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Research Article

Evaluation of Prescription Pattern, Health-Related Quality of Life and Adherence to Standard Treatment Guidelines in Patients who have Undergone Percutaneous Coronary Intervention

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Abstract

Introduction: Advances in medical therapy have significantly improved the prognosis of patients with coronary artery disease and PCI is one of the them. ACCF/AHA/SCAI Guidelines for PCI aim to reduce cardiovascular disease mortality by encouraging guideline-based medical therapy. Prescription analyzing studies will help the policy makers to prioritize and promote the rational use of medicines. QoL assessment would help to assess the functional capacity of patients, effects of drugs and cardiac rehabilitation.

Methods: It was a prospective, longitudinal study where prescriptions were evaluated for adherence to 2011 ACCF/AHA/SCAI Guidelines for PCI. Adherence was adjudged by the application of Class of Recommendation (COR) and Level of Evidence (LOE) as the criteria. The QoL was assessed thrice i.e. at the end of 1 week, 1 month and 3 months respectively by using 12-question long DASI questionnaire. Pearson correlation coefficient was used to find correlation between different variables and quality of life. Unpaired t-test was used to compare the distribution of variables such as age, no. of prescribed drugs and the assessment of QoL on three follow-ups of all patients suffering from different ACS types. p value < 0.05 was significant.

Results: Total 81 patients were included with about 9 drugs on average being prescribed to each. Antiplatelet drugs and statins were prescribed to all; followed by beta-blockers (92.6%), anti-coagulants (28.4%), anti-diuretics (28.4%) and ACE inhibitors/ARBs (26.2%) subsequently. The adherence to guidelines is 89.75%. Triple-antiplatelet therapy was followed instead of recommended dual-antiplatelet therapy (DAPT). The mean ± SD for QoL at first week, first month and third month was 6.4617 ± 2.08330, 26.3932 ± 14.66368 and 40.9222 ± 11.48307 respectively. There was a negative correlation between age & DASI score at 1st (p = 0.037) and 3rd month (p = 0.000). On comparing DASI score across different groups on 1st follow-up, UA v/s NSTEMI and UA v/s STEMI is found significant (p = 0.001). On 2nd follow-up, UA v/s STEMI is found significant (p = 0.0374).

Conclusion: Antiplatelet drugs and statins were prescribed indiscriminately and the prescriptions were highly adherent to the guidelines. At the end of third month, irrespective of the diagnosis, all groups (UA/STEMI/NSTEMI) achieved similar physical activity status with age being the key factor influencing the DASI score.

Keywords: *Adherence; HRQOL; Percutaneous Coronary Intervention*

Introduction

Advances in medical therapy have significantly improved the prognosis of patients with coronary artery disease. Percutaneous coronary intervention (PCI) is a non-surgical procedure used to treat narrowing (stenosis) of the coronary arteries of the heart found in coronary artery disease. It is one of the alternative revascularization procedures for the suffering patients [1]. Secondary prevention with evidence-based care is also essential for patients who undergo this procedure to reduce the risk of future cardiac events and improve the quality of life [2].

Various professional societies, such as the American Heart Association and American College of Cardiology (AHA/ACC), aim to reduce cardiovascular disease mortality and here is where the application of guideline-based medical therapy (GBMT) plays an important role; the strategy for secondary prevention with GBMT has been codified into the 2011 AHA/ACC Guidelines for Secondary Prevention for Patients with Coronary and Other Atherosclerotic Vascular Disease.

Despite the known benefits of GBMT in patients with Coronary Artery Disease (CAD), not all patients receive GBMT, due to their co- morbidities and procedural types. Underestimation of risk, overestimation of side effects and preference of the treating physician to prioritize invasive procedures may all affect prescription patterns and subsequently have an effect on quality of life [3].

In order to improve the prescription quality, there is an utmost necessity to investigate the factors affecting doctors' prescription patterns. Studies have shown that there is a marked correlation between prescription patterns and gender, age, educational qualification, work experience, economic status, and physician's specialty apart from the demographical status of the patient [4]. Defining drug prescription and the consumption pattern provides an advantageous feedback to the prescribers in order to improve their prescribing behavior particularly in cardiac patients. Prescription analyzing studies will not only help the policy makers to prioritize and promote the rational use of medicines nationwide and improving the quality of life [5]. Duke Activity Status Index (DASI) is a self-administered questionnaire that assesses functional capacity by determining the patient's ability to perform a range of specific daily activities. The DASI has been used in large cross-sectional studies of coronary patients [6]. It consists of 12 items answered in a yes-or-no format with scores ranging from 0 to 58.2, with a higher score indicative of better functioning [7].

Objectives of the Study

1. To evaluate the different prescription patterns for secondary prevention of coronary artery disease post- Percutaneous Coronary Intervention (PCI).
2. To check the adherence of the prescription pattern to standard treatment guidelines.
3. To establish a correlation between the drugs prescribed and the quality of life subsequently assessed.

Method

The study began after obtaining permission from the Indian Council of Medical Research and Institutional Ethics Committee. The approval of the HOD and hospital superintendent was taken and written consent of the patients was obtained in their vernacular language. The patients were informed that their participation was entirely voluntary and that they can drop out of the study at any given point of time. According to severity, the acute coronary syndromes (ACS) maybe graded into:

- Unstable angina (UA): Vascular obstruction is incomplete, myocardial necrosis is absent-biochemical markers of ischemia do not appear in blood and ST segment is not elevated in ECG.

- Non ST segment elevation myocardial infarction (NSTEMI): Vascular obstruction is incomplete, but is attended by relatively smaller area of myocardial necrosis; biochemical markers appear in blood, but ST segment is not elevated.

- ST segment elevation myocardial infarction (STEMI): Vascular obstruction is complete, larger area of myocardium is necrosed, biochemical markers are prominent and ST segment in ECG is elevated [8].

Demographic data such as name, age, sex, address was recorded. Thereafter clinical diagnosis, history of present illness, past history, family history and co-morbid conditions were also noted. The prescriptions of the patients were recorded which included the drugs prescribed.

The prescription was further evaluated for adherence to 2011 AHA/ACC guidelines for management of patients undergoing PCI. Adherence will be adjudged by the application of Class of Recommendation (COR) and Level of Evidence (LOE) as the criteria.

The confidentiality of the data was maintained. Male and female patients were enrolled irrespective of their ethnicity. However, selection criteria were applied.

Selection criteria

Inclusion criteria was

- Age greater than 18 years.

- Patients diagnosed with STEMI, NSTEMI, UA or any CAD requiring PCI.

Study design: This was a prospective, longitudinal duration-based study and was carried out on the patients visiting the Cardiology department at a tertiary care hospital. QoL in its literal sense would mean the ability to carry out one's daily activities without any hindrance and hence, DASI was perfectly suited assess the QoL of the patients having undergone PCI.

The responses of patients were recorded by subjecting them to a 12-question long DASI questionnaire. In case of illiterate patients, the questions were asked orally. Answer to each question was scored differently according to the physical effort put in that particular activity.

The Duke Activity Status Index is a 12-item questionnaire that assesses daily activities such as personal care, ambulation, household tasks, sexual function and recreation with respective metabolic costs. The final score ranges between zero and 58.2 points. Higher the score, better the functional capacity [9].

In clinical practice, DASI can be used to assess the effects of medical treatments and cardiac rehabilitation and to assist clinical decisions. In controlled trials, DASI can serve to evaluate interventions and as a component of the assessment of the treatment cost/benefit [10].

Duration of study: A total of 81 patients were included from April 2018 to June 2018. The study duration was of 4 months.

Statistical analysis

All the data was recorded in the Microsoft Excel Spreadsheet. Analysis was done using SPSS version 25.0**.** p value < 0.05 was considered statistically significant. Pearson correlation coefficient was used to find correlation between different variables and quality of life. Unpaired t-test was used to compare the distribution of variables such as age, no. of prescribed drugs and the assessment of QoL on three follow-ups of all patients across the various heart conditions such as stable angina, UA, STEMI and NSTEMI.

Results

Demographic characteristics

Age and gender distribution

Out of the 81 patients enrolled in the study, 63 were males (77.77%) while 18 were females (22.22%) i.e. the sex ratio was 3.5:1. The mean ± SD for age was 59.36 ± 9.403 yrs.

Majority of the patients belonged to the age group of 61-70 years (38%).

Clinical characteristics

The most common presenting complaint was chest pain (64), followed by breathlessness (22). Out of the 64 patients that came with the complaints of chest pain, 15 cases were of radiating pain.

The mean ± SD for Systolic Blood Pressure was 129.39 ± 9.79, while the mean ± SD for Diastolic Blood Pressure was 79.09 ± 14.98.

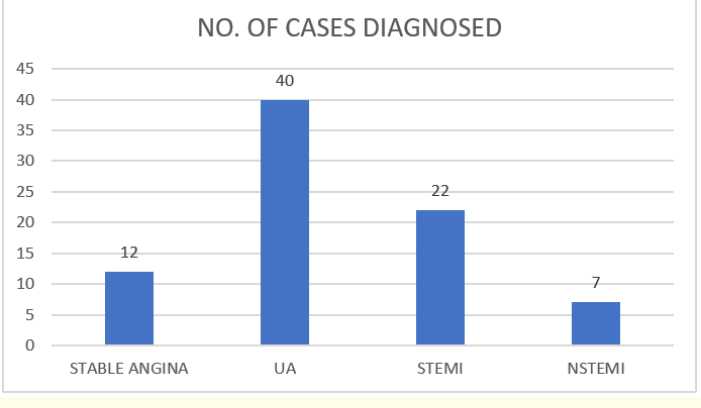


Figure 1: *Diagnosis.*

The most common diagnosis was UA (50%), followed by STEMI (27.2%), Stable angina (14.8%) and then, NSTEMI (9%) (Figure 1).

Hypertension was found to be the most common co-morbid factor (53%) followed by diabetes mellitus (34.6%).

Drug prescribing pattern (Table 1)

There was a total of 759 drugs prescribed to 81 patients. On an average, 9.37 drugs were prescribed to a patient. Out of the total 81 prescriptions, antiplatelet drugs and statins were prescribed in all (100%). They were followed by beta-blockers at 75 (92.6%), potassium channel openers at 29 (35.8%), anti-coagulants at 23 (28.4%), anti-diuretics at 23 (28.4%) and ACE inhibitors/ARBs at 22 (26.2%). Among the beta-blockers, most commonly prescribed beta-blocker was Metoprolol (84%), followed by newer generation beta-blockers such as Nebivolol and Carvedilol. Most commonly prescribed anti-platelet drug was found to be aspirin (79%), followed by Cilostazol (59.25%), Clopidogrel (53%) and Ticagrelor (28.4%). Dual anti-platelet drug therapy was followed in all prescriptions.

Drug name	Frequency
Metoprolol	68
Aspirin	64
Atorvastatin	49
Cilostazol	48
Clopidogrel	43
Rabeprazole + Domperidone	31
Cefixime	30
Nicorandil	29
Pantoprazole	25
Rosuvastatin	24
Enoxaparin	23
Ticagrelor	23

Table 1: *Most commonly prescribed drugs in patients post-PCI.*

Adherence of the evaluated prescriptions to AHA/ACC guidelines

Generic name	Frequency	COR	LOE	Adherence frequency
Metoprolol	68	I	A	68
Aspirin	64	I	A	64
Atorvastatin	49	I	A	49
Clopidogrel	43	I	B	43
Rabeprazole + Domperidone	31	IIa	C	31
Pantoprazole	25	I	B	25
Rosuvastatin	24	I	A	24
Enoxaparin	23	IIb	B	23
Ticagrelor	23	I	B	23
Clopidogrel + Aspirin	15	I	A	15
Glimepiride + Metformin	11	I	C	11
Ramipril	10	I	A	10
Torsemide + Spironolactone	10	I	A	10
Amlodipine	7	I	A	7
Metformin	7	I	C	7
Pantoprazole + Domperidone	6	IIa	C	6
Telmisartan	6	I	A	6
Cilostazol	48	XXXXXXXX	XXXXXX	0

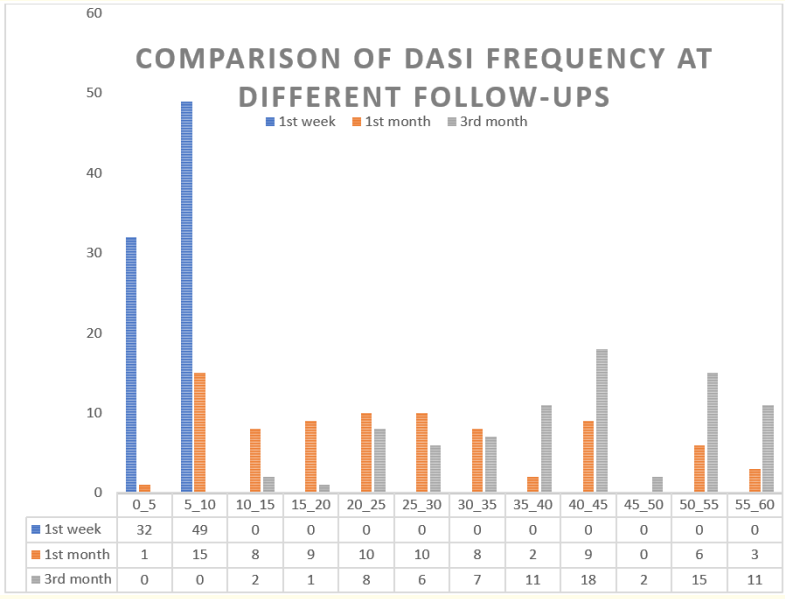
Table 2: *Adherence of the prescribed drugs to AHA/ACC guidelines.*

**: Only the relatively important cardiovascular drugs have been included.*

There is 89.75% adherence to the 2011 AHA/ACC guidelines for the management of PCI. Cilostazol was the overprescribed drug. Triple-antiplatelet therapy was used instead of the usual recommended dual-antiplatelet therapy (DAPT). No significant drug contraindications, incorrect drug selections or dosing were encountered.

Analysis of quality of life

The patients were subjected to the QoL questionnaire at the three different follow-ups at one week, one month and three months respectively.



	0_5	5_10	10_15	15_20	20_25	25_30	30_35	35_40	40_45	45_50	50_55	55_60
1st week	32	49	0	0	0	0	0	0	0	0	0	0
1st month	1	15	8	9	10	10	8	2	9	0	6	3
3rd month	0	0	2	1	8	6	7	11	18	2	15	11

Figure 2: *Comparison of DASI frequency at different follow-ups (N = 81).*

As depicted in figure 2, higher the DASI score, better is the QoL. All the 81 patients when subjected to the QoL questionnaire at the end of 1st week post-PCI scored in the lowest range (0 - 10). This can be explained by the fact that the functional capacity of the patient was restricted due to symptoms experienced by the patients, medical advice, procedure underwent, medical therapy and the period of hospitalization.

When the same patients were subjected to follow-up QoL at the end of 1st month, 16 patients still had a score ranging from 0 - 10, which again corresponded to poorer QoL. Seventeen patients had scores between the range 10 - 20.

About 30 patients demonstrated moderately improved scores between 20 and 40. The QoL was substantially improved in 18 patients who had scores in the higher range (40 - 60).

In the third month when the QoL was assessed, there was no patient who reported DASI score in the lower range of 0 - 10. Thirty-two patients demonstrated moderate scores in the range of 20 - 40. At the end of third month, 46 patients had scores in the higher range (i.e. 40 - 60) and only 3 remained in the range between 10 - 20.

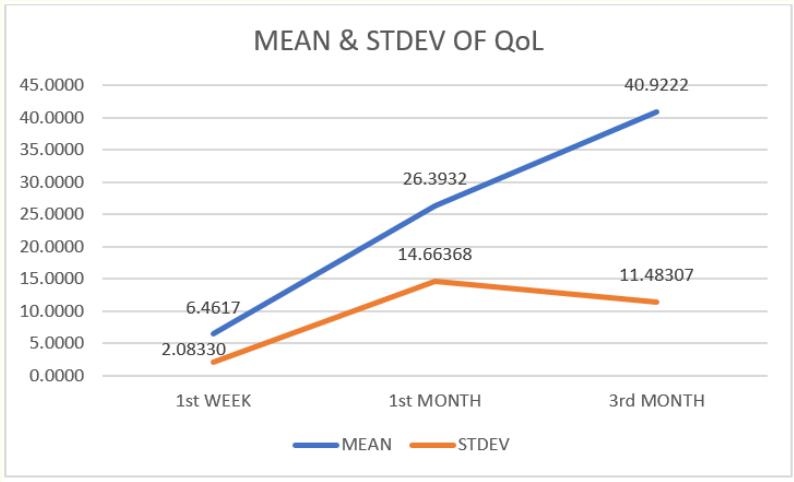
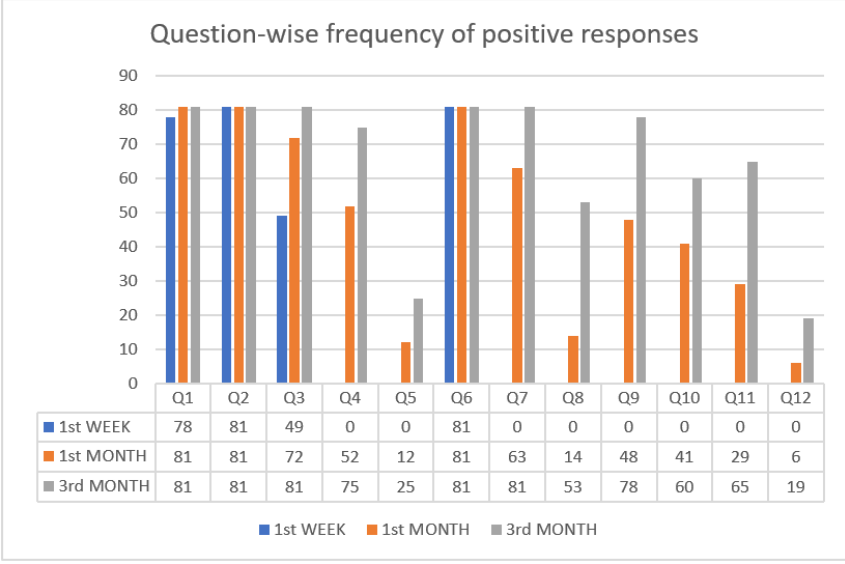


Figure 3: *Mean and Std. deviation of QoL at different follow-ups.*

As shown in figure 3, the mean ± SD for QoL at 1st week was quite low at 6.4617 ± 2.08330. In the first month and the third month the scores substantially improved to 26.3932 ± 14.66368 and 40.9222 ± 11.48307 respectively.



	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
1st WEEK	78	81	49	0	0	81	0	0	0	0	0	0
1st MONTH	81	81	72	52	12	81	63	14	48	41	29	6
3rd MONTH	81	81	81	75	25	81	81	53	78	60	65	19

Figure 4: *Question-wise frequency of positive responses (N = 81).*

As shown in figure 4, the DASI contains 12 questions. On comparing the responses to Q1, which was related to self-care, almost all the patients on all the three follow-ups showed a positive response indicating no negative effect on their quality of life. Almost similar responses were observed in response to Q2, which dealt with walking indoors. With regards to Q3, which dealt with walking around the neighborhood, the frequency of positive responses in first week was lesser, which improved at the end of first month and third month. The next two questions Q4 and Q5, dealt with climbing stairs and running a short distance which showed no positive responses in first week owing to medical advice and procedure underwent. The frequency of positive responses with respect to these questions improved in relation to climbing stairs but not so much with aspect of running a short distance (Refer figure 4).

With regards to Q8, dealing with heavy work, positive responses were seen in 14 at the end of first month and 53 at the end of third month.

With respect to Q10 dealing with sexual relations, there was no positive response at 1st follow-up. But, 41 patients and 60 patients at the end of first and third month respectively showed positive response. Some patients felt uncomfortable answering it and left it unanswered, which is why it had to be scored zero.

		Age (yrs.)	No of drugs	QoL 1st week	QoL 1st month	QoL 3rd month
Age (yrs.)	Pearson Correlation	1	.189	-.164	-.232*	-.558**
	Sig. (2-tailed)		.093	.142	.037	.000
No of drugs	Pearson Correlation	.189	1	-.223*	-.206	-.274*
	Sig. (2-tailed)	.093		.047	.067	.014
QoL 1st week	Pearson Correlation	-.164	-.223*	1	.648**	.573**
	Sig. (2-tailed)	.142	.047		.000	.000
QoL 1st month	Pearson Correlation	-.232*	-.206	.648**	1	.799**
	Sig. (2-tailed)	.037	.067	.000		.000
QoL 3rd month	Pearson Correlation	-.558**	-.274*	.573**	.799**	1
	Sig. (2-tailed)	.000	.014	.000	.000	
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 3: *Correlation between various parameters.*

As shown in table 3. There was a negative correlation between age and total scores, especially at second and third follow-up and that was statistically significant. As the age increases QoL scores are seen decreasing which is suggestive of decreased physical activity. Thus, age turns out to be one of the key factors in determining the DASI score after third month. Aged patients having a better DASI after initial follow-up did not necessarily have a better DASI score than their younger counterparts at the end of 3 months.

As the total number of drugs increases, QoL scores are found to be deteriorating and the values are statistically significant. This shows that increased co-morbid conditions lead to increased drug usage.

Comparison of findings (w.r.t. age of the patients, no. of prescribed drugs and QoL assessed at the three follow-ups) between the four clinical groups (Stable angina, UA, STEMI and NSTEMI) taken in this study (Refer to table 4).

	NSTEMI		Stable Angina		
	Mean	Std. Deviation	Mean	Std. Deviation	p value
Age (yrs.)	61.29	10.14	62.25	5.75	0.7937
No. of drugs	9.28	2.56	10.58	3.20	0.375
QoL 1st week	5.67	1.46	6.78	1.95	0.2146
QoL 1st month	28.24	13.57	23.53	14.08	0.486
QoL 3rd month	39.45	16.02	40.47	12.21	0.8772

Table 4a: *NSTEMI v/s stable angina.*

On comparing the findings of the various above parameters between the two groups- NSTEMI and stable angina, there was no significant difference amongst them.

	NSTEMI		STEMI		
	Mean	Std. Deviation	Mean	Std. Deviation	p value
Age(yrs.)	61.29	10.14	57.18	11.15	0.3942
No. of drugs	9.28	2.56	10.45	3.71	0.4469
QoL 1st week	5.67	1.46	5.12	2.06	0.5158
QoL 1st month	28.24	13.57	21.40	12.63	0.2311
QoL 3rd month	39.45	16.02	38.16	11.81	0.8198

Table 4b: *NSTEMI v/s STEMI.*

On comparing the findings of the various above parameters between the two groups- NSTEMI and STEMI, there was no significant difference amongst them.

	NSTEMI		UA		
	Mean	Std. Deviation	Mean	Std. Deviation	p value
Age(yrs.)	61.29	10.14	59.35	9.12	0.6119
No. of drugs	9.28	2.56	8.650	2.14	0.4848
QoL 1st week	5.67	1.46	7.23	1.85	0.001
QoL 1st month	28.24	13.57	29.66	15.57	0.8214
QoL 3rd month	39.45	16.02	42.83	10.26	0.4651

Table 4c: *NSTEMI v/s UA.*

On comparing the findings of the various above parameters between the two groups- NSTEMI and UA, significant difference (p value = 0.001) is found between the QoL assessed at the end of first week. However, there is no significant difference in the QoL that was subsequently assessed at the end of first and third month.

	Stable Angina		STEMI		
	Mean	Std. Deviation	Mean	Std. Deviation	p value
Age (yrs.)	62.25	5.75	57.18	11.15	0.1528
No. of drugs	10.58	3.20	10.45	3.71	0.9205
QoL 1st week	6.78	1.95	5.12	2.06	0.292
QoL 1st month	23.53	14.08	21.40	12.63	0.7464
QoL 3rd month	40.47	12.21	38.16	11.81	0.5947

Table 4d: *Stable angina v/s STEMI.*

On comparing the findings of the various above parameters between the two groups- stable angina and STEMI, there is no significant difference amongst them.

	Stable Angina		UA		
	Mean	Std. Deviation	Mean	Std. Deviation	p value
Age(yrs.)	62.25	5.75	59.35	9.12	0.349
No. of drugs	10.58	3.20	8.65	2.14	0.0187
QoL 1st week	6.78	1.95	7.23	1.85	0.464
QoL 1st month	23.53	14.08	29.66	15.57	0.2276
QoL 3rd month	40.47	12.21	42.83	10.26	0.5067

Table 4e: *Stable angina v/s UA.*

On comparing the findings of the various above parameters between the two groups- stable angina and UA, there is significant difference (p value = 0.001) found between the no. of drugs prescribed in both the groups. However, other variables are not significant.

	STEMI		UA		
	Mean	Std. Deviation	Mean	Std. Deviation	p value
Age (yrs.)	57.18	11.15	59.35	9.12	0.4114
No. of drugs	10.45	3.71	8.65	2.14	0.0744
QoL 1st week	5.12	2.06	7.23	1.85	0.001
QoL 1st month	21.40	12.63	29.66	15.57	0.0374
QoL 3rd month	38.16	11.81	42.83	10.26	0.1098

Table 4f: *STEMI v/s UA.*

On comparing the findings of the various above parameters between the two groups- STEMI and UA, there is significant difference in the QoL assessed at the end of first week (p value = 0.001) and first month (p value = 0.0374) respectively. However, other variables are not significant.

It is important to note that in all intra-group comparisons, one noticeable fact is that that there was no significant difference in QoL assessed at the end of 3rd month in all patients who underwent PCI.

Discussion

Percutaneous coronary intervention, or PCI, also known as an angioplasty, is a medical procedure in which a balloon is used to open narrowed or blocked blood vessels of the heart (coronary arteries). With a percutaneous coronary intervention, a catheter with a deflated balloon on its tip is passed into the narrowed artery segment, the balloon is inflated and the narrowed segment widened. Then the balloon is deflated and the catheter is removed.

India has the highest burden of acute coronary syndromes in the world, yet little is known about the treatments and outcomes of these diseases [11].

Acute STEMI is the most lethal presentation of CAD with mortality rates in community ranging from 15 to 20%. PCI has been established as the treatment of choice for patients presenting with acute STEMI [12].

The main cause of ACS is atherosclerosis in the coronary arteries. Atherosclerosis is a complex inflammatory-fibro protective response to the retention of plasma derived atherogenic lipoproteins in the coronary artery. This deposition of lipoproteins in the coronary artery results in the formation of plaque. The plaque progression, disruption and thrombosis further contribute to infarction [13].

This is a prospective, longitudinal study in which the prescription pattern and its adherence to 2011 AHA/ACC guidelines for management of patients undergoing PCI was checked. Subsequently, QoL of the patients was assessed post-PCI on three different occasions i.e. at the end of 1st week, 1st month and 3rd month. The study duration was of 4 months and the data was collected from the patients visiting the Cardiology department at a tertiary care hospital.

Demographic characteristics: There were a total of 81 patients, out of which 63 were males (77.77%) while 18 were females (22.22%). Most of the patients belong to the age group of 61-70 years (38%), followed by 51 - 60 years (34.6%). The mean ± SD for age was 59.36 ± 9.403 years. Out of the total 81 patients, 53% suffered from hypertension. The mean ± SD for age is comparable to study conducted by Rachel., *et al*. [14] where it came out to be 62 ± 12 years. However, out of the 745 patients assessed, 70% were males compared to 77.77% in this study.

A year-long duration study conducted by Jarrah., *et al*. [15] showed that women comprised 20.6% of 2426 enrolled patients, were older (mean age 62.9 years versus 57.2 years) and had higher prevalence of hypertension (81% versus 57%) compared with men.

In a retrospective study conducted by Barbosa., *et al*. [16] in which 208 patients underwent PCI, 51 (24.5%) were women and 157 (75.5%) men.

The most common diagnosis was UA (50%), followed by STEMI (27.2%), Stable angina (14.8) and then, NSTEMI (9%). The diagnosis of UA/NSTEMI is comparable to a study conducted collectively in France, Spain and UK by Ferrieres., *et al*. [17] where index diagnosis was UA/NSTEMI in 53% but, no so much similar in case of STEMI, where its incidence was at 47%. In a study conducted by Liu., *et al*. [18], out of the 168 enrolled for analysis: 104 patients (61.9%) had STEMI and 64 (38.1%) had NSTEMI.

Prescription pattern: There were a total of 759 drugs prescribed to 81 patients. On an average, 9.37 drugs were prescribed to a patient, which is almost similar to a study conducted by Ghosh., *et al*. [27] where it was found to be 9.09 ± 2.17.

Out of the total 81 prescriptions, antiplatelet drugs and statins were prescribed in all (100%). They were followed by beta-blockers at 75 (92.6%), potassium channel openers at 29 (35.8%), anti-coagulants at 23 (28.4%), diuretics at 23 (28.4%) and ACE inhibitors/ARBs at 22 (26.2%). The percentage of antiplatelet drugs and statins prescribed is similar to a study conducted by Naveen., *et al*. [19] and

Ghosh., *et al*. [20] where again it was 100%. However, it was then followed by antacids at 87%, opioids at 51%, anti-emetics at 69%, anti-coagulants at 40%, beta-blockers at 53%, thrombolytic drugs at 44% and ACE-inhibitors at 41% in the study conducted by the former.

Whereas, resemblance in the prescribing of antihypertensive drugs can be seen in a study conducted by Chandana., *et al*. [21] revealed that, 61 (100%) received anticoagulants, anti-anginal and antihypertensive drugs 60 (98.4%), 54 (88.5%) lipid lowering drugs, 24 (39.34%) thrombolytic and 14 (22.9%) inotropic agents.

Adherence of prescriptions to AHA/ACC guidelines: As there were no concrete Indian standard treatment guidelines in use, we were bound to use AHA/ACC guidelines. The adherence to the AHA/ACC guidelines in this study was found to be 89.75%, where, Cilostazol was the overprescribed drug. Triple-antiplatelet therapy was used instead of the usual recommended dual-antiplatelet therapy (DAPT), though, in a study conducted by I. Singh., *et al*. [22] it was found that there was no difference in the incidence of major adverse cardiovascular and cerebrovascular events (MACCE) between the triple therapy and dual therapy groups of patients (N>1725). On the other hand, on subgroup analysis there was a significant difference between the two groups favoring the triple drug therapy in patients undergoing PCI with drug-eluting stents (DES).

No significant drug contraindications, incorrect drug selections or dosing were encountered in our study. This is in sharp contrast to the study conducted by Biradar., *et al*. [13] where there was overprescribing, improper drug selection and untreated indication in 30%, 20% and 18% of a total of 120 cases.

In a study conducted by Parthasarathi., *et al*. [23], there was untreated indication, sub-therapeutic dosage and overprescribing in 3.77%, 13.2% and 5.66% patients respectively out of a total of 53 patients.

Adverse drug interactions and drug interactions of the studies conducted there have not been taken into account to make the results comparable to the study conducted here as this study takes into account only the drugs prescribed at the time of discharge.

QoL assessment: Our study was unique because the QoL was measured three times in the same patient. The DASI was used to calculate the QoL.

The DASI is a 12-item questionnaire that assesses daily activities such as personal care, ambulation, household tasks, sexual function and recreation with respective metabolic costs. The final score ranges between zero and 58.2 points. Higher the score, better the functional capacity [9].

As the score could calculate only the physical functioning of the patient, it did not let the investigator know the effect of Ischemic Heart Disease and the procedure underwent on the behavioural, emotional and psychological domain.

All the 81 patients when subjected to the QoL questionnaire at the end of 1st week post-PCI scored in the lowest range (0 - 10). This can be explained by the fact that the functional capacity of the patient was restricted due to symptoms experienced by the patients, medical advice, procedure underwent, medical therapy and the period of hospitalization.

At the end of 1st month, 16 patients still had a score ranging from 0-10, while 17 patients had scores between the range 10 - 20.

About 30 patients achieved scores between 20 and 40 and eighteen patients attained scores in the higher range (40 - 60).

Thirty-two patients demonstrated moderate scores in the range of 20 - 40. At the end of third month, 46 patients had scores in the higher range (i.e. 40 - 60), 32 had moderate scores in the range of 20 - 40 while only 3 remained in the range between 10 - 20.

The mean ± SD for QoL at first week, first month and third month was 6.4617 ± 2.08330, 26.3932 ± 14.66368 and 40.9222 ± 11.48307 respectively.

In a study conducted by Shuaib., *et al*. [29] which was to assess for change in peak oxygen uptake during cardiopulmonary exercise testing after PCI of coronary Chronic Total Occlusions (CTO), mean baseline DASI score of 28 patients came out to be 29.2 ± 13.7. While on follow-up, after cardiopulmonary testing, it was 37.5 ± 13.9.

Whereas in a study conducted by Hlatky., *et al*. [9], the mean baseline DASI score for 465 patients who underwent PCI came out to be 21.6 and the mean improvement in functional status after one, two, three, four and five years was 4.4 units, 3 units, 3.2 units, 2.6 units and 2 units respectively.

Strengths of the Study

This study is first-of-its kind in India. This study can be a stepping stone towards formulating a better and concrete Indian Standard Treatment Guidelines for post-procedural management of PCI. We have correlated prescription pattern and other variables with QoL at different follow-ups.

Limitations of the Study

This study had a limited duration of 4 months as specified by the ICMR board. So, we could not design a methodology in which we could evaluate the long term safety and efficacy of drugs prescribed in chronic stable angina and ACS. We also could not evaluate long-term outcomes in patients who underwent PCI. Secondary prevention of adverse coronary events becomes a major objective in such patients who have undergone PCI and can be partly achieved by continuing with the right medical therapy. However, this could not be assessed due to the short duration of the study. All these limitations can be taken care of by subsequent studies planned in this direction.

Conclusion

Higher incidence of CAD is detected in males also the elderly population in the age group 61-70 years. Hypertension is the most important co-morbid factor linked to it.

Antiplatelet drugs and statins are the most widely prescribed drugs for post-PCI management. Metoprolol is the most commonly prescribed beta-blocker.

Adherence of the drug prescription to AHA/ACC guidelines is 89.75%. However, minor changes are bound to be noticed according to the guidelines used. Cilostazol was the overprescribed drug. Triple-antiplatelet therapy was used instead of the usual recommended dual-antiplatelet therapy (DAPT). No significant drug contraindications, incorrect drug selections or dosing were encountered.

Of all the categories of ACS, UA has the best prognosis which could be determined from the QoL assessment done on three separate occasions. But, at the end of third month, irrespective of the diagnosis, all groups achieve similar physical activity status.

Age turns out to be one of the key factors in determining the DASI score after the third month. Aged patients having a better DASI score initially did not necessarily have a better DASI score than their younger counterparts at the end of three months.

Summary

The purpose of this study was to evaluate of Prescription Pattern, Health-Related Quality of Life and Adherence to Standard Treatment Guidelines in Patients who have undergone Percutaneous Coronary Intervention. It was carried out in a tertiary care hospital after obtaining permission from the respective legal and administrative authorities. A total of 81 patients were enrolled in this prospective, longitudinal study. The male-female ratio was 3.5:1 and the mean ± SD for age was 59.36 ± 9.403 yrs. Out of the total 81 patients, 64 presented with complaints of chest pain. About 50% of the patients were diagnosed with UA, followed by STEMI (27.2) %.

Their post-discharge prescription pattern was evaluated and checked for adherence to the AHA/ACC guidelines. Antiplatelet drugs and statins were prescribed in all the patients (100%) followed by beta-blockers (92.6%). The adherence was found to be 89.75%.

QoL was assessed on three separate occasions in which the mean ± SD for QoL at first week, first month and third month was 6.4617 ± 2.08330, 26.3932 ± 14.66368 and 40.9222 ± 11.48307 respectively. All the 81 patients when subjected to the QoL questionnaire at the end of 1st week post-PCI scored in the lowest range (0 - 10). However, there was gradual improvement in the QoL in subsequent follow-ups and eventually only 3 out of 81 had a DASI score below 20, while none of them had a score below 10. UA had relatively better QoL than the rest of the groups. However, at the end of three months, there was no significant difference in the mean QoL of all the clinical groups assessed.

Age turned out to be one of the key factors in determining the DASI score after the third month.

Suggestions

Duration of study can be extended to evaluate QoL till several months for more accurate findings. Apart from checking adherence to AHA/ACC guidelines, European Society of Cardiology (ESC) guidelines can also be used for studies planned in this direction.

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Bibliography

1. Garg P., *et al*. "Practice Patterns and Trends in the Use of Medical Therapy in Patients Undergoing Percutaneous Coronary Intervention in Ontario (2014).

2. David JC., *et al*. "Quality of Life after PCI with Drug-Eluting Stents or Coronary-Artery Bypass Surgery". *The New England Journal of Medicine* 364 (2011): 11.

3. Ayaka E., *et al*. "Disparity in the Application of Guideline-Based Medical Therapy after Percutaneous Coronary Intervention: Analysis from the Japanese Prospective Multicenter Registry" (2013).

4. Wang H., *et al*. "Prescription pattern and its influencing factors in Chinese county hospitals: A retrospective cross-sectional study". *PLoS One* 8 (2013): e63225.

5. Pavani V., *et al*. "Study of prescribing pattern for evaluation of rational drug therapy in Warangal". *Indian Journal of Pharmacy Practice* 4.4 (2011): 77-79.

6. Maria BO., *et al*. "Symptoms, myocardial ischaemia and quality of life in women". *European Heart Journal* 24 (2003): 1506-1514.

7. Rakesh MS., *et al*. "Quality of Life After Early Mitral Valve Repair Using Conventional and Robotic Approaches". *The Annals of Thoracic Surgery* 93.3 (2012): 761-769.

8. KD Tripathi. "Essentials of Medical Pharmacology". 7th Edition 39 (2013): 556.

9. Hlatky MA., *et al*. "Medical care costs and quality of life after randomization to coronary angioplasty or coronary bypass surgery. Bypass Angioplasty Revascularization Investigation (BARI) Investigators". *The New England Journal of Medicine* 336.2 (1997): 92-99.

10. Mariana AC., *et al*. "Duke Activity Status Index for Cardiovascular Diseases: Validation for Portuguese Translation". *Arquivos Brasileiros de Cardiologia* 102.4 (2014): 383-390.

11. Denis X., *et al*. "Treatment and outcomes of acute coronary syndromes in India (CREATE): a prospective analysis of registry data". *The Lancet* 371.9622 (2008): 1435-1442.

12. Gajendra D., *et al*. "Primary percutaneous coronary intervention for acute ST elevation myocardial infarction: Outcomes and determinants of outcomes: A tertiary care center study from North India". *IHJ* 69.3 (2017): 294-298.

13. Siddaruda MB., *et al*. "Prescribing Pattern, Drug Utilization and Clinical Pharmacy Services in Acute Coronary Syndrome Patients". *American Journal of Drug Discovery and Development* 7 (2017): 63-69.

14. Murali-Krishnan R., *et al*. "Impact of frailty on outcomes after percutaneous coronary intervention: a prospective cohort study". *Open Heart* 2 (2015): e000294.

15. Mohamad IJ., *et al*. "Gender differences in risk profile and outcome of Middle Eastern patients undergoing percutaneous coronary intervention". *Saudi Medical Journal* 38.2 (2017): 149-155.

16. Roberto RB., *et al*. "Gender differences in primary percutaneous coronary intervention outcomes in patients with ST-elevation myocardial infarction 23.2 (2015): 96-101.

17. Jean F., *et al*. "A prospective observational study of treatment practice patterns in acute coronary syndrome patients undergoing percutaneous coronary intervention in Europe". *Archives of Cardiovascular Diseases* 104.2 (2011): 104-114.

18. Chung HL., *et al*. "Comparison of STEMI and NSTEMI patients in emergency department". *Journal of Acute Medicine* 1.1 (2011): 1-4.

19. Avula N., *et al*. "Drug utilization patterns in acute coronary syndrome at a tertiary care teaching hospital: A retrospective, non-interventional and observational study". *TPI* 6.9 (2017): 538-542.

20. Ghosh A., *et al*. "Drug utilization study in patients of acute coronary syndrome on follow-up visits at a tertiary care center in Kolkata". *Asian Journal of Pharmacy and Life Science* 2 (2012): 155-165.

21. Chandana N., *et al*. "A prospective study on drug utilization of cardiac unit in acute myocardial infarction of hospitalized patients". *International Journal of Clinical Pharmacology and Pharmacotherapy* 3 (2013): 6-11.

22. Singh I., *et al*. *British Journal of Clinical Pharmacology* 68.1 (2009): 4-13.

23. Parthasarathi G., *et al*. "Assessment of drug-related problems and clinical pharmacists' interventions in an Indian teaching hospital". *The Journal of Pharmacy Practice and Research* 33 (2003): 272-274.

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