

Assess Pain and Patients' Perceptions of Pain Management in Poststernotomy Cardiac Surgery in Selected Hospital Settings of Punjab, With a View to Develop "Self-Assessment Sternal Precaution Algorithm"

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Abstract

Background: Chronic poststernotomy pain is a well-recognized problem. Cardiac surgical patients are often rapidly recovered from anesthesia. The lower levels of sedation given to accelerate this process lead to higher rates of recall in intensive care particularly memories of pain. **Method:** In a prospective manner a cohort of 200 consecutive patients were evaluated for chronic poststernotomy pain one year after surgery. Participants were identified during the postoperative period by nonprobability purposive sampling method. Generally on the day of transfer to the cardiothoracic step-down ward. The structured interview was conducted before patient is transferred to the ward by using the tool. A prospective analysis of pain was done after 12 months of surgery. **Result:** The result revealed that after surgery higher 59.50% patients were having mild pain over the surgical site, 38% patients were having moderate pain, 2% patients were having severe pain over the surgical site and it was observed that the pain intensity at none was 0%. The mean of pain intensity at the time of data collection was 3.495 and it was 34.95%. Standard deviation of pain at the time of data collection was 1.23597 and its variance was 1.52761. The anterior regions of body that hurts the most were right anterior and posterior triangles of neck 29%, left anterior and posterior triangles of neck 37%, right supra clavicular region 20%, left supra clavicular region 23%, right clavicular region 12%, left clavicular region 15.5%, right infra clavicular region 30%, left infra clavicular region 37%, supra sternal region 9%, upper sternal region 54%, lower sternal region 22%, right mammary region 16%, left mammary region 52%, right infra mammary region 7%, left infra mammary region 33.5%, infra sternal subcostal angle 7%, left costal margin 12.5% and right costal margin 1.5%. The posterior regions of body that hurts most Cervical region 56.7%, right supra scapular region 4.5%, left supra scapular region 10%, right scapular region 5.50%, left scapular region 10%, inter scapular region 26.5%, right infra scapular region 0.50%, left infra scapular region 3.5% and thoracic vertebral region (T9-T12) 4.5%. The lateral regions of body that hurts most- left shoulder acromial region 4.5% and right shoulder acromial region 2%. The sensory and affective the higher 22% of patients perceived it as tiring-exhausting at mild level. Most of times were 54.5% pain was associated with physiotherapy, 52% with coughing, 50% moving self, 36% when moved by nurse. Pain interfered with patient's behavior with general activity partially interfered were 77%, with mood partially interfered were 39%, with sleep partially interfered were 61% and with relation with others partially interfered were 55.5%. The regions that hurts most were higher upper sternal region 54%, left mammary region 52%, left anterior and posterior triangles of neck 37%, left infra clavicular region 37%, cervical region 56.7%. The result shown that higher frequency 52 was of 50% pain relief and patients perception of pain management, had to wait for pain killer higher was some of times were 46%, refused pain killer higher was never were 88.5%, felt comfortable higher was some of times were 75.5% and level of pain experience acceptable higher was some of times were

58%. **Conclusions:** This prospective study shows that sensory pain description was as higher as sharp and affective component of pain shown as higher as tiring-exhausting sensation and complication reported on surgical site after 12 months of post sternotomy surgery 9.28% patients were having numbness on surgical site, 3.8% patients were having tenderness and pulling sensation, tightness was perceived by 3.27% of patients, 1.09% were having mediastinitis and 1.09% patients reported sternal closure wire pricking. Pain after sternotomy was associated with BMI, type of cardiac surgery, number of time under gone cardiac surgery, type of sternotomy and type of analgesics given.

Keywords: cardiac surgeries, complications of sternotomy, pain survey, poststernotomy pain, poststernal precautions

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INTRODUCTION

“Still have pain from sternotomy” I had my open heart surgery November of last year and I still have pain in my sternum area. The pain only hurts when I move certain ways, for example I tried to swim freestyle and backstroke and it hurt (a lot).

Thanks

Dianna

Women heart support community, 2010

“Recovery is a process, it takes time, it takes patients, and sometimes it takes everything you have got”

Diadre Collins

Sternotomy is a type of surgical procedure in which an incision is made along the sternum, after which the sternum itself is divided, or “cracked.” This procedure provides access to the lungs and heart for surgical procedures like heart transplant, corrective surgery for congenital heart defects, or coronary artery bypass surgery Chikwe et al (2006).^[1]

Health is a dynamic process and it is always changing. There are a variety of diseases which leads to abnormalities of the heart structures like coronary arteries (the blood vessels that supply oxygen to heart muscles), or the valves that ensure one way flow of blood through the cardiac pumping chambers. In addition, some

disorders lead to increased size of the major blood vessels taking blood from the heart around the body, additionally there are some problems which affect the heart muscle itself reducing its pumping ability. Many of these disorders are treated by open heart surgery.^[2]

The most common heart operation performed in adults is coronary artery bypass graft (CABG) following sternotomy. This is a treatment for patients who have narrowing or blockages in their coronary arteries. CABG is a good option for this problem as it restores normal blood flow back to heart muscle relieves symptoms (usually angina) and can also increase the patient's life expectancy.^[3]

According to National Cardiac Surgery Audit Annual Report (2010–2011).^[4] In year 2010/2011, there were 16,408 isolated first time coronary artery bypass graft (CABG) operations performed. The predicted risk of patients who had cardiac surgery increased from 2001/02 to 2010/11. This is because of an increase in the proportion of elderly and female patients having surgery along with enhancement in the proportion of more complex operations. The proportion of patients receiving isolated first time CABG as hospital in-patients (urgent

cases) rather than coming into hospital from home has increased from 27% (2001/02) to 37% in (2011/12). This increased number of heart diseases also increases the burden over the health care professionals to provide a surgical management with reduced risk and complications.

Heart valve disorders can either be present from birth or develop as people get older. Even problems which are present from birth can often go undetected until middle age or later. The commonest valve to require surgical treatment following sternotomy is the aortic valve, which sits at the outlet of the heart. This can become

narrowed (aortic stenosis) or it may leak (aortic regurgitation). Severe aortic stenosis may lead to symptoms of chest pain, shortness of breath, dizziness, heart failure or occasionally sudden death. When severe, aortic valve problems are usually treated by valve replacement surgery following sternotomy. Aortic Valve segment represents 55% of the overall market in India. However, with 35-50% patients suffering from intense aortic stenosis considered at high risk for surgery, the current number of patients is 200,000 across the world. Strategic Insights: Heart Valve Replacement Market – India (2013) (Figure 1).^[5]

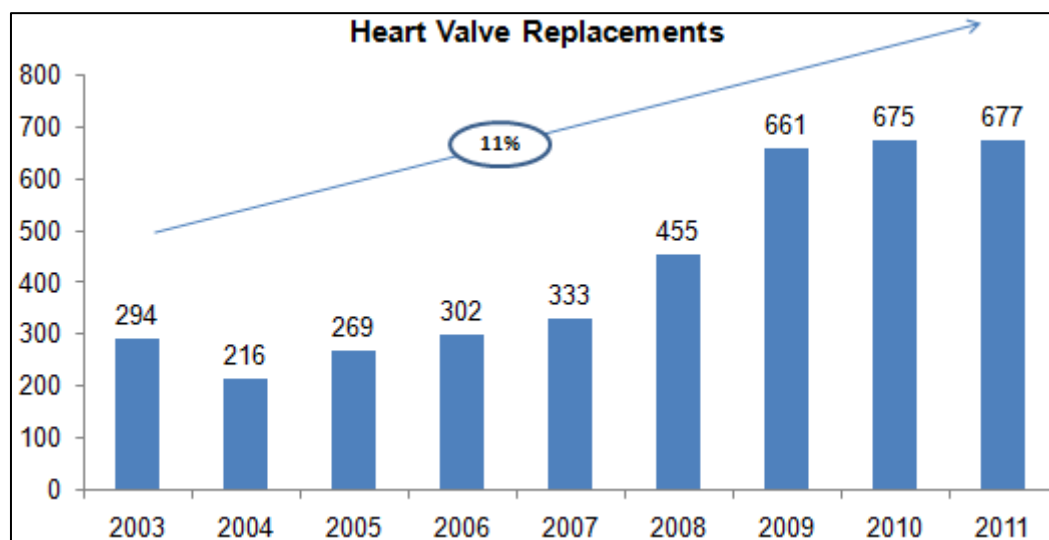


Fig. 1. Statistics of heart valve replacement in Sri Jaya deva Institute of Cardiovascular Sciences and Research Bangalore.

As per statistical data's, the Brazilian, Russian, Indian, and Chinese heart valve device market comprising sales of heart valve replacement and heart valve repair devices was valued at approximately \$180 million in 2011 and will expand upto 2016, primarily driven by rising heart valve procedure volumes.^[6]

Results of cardiac surgery have been subjected to more detailed scrutiny than

perhaps any other branch of surgery anywhere in the world. An increased number of centers are achieving repair rates for degenerative mitral valve disease of over 80% mitral repair is generally accepted to be a better treatment for these patients than mitral replacement these surgeries follow sternotomy. Complications of the cardiac surgeries are affecting the daily life of these patients

through chest pain at surgical site of sternotomy.^[4]

Chronic thoracic pain after cardiac surgery through sternotomy is a serious condition afflicting many patients. Recent studies report cases of pain after sternotomy varying from 11–56%.^[6] Persistent chest pain may originate from cardiac surgery. Conflicting results have been reported on the occurrence of persistent post sternotomy pain with considerable discrepancies between the retrospective reports and the prospective study conducted to assess this pain.^[4]

However, studies has identified that many patients remain functionally impaired long after cardiothoracic surgery because of pain there are various factors contributing to this difference in pain level and its perception by patient. Deep sternal wound infection (DSWI) is a significant cause of pain in cardiac surgery patients. DSWI occurs in 1–4% patients, although the incidence is increased with advanced patient age, diabetes, obesity, smoking, steroid therapy, and COPD. Damage to the periosteum can cause problems with healing and puts the patient at increased risk of DSWI. Prolonged surgery or reopening of the sternotomy also puts the patient at higher risk of DSWI. The patient with a DSWI often has a fever, leukocytosis (an increase in white blood cell count), a sternal “click” with movement or respiration, purulent discharge from the sternal wound, and sternal dehiscence. Patients may also have a pericardial effusion.^[7]

PURPOSE OF STUDY

The purpose of study is to assess sensory and affective pain in post sternotomy cardiac surgery with its interference in behaviors and to assess factors increasing its intensity and to identify the patients' perception of pain management.

METHODOLOGY

Research Approach: Non-experimental

Research Design: Prospective Cohort Study

Research Setting: The study was conducted in cardiac OT recovery ward of Fortis Escort Hospital, Amritsar and Punjab.

Target Population: The target population of the study comprise of clients under gone cardiac surgery with sternotomy at Amritsar, Punjab.

Accessible Population: The accessible population of the study comprise of clients under gone cardiac surgery with sternotomy at Fortis Escort Hospital, Amritsar, Punjab.

Sample Size: Sample comprised a cohort of 200 patients under gone post sternotomy cardiac surgery at Fortis Escort Hospitals at Amritsar.

Sampling Technique: Non-probability sampling method, the purposive sampling technique was used to select the eligible samples for the study.

Inclusion and Exclusion Criteria

Inclusion Criteria

Clients who were:

- (1) Willing to participate.
- (2) Clients under gone cardiac surgery with sternotomy.
- (3) Present during the period of data collection.

Exclusion Criteria

Clients who were:

- (1) Not willing to participate in the study.
- (2) Mentally retarded.
- (3) Clients who have severe postsurgical complications.

Selection and Development of Tool

Selection of tool: In this study, two data collection tools were used. A patients profile form consisted of questions on selected demographic variables and a

patient interview tool which consisted of 4 standardized interview tools for assessment of pain and patients perception of pain management.

Development of Tool

The steps carried out in preparation of tool were:

- (1) Literature review
- (2) Preparation of blue print
- (3) Consultation with experts
- (4) Establishment of reliability of tool

Description of Tool

Data collection tool consisted of two parts which includes:

Part I: A patient's profile form of demographic variables. It included questions regarding Age, sex, body mass index, Number of time undergone cardiac surgeries, type of cardiac surgery, type of sternotomy, type of sternotomy closure and type of analgesics given.

Part II: Structured interview schedule questionnaires consisted of

- (a) SP and CQ (modified Brief Pain Inventory, Short Form). The Site of Pain and Communication Questionnaires consisted of modified brief pain inventory questionnaires that consisted of 11 questions that provided information on the location of pain, activities associated with pain sensation, communication of pain experience, and the effectiveness of pain management. A categorical scale ranging from 0 (never) to 10 (always) was used. The brief pain inventory was devised by Dr. Charles S. Cleeland (1991) and it was modified for present study and was reviewed experts to ensure face and content validity.
- (b) Numerical pain intensity scale – The Numeric pain rating scale of the brief pain inventory was used to assess pain and intensity at different time points

including pain at its worst, pain at its least, pain on average, and pain at the time of interview and degree of relief from analgesia. Patients were asked to rate the severity of their pain, according to the specified time point, using an Numerical pain rating scale ranging from 0 (none) to 10 (severe).

Pain intensity	Score
None	0
Mild	1–3
Moderate	4–6
Severe	7–10

- (c) Wong-baker's faces pain rating scale it is a self-assessment scale, so the patient needs to understand the instructions and select a face that illustrates the pain they are experiencing at the time of collecting the data.

Pain intensity	Score
No hurt	0
Hurt little bit	2
Hurts little more	4
Hurts even more	6
Hurts whole lot	8
Hurts worst	10

- (d) McGill's Pain Questionnaire – Short Form The 15-word descriptor list of the MPQ-SF, derived from the MPQ-Long Form, and was used to measure sensory and affective pain sensation. Each descriptor word was ranked by the patient on a 4-point intensity scale, from 0 (none) to 3 (severe).

Validity of Tool

Standardized tools of pain measurement was used for the study and for use of scale in present study the informed consent was taken from the official pain rating scale foundation. Valuable opinion and suggestions were taken from the experts to ensure face and content validity.

Reliability of the Tool

Reliability of tool was obtained by split half method on samples participating in the pilot study and correlation was done by Karl Pearson's coefficient of correlation.

The reliability of tool was for site of pain and communication questionnaire $r=0.96$ numerical pain rating scale $r=0.97$, Wong-baker's faces pain rating scale $r=0.93$ McGill's Pain Questionnaire $r=0.83$, and shown excellent reliability to conduct the study.

Pilot Study

Pilot study is a small preliminary investigation of the same general characters as the major study, which is designed to acquaint the researchers with the problem that can be corrected in preparation for a larger project. After having obtained formal administrative approval, a pilot study was conducted in Fortis Escort Hospital from 21 April to 30 April 2014.

It was conducted on 20 samples at Fortis Escort Hospital, Amritsar in the month of April. Samples were selected non-randomly for pilot study. Permission was sought from administrator of the hospital to conduct the research study and written consent was taken from them that they were willing to participate and their confidentiality was maintained.

The structured interview schedule was taken and it took 20 minutes on an average to complete it for one patient.

The investigator found that some of the patients were not able to respond quickly to the structured interview questionnaires in recovery period of cardiac surgery and the study was found feasible and can be applied practically.

Data Collection Procedure

Formal permission was obtained from concerned authority. On the first day after getting consent data was collected on pain and patients' perceptions of pain management in post sternotomy cardiac surgery from 200 patients at cardiac OT recovery of Fortis Escort Hospital, Amritsar. Potential participants were identified during the postoperative period by nonprobability purposive sampling method. Generally on the day of transfer to the cardiothoracic step-down ward. The structured interview was conducted before patient is transferred to the ward by using the tool. A prospective analysis of pain was done in 1st, 3rd, 6th and 12th postoperative months by telephonic interview schedule of patient under study for pain and symptoms accompanying in postoperative months. Sample mortality was found in samples and total of 183 patients were followed through telephonic interview schedule till 12th postoperative month.

Plan for Data Analysis

The data were analyzed in terms of the objectives of the study using descriptive and inferential statistics.

RESULTS

Section I – Description of Demographic Characteristics of Poststernotomy Cardiac Surgery Patients

This section deals with the demographic variables of post sternotomy cardiac surgery patients such as age, Gender, BMI, number of times undergone cardiac surgery, type of cardiac surgery, type of sternotomy, type of sternotomy closure and type of analgesics given.

The data on the sample characteristics were analyzed using descriptive statistics in terms of frequency and percentage and presented in the form of tables and figures.

Table 1. Demographic Characteristics of Poststernotomy Cardiac Surgery Patients, N = 200.

Sr. no.	Demographic characteristic	Frequency (f)	Percentage (%)
1.	Age		
a.	15–29	1	0.5
b.	30–44	17	8.5
c.	45–59	74	37
d.	60 and above	108	54
2.	Gender		
a.	Male	162	81
b.	Female	38	19
3.	Body mass index		
a.	Under weight (15–18.5)	9	4.5
b.	Healthy weight (18.6–25)	106	53
c.	Over weight (25–30)	77	38.5
d.	Obesity (30<)	8	4
4.	Number of time undergone cardiac surgery		
a.	1 Time	194	97
b.	2 Times	6	3
5.	Type of cardiac surgery		
a.	CABG	165	82.5
b.	Valvuler surgery	30	15
c.	Both	5	2.5
6.	Type of sternotomy		
a.	Complete median sternotomy	149	74.5
b.	Partial median sternotomy	48	24
c.	Distal sternotomy	3	1.5
7.	Type of sternotomy closure technique		
a.	Robicsek wave closure	51	25.5
b.	Butterfly closure	149	74.5
8.	Type of analgesics given		
a.	NSAIDs	80	40
b.	Opioids	30	15
c.	Both	90	45

Table 1 depicts the variables of the subjects according to age, sex, body mass index, number of time undergone cardiac surgery, type of cardiac surgery and type of sternotomy, type of sternotomy closure technique and type of analgesics given. The result indicates that the higher percentage of subjects 54% belongs to age group 60 and above and 45–59 years of age indicates second higher percentage of subject 37%. About 8.5% were belongs to age group 30–44 years and 0.5% belongs to age 15–29 years.

- It can be seen that majority of respondents 81% were males, where as 19% were females.
- In Body mass index majority of patients 53% were of healthy weight, 38.5% were of overweight, 4.5% were

of underweight and 4% of sample were obese.

- In relation to number of time undergone cardiac surgery 97% patients under gone 1 time cardiac surgery, where 3% under gone 2 times cardiac surgery.
- The results indicate in relation to type of cardiac surgery that 82.5% had CABG, 15% had valvuler surgery and 2.5% had both surgeries.
- In relation to type of sternotomy 74.5% had complete median sternotomy, 24% partial median sternotomy and 1.5% had distal sternotomy.
- In relation to type of sternotomy closure technique 74.5% patients had butterfly closure and 25.5% had Robicsek wave closure wire closure.

- The result indicates that 40% patients were given NSAIDs, 15% were given

Opioid and 45% were given both to control pain..

Section II Assessing the level of pain

Table 2. Assessing the Pain Intensity after Surgery at the Time of Data collection over the surgical site of sternotomy in cardiac surgery.

Pain intensity at the time of data collection	Frequency (f)	Percentage (%)	Mean	Mean (%)	Standard deviation	Variance (Standard deviation)
None	1	0.5	3.495	34.95%	1.23597	1.52761
Mild	119	59.5				
Moderate	76	38				
Severe	4	2				

Table 2 depicts that higher 59.50% patients were having mild pain over the surgical site, 38% patients were having moderate pain, 2% patients was having severe pain over the surgical site and it was observed that the pain intensity at

none was 0%. The mean of pain intensity at the time of data collection was 3.495 and it was 34.95%. Standard deviation of pain at the time of data collection was 1.23597 and its variance was 1.52761.

Section III – Assessing the area of body that hurts the most.

Table 3. Anterior Regions of Body That Hurts the Most.

Regions	Frequency (f)	Percentage (%)
Right anterior and posterior triangles of neck	58	29
Left Anterior and posterior triangles of neck	74	37
Right supra clavicular region	40	20
Left supra clavicular region	46	23
Right clavicular region	24	12
Left clavicular region	31	15.5
Right infra clavicular region	60	30
Left Infra clavicular region	74	37
Supra sternal region	18	9
Upper sternal region	108	54
Lower sternal region	44	22
Right mammary region	32	16
Left mammary region	104	52
Right infra mammary region	14	7
Left infra mammary region	67	33.5
Infra sternal subcostal angle	14	7
Left costal margin	25	12.5
Right costal margin	3	1.5

Table 3 depicts the anterior regions of body that hurts the most were right anterior and posterior triangles of neck 29%, left anterior and posterior triangles of neck 37%, right supra clavicular region 20%, left supra clavicular region 23%, right clavicular region 12%, left clavicular region 15.5%, right infra clavicular region

30%, left infra clavicular region 37%, supra sternal region 9%, upper sternal region 54%, lower sternal region 22%, right mammary region 16%, left mammary region 52%, right infra mammary region 7%, left infra mammary region 33.5%, infra sternal subcostal angle 7%, left costal

margin 12.5%, and right costal margin 1.5% (Figure 2).

Anterior regions of body that hurts the most

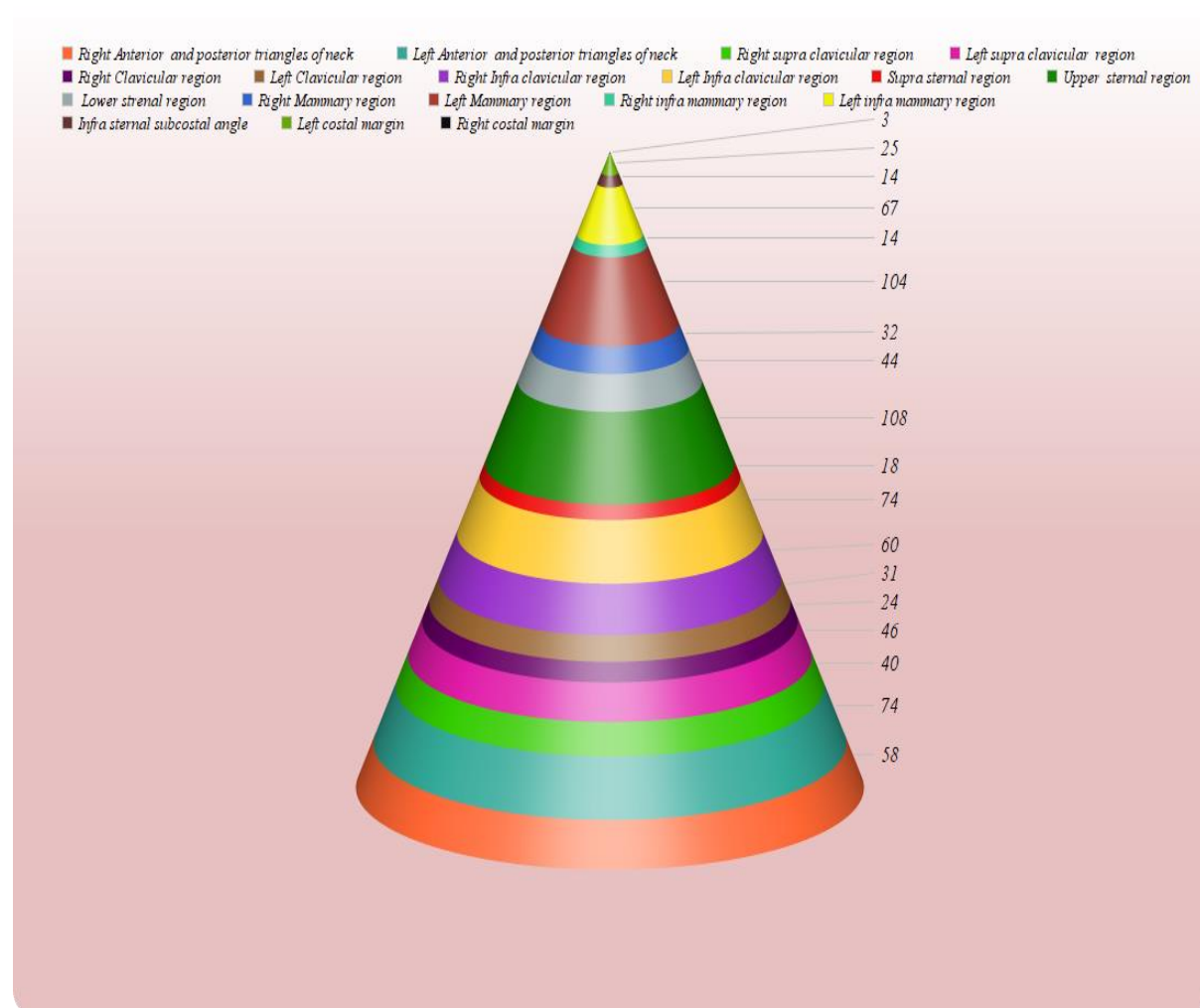


Fig. 2. Anterior Regions of Body That Hurts Most.

Table 4. Posterior Regions of Body That Hurts Most.

Regions	Frequency (f)	Percentage (%)
Cervical region	31	56.7
Right supra scapular region	9	4.5
Left supra scapular region	20	10
Right scapular region	11	5.50
Left scapular region	20	10
Inter scapular region	53	26.5
Right infra scapular region	1	0.50
Left infra scapular region	7	3.5
Thoracic vertebral region (T9-T12)	9	4.5

Table 4 depicts the posterior regions of body that hurts most cervical region 56.7%, right supra scapular region 4.5%,

left supra scapular region 10%, right scapular region 5.50%, left scapular region 10%, inter scapular region 26.5%, right

infra scapular region 0.50%, left infra scapular region 3.5% and thoracic

vertebral region (T9-T12) 4.5% (Figure 3).

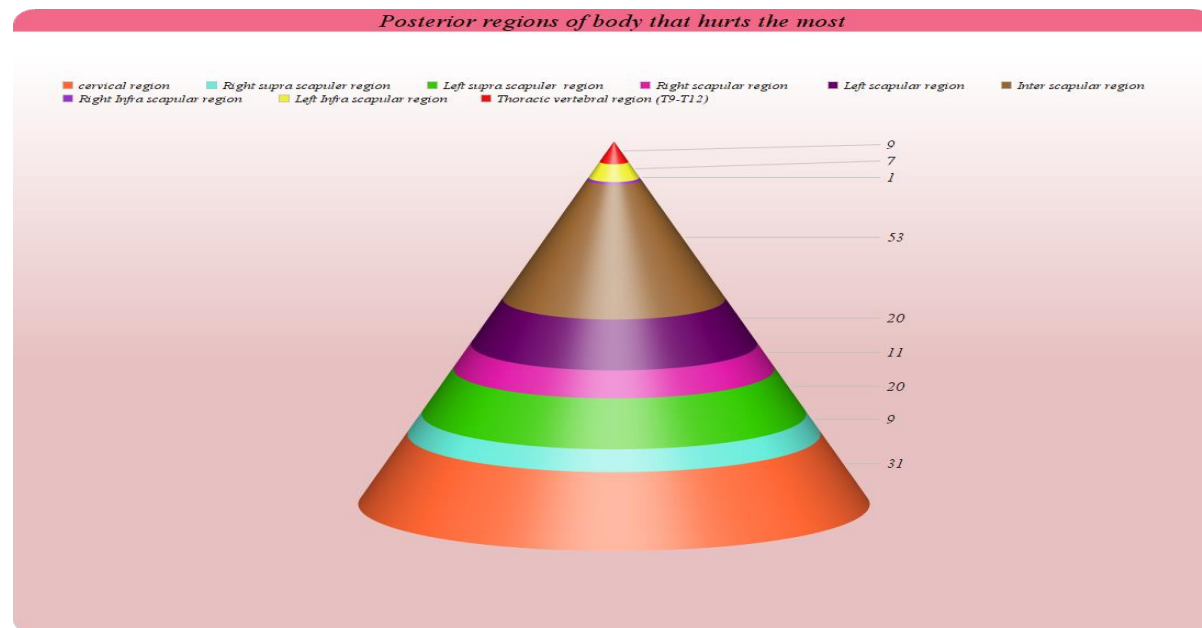


Fig. 3. Posterior Regions of Body That Hurts Most.

Table 5. Lateral Regions of Body That Hurts Most.

Regions	Frequency (f)	Percentage (%)
Left shoulder acromial region	9	4.5
Right shoulder acromial region	4	2

Table 5 depicts the lateral regions of body that hurts most left shoulder acromial

region 4.5% and right shoulder acromial region 2% (Figure 4).

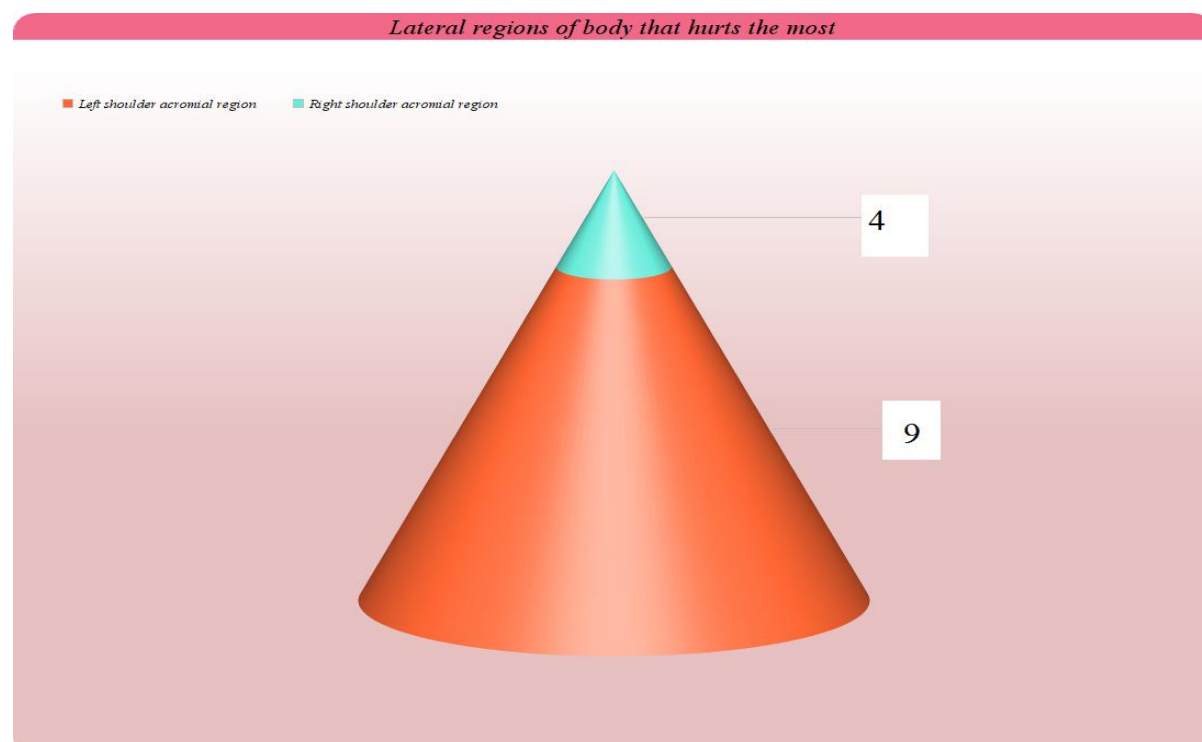


Fig. 4. Lateral Regions of Body That Hurts Most.

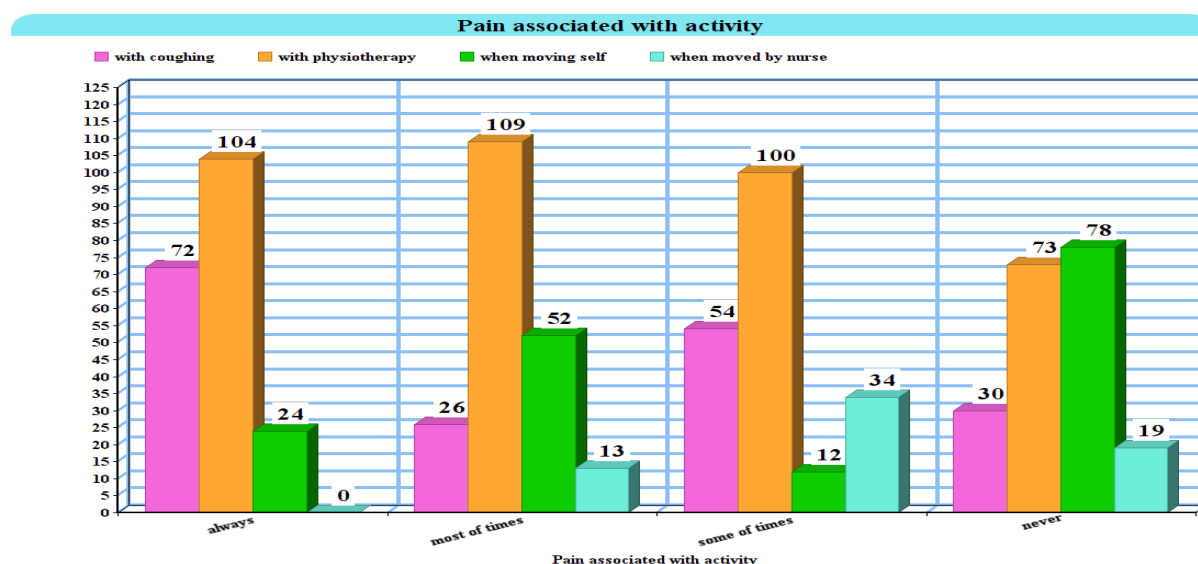
Section IV – Assessing the pain associated with activity.

Table 6. Pain Associated With Activity.

Pain associated with activity	Always		Most of the times		Some of times		Never	
	f	%	f	%	f	%	f	%
With coughing	72	36	104	52	24	12	0	0
With physiotherapy	26	13	109	54.5	52	26	13	6.5
When moving self	54	27	100	50	12	6	34	17
When moved by nurse	30	15	73	36.5	78	39	19	9.5

Table 6 depicts the pain associated with activity with coughing always was 36%, most of the times were 52%, some of times were 12% and never was 0%. Pain associated with physiotherapy always was 13%, most of times were 54.5%, some of times were 26% and never was 6.5%. Pain

associated when moving self always were 27%, most of the times 50%, some of times 6% and never were 17%. Pain when moved by nurse always 15%, most of the times were 36.5%, some of times were 39% and never were 9.5% (Figure 5).

**Fig. 5. Pain Associated With Activity.**

Section V: Assessing how much pain has interfered with patient's behavior.

Table 7. Pain Interfered with Patient's Behavior.

Pain interference with patients behavior	General activity		Mood		Sleep		Relation with others	
	f	%	f	%	f	%	f	%
Not interfered	0	0	0	0	7	3.5	0	0
Slightly interfered	8	4	74	37	65	32.5	74	37
Partially interfered	154	77	111	55.5	122	61	78	39
Extremely interfered	38	19	15	7.5	6	3	48	24
Completely interfered	0	0	0	0	0	0	0	0

Table 7 depicts the pain interfered with patient's behavior with general activity not

interfered was 0%, slightly interfered were 4%, partially interfered were 77%,

extremely interfered were 19% and completely interfered were 0%. With mood not interfered was 0%, slightly interfered were 37%, partially interfered were 55.5%, extremely interfered were 7.5% and completely interfered were 0%. With sleep not interfered were 3.5%, slightly interfered were 32.5%, partially

interfered were 61%, extremely interfered were 3% and completely interfered were 0% and with relation with others not interfered was 0%, slightly interfered were 37%, partially interfered were 39%, extremely interfered were 24% and completely interfered were 0% (Figure 6).

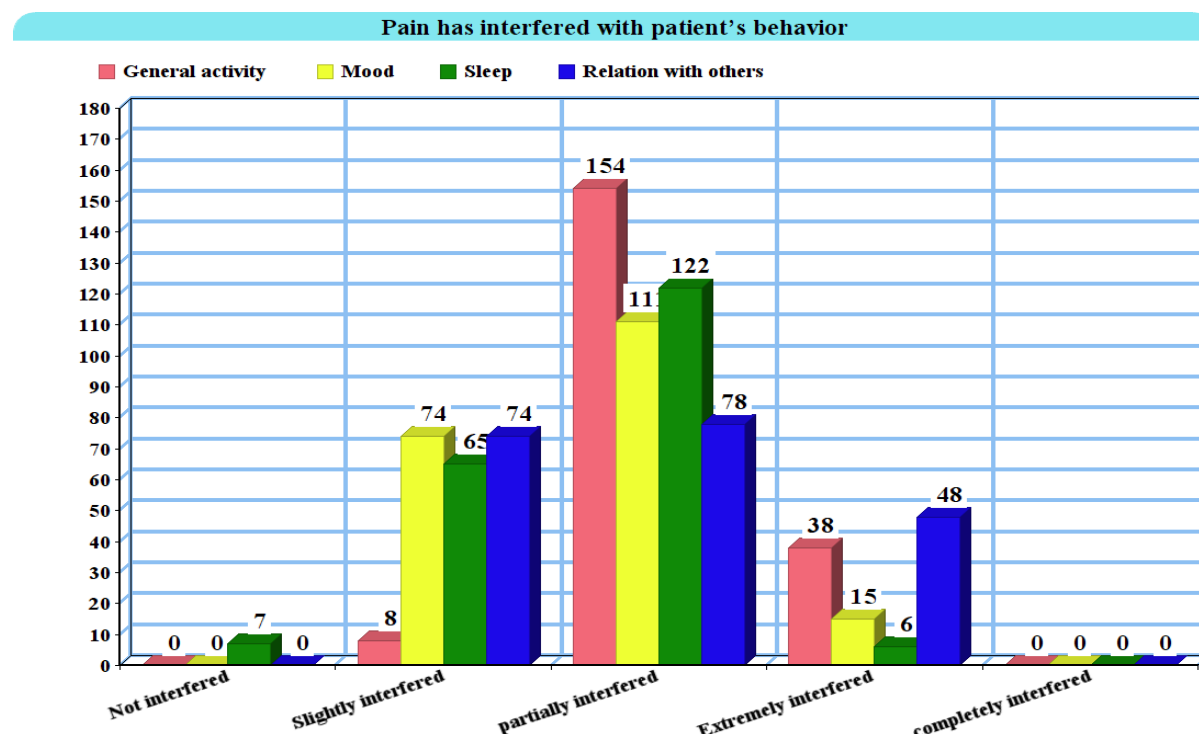


Fig. 6. Pain Interfered with Patient's Behavior.

Section VI: Assessing sensory and affective pain sensation.

Table 8. Sensory and Affective Pain Sensation.

Sensory and affective component	Mild		Moderate		Severe	
	f	%	f	%	f	%
Throbbing	30	15	17	8.5	0	0
Shooting	9	4.5	3	1.5	0	0
Stabbing	6	3	5	2.5	3	1.5
Sharp	57	28.5	52	26	14	7
Cramping	44	22	5	2.5	0	0
Hot burning	0	0	30	15	6	3
Aching	38	19	19	9.5	5	2.5
Heavy	25	12.5	43	21.5	0	0
Tender	2	1	11	5.5	3	1.5
Splitting	3	1.5	0	0	0	0
Tiring-exhausting	44	22	22	11	3	1.5
Sickening	11	5.5	5	2.5	3	1.5
Fearful	59	29.5	8	4	2	1

Table 8 depicts the sensory and affective pain sensation in poststernotomy cardiac patients were throbbing mild 15%,

moderate 8.5%, severe 0%, shooting mild 4.5%, moderate 1.5%, severe 0%, stabbing mild 3%, moderate 2.5%, severe 1.5%,

sharp mild 28.5%, moderate 26%, severe 7%, cramping mild 22%, moderate 2.5%, severe 0%, hot burning mild 0%, moderate 15%, severe 3%, aching mild 19%, moderate 9.5%, severe 2.5%, heavy mild 12.5%, moderate 21.5%, severe 0%, tender mild 1%, moderate 5.5%, severe 1.5%,

splitting mild 1.5%, moderate 0%, severe 0%, tiring-exhausting mild 22%, moderate 11%, severe 1.5%, sickening mild 5.5%, moderate 2.5%, severe 1.5% and fearful mild 29.5%, moderate 4%, severe 1% (Figure 7).

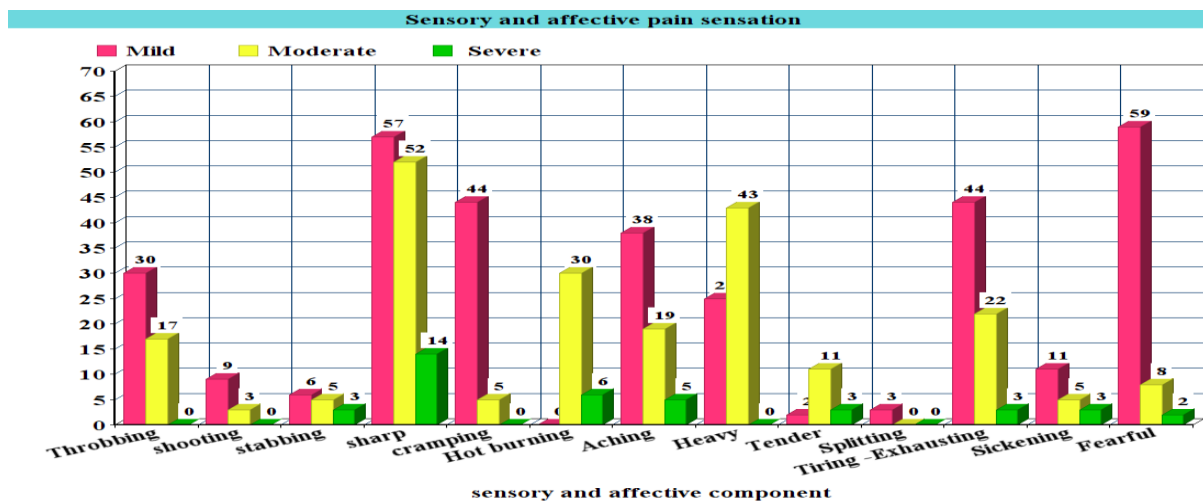


Fig. 7. Sensory and Affective Pain Sensation.

Section VII: Assessing how much relief has pain treatments or medications provided in past 24 hours.

Table 9 depicts the pain relief from treatment and medications in past 24 hours the frequency of 0% pain relief was 0,

10% pain relief was 0, 20% pain relief was 25, 30% pain relief was 19, 40% pain relief was 27, 50% pain relief was 52, 60% pain relief was 40, 70% pain relief was 36, 80% pain relief was 0, 90% pain relief was 0 and 100% pain relief was 0.50% (Figure 8).

Table 9. Pain Relief from Treatment and Medication in Past 24 hours.

Pain relief	Percentage of pain relief										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
(f)	0	0	25	19	27	52	40	36	0	0	1
(%)	0%	0%	12.5%	9.5%	13.5%	26%	20%	18%	0%	0%	0.50%

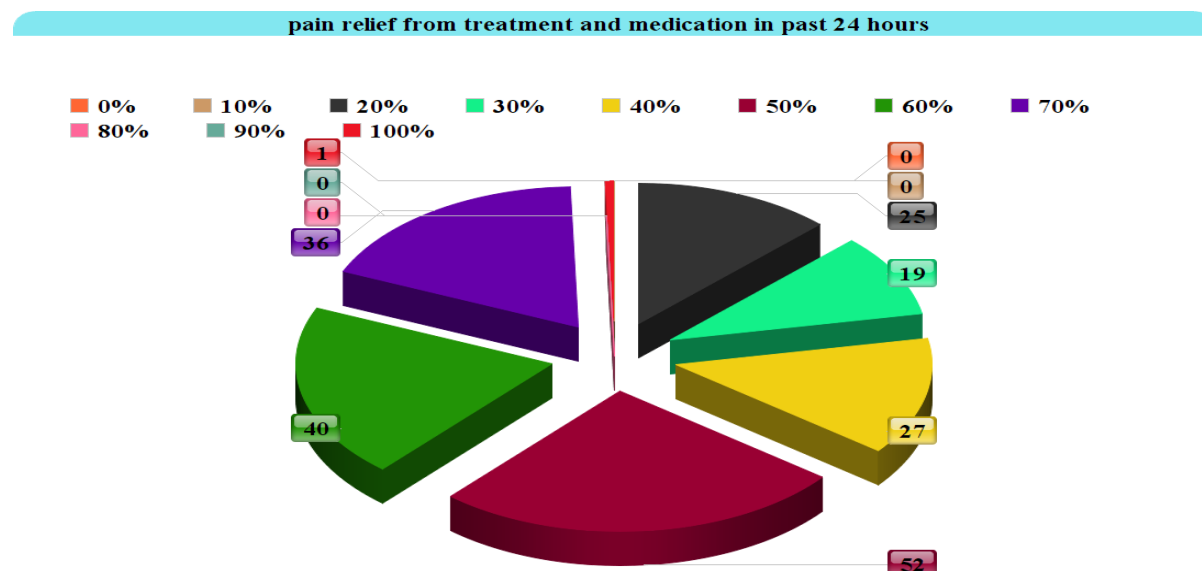


Fig. 8. Pain Relief from Treatment and Medication in Past 24 hours.

Section VIII: Assessing patients' perception about effectiveness of pain management regime.

Table 10. Patients' Perception about Effectiveness of Pain Management Regime.

Effectiveness of pain management regime	Always		Most of the times		Some of times		Never	
	f	%	f	%	f	%	f	%
Had to wait for pain killer (any prescribed)	6	3	76	38	92	46	26	13
Refused pain killer (any prescribed)	0	0	0	0	23	11.5	177	88.5
Felt comfortable	19	9.5	24	12	151	75.5	6	3
Level of pain experience was acceptable	28	14	53	26.5	116	58	3	1.5

Table 10 depicts the patients' perception about effectiveness of pain management regime had to wait for pain killer always were 3%, most of times were 38%, some of times were 46%, never were 13%. Refused pain killer always were 0%, most of times were 0%, some of times were 11.5%, never were 88.5%. Felt

comfortable always were 9.5%, most of times were 12%, some of times were 75.5%, never were 3%. Level of pain experience was acceptable always were 14%, most of times were 26.5%, some of times were 58%, never were 1.5% (Figure 9).

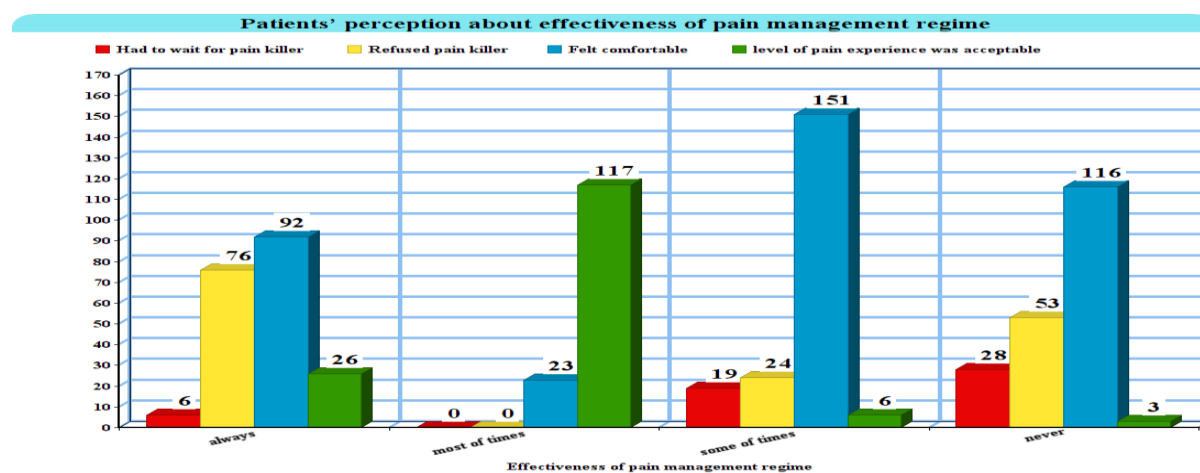


Fig. 9. Patients' Perception about Effectiveness of Pain Management Regime.

Table 11. Pain Associated with Activity after 12 month of Poststernotomy Surger.

Pain associated with activity always	Frequency	Percentage (%)
Activity of daily living	4	2.2
Instrumental activity of daily living	7	3.8
Walking	2	1.09
Coughing	2	1.09
Sleeping hours	5	2.73

Table 11 depicts that 2.2% patients were having pain during activity of daily living, 3.8% patients were having pain during

instrumental activity of daily living, 1.09% were having walking and coughing, 2.73% patients reported pain in sleeping hours.

Table 12. Sensation and Complication Reported on Surgical Site After 12 months of Poststernotomy Surgery.

Complication and sensation on surgical site	Frequency	Percentage (%)
Numbness	17	9.28
Pulling or Tenderness	7	3.83
Tightness	6	3.27
Mediastinitis	2	1.09
Sternal closure wire pricking	2	1.09

Table 12 depicts that 9.28% patients were having numbness on surgical site, 3.8% patients were having tenderness and pulling sensation, tightness was perceived by 3.27% of patients, 1.09% were having mediastinitis and 1.09% patients reported sternal closure wire pricking.

Section IX: Association between levels of pain in poststernotomy cardiac surgery at the time of data collection with their selected demographic variables.

The Results Shown that the chi square values were calculated to find out the associations between levels of pain in post sternotomy cardiac surgery at the time of data collection with age (5.88), associated with gender (4.105), associated with body mass index (54.522), associated with number of time undergone cardiac surgery (133.080), associated with type of cardiac surgery (50.386), associated with type of sternotomy (70.245), associated with technique of sternotomy closure (5.693)

and associated with type of analgesics given (55.485).

There was a significant association found between levels of pain in post sternotomy cardiac surgery at the time of data collection with body mass index (54.522), number of time undergone cardiac surgery (133.080), type of cardiac surgery (50.386), type of sternotomy (70.245), type of analgesics given (55.485), at the ($p \geq 0.05$), However no association found between levels of pain in post sternotomy cardiac surgery at the time of data collection with age, gender and technique of sternotomy closure (Figure 10).

SECTION: IX Develop self-assessment sternal precaution algorithm.

The sternal precaution algorithm is prepared through following steps

- (1) Literature review
- (2) Preparation of blue print
- (3) Consultation with experts

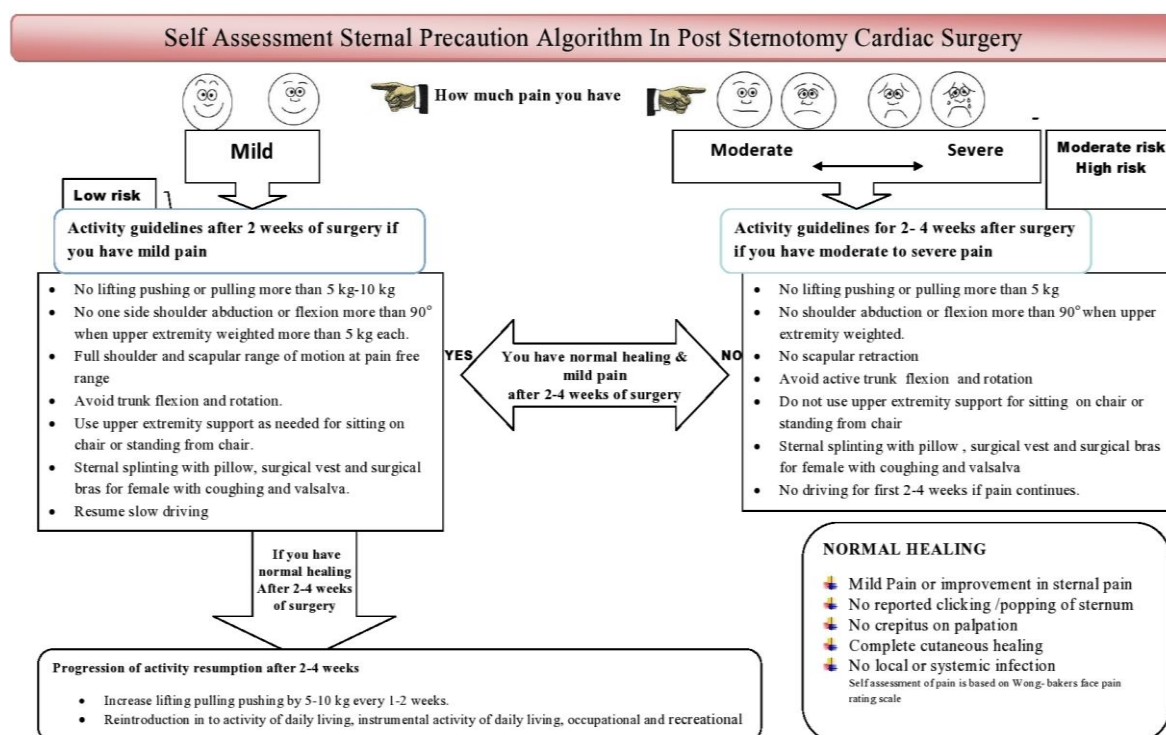


Fig. 10. Algorithm for Determining Type and Duration of Activity Restriction for Patient Following Sternotomy.

CONCLUSION

- The mean of pain intensity at the time of data collection was 3.495.
- The pain associated with activity with coughing always was 36%, most of the times were 52%, and sometimes were 12% and never 0%.
- Pain associated with physiotherapy always was 13%, most of times were 54.5%, sometimes were 26% and never was 6.5%.
- Pain associated when moving self always were 27%, most of the times 50%, sometimes 6% and never were 17%.
- Pain when moved by nurse was always 15%, most of the times were 36.5%, sometimes were 39% and never were 9.5%.
- The pain interfered with patient's general activity not interfered was 0%, slightly interfered were 4%, partially interfered were 77%, extremely interfered were 19% and completely interfered were 0%.
- The pain interfered with mood not interfered was 0%, slightly interfered

were 37%, partially interfered were 55.5%, extremely interfered were 7.5% and completely interfered were 0%.

- The pain interfered with sleep not interfered were 3.5%, slightly interfered were 32.5%, partially interfered were 61%, extremely interfered were 3% and completely interfered were 0%.
- The pain interfered with relation with others not interfered was 0%, slightly interfered were 37%, partially interfered were 39%, extremely interfered were 24% and completely interfered were 0%.
- The sensory and affective pain sensation in post sternotomy cardiac patients throbbing was mild 15%, moderate 8.5%, severe 0%.
- The sensory and affective pain sensation in poststernotomy cardiac patients shooting was mild 4.5 %, moderate 1.5%, severe 0%.
- The sensory and affective pain sensation in poststernotomy cardiac patients stabbing was mild 3%, moderate 2.5%, severe 1.5%.

- The sensory and affective pain sensation in post sternotomy cardiac patients sharp was mild 28.5%, moderate 26%, severe 7%.
- The sensory and affective pain sensation in post sternotomy cardiac patients cramping was mild 22%, moderate 2.5%, severe 0%.
- The sensory and affective pain sensation in post sternotomy cardiac patients. Hot burning was Mild 0%, Moderate 15%, Severe 3%.
- The sensory and affective pain sensation in post sternotomy cardiac patients aching was mild 19%, moderate 9.5%, severe 2.5%.
- The sensory and affective pain sensation in post sternotomy cardiac patients heavy was mild 12.5%, moderate 21.5%, severe 0%.
- The sensory and affective pain sensation in poststernotomy cardiac patients tender was mild 1%, moderate 5.5%, severe 1.5%.
- The sensory and affective pain sensation in post sternotomy cardiac patients splitting was mild 1.5%, moderate 0%, severe 0%.
- The sensory and affective pain sensation in post sternotomy cardiac patients tiring-exhausting was mild 22%, moderate 11%, severe 1.5%.
- Sickening was mild 5.5%, moderate 2.5%, severe 1.5%.

Patient's Perception of Pain Management

- The sensory and affective pain sensation in post sternotomy cardiac patients fearful was mild 29.5%, moderate 4%, severe 1%.
- The 50% pain relief from treatment and medications in past 24 hour's higher was pain relief was 52.
- The patients' perception about effectiveness of pain management

regime had to wait for pain killer always were 3%, most of times were 38%, some of times were 46%, never were 13%.

- Refused pain killer always were 0%, most of times were 0%, some of times were 11.5%, never were 88.5%.
- Felt comfortable always were 9.5%, most of times were 12%, some of times were 75.5%, never were 3%.
- Level of pain experience was acceptable always were 14%, most of times were 26.5%, some of times were 58%, never were 1.5%.

The Level of Pain Prospectively

- Sensation and complication reported on surgical site after 12 months of poststernotomy surgery 9.28% patients were having numbness on surgical site, 3.8% patients were having tenderness and pulling sensation, tightness was perceived by 3.27% of patients, 1.09% were having mediastinitis and 1.09% patients reported sternal closure wire pricking.

Association Between Levels of Pain in Poststernotomy Cardiac Surgery at the Time of Data Collection With Their Selected Demographic Variables

- There was a significant association found between levels of pain in poststernotomy cardiac surgery at the time of data collection with body mass index (54.522) at the ($p \geq 0.05$) the intensity of pain was higher in over weight patients.
- There was a significant association found between levels of pain in poststernotomy cardiac surgery at the time of data collection with number of time undergone cardiac surgery (133.080) at the ($p \geq 0.05$). The pain intensity was higher in patient had both surgery CABG and valvuler.

- There was a significant association found between levels of pain in post sternotomy cardiac surgery at the time of data collection with type of cardiac surgery (50.386) at the ($p \geq 0.05$). Higher pain intensity was in CABG and both surgeries.
- There was a significant association found between levels of pain in post sternotomy cardiac surgery at the time of data collection with type of sternotomy (70.245) at the ($p \geq 0.05$). Higher pain intensity was found in complete median sternotomy.
- There was a significant association found between levels of pain in poststernotomy cardiac surgery at the time of data collection with type of analgesics given (55.485) at the ($p \geq 0.05$). Higher pain intensity was in patients given both to control pain and patients given NSAIDs shown higher moderate pain intensity and opioids alone shown lower moderate pain intensity. Patients were having less pain intensity than patients given both and NSAIDs alone.

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