



(RESEARCH ARTICLE)



IMPACT OF PREOPERATIVE ANXIETY ON HEMODYNAMIC PARAMETERS IN COUNSELLED VERSUS NON-COUNSELLED PATIENTS UNDERGOING GENERAL SURGERY IN NORTHWEST GENERAL HOSPITAL AND RESEARCH CENTER

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ABSTRACT

Background: Anxiety is a natural response to surgery and anesthesia depending to various factors and manifesting different effects on patients. The aim of this study was to find out counselling effect on anxiety levels and hemodynamic parameters of patients. Also to find out whether counselled patients manage their anxiety symptoms better than the non-counselled patients.

Materials and Methods: A cross-sectional study was carried out at Northwest General Hospital and Research Centre. Patients were divided into two groups, counselled and non-counselled group. Counselled patients counselling was done by researchers and non-counselled were managed by hospital ward staff. A pre-tested questionnaire including demographics, VAS score and hemodynamic parameters was completed for all the patients. Data was analyzed through R software version 4.6.1.

Results: No significant differences were obvious in counselled group after counselling. The VAS score and hemodynamic values either remain the same or increases slightly in both groups. However, there was a slight improvement in systolic blood pressure after counselling in counselled group.

Conclusion: Mostly female patients, significant low education levels and no previous surgical experience are the main factors in increase anxiety which remains almost unchanged after counselling.

Keywords: Pre-Operative Anxiety, Hemodynamic Parameters, Counselling, Visual Analogue Scale for Anxiety Score.

1 INTRODUCTION

A wide definition of anxiety is an emotion that involves assessing an uncertain or uncontrollable threat and is linked to subjective sensations of apprehension about potential or imminent damage. (1) Spielberger and Krasner propose that anxiety can be categorized into state anxiety and trait anxiety. State anxiety refers to an individual's current anxiety level, influenced by situational factors, and encompasses feelings of tension and worry. It is a dynamic emotional state that fluctuates in both intensity and duration. (2) In contrast, trait anxiety refers to a person's overall tendency to experience anxiety, often described as their "anxiety proneness." (3) In the fields of anesthesia and perioperative care, preoperative anxiety is a common occurrence. Preoperative anxiety is a widespread issue that has been documented in numerous international research, indicating that it is a significant global concern during surgical procedures with incidence rates of 60% to 90% among patients. (4) Fears related to anesthesia and surgery are included in preoperative anxiety. The latter's intensities vary greatly among patients. (5) Preoperative anxiety ranges in prevalence from 16.7% to 97% worldwide, with a pooled frequency of 48% found in studies conducted in both industrialized and developing nations. (6) With rates ranging from 16% to 81% in the pediatric population, preoperative anxiety in children is influenced by both their age and parental concern. (7)

Stimuli that induce anxiety trigger a neuroendocrine reaction that adds to the feeling of anxiety. This neuroendocrine response has distinct impacts on metabolism and hemodynamics. (8) Anxiety causes bodily changes through stimulating the adrenal medulla and sympathetic nervous system, which in turn produces catecholamines, and by triggering the hypothalamic-pituitary-adrenal axis, which produces cortisol. It frequently appears as undiagnosed hypertension that is treated right away with antihypertensive drugs. (9) Patients with depression have slower healing diabetic foot ulcers, while patients who experienced higher levels of stress in the month before surgery had slower healing surgical wounds. Due to their ability to suppress the immune system, higher cortisol levels may be a factor in the association between stress and slower healing. It has been demonstrated that highly stressed people's wounds have less local inflammatory cells and pro-inflammatory cytokines, such as interleukin-1. (10) Anxiety levels higher before surgery have been linked to hypertension, dysrhythmias, operation refusal, worsening symptoms of coronary artery disease, delayed wound healing, electrolyte and fluid imbalance, and an elevated risk of infection. Elevated anxiety has also been connected to higher morbidity and mortality, poor quality of life, and post-operative pain. (11) Additionally, patients' perceptions of discomfort, suffering, and worry may get worse due to this pre-operative anxiety. (12) Patients who experience anxiety react to anesthesia differently than those who do not. Anxiety-related vasoconstriction can make the preoperative intravenous catheter placement procedure challenging. (13) Preoperative anxiety in adults has been linked to longer recovery times and hospital stays, as well as greater postoperative pain and painkiller doses. (14) Preoperative anxiety has been linked to immune system suppression, elevated blood pressure and heart rate before, during, and after surgery, trouble carrying out everyday tasks, and impaired focus, according to studies. Moreover, it results in a diminished reaction to analgesics and anesthetic medications. (15)

2 LITERATURE REVIEW

In a 2010 study conducted by Won-Sung Kim in Masan, Korea, it was found that the availability of a preoperative anxiety scale can serve as a predictive factor for hemodynamic changes during anesthesia induction. The research demonstrated that elevated preoperative anxiety levels are significantly linked to alterations in mean blood pressure and heart rate during this phase of anesthesia. (16). A 2017 study by Somchart Raocharernporn et al. in Bangkok, Thailand, investigated hemodynamic changes and anxiety related to pain perception following impacted tooth removal. The findings revealed a notable increase in both blood pressure and heart rate among patients with high preoperative anxiety before the surgery. Additionally, the study indicated that blood pressure exhibited a significant difference ($P < 0.05$) in the preoperative phase. (17)

In a 2020 study by Arash Farbood et al. in Iran, researchers explored how preoperative depression and anxiety affect heart rate variability in women with breast cancer. The findings indicated that those with higher levels of preoperative anxiety experienced significantly increased systolic, diastolic, and mean blood pressure both prior to and following the induction of anesthesia. (18)

A study conducted by Jasmina Ahmetovic-Djug et al. examined the effects of preoperative anxiety on hemodynamic changes and anesthetic dosage during anesthesia induction. The results revealed that the average mean arterial pressure differed by 15.4 mmHg between the groups before and after anesthesia induction. However, no statistically significant association was found between anxiety levels and variations in blood pressure. (19)

In a 2019 study by Aysegul Bayrak et al., it was found that high preoperative anxiety significantly increased systolic and diastolic blood pressure, as well as heart rate values, before surgery and at the 5th, 15th, 30th, and 60th minutes compared to patients with low preoperative anxiety levels. (20) In a 2013 study by Liao Chunhui and Li Ju-Xiang et al., it was observed that systolic blood pressure (SBP) and diastolic blood pressure (DBP) steadily increased in

patients with high perioperative anxiety prior to the operation, reaching their peak just before entering the operating room. Specifically, SBP was significantly higher (136 ± 15 mmHg vs. 118 ± 14 mmHg, $P < 0.05$), as was DBP (79 ± 9 mmHg vs. 72 ± 9 mmHg, $P < 0.05$) compared to baseline values. Following the operation, both SBP and DBP decreased. (21)

A study by Jean Carlos Fernandes Goulart et al. in Brazil examined the influence of anxiety on blood pressure and heart rate during dental treatment. The findings indicated that there were no statistically significant differences in heart rate, systolic blood pressure, or diastolic blood pressure in relation to anxiety levels during the treatment. (22)

2.1 Rationale

This study explored how preoperative anxiety affected blood pressure, heart rate and mean arterial pressure and whether counselling before surgery could reduce these effects. It compared patients who received counselling to those who did not aiming to show the benefits of emotional support in improving surgical outcomes. Also, there was less literature available on counselled versus non-counselled in research works done at Northwest General Hospital and Research Centre.

3 MATERIALS AND METHODS

3.1 Study Design

Cross sectional study.

3.2 Study Setting

Northwest General Hospital and Research Center Peshawar.

3.3 Study Duration

This study was completed in 6 months after the approval of proposal from the institutional research board and ethical committee of northwest General Hospital and Research Center.

3.4 Study Groups

Patients were randomly selected in two groups.

- **Group-A:** This group contains counselled patients whose counselling was done by researchers.
- **Group-B:** This group contains all non-counselled patients whose counselling was done by hospital staff.

3.5 Sample Size

The sample size of 194 patients from Northwest General Hospital and Research Center was calculated through OpenEpi version 3 calculator with confidence of 95% and margin of error 5%.

3.6 Sampling Technique

Sampling technique was based on random sampling technique.

3.7 Inclusion Criteria

- All patients of elective general surgery
- Patients with ASA grading of I and II
- Patients willing to participate in the study
- Patients undergoing general anesthesia
- Age ranges from 18-50 years

3.8 Exclusion Criteria

- Patients previously on anti-anxiety medication
- Patients with comorbidities including cardiovascular diseases, trauma, neurological diseases etc.
- Age above 50 years
- Patients' refusal

3.9 Data Collection

Patients enlisted for surgery were enrolled and assessed for eligibility. Those not meeting the inclusion criteria or those refusing to participate were excluded and consent was taken from all patients willing to participate in the study. The patients were then randomly allocated to one of two groups. The data was collected on a pretested questionnaire for each patient. In this study we use visual analogue scale for anxiety as a tool to measure anxiety preoperatively.

3.10 Ethical Consideration

The director of the northwest general hospital and research center gave his approval for the data collection. only supervisors and primary data collectors had access to the entire collection of data, which was kept private.

3.11 Data Analysis

The data was analyzed with R version 4.6.1. Tables and graphs were generated after calculation of the data.

4 RESULTS

4.1 Demographic Characteristics

Table 1: Demographic Characteristics

Characteristic	Counselled	Non-Counselled
Sample Size (n)	97	97
Age (mean +/- SD)	39 +/- 11	38.4 +/- 11
Gender - Male n (%)	45 (46.4%)	44 (45.4%)
Gender - Female n (%)	52 (53.6%)	53 (54.6%)
No Education n (%)	55 (56.7%)	51 (52.6%)
High School n (%)	20 (20.6%)	16 (16.5%)
Undergraduate n (%)	21 (21.6%)	28 (28.9%)
Post Graduate n (%)	1 (1%)	2 (2.1%)
Previous Surgery - Yes n (%)	31 (32%)	40 (41.2%)
Previous Surgery - No n (%)	66 (68%)	57 (58.8%)
Biopsy n (%)	1 (1%)	7 (7.2%)
Laparoscopy n (%)	36 (37.1%)	14 (14.4%)
Minor Surgery n (%)	22 (22.7%)	38 (39.2%)
Major Surgery n (%)	38 (39.2%)	38 (39.2%)

Table 2 shows age of counselled patients in which 28 (28.9%) patients out of total 97 patients were between the age of range 18-30 and the remaining 69 (71.1%) patients were in the age range of 31-50. The mean age is 38 (38.3±11.03) years.

Table 2: Age in years of Counselled Patient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	28	28.9	28.9	28.9
	30-50	69	71.1	71.1	100.0
	Total	97	100.0	100.0	

Table 3 shows the age of non- counselled patients in which 26(26.8%) patients out of 97 were in age range of 18-30 while the remaining 71(73.2%) patients were in the range of 31-50. The mean age is 38 (38.9±10.97) years.

Table 3: Age in years of non-counselled patients

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	26	26.8	26.8	26.8
	31-50	71	73.2	73.2	100.0
	Total	97	100.0	100.0	

Table 4 shows the Gender of counselled patients in which 44 (45.4%) are males and the 53(54.6%) are females patients. So, most of the participants of counselled group were females.

Table 4: Gender of the counselled patient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male female Total	44	45.4	45.4	45.4
		53	54.6	54.6	100.0
		97	100.0	100.0	

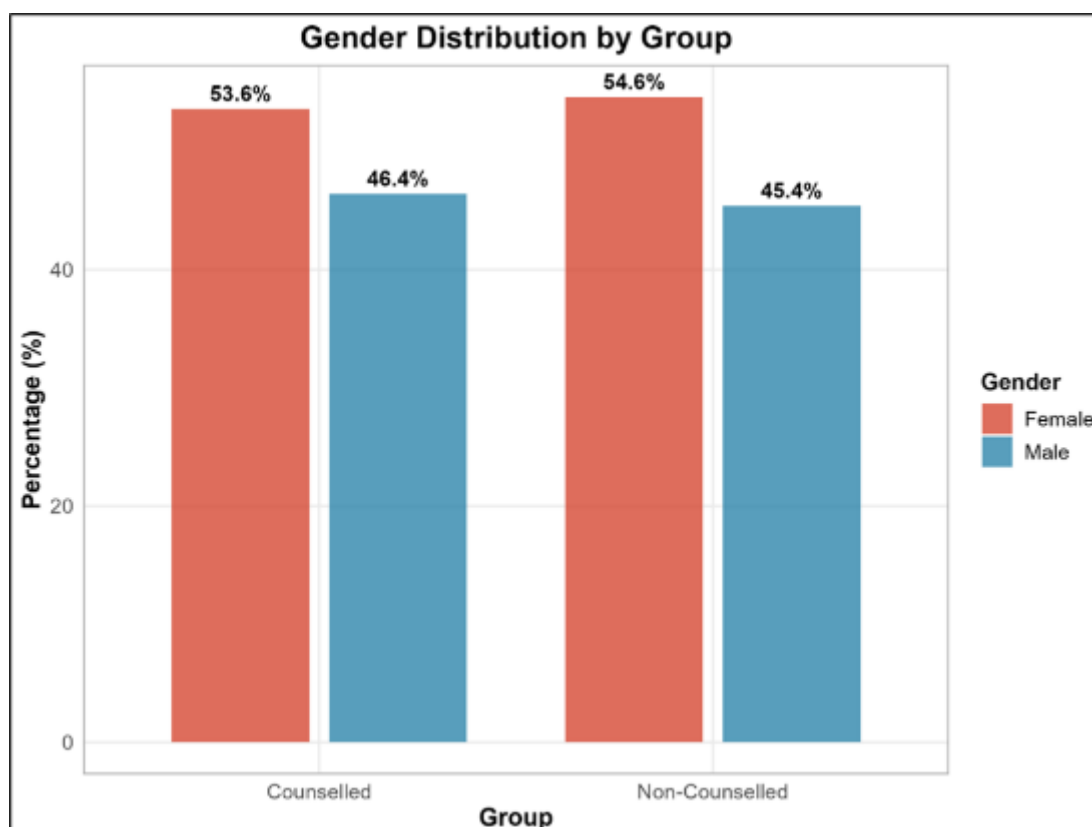
**Figure 1: Percentage of gender distribution by group**

Table 5 shows education levels of patients of counselled patients. Education levels were classified into 4 categories. According to above data 52 (53.6%) patients were uneducated, 16 (16.5%) were high school graduates, 27 (27.8%) were undergraduate and 2 (2.1%) patients were post educated. This data also shows that most of the patients who participated in counselled group were uneducated (53.6% out of 100%).

Table 5: Education level of counselled patient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no education	52	53.6	53.6	53.6
	high school graduate	16	16.5	16.5	70.1
	undergraduate	27	27.8	27.8	97.9
	post graduate	2	2.1	2.1	100.0
	Total	97	100.0	100.0	

Table 6 shows education levels of patients who were included in non-counselled group. Education levels were classified into 4 categories. According to the data in above table 56 (57.7%) patients were uneducated, 18 (18.6%) patients had high school education, 22 (22.7%) patients were undergraduates while 1 (1.0%) patient was post graduated. This data also shows that mostly patients participated in non-counselled group were uneducated (57.7% out of 100%).

Table 6: Education level of non-counselled group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no education	56	57.7	57.7	57.7
	high school education	18	18.6	18.6	76.3
	undergraduate	22	22.7	22.7	99.0
	post graduate	1	1.0	1.0	100.0
	Total	97	100.0	100.0	

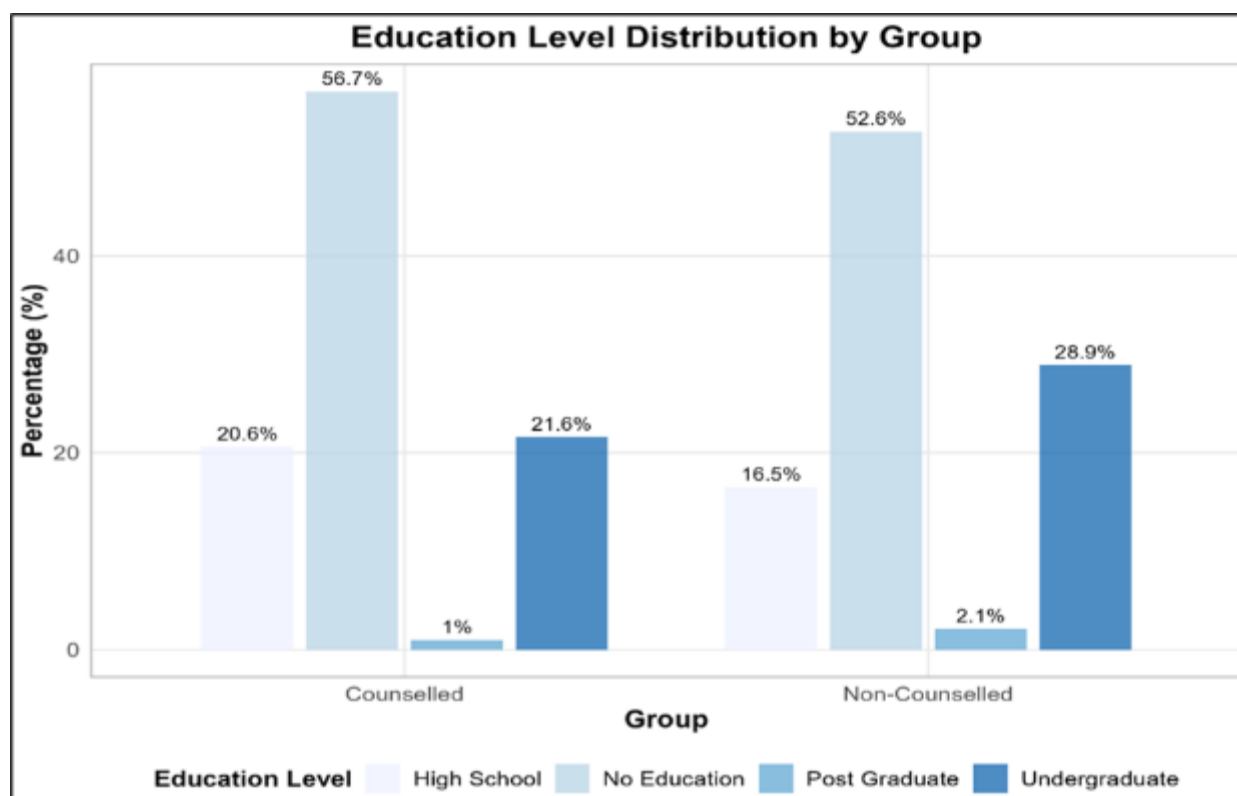
**Figure 2: Percentage of education level distribution by group**

Table 7 shows age correlation with anxiety score in counselled group patients. The patients of age range 18-30 have mostly mild anxiety, 15 (53.57%) patients out of total 28 patients while the similar is true for age range of 31-50, 57 (82.60%) patients out of 69. In general, before counselling most of patients have mild anxiety 72 (74.22%) out of 97 patients while the remaining 24 (24.74%) patients have moderate anxiety and only 1 (1.03%) had severe anxiety. All these values were clinically significant with a $p=0.007$.

Table 7: Age correlation with anxiety score before hospital counselled group

		Visual anxiety score before counselling			Total
		MILD	MODERATE	SEVERE	
Age in years	18-30	15	12	1	28
Total	30-50	57	12	0	69
		72	24	1	97

Table 8 shows correlation between age ranges and anxiety scores. The patients of age range 18-30 have mild anxiety, 15 (53.57%) out of 28 patients while the same is true for the patients of age range 31-50, 51 (73.91%) out of 69 patients have a mild anxiety. In general, most of the patients have mild anxiety after counselling done by researchers 66 (68.04%) out of 97 patients. The remaining 29 (28.89%) have moderate anxiety and only 2 (2.06%) have severe anxiety. All these values were clinically insignificant with $p=0.060$.

Table 8: Age ranges correlation and anxiety score after hospital counselled group

		Visual anxiety score after counselling			Total
		mild	moderate	severe	
Age in years	18-30	15	13	0	28
Total	30-50	51	16	2	69
		66	29	2	97

Table 9 shows correlation between age and anxiety in non-counselled group patients before hospital counselling. In age range 18-30, there were 15 (57.69%) out of 26 who had mild anxiety and 11 (42.30%) had moderate anxiety. In age range of 31-50, 63 (88.73%) had mild anxiety while 8 (11.26%) had moderate anxiety. In general, 78 (80.41%) out of 97 patients had mild anxiety. All these values were clinically significant at $p=0.001$.

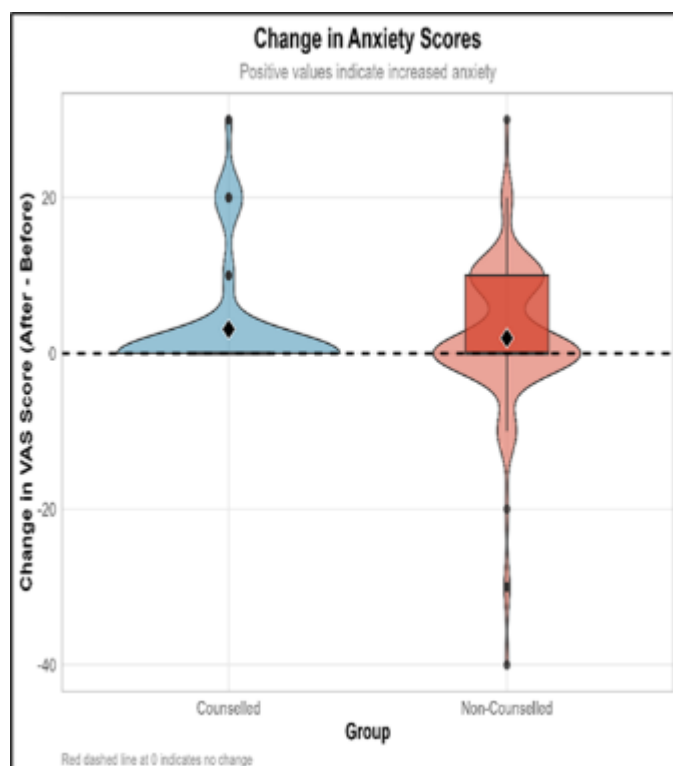
Table 9: Correlation between age and anxiety in before hospital non-counselled group

		Visual anxiety score before hospital counselling		Total
		mild	moderate	
Age in years	18-30	15	11	26
Total	31-50	63	8	71
		78	19	97

Table 10 shows correlation between age and anxiety score after hospital counselling. After hospital counselling 12 (46.15%) patients have mild anxiety while 14 (53.84%) had moderate anxiety in age range 18-30. In age range 31-50, 56 (78.87%) had mild anxiety while 15 (21.12%) had moderate anxiety. In general, 68 (70.10%) patients had mild anxiety after hospital counselling while 29 (29.89%) had moderate anxiety out of 97 patients. All these clinical values were significant at $p=0.002$

Table 10: Correlation between age and anxiety score after hospital counselling

		Visual anxiety score after hospital counselling		Total
		mild	moderate	
Age in years	18-30	12	14	26
Total	31-50	56	15	71
	68	29		97

**Figure 3: Change in Anxiety scores****Table 11: Before Counselling**

		Blood pressure before counselling			Total
		110/70-119/79	120/80-129/89	130/90-139/99	
Age in years	18-30	5	22	1	28
Total	30-50	9	31	29	69
	14	53	30	97	

Table 11 shows correlation between age and blood pressure in counselled group before counselling. In age range 18-30, there were 5 (17.85%) patients with BP in mild range (11/70-119/79), 22 (78.85%) patients had BP in moderate ranges (120/80-129/89) while 1 (3.57%) patient had severe BP (130/90-139/99). for the other range group 31-50, there were 9 (13.04%) who had mild BP, 31 (44.92%) had moderate BP while 29 (42.04%) patients had severe BP. In general, out of 97 patients in counselled group 14 (14.43%) patients had mild BP, 53 (54.63%) had moderate BP and 30 (30.92%) had severe BP. All these values were clinically significant with $p=0.001$.

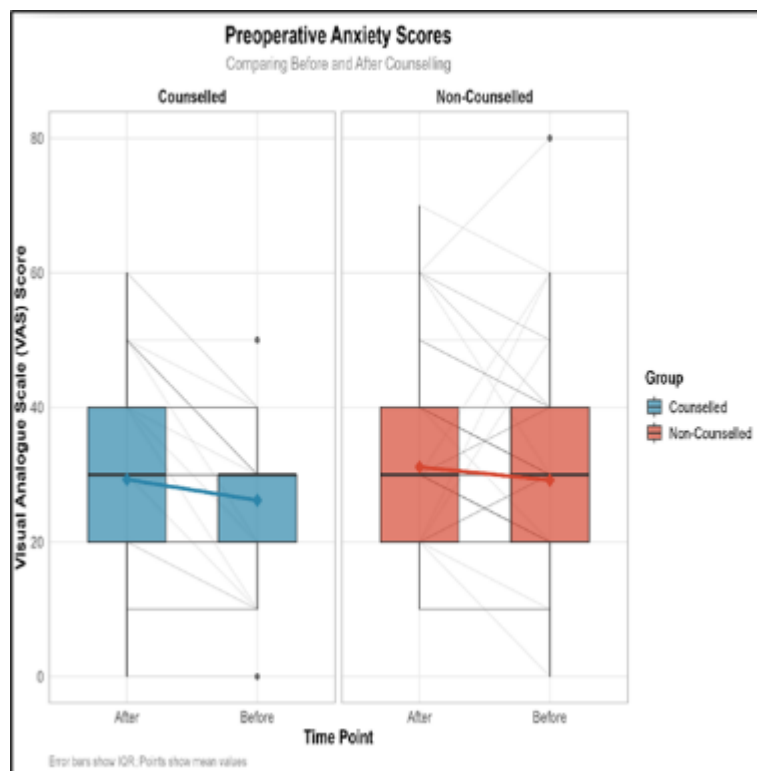


Figure 4: Preoperative Anxiety scores

Table 12 shows age correlation with BP in counselling group after counselling. In age ranges 18-30, there were 6 (21.42%) patients had mild BP, 15 (53.57%) had moderate BP and 7 (25%) patients had a severe BP. In age range 31-50, there were 8 (11.59%) patients with mild BP, 20 (28.98%) had moderate BP while 41 (59.42%) had severe BP. In general, out of 97 patients, 14 (14.43%) patients had mild BP (110/70-119/79), 35 (36.08%) had moderate BP (120/80-129/89) and 48 (49.48%) had severe BP (130/90-139/99). all the clinical values were significant with $p=0.009$.

Table 12: After counselling

		Blood pressure after counselling			Total
		110/70-119/79	120/80-129/89	130/90-139/99	
Age in years Total	18-30	6	15	7	28
	30-50	8	20	41	69
		14	35	48	97

Table 13 shows correlation between age and blood pressure in non-counselled patient group. In age range 18-30, there were 2 (7.6%) patients with mild BP, 24 (92.30%) patients had mild BP. In age range 31-50, there were 2 (2.81%) patients with mild BP, 45 (63.38%) patients had moderate BP and 24 (33.08%) patients had severe BP. In general, out of 97 patients 4 (4.12%) had mild blood pressure, 69 (71.13%) had moderate BP and 24 (24.74%) had severe blood pressure. All the clinical values were significant at $p=0.002$.

Table 13: Before Hospital Counselling

		Blood pressure before counselling			Total
		110/70-119/79	120/80-129/89	130/90-139/99	
Age in years Total	18-30	2	24	0	26
	31-50	2	45	24	71
		4	69	24	97

Table 14 shows age correlation with blood pressure after counselling in non-counselled group. In age range 18-30, there was 1 (3.8%) patient with mild BP, 21 (80.76%) patients with moderate BP and 4 (15.38%) with severe BP. In age range 31-50, there were 44 (61.97%) patients with moderate BP and 27 (38.02%) patients had severe BP. In general, out of 97 patients there was 1 (1.03%) patient with mild BP, 65 (67.01%) patients with moderate BP and 31 (31.95%) with severe BP. All the values were insignificant at $p=0.034$.

Table 14: After Hospital Counselling

		Blood pressure after counselling			Total
		110/70-119/79	120/80-129/89	130/90-139/99	
Age in years	18-30	1	21	4	26
Total	31-50	0	44	27	71
		1	65	31	97

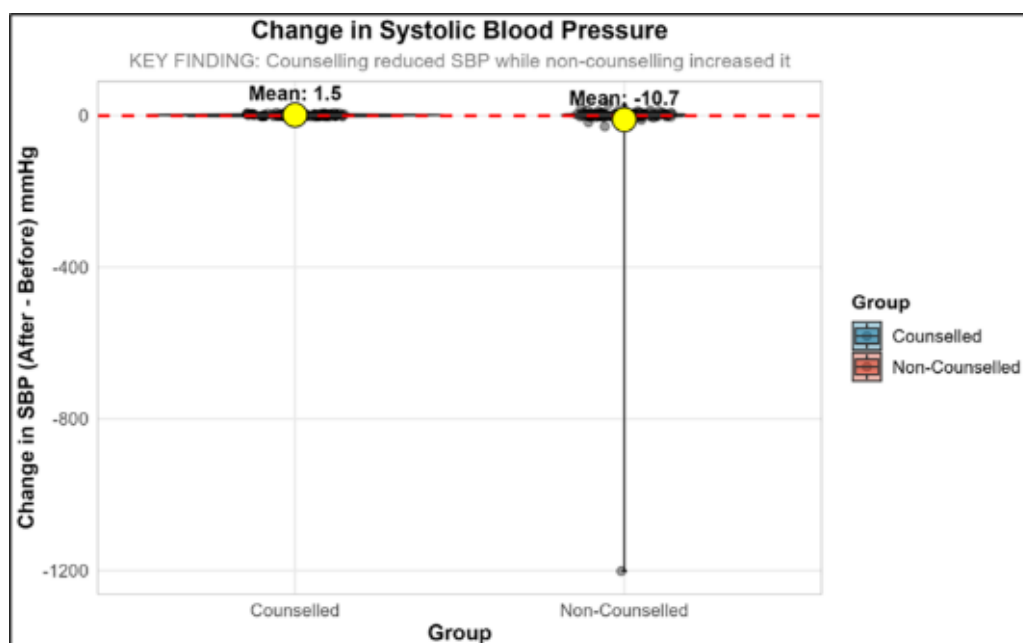


Figure 5: Change in Systolic blood pressure

Table 15: Combine comparison of counselled and non-counselled

Variable	Counseled by hospital staff		Counseled by researchers	
	Before Counseling (mean)	After Counseling (mean)	Before Counseling (mean)	After Counseling (mean)
VAS score	26.18	29.27	29.17	31.13
SBP	125.97	127.43	138.51	127.77
DBP	81.81	82.33	81.76	82.17
HR	74.20	74.61	78.26	78.58
MAP	96.37	97.10	95.87	97.00

Comparing the means in the two groups, i.e., hospital staff counselled group and researchers counselled group, diastolic blood pressure and heart rate were not affected by counselling. Visual anxiety score, and mean arterial pressure increased in both groups with counselling. Counselling had one positive effect on systolic blood pressure in the group counselled by researchers; their systolic blood pressure dropped from 138.51 to 127.77 while in the group that were

counselled by hospital staff there was an increase in the systolic blood pressure from 125.97 to 127.43. Effect of counselling by hospital staff and researchers and means of variables before and after are presented in the table 15.

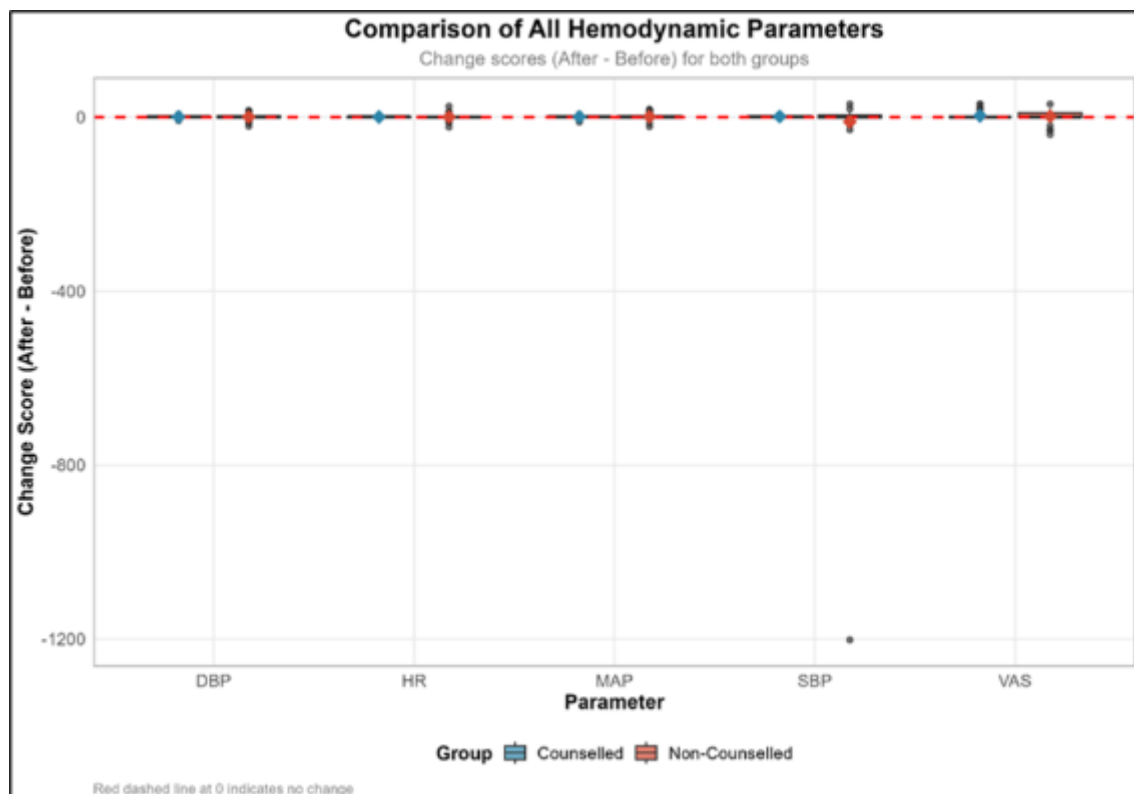


Figure 6: Comparison of all hemodynamic parameters

5 DISCUSSION

In our study there was an increase in VAS-A score in both counselled and non-counselled groups. Counselled group had anxiety score 29.17 before counselling and it was 31.13 after counselling. In non-counselled group before hospital intervention VAS-A score was 26.18 and it was 29.27 after hospital intervention. On comparing the results, we concluded that there was overall increase in patient's anxiety in both groups. This is in contrast with a study done in India. The patients were divided into three random groups and different interventions were made. Visual analogue scale for anxiety (VAS-A) and state trait anxiety inventory state (STAI-S) were used in the study (23)

The mean age was 38 (for counselled group 38.3 ± 11.03 and for non-counselled 38.9 ± 10.97) years. Majority of the patients were females (54.6% in counselled group and 53.6% in non-counselled group). Moreover, most of the participants were uneducated (53.6% in counselled group and 57.7% in non-counselled group). Visual analogue scale for anxiety was used to measure the anxiety of patients of both groups in counselled and non-counselled along with hemodynamic parameters including BP, HR and MAP. The scores for anxiety and hemodynamic parameters were compared in two ways. First the scores were compared within each group for intervals before and after counselling and then scores of both groups were compared to see if there is any significant result of the additional counselling done by the researchers of the first group with the second group who were managed by the hospital staff as on daily basis. There were total of ten questions asked from each individual patients at both intervals and each question carries same marks and then this score was compared. Most frequently performed surgical procedure for counselled group was minor procedures (39.2% out of 100%) while non-counselled mostly have laparoscopic surgeries (41.2% out of 100%). Most patients do not have a previous surgical experience, 57 (58.76%) out of 97 patients for counselled and 66 (68.04%) out of 97 for non-counselled patients. Ranges were designed for each parameter and all the main parameters have 3 ranges called mild, moderate and severe. For visual analogue scale there were three ranges. Range one includes the score from 0-30, range two has a score of 40-60 while the range three has a score of 70-100. Similarly, there were ranges for hemodynamic parameters. Blood pressure has three ranges, 110/70-119/79, 120/80-129/89 and 130/90-139/99. The ranges for heart rate were 70-79, 80-89 and 90-99. Similarly ranges for mean arterial pressure were 80-89, 90-99 and 100-110. Also, there were two age groups, 18-30 and 31-50. In counselled group there is an increase in anxiety levels of patients of second age group from 57 to 51 patients in mild group, from 12 to 16 in moderate and from 0 to 2 in severe range. On the other hand, in non-counselled group there is similar result with age group 31-50 undergoes prominent increase in anxiety from 63 to 56 patients in mild and from 8 to 15 patients in moderate range.

A correlation of anxiety score and blood pressure was established in counselled group which shows that there was simultaneous rise in both anxiety scores and blood pressure after counselling. Most patients with mild increases to moderate after counselling from 72 to 66 patients in mild and from 24 to 29 patients in moderate range. Also, there was an increase in number of patients in severe range of BP from 30 to 48 out of 97 patients. According to our study there was no significant difference in the mean values of hemodynamic parameters in both counselled and non-counselled group similarly to a study done in Iran. In this study two groups were taken, control and intervention group. Pre-operative patients' education regarding the proposed procedure was provided to intervention group to see if this is helpful or not. The results showed no significant difference in the vital values of intervention group after patient education was done. In fact, the values for hemodynamic parameters were increase above the baseline in both intervention and control group. (24)

6 CONCLUSION

According to our study we concluded that female population, patients with no previous surgical experience and low literacy rate can contribute to elevated anxiety scores and hemodynamic values. In both counselled and non-counselled groups both anxiety and vital signs either remain same or elevated. Addressing common fears of patients related to surgery and anesthesia could further increase the anxiety levels and its hemodynamic effects in patients.

Recommendation

No specific factor can be relied on as there could be multiple factors causing persistent increase in anxiety after hospital admission even after counselling. We recommend that more research work should be done on the same comparison by using another anxiety measuring tool like Amsterdam Preoperative Anxiety and Information Scale (APAIS).

Limitations

It is important to acknowledge that this study has certain limitations like single center study with a small patient population and a limited time for research work. To confirm and expand on our findings, more research with larger sample size should be done with multiple health care and research center involved rather than a single research center.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript.

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