

## ORIGINAL ARTICLE

## KNOWLEDGE ABOUT THE STENTS AND POST PCI PHARMACOTHERAPY AMONG PATIENTS UNDERGOING PCI

Ghulam Shabbir Shar<sup>1</sup>, Mukesh Kumar<sup>1</sup>, Haroon Ishaq<sup>1</sup>, Abdul Hakeem<sup>1</sup>, Bashir Ahmed Solangi<sup>1</sup>, Gulzar Ali<sup>1</sup>, Tahir Saghir<sup>1</sup>, Musa Karim<sup>1</sup>

<sup>1</sup>National Institute of Cardiovascular Diseases, Karachi, Pakistan

**Objectives:** The main objective of the study was to evaluate the knowledge of patients for stents and post PCI pharmacotherapy.

**Methodology:** A cross-sectional study was carried out on 102 consecutive selected patients with age  $\geq 18$  years who had undergone elective PCI. Various patient characteristics including demographics, previous history of cardiac problems, evaluation processes and overall knowledge were assessed using the survey questionnaire. With regards to evaluating levels of knowledge and awareness, the percentage for the number of correct answers about the dangers and advantages of elective PCI, clinical therapy for CAD, and bypass surgery was calculated.

**Results:** A total of 102 patients were included, 78(76.5%) were male with mean age of study population was  $53.93 \pm 11.0$  years and majority 66(64.7%) were above 50 years of age. On analysis of demographics data it was observed that 74(72.5%) were educated. The results showed that adequate knowledge ( $\geq 70\%$ ) was observed only in 16.7% while there was not a single patient who answered all the questions in the correct fashion.

**Conclusion:** Patients undergoing PCI had inadequate knowledge about the stents and post PCI pharmacotherapy.

**Keywords:** PCI, stent, dual antiplatelet therapy, in stent thrombosis

**Citation:** Shar GS, Kumar M, Ishaq H, Hakeem A, Solangi BA, Ali G, Saghir T, Karim M. Knowledge about the Stents and Post PCI Pharmacotherapy among Patients Undergoing PCI. Pak Heart J. 2021;54(02):139-143. DOI: <https://doi.org/10.47144/phj.v54i2.2088>

### INTRODUCTION

One of the leading causes of death due to non-communicable diseases through the world is coronary artery disease (CAD).<sup>1</sup> With progress in medicine over the past few decades, more invasive techniques like CABG have been replaced with less invasive method like percutaneous coronary intervention (PCI). Over the years, PCI has been preferred over other methods particularly in cases where there is the absence of left main or complex multi-vessel disease for a large number ischemic heart disease patients and the yearly number of PCI procedures carried out for coronary artery disease is in excess of CABG procedures. It is estimated that around one million PCI procedures are carried out in the U.S alone.<sup>2</sup> According to another estimation, more than half a million PCI procedures are carried out in the US while the global figures for PCI are estimated to be in excess of 1 million.<sup>3</sup>

In more than 90% of the patients, angioplasty is useful in opening coronary arteries. Out of these successful coronary angioplasty patients, around 30 to 40% will at some time develop recurring narrowing at the position of balloon. However, with the advent of new technology and devices like intracoronary stents and atherectomy, as well as the use of newer pharmacologic agents has increased the chances of success and also minimized the

chances of developing complications and re-emergence of PCI. At present, after stent the recurrence rate is well below 10%. With these improvements in the overall levels of safety and effectiveness of PCI, the number of procedures being carried out has seen an exponential increase with more than 90% of all PCI procedures involving at least one coronary stent.<sup>4,5</sup>

It was in 1977 that the very first coronary balloon angioplasty was carried out by Andreas Gruentzig using. Since the first time, this procedure has grown in use and been developed progressively with the advances in technology.<sup>6</sup> With the emergence of coronary stents and with drug eluting stents, the chances of restenosis after intervention have been massively reduced. In around 20 to 30% of the patients, restenosis still occurs with bare metal stents while restenosis that is clinically significant occurs in only 10 to 15% of the patients in the 1st year following treatment.<sup>7</sup>

It is recommended that long term dual antiplatelet therapy should be used after bare-metal or drug eluting stent placement given there are contraindications due to the risk of bleeding.<sup>8</sup> The level of patient compliance to the prescribed medication becomes very important due to the extended time duration of this therapy method. The lack of compliance by the patient is the easiest risk

factor that can be prevented. The key to good levels of compliance among the patients include the knowledge of the patients regarding PCI, stent and antiplatelet drugs.<sup>9</sup> With high levels of compliance, the risk of developing adverse cardiac events is greatly reduced. A study carried out by the University of California in San Francisco showed that the mean number of correct answers stood at 31% while around 5% of the patients documented that the physicians informed that about alternate treatment methods.<sup>10</sup> For a developing country like Pakistan where the levels of patient education and knowledge are generally poor, non-compliance is quite common resulting in higher chances of restenosis.

This study was carried out to evaluate the levels of knowledge of patients with regards to stents and post PCI pharmacotherapy. The results have presented a clearer picture about the nature and magnitude of the problem. Our findings also highlight and reflect on the need to carry out effective counseling to patients enabling and encouraging physicians to take a more proactive approach.

## METHODOLOGY

This cross-sectional study was conducted at a tertiary care cardiac center of Karachi, Pakistan. All consecutive patients with age greater than or equal to 18 years who underwent elective PCI were included in this study between July 2018 and December 2018. Those patients who had emergency cases, and prior intervention were excluded from our study. Study was approved by the respective ethical review board and informed consent was obtained from all the patients or next of kin after explanation of the study protocol. On the day of discharge history and examination was done. Considering the proportion of approximately 31.1% of average knowledge score of patient at 95% confidence level and margin of error 9%, 102, patients were enrolled in study. The sample size calculation was done using the WHO software for sample size calculation version 2.0. Various patient characteristics including demographics, previous history of cardiac problems, evaluation processes and overall knowledge were assessed using the survey questionnaire. With regards to evaluating levels of knowledge and awareness, the percentage for the number of correct answers about the dangers and advantages of elective PCI, clinical therapy for CAD, and bypass surgery was calculated. Those with  $\geq 70\%$  correct answers were labeled as having adequate; those with lower scores were considered inadequate knowledge. With regards to the decision making process, questions were used to assess the

level of communication between the patient and doctor about the process and the overall perception of the patient in terms of their involvement in the decision making process. Descriptive and demographics characteristic including mean  $\pm$  SD or frequency and percentage were reported. Univariate analysis using chi-square or fisher exact test was used to determine the connection between the several predictors and levels of knowledge. All analysis was done taking 5% level of significance.

## RESULTS

Hundred and two patients fulfilling the inclusion criteria were included in this study. There were 78 (76.5%) males and 24 (23.5%) females. The mean  $\pm$  standard deviation age of study population was  $53.93 \pm 11.0$  years. On analysis of demographics data it was observed that 74 (72.5%) were educated and 9 (32.1%) were uneducated. Analysis of adequate knowledge was found to be in 17 (16.7%) patients only. On analysis of language it was observed that a majority 49 (48%) and 27 (26.5%) patients were Urdu and Sindhi speaking respectively. Descriptive statistics of baseline, demographics and clinical knowledge of the study subjects are presented in Table 1.

**Table 1: Descriptive statistics of baseline, demographics and clinical knowledge of the study subjects**

Age in Years	Descriptive Statistics
Mean $\pm$ SD	53.93 $\pm$ 11.01
Min Max	32 - 75
<b>Age Groups</b>	
Below 50	36 [35.3%]
50 and Above	66 [64.7%]
<b>Gender</b>	
Male	78 [76.5%]
Female	24 [23.5%]
<b>Education Status</b>	
Educated	74 [72.5%]
Uneducated	28 [27.5%]
<b>Knowledge</b>	
Adequate	17 [16.7%]
Inadequate	85 [82.7%]
<b>Language</b>	
Urdu	49 [48%]
Sindhi	27 [26.5%]
Punjabi	9 [8.8%]
Pashto	14 [13.7%]
Balochi	2 [2%]
Siraiki	1 [1%]

On analysis of association of gender with adequacy of knowledge it was observed that out of 78 male patients, 14 (19.4%) and out of 24 female patients 3 (12.5%) had adequate knowledge while ( $p=0.391$ ). On analysis of association of education

with adequacy of knowledge it was observed that out of 74 educated patients and out of 28 uneducated patients 24 (85.71%) had inadequate knowledge ( $p=0.473$ ). On analysis of association of age group with adequacy of knowledge it was observed that out of 36 below 50 years patients, 5(13.8%) had adequate knowledge while out of 66 above 50 years patients, 12(18.2%) had adequate knowledge ( $p=0.398$ ).

**Table 2: Comparison of adequate knowledge among different demographics characteristics**

	Adequate Knowledge			P-value
	Yes	No	Total	
<b>Gender</b>				
Male	14 [17.9%]	64 [82.1%]	78	0.391
Female	3 [12.5%]	21 [87.5%]	24	
<b>Education Status</b>				
Educated	13 [17.6%]	61 [82.4%]	74	0.473
Uneducated	4 [14.3%]	24 [85.7%]	28	
<b>Age Groups</b>				
< 50 Years	5 [13.9%]	31 [86.1%]	36	0.398
≥ 50 Years	12 [18.2%]	54 [81.8%]	66	
<b>Language</b>				
<b>Urdu</b>				
Yes	10 [20.4%]	39 [79.6%]	49	0.239
No	7 [13.2%]	46 [86.8%]	53	
<b>Sindhi</b>				
Yes	4 [15.4%]	22 [84.6%]	26	0.554
No	13 [17.1%]	63 [82.9%]	76	
<b>Punjabi</b>				
Yes	1 [12.5%]	7 [87.5%]	8	0.608
No	16 [25%]	48 [75%]	64	
<b>Pashto</b>				
Yes	1 [7.1%]	13 [92.9%]	14	0.275
No	16 [18.2%]	72 [81.8%]	88	
<b>Balochi</b>				
Yes	0 [0%]	2 [100%]	2	0.693
No	17 [17%]	83 [83%]	100	
<b>Siraiki</b>				
Yes	0 [0%]	1 [100%]	1	0.833
No	17 [17%]	84 [83.2%]	101	

**DISCUSSION**

Clinical management and PCI are both needed to treat stable CAD, therefore treatment is mostly on individual basis. Therefore, the preferences and involvement of the patient is equally important when managing the treatment of these patients. The management of an effective antiplatelet therapy that is long term after implantation of stents is a vital concern for the survival and well-being of the patients.<sup>11</sup> Even though the causes involve various factors for the development of stent thrombosis, early cessation of antiplatelet therapy is regarded as the most important risk factor after coronary stenting, especially with regard to late<sup>12</sup> and very late stent thrombosis.<sup>13</sup> Studies carried out previously provide an indication that educational programs were useful in improving

knowledge and behavior among elderly population.<sup>14,15</sup> Hence, an evaluation into the levels of knowledge of PCI patients can serve as a guide in directing public health programs to minimize the risk factors associated with CAD.

It was also found that patients who had previously gone through coronary artery bypass surgery had higher levels of knowledge in comparison to those patients who were going through their first PCI (mean correct score 36.7% vs. 29.4%,  $p<0.01$ ).<sup>7,16,17</sup>

With regards to post PCI outcomes, employment status of the patients was observed to play a critical role. In specific terms, poorer outcomes were generally associated with unemployment among the patients which is in line with results from previous studies.<sup>13</sup> Therefore, along with sufficient health insurance, the rehabilitation programs should encourage patients in returning to full time work in order to improve outcomes in the long term.<sup>18</sup>

Premature cessation of dual antiplatelet therapy seems to be mostly caused by bleeding, non-compliance, noncardiac surgery and allergic reactions. The most common reason for premature cessation of antiplatelet therapy was planned surgery which happens in approximately 30% of all the patients.<sup>12</sup>

The risk of thrombosis of stents is particularly increased by non-cardiac surgery especially if the surgery is carried out immediately after stent placement. The arterial lumen undergoes endothelialization immediately after stent replacement, and possibly it is during this time that dual antiplatelet therapy is vital to the patency of the vessel. Due to the risk of bleeding, antiplatelet therapy is often stopped in the period immediately after the operation. This temporary cessation of antiplatelet therapy combined with the prothrombotic state of surgery may be reasons which cause an increase in the risk of early stent thrombosis.<sup>19,20</sup> This is particularly concerning to patients who have a previous history of PCI with stents due to the prothrombotic state and elevated demand on the cardiopulmonary system caused by the orthopedic procedure.

Stent thrombosis is not only riddled with problems but another issue with these patients is the increased tendency to bleed. The current literature’s review in the usage of antiplatelet agents in surgery showed that the average surgical blood loss increased by aspirin use was 2.5–20%. This percentage increased to 30 to 50% with the use of dual antiplatelet therapy.<sup>21,22</sup>

Our study is the pioneer work showing a general lack of medical awareness with regards to antiplatelet therapy and stents among patients who go through PCI.<sup>23</sup> The results from our study showed that only 15% of the total patients had an adequate level of awareness about stents and pharmacotherapy therapy after PCI. Another deficiency was found in the levels of knowledge of the patients with regards to the cessation of dual antiplatelet

therapy during surgery. This finding was particularly important as physicians themselves were found not be fully aware about the advantages of dual antiplatelet therapy during various surgical and dental procedures.<sup>20</sup> It goes without saying that this lack of awareness has serious implications with regards to potential risks.

There are several reasons which cause a general lack of awareness among physicians including surgeons and dentists. Our research found that for some patients with cardiovascular disease undergoing dental procedures, there was a single mention of coronary stents highlighting the massive gaps in knowledge and awareness.

A large number of studies showed that there was a negative correlation between levels of knowledge and age with older people having being less knowledgeable than their younger counterparts.<sup>1,5,7,9,11,15,16</sup> However, there was no association that was found between age and dependent variable in our study.

With regards to awareness and levels of education, no particular correlation was observed. One possible way to explain this finding is that the questions being asked were too basic and easy to evaluate the level of the patients' knowledge and awareness about their condition. The majority of questions were standardized enough for anyone undergoing PCI to be able to answer. Secondly the definition we used for an educated person included anyone who had passed primary school or anyone who could read a newspaper of any language. It was because of this definition that the educated patients had different levels of awareness and knowledge levels. While some had just passed primary school, others included PhDs so this mixture of education levels may have offset the difference.

Finally overall concluded that Patients who had gone through elective PCI had an overall lower levels of knowledge about the dangers and advantages of PCI, making it hard to evaluate whether the patients made decisions that were informed. It is not evident from the results whether the massive gaps in knowledge are due to poor transfer of knowledge or weak recall by the patients or both, it is however clear that more emphasis should be given on bettering the levels of knowledge for patients and improving the level of communication between the physician and patient so that treatment preferences and methods are better aligned and reflective of patients who are well informed.

## CONCLUSION

Patient's knowledge about stents and post PCI pharmacotherapy is inadequate. Majority of them are unaware of even basic knowledge. There is a wide gap in transfer of knowledge between doctor and patient. Females are comparatively less aware than males. Language/Ethnicity has no effect on adequacy of knowledge. Moreover, it was documented that patients highlighted discussions that were not complete with

limited knowledge about the various treatment alternatives and preferences, although they had earlier reported an advanced level of perceived decision making process.

## AUTHORS' CONTRIBUTION

GSS: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. MK, HI, AH, BAS, GA, TS, MK: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

**Conflict of interest:** Authors declared no conflict of interest.

## REFERENCES

- Zaman AG, Aleem Q. Pharmacology before, during and after percutaneous coronary intervention. *Heart*. 2021;107(7):585-92.
- Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Borden WB, et al. Heart disease and stroke statistics—2013 update: a report from the American Heart Association. *Circulation*. 2013;127(1):e6-e245.
- Langabeer JR, Henry TD, Kereiakes DJ, DelliFraine J, Emert J, Wang Z, et al. Growth in percutaneous coronary intervention capacity relative to population and disease prevalence. *J Am Heart Assoc*. 2013;2(6):e000370.
- Khan MR, Kayani WT, Ahmad W, Siddiqui S, Shahzad SA, Mumtaz SA, et al. Comparison of percutaneous coronary intervention versus coronary artery bypasses grafting in older Adults with Unprotected Left Main Coronary Artery Disease: A Meta-Analysis and Meta regression. *J Am Coll Cardiol*. 2019;73(9S1):2133.
- Wang J-l, Guo C-y, Chen H, Li H-w, Zhao X-q, Zhao S-m. Improvement of long-term clinical outcomes by successful PCI in the very elderly women with ACS. *BMC cardiovasc disord*. 2021;21(1):1-11.
- Barton M, Grüntzig J, Husmann M, Rösch J. Balloon angioplasty—the legacy of Andreas Grüntzig, MD (1939–1985). *Front Cardiovasc Med*. 2014;1:15.
- Shaw LJ, Berman DS, Maron DJ, Mancini G, Hayes SW, Hartigan PM, et al. Optimal medical therapy with or without percutaneous coronary intervention to reduce ischemic burden. *Circulation*. 2008;117(10):1283-91.
- Kushner FG, Hand M, Smith SC, King SB, Anderson JL, Antman EM, et al. 2009 focused updates: ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction (updating the 2004 guideline and 2007 focused update) and ACC/AHA/SCAI guidelines on percutaneous coronary intervention (updating the 2005 guideline and 2007 focused update) a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Catheter Cardiovasc Interv*. 2009;54(23):2205-41.
- Czamy MJ, Nathan AS, Yeh RW, Mauri L. Adherence to dual antiplatelet therapy after coronary stenting: a systematic review. *Clin Cardiol*. 2014;37(8):505-13.
- Lin G, Bynum J, Cosenza C, Lucas A, Reinking C, Sepucha K, et al. What Do Patients Remember? The Knowledge Gap in Patients Undergoing Elective Percutaneous Coronary Interventions. *Am Heart Assoc*; 2012.
- Acharjee S, Teo KK, Jacobs AK, Hartigan PM, Barn K, Gosselin G, et al. Optimal medical therapy with or without percutaneous coronary intervention in women with stable coronary disease: A pre-specified subset analysis of the Clinical Outcomes Utilizing Revascularization and Aggressive druG Evaluation (COURAGE) trial. *Am Heart J*. 2016;173:108-17.

12. Rossi ML, Zavalloni D, Gasparini GL, Presbitero P. Very late multivessel thrombosis of bare metal stents with concomitant patent drug-eluting stents after withdrawal of aspirin. *Int J Cardiol.* 2008;131(1):e7-e9.
13. Ayton DR, Barker AL, Peeters GM, Berkovic DE, Lefkovits J, Brennan A, et al. Exploring patient-reported outcomes following percutaneous coronary intervention: A qualitative study. *Health Expectations.* 2018;21(2):457-65.
14. Norekvål TM, Allore HG, Bendz B, Bjorvatn C, Borregaard B, Brørs G, et al. Rethinking rehabilitation after percutaneous coronary intervention: a protocol of a multicentre cohort study on continuity of care, health literacy, adherence and costs at all care levels (the CONCARDPCI). *BMJ Open.* 2020;10(2).
15. Magnani JW, Mujahid MS, Aronow HD, Cené CW, Dickson VV, Havranek E, et al. Health literacy and cardiovascular disease: fundamental relevance to primary and secondary prevention: a scientific statement from the American Heart Association. *Circulation.* 2018;138(2):e48-e74.
16. Rassaf T, Steiner S, Kelm M. Postoperative care and follow-up after coronary stenting. *Dtsch Arztebl Int.* 2013;110(5):72.
17. Kushner FG, Hand M, Smith SC, King SB, Anderson JL, Antman EM, et al. 2009 focused updates: ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction (updating the 2004 guideline and 2007 focused update) and ACC/AHA/SCAI guidelines on percutaneous coronary intervention (updating the 2005 guideline and 2007 focused update) a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol.* 2009;54(23):2205-41.
18. Goodman D, Park HL, Stefanick M, LeBlanc E, Bea J, Qi L, et al. Relation between self-recalled childhood physical activity and adult physical activity: The Women's Health Initiative. *Open J epidemiol.* 2013;3(4):224.
19. Beving H, Zhao C, Albåge A, Ivert T. Abnormally high platelet activity after discontinuation of acetylsalicylic acid treatment. *Fibrinolysis Int J Haemost Thromb.* 1996;7(1):80-4.
20. Lotrionte M, Biondi-Zoccai GG. The hazards of discontinuing acetylsalicylic acid therapy in those at risk of coronary artery disease. *Curr Opin Cardiol.* 2008;23(5):487-93.
21. Oprea A, Popescu W. Perioperative management of antiplatelet therapy. *Br J Anaesth.* 2013;111(suppl\_1):i3-i17.
22. Song JW, Soh S, Shim J-K. Dual antiplatelet therapy and non-cardiac surgery: evolving issues and anesthetic implications. *Korean J Anesthesiol.* 2017;70(1):13.
23. Ahmad M, Mehta P, Reddivari AKR, Mungee S. Percutaneous Coronary Intervention. *StatPearls [Internet].* 2021.

### Address for Correspondence:

**Dr. Ghulam Shabbir Shar**, Senior Registrar at National Institute of Cardiovascular Diseases, Karachi, Pakistan.

**Email:** drshabbir.shar@gmail.com