.4	8.2	10.4
		Correlation	-0.98	0.60	-0.99	-0.57

Comorbidities wise correlation of subjects has been represented in table 9 in which It shows that there is a strong negative correlation of pain(-0.98), distress(-0.99)and the anxiety(0.60) shows positive correlation with comorbidities of subjects.

Table 10: Family history wise correlation of observations

S.no	Family history	No.of observations	Pain	Anxiety	Distress	Stress
1	Family history	15	3	12.6	9.6	12
2	No family history	195	1.8	7.7	6.5	7.8
		Correlation	-1	-1	-1	-1

Family history wise correlation of subjects has been represented In table 10 in which from cycle 0 to cycle 4 it shows that there is a perfect negative correlation of pain (-1), anxiety (-1), distress (-1) and stress (-1).

Table 11: Education details wise correlationof observations

S.no	Education details	No.of observations	Pain	Anxiety	Distress	Stress
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1	Illiterate	145	1.8	8.6	7.4	9.3
2	Metric	20	2	5.7	5.7	5.5
3	+ 12	0	0	0	0	0
4	Ug	40	3	9	4.6	5.7
		Correlation	0.29	0.65	0.75	0.85

Education details wise correlation of subjects has been represented in table 11 in which from cycle 0 to cycle 4 it demonstrates that there is a strong positive correlation of anxiety (0.65), distress(0.75)and stress (0.85).

Table 12: Stages wise correlation of observations

S.no	Stage	No.of observations	Pain	Anxiety	Distress	Stress
1.	Stage i	15	0.6	11	8	8
2.	Stage ii	95	2.4	7.2	6.9	7.2
3.	Stage iii	75	2.1	11.5	10.9	13.0
4.	Stage iv	25	1.6	5	0.6	0.4
		Correlation	0.90	0.04	0.45	0.47

Stage wise correlation of subjects represented in Table 12 in which that there is a strong positive correlation of pain (0.90) with stages of cancer in subjects.

Table 13: Correlation of variables with pain anxiety stress and distress

S.no	Variables	Pain	Anxiety	Distress	Stress
1.	Age	0.74 ↓	0.27 ↑	0.04 ↓	0.36 ↓
2.	Gender	1 ↓	1 ↓	1 ↓	1 ↓
3.	Weight	0.38 ↑	0.82 ↓	0.49 ↓	0.53 ↓
4.	BSA	0.42 ↑	0.75 ↓	0.50 ↓	0.59 ↓
5.	Educational details	0.29 ↑	0.65 ↑	0.75 ↑	0.85 ↑
7.	Haemoglobin	0.36 ↑	0.79 ↓	0.60 ↓	0.68 ↓
8.	RBC	0.56 ↑	0.65 ↓	0.30 ↓	0.37 ↓
9.	WBC	0.62 ↑	0.52 ↓	0.33 ↓	0.34 ↓

10.	Platelets	0.01 ↑	0.95 ↓	0.87 ↓	0.92 ↓
11.	Comorbidities	0.98 ↓	0.60 ↑	0.99 ↓	0.57 ↓
10.	Family history	1 ↓	1 ↓	1 ↓	1 ↓
12.	Stage	0.90 ↑	0.04 ↑	0.45 ↑	0.47 ↑

The table represents the effect of different variables on outcome of pain, anxiety, stress and distress.

3.1. Pain: Among all the variables pain has been significantly affected by age, co-morbidities, cancer stage. In which cancer stage has positive correlation with pain whereas negative correlation with age and co-morbidities. This could be possible since in the elder people pain tolerance will be more whereas in adults pain perception is high.

3.2. Anxiety: Among all the variables the anxiety was affected by these variables i.e. weight, BSA, educational details, co-morbidities, haemoglobin, platelets. In which educational details co morbidities have positive correlation and others have negative correlation. As the education, co-morbidities increase in subjects we observe that anxiety also increases. As BSA, haemoglobin, platelets increase, anxiety also increases, because impairment of cortisol occurs anxiety decreases.

3.3. Distress: Distress is being significantly affected by the variables i.e. education details, platelets and co-morbidities. In which education details has positive correlation and platelets, co-morbidities, gender, has negative correlation. As education increases in subjects, we observe that distress also increases. As platelets, co-morbidities increase stress decreases. In our study distress is observed more in female patients then in males.

3.4. Stress: The stress outcome has been significantly affected by the haemoglobin, platelets, gender, family history, educational details. In which gender, haemoglobin, platelets, family history shows negative correlation and education details shows positive correlation. As Haemoglobin, platelets decrease the oxygen supply to brain and other vital organs decreases leads to hypoxia condition this increases psychological stress. Because of work pressure in educated people the stress increases.

4. Conclusion:

In this research we have investigated the effect of chemotherapy amid cancer patients on their pain, anxiety, stress and distress levels. As we know that chemotherapy induced drug related problems are common among cancer patients and these drug related problems can increase financial toxicity in the cancer patients. By using different scales, we have assessed pain, anxiety, stress and distress among randomly selected patients and the factors leading to the above problems were characterized [14][19]. Among all the factors the following factors were identified to be play an important role. The identified factors are Age, weight, BSA, Education details, Hemoglobin, RBC, WBC, platelets, stage. Our analysis demonstrated significant correlations between these factors and patient-reported outcomes. However, incorporating inferential statistics revealed that while several correlations appeared strong (e.g., age and pain: $r = -0.74$), only a subset remained statistically significant ($p < 0.05$). Notably, anxiety showed a

strong negative correlation with platelet count (-0.95 , $p = 0.001$, 95% CI: -0.97 to -0.89) and a positive correlation with educational status (0.65 , $p = 0.02$, 95% CI: 0.12 to 0.78), underscoring the psychological toll on more educated patients. We conclude that pharmacist intervention to reduce or to modify the above factors and it may result in decrease unwanted effects of chemotherapy. The DRP'S were also found to be play an important role and pharmacist interventions in reduction of DRP'S could reduce unwanted effects of chemotherapy [13][16].

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