Information Needs for Patients Undergoing Coronary Angiography: Providing Nursing Instructions

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Abstract
Background: Patients undergoing coronary angiography; have various needs such as physical, psychological, and social needs. **Aim:** To determine the information needs of patients undergoing coronary angiography. **Research question:** What is information needed for patients undergoing coronary angiography? **Research design:** A descriptive research design was utilized to conduct this study. **Subjects:** A convenience sample included all admitted patients for coronary angiography at Assiut University Heart Hospital for six months; the total number of subjects was 140 adult male and female. **Setting:** The present study was conducted in the cardiology department at Assiut University Heart Hospital. **Tool:** Interview patients' assessment sheet included demographic, medical data, and patient knowledge assessment. **Results:** The highest percentage of studied patients is the unsatisfactory level of knowledge about coronary angiography (80.7%). There is a statistically significant difference between education level and patient knowledge (p =.034). **Conclusion:** Patients undergoing coronary angiography had an unsatisfactory level of knowledge regarding the disease process and coronary angiography procedure. **Recommendation:** Provide nursing instructions for patients before, during, and after coronary angiography procedure and educational booklet should be provided for patients with needed instructions and knowledge about coronary angiography.

Keywords: Coronary angiography, Information & Nursing instructions.

Introduction

For both men and women, coronary artery diseases (CADs) are the leading cause of mortality. Atherosclerosis (AS), the narrowing of blood arteries brought on by the accumulation of connective tissue and cholesterol in the blood vessel walls, is the underlying cause of coronary artery disease, which is categorized as a serious sickness. The heart's tissue dies as a result of the myocardial infarction (MI), or heart muscle, not getting enough oxygen and blood. **(Mahgoub et al., 2022).**

Coronary angiography, or CA, is thought to be an efficient way to diagnose, assess, and treat heart disease issues. Even though cardiovascular disease (CVD) mortality and morbidity are decreasing **(Members et al., 2023).**

Coronary angiography is the process of injecting radio-opaque dyes via a catheter into the heart's chambers, coronary arteries, or major vessels to measure the contractility of the ventricles and get X-ray videos of the valves (VN). It enables a medical professional to examine the heart's internal blood pressure, evaluate blood flow, visualize the coronary arteries on the outside of the heart, and measure blood oxygen levels. **(Zaghlol, 2018).**

Coronary angiography is a process that creates unique "pictures" of the heart's left ventricle, which serves as the main pumping chamber, and the arteries that provide blood to the coronary arteries. These scans can show if the left ventricle is flowing blood throughout the body normally or whether one or more coronary arteries are occluded. It also acquired data on the pressure within the heart's various chambers and the state of the heart valves—that is, whether they are stenotic, leaky, or functioning correctly. **(Sorajja et al., 2021).**

Cardiovascular disease morbidity has decreased with coronary angiography. Other than that, these invasive procedures are usually risk-free but occasionally problematic. **(Nakano et al., 2022).**

Heart rhythm disturbances (HR) are the most frequent kind of complication, which is why the patient's heart rhythm is constantly observed before, during, and following the surgery. Blood clots, heart attacks, injury to the accessible artery, and hematomas (collections of blood beneath the skin) are other potential consequences. Every attempt is taken to reduce the possibility of any complications, and the personnel is equipped to handle any issues that may arise. **(Surges et al., 2021).**

Furthermore, there is a less than 1% chance of serious side effects, such as cardiac arrhythmias, cardiac perforation, and cerebrovascular stroke (CVS) (CA) **(Hull et al., 2023).**

Comorbid disorders include renal insufficiency (RI), coronary artery bypass grafting (CABG), left ventricular dysfunction (LVD), valvular heart disease (VHD), and congestive heart failure (CHF) increase the risk of consequences for patients with these

illnesses. **(Fang et al., 2023).** It makes sense that taking action to acquire timely treatment and so reducing subsequent problems is correlated with early detection of issues and adequate care. **(Hasballah et al., 2019).**

Individuals having coronary angiography have different requirements, including social, psychological, and physical demands. The insertion site has to be prepared physically, and there is a psychological need for communication and assurance before cardiac catheterization. There is also a need for knowledge of possible problems, feelings that may arise during the process, and post-procedure care. **(Zaghlol, 2018).**

In addition to providing excellent patient instructions regarding pre-procedure preparation, close assessment, pain medication, sheath removal, problem management, patient placement, ambulation, and health education, nurses play a critical role in preventing complications such as bleeding, retroperitoneal hematoma (RPH), false aneurysm (FA), and myocardial infarction, especially for high-risk patients. **(Valaker et al., 2017).**

A patient should be provided with all necessary information to manage their illness, including instructions from their doctor, the most important practices to follow, and any potential complications from any interventions. The more information that a patient has about their illness, the more likely it is that they will feel comfortable receiving care. **(Ivynian et al., 2020).**

Therefore, having CA surgery on a patient might be very frightening. It's important to have a sufficient understanding of what to anticipate before, during, and after the surgery. Therefore, the nurse should educate the coronary angiography patients about the CA process and any necessary practices, such as oral medication, breathing exercises, foot exercises, and back massages **(Mahnken et al., 2021).**

According to **Zhou et al. (2019),** patients must be provided with comprehensive discharge instructions and consistent information to ensure a smooth transition out of the hospital.

This can be accomplished by attending to the patient's needs and offering well-planned, efficient nursing care. To improve patient outcomes and reduce the rates of death and morbidity after coronary angiography, skilled staff members must perform specialized medical and nursing interventions. **(Rodríguez-Huerta et al., 2022).**

Significance of the study:
According to **Zaghlol (2018),** coronary angiography is one of the techniques used to diagnose and treat coronary artery diseases, with millions of cases performed each year. According to the cardiac catheterization unit patient record at Assiut University Heart Hospital, (900) patients were admitted between July 2021 and June 2022. According to the

researcher's seven years of clinical experience in the cardiology department at Assiut University Heart Hospital, observed that patients having coronary angiography needed for nursing instructions before or during the procedure due to their lack of knowledge. Therefore, the study will be conduct to assess information needs for patients undergoing coronary angiography as well as providing nursing instructions to meet the patient's needs.

Aims of the study:
1. Determine information needs for patients undergoing coronary angiography.
2. Designing nursing instructions for patients undergoing coronary angiography.
3. Providing nursing instructions for patients undergoing coronary angiography.

Research question:
What are the information needs for patients undergoing coronary angiography?

Patients & Method:
Research design: For this study, a descriptive exploratory approach was utilized to achieve its objective.

Setting: This study was conducted in cardiology department at Assiut University Heart Hospital. It consists of two flours the first flour was men department which include 10 rooms each ones consists of 3 bed the second flour was women department which include 6 rooms each ones consists of 3 bed.

Subjects:
The study sample consisted of all patients who were seen in the department of cardiovascular medicine and had coronary angiography for a period of six months, from April 2023 to October 2023 (76 men and 64 women), with ages ranging from 18 to 65. The patients gave their consent to participate in the study.

Tool of the study:
An interview questionnaire sheet included the following:
- Patients' demographic data as age, sex, marital status, residence, level of education and occupation.
- Medical data as medical diagnosis, chronic disease, result of coronary angiography, smoking, and family history of ischemic heart disease.
- Patient's knowledge assessment including the patient's knowledge regarding the definition of coronary angiography, indication, laboratory investigations, medication, pre procedure preparation, post procedure instruction, and post-discharge instruction.

Scoring system:
Patient's knowledge regarding coronary angiography included 22 questions (4) list questions about the definition, an indication of coronary angiography, laboratory investigations, medication, and potential risks of coronary angiography, (5) multiple choice questions about patient's knowledge about pre-

procedural preparations, (6) multiple choice questions regarding patient's knowledge about post-procedural instructions and (7) multiple choice questions regarding patient's knowledge about post-discharge instructions}: Scores assigned to each item were between 1 and 0 points as follow; (correct=1, incorrect=0) According to a range of total scores lie between 0-22. Patients' knowledge was classified as:
- Satisfactory knowledge ≥60%.
- Unsatisfactory knowledge <60%.

The procedure of data collection:
Data gathering tools were created by reviewing literature from the past, present, and worldwide in a variety of contexts through the use of books, articles, journals, magazines, and references.

Content validity and reliability:
Five experts from the departments of cardiovascular medicine and medical-surgical nursing verified the content validity of the instruments by assessing their comprehensiveness, relevance, comprehension, and clarity. After making a few small adjustments and making the necessary corrections, the tools were developed in their final configuration and dependability tested.
The tool's **reliability** was assessed using the Cronbach's alpha coefficient (r-0.72).

Pilot study:
To assess the clarity and usefulness of the instruments, pilot research including 12 patients, or 10% of the study subjects, was carried out. 10% of the people selected for the pilot study were included in the study after the results from that trial were examined and no modifications were made to the instruments employed.

Ethical approval:
The Faculty of Nursing Ethical Committee granted ethical approval. In December 2022, No. 533. To gather the required information, the head of the cardiovascular department received an official letter from the dean of the faculty of nursing. The oral agreement was collected from patients or guidance who were willing to participate in the study after they were informed of its nature and aim. There was no risk to the research subjects during its implementation. The study complied with accepted standards of ethics for research. Anonymity and confidentiality were guaranteed. Patients were free to decline participation in the trial or to leave at any moment without giving a reason.

Development of the interview questionnaire for patients undergoing coronary angiography:
▪ It was designed in English to gather information from patients having coronary angiography concerning their personal information, medical information, and understanding of angiography, pre-procedure preparations, post-procedure instructions, and post-discharge instructions.

▪ After obtaining approval to carry out the suggested study, the researcher started gathering data. The time frame for data collection was April 2023–October 2023. Every patient receiving coronary angiography in the cardiovascular medicine department during morning shifts, including those who were present and available, had their data collected in a single session.

▪ The researcher gave a brief introduction, went over the objectives of the study, and got the patient's verbal agreement to participate voluntarily in the research during the session.

▪ The 140 patients who took part in the study were each interviewed one-on-one by the researcher, who also filled out a questionnaire and recorded the patient's responses. In twenty minutes, the sheet was filled out and finished.

▪ An educational pamphlet was utilized to provide patients with the information and instructions they required regarding angiography. A researcher who visited the chosen environment and asked patients to participate in the study through in-person interviews created an interview form.

▪ To find out how much each patient knew about coronary angiography, the researcher interviewed each patient and asked them to complete a standardized questionnaire.

▪ The number of patients differs from day to day depending on the number of coronary angiography patients in the operations list ranging from 0 to 15 patients per day.

▪ The researcher was assessing patient demographic and medical data on patient admission. Also, patient knowledge regarding coronary angiography was assessed.

▪ The researcher was provided nursing instructions for patients undergoing hospitalization.

Statistical analysis:
The researcher utilized a personal computer to input the data. Excel was used to construct the figures after all data were entered into the statistical programs for the social sciences (SPSS) version 23.0 program for analysis. Each tool's material was examined, sorted, and then coded by the researcher. Numbers and percentages were used to represent categorical variables, whereas the mean and standard deviation (Mean, SD) were used to describe continuous variables. The t-test was used to compare continuous variables, while the chi-square and Fisher exact tests were employed to evaluate categorical variables. A P-value of less than 0.05 was deemed statistically significant.

Results:

Table (1): Distribution of demographic data for studied patients (n=140).

Item	n	%
Age:		
Mean& Std. Deviation	52±8.8	
Sex:		
Male	76	54.3
Female	64	45.7
Marital status:		
Single	16	11.4
Married	93	66.4
Divorced	9	6.4
Widow	22	15.7
Level of education:		
Illiterate	23	16.4
Read and write	30	21.4
Secondary	43	30.7
High education	44	31.4
Residence:		
Urban	66	47.1
Rural	74	52.9
Occupation:		
Intellectual Work	61	43.6
Manual Work	79	56.4

Table (2): Distribution of medical data for studied patient (n=140).

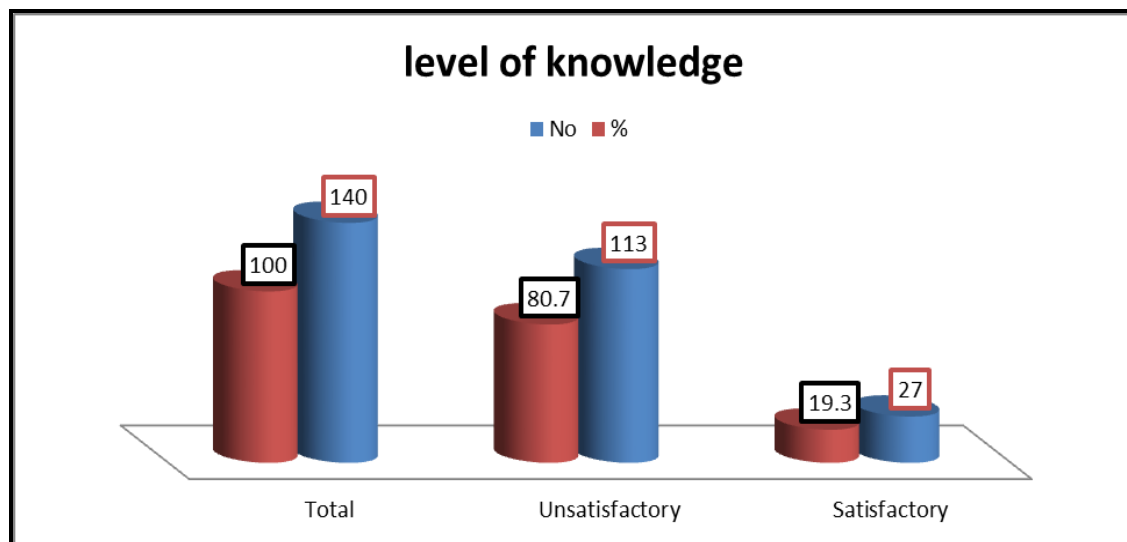| Item	N	%
Medical diagnosis:		
▪ Unstable Angina	46	32.9
▪ Myocardial Infarction	42	30.0
▪ Ischemic Heart Disease	50	35.7
▪ Others	2	1.4
Chronic disease:		
▪ Hypertension	55	39.3
▪ Diabetes Mellitus	37	26.4
▪ Chest Disease	15	10.7
▪ Renal Disease	14	10.0
▪ Others	19	13.6
Smoking:		
▪ Yes	86	61.4
▪ No	54	38.6
Results of Coronary Angiography:		
▪ Normal	41	29.3
▪ No significant coronary artery disease	34	24.3
▪ Significance of coronary artery disease for PCI	56	40.0
▪ Significance of coronary artery disease for CABG	9	6.4
Family History :		
▪ Yes	85	60.7
▪ No	55	39.3

Figure (1): Shows the total level of knowledge.

Table (3): Total mean knowledge pre-procedure, post-procedure, and post-discharge of studied patients undergoing coronary angiography (n=140).

Item	N	Minimum	Maximum	Mean	Std. Deviation
Pre-procedure (5- 15 marks)	140	5.00	15.00	9.5786	1.95661
Post-procedure (6- 18 marks)	140	.00	11.00	5.4571	2.01209
Post-discharge (6-18 marks)	140	2.00	14.00	9.4643	2.81417

Table (4): Relation between demographic data and level of knowledge of studied patients (n=140).

Item	Unsatisfactory N %	Satisfactory N %	p. value
Age:			
Mean& Std. Deviation	54.77±7.811	51.36±8.912	.067ns
Sex:			
▪ Male	13(9.3%)	63(45.0%)	.523 ns
▪ Female	14(10.0%)	50 (35.7%)	
Education level:			
▪ Illiterate	9 (6.4%)	14(10.0%)	.034*
▪ Read and write	7 (5.0%)	23 (16.4%)	
▪ Secondary school	5(3.6%)	38(27.1%)	
▪ High school	6(4.3%)	38(27.1%)	
Occupation:			
▪ Intellectual Work	8(5.7%)	53(37.9%)	.132
▪ Manual Work	19(13.6%)	60(42.9%)	
Family History:			
▪ Yes	15 (10.7%)	70(50.0%)	.662
▪ No	12(8.6%)	43(30.7%)	

*NS=Not significant P>0.05   *Significant p <0.05*

Table (5): Relation between medical data and knowledge of studied patient (n=140).

Item	Unsatisfactory N %	Satisfactory N %	P.Value	
Medical diagnosis:				
▪ Unstable Angina	6(4.3%)	40(28.6%)		
▪ Myocardial Infarction	11(7.9%)	31(22.1%)	.402	ns
▪ Ischemic Heart Disease	10(7.1%)	40(28.6%)		
▪ Others	0(0.0%)	2(1.4%)		
Chronic disease:				
▪ Hypertension	10(7.1%)	45(32.1%)		
▪ Diabetes Mellitus	5(3.6%)	32(22.9%)		
▪ Renal Disease	1(0.7%)	13(9.3%)	.168	ns
▪ Chest Disease	4(2.9%)	11(7.9%)		
▪ Others	7(5.0%)	12(8.6%)		
Smoking:				
▪ Yes	19(13.6%)	67(47.9%)	.380	ns
▪ No	8(5.7%)	46(32.9%)		
Results of Coronary Angiography:				
▪ Normal	7(5.0%)	34(24.3%)		
▪ Nonsignificance coronary artery disease	2(2.9%)	30(21.4%)	.459	ns
▪ Significance of coronary artery disease for PCI	14(10.0%)	42(30.0%)		
▪ Significance of coronary artery disease for CABG	2(2.9%)	7(5.0%)		

NS=Not significant P>0.05

Table (1): Illustrates the distribution of the demographic data for studied patients it reveals that; the mean age of the studied sample is (52±8.8), and the highest percentage of them (54.3%) are males and married (66.4%). Regarding residence, (52.9%) of studied patients are living in rural areas, (31.4%) had high education levels and more than half of them (56.4%) worked in manual occupations.

Table (2): Clarifies that; the highest percentage of studied patients undergoing coronary angiography are (35.7%) diagnosed with ischemic heart disease (39.3%) of them have hypertension and (61.4%) of studied patients are smokers. Regarding results of coronary angiography (40.0%) are significant coronary artery disease for PCI. Finally, more than half of patients (60.7%) have a family history of ischemic heart disease.

Figure (1): This figure shows that the highest percentage of studied patients have an unsatisfactory level of knowledge about coronary angiography (80.7%).

Table (3): This table shows that the mean knowledge of the studied patient's pre-procedure is (9.6%), post-procedure is (5.4571%) and post-discharge is (9.5%).

Table (4): Reveals that there is a statistically significant difference between education level and patient knowledge (p =.034).

Table (5): This table shows that there is no statistically significant difference between medical data and patient's knowledge regarding coronary angiography.

Discussion:
Millions of patients, their families, caregivers, and those in charge of organizing and financing treatment, particularly in developing nations like Egypt, are impacted by coronary artery disease. The WHO estimates that emerging nations bear 60% of the worldwide CAD burden. **(Amin et al., 2020).**

The gold standard for CAD diagnosis and analysis that necessitates hospitalization for patients is coronary angiography. It is an invasive, non-surgical procedure that is the most reliable method for CAD diagnosis, therapeutic (PCI), and evaluation. Currently, many hospitals perform coronary angiography as a routine diagnostic procedure. Due to the femoral artery's greater diameter, it is frequently utilized in routine cardiology procedures. **(Shaheen et al., 2022).**

One of the requirements for the patient to receive inspiration to change attitudes, increase knowledge, practice, motivation, and awareness of the importance of co-responsibility is a patient education process that is comprehensive, tailored to the patient's level of understanding, delivered at the appropriate time, and easy to understand. The patient can then make decisions about their medical care, their behavior, or the adoption of new habits. **(Amin et al., 2020).**

When it comes to providing care through patient evaluation, safety, support, and education, nurses are essential and crucial. To provide the best care possible, nurses must appropriately prepare the patient on a physical and emotional level. To prevent problems and guarantee satisfactory outcomes, adequate assessment and monitoring are essential before, during, and after catheterization. **(Faried et al., 2023).**

The present study aimed to determine the level of Knowledge and Information needs of Patients Undergoing Coronary angiography (CA).

Regarding the demographic data of the studied Patients Undergoing

For coronary angiography, the finding of the current study revealed that, the majority of the studied patients were male and more than half of them their mean age of 52±8.8 years. Age-related changes to the heart and blood vessels, such as a decrease in elasticity and the body's capacity to adapt to changes in arterial system compliance, maybe the cause of these findings. These changes increase the effort required to pump blood to the body's organs because they increase the heart's resistance to the pumping action.

These findings were supported with **(Ayman et al., 2022),** who performed a study on 163 cardiac patient s about Percutaneous coronary artery intervention in unprotected left main coronary artery disease in Egypt and found that mean age ± SD 58.61 ± 9.5 years of study participants and more than half of them were males.

Also, this finding in the same line with the study done by **(Baljepally et al., 2021)** who had shown that men are more likely than women to undergoing cardiac catheterization procedures. This might due to men are more exposure to more stress from heavy physical activities and more limited ways to express emotional stress than women.

Moreover, female hormones protect female from coronary artery disease (CAD). Also the finding of a study done by **(Vincent et al., 2021)** suggested that men are more likely than women to undergo cardiac catheterization procedures, and that the average age of patients undergoing the procedure is typically in the mid-of 60 years old.

In the other hand, the finding of a study done by **(Steenblik et al., 2021)** found that women were less likely than men to undergo cardiac catheterization procedures, and that they were also less likely to receive appropriate care for their cardiovascular conditions.

However, this result was contradicted by a study by **Gao et al. (2019),** which found that cardiac catheterization procedures for coronary vascular disease (CVD) occur similarly in men and women,

particularly after menopause, because low estrogen increases the risk of cardiovascular disease by causing several structural and functional changes to the cardiovascular system.

Regarding the patient's marital status, according to the results of the current study that show, three quarters of the patients were married. This outcome may be the result of the fact that typical individuals of those ages were married and had families. The majority of the patients were married, according to **(Hamdi et al., 2023)** and this result was in line with their findings. The majority of patients were married, according to **(Guzelhan et al., 2020),** which further validated this finding.

Regarding patient's educational level, the current study showed that, more than one third had a university education.The importance of education in Egyptian society may be the cause of this outcome.This result was agreement with **(Elkady et al., 2022)** who reported that, more than one third of the patients had high educational level. However, these results conflict with research by **Takemoto et al. (2020),** which found that more than half of the patients had just completed secondary school.

Regarding patient residence, according to the results of the present study, more than half of the patients were from rural areas. This outcome might be attributed to factors like enjoying life with their family and receiving emotional support from the rural lifestyle. This result was consistent with that of **(Ataya et al., 2023)** who discovered that more than half of the patients resided in rural areas. On the other hand, this result was at odds with research by **Amin et al. (2020),** which discovered that almost three-quarters of the population lived in cities.

Regarding the patient's occupation, according to the results of the current study, more than half of the patients were engaged in manual work. This conclusion was consistent with the findings of **Madureira et al. (2020),** who reported that three quarters of patients worked manually. Additionally, the results of the current study are consistent with a study conducted by **Yujeong (2022),** who investigated the demographic data of patients undergoing cardiac catheterization procedures and discovered that the majority of the patients were employed, with a significant percentage working in manual work.

Regarding the medical data, in the current study more than half of the studied patients undergoing coronary angiography (CA) had hypertension, while less than half of them were having diabetes mellitus and fewer percentage were having chest disease. This in line, with the finding of a study done by **(Stein et al., 2022)** found that hypertension, or high blood pressure, is a major risk factor for cardiovascular

diseases and is a common comorbidity in patients undergoing cardiac catheterization.

The researcher point of view, people with diabetes are more likely to get high blood pressure, high cholesterol, and obesity, all of which are a major risk factors for cardiovascular diseases. Additionally, diabetes could cause damage to the blood vessels and nerves that control the heart and blood vessels, which can lead to complications such as heart attack, stroke, and peripheral artery disease as mentioned in study done by **Otvos et al. (2023)**.

In the field, **(Sung et al., 2020)** their study revealed that cardiac catheterization is common in people who suffer from medical diagnosis (ischemic heart disease) and coronary heart disease associated with hypertension, diabetes mellitus. Besides, the finding of a study done by **(Huang et al., 2022)** who found other risk factors, such as obesity, smoking, high cholesterol, and a sedentary lifestyle, which could also contribute to the development of cardiovascular diseases and may require further evaluation and management.

Additionally, the result of the present study showed that a large percentage of the studied patients undergoing coronary angiography were smokers. From the researcher pointed of view smoking is a well-established risk factor for cardiovascular diseases, and it is not surprising that a significant proportion of patients undergoing coronary angiography were smokers.

This confirmed by the finding of a study done by **(Malakar et al., 2019)** who found cigarette smoking could contribute to the development of atherosclerosis, a buildup of plaque in the arteries that can lead to heart attack, stroke, or other cardiovascular complications.

Additionally, this result was in line with the findings of **Ahmed et al. (2022),** who found that the risk of cardiovascular diseases, especially ischemic heart disease, increased with daily cigarette smoking.

Regarding patient's knowledge about coronary angiography (CA); Less than half of patients accurately define coronary angiography, according to research and more than three quarters were unaware of the hazards associated with coronary angiography and medication. This was in line with the findings of **(Shaheen et al., 2022)** who studied, "association between knowledge and anxiety level among patients undergoing coronary angiography in tertiary care hospital of peshawar", reported that, patients had no data and knowledge regarding cardiac catheterization. This is due to lack of health education and instruction provided by nursing and medical staff member who did not offer them enough knowledge about their condition and this cause anxiety and distress from procedure.

Furthermore, the findings were not in line with those of **Kamal et al. (2019),** who used an educational program for patients following primary percutaneous coronary intervention to conduct a study on 150 Egyptian patients who had myocardial infarction. They found that the patients' knowledge of primary percutaneous coronary intervention (PPCI) was 58.0% poor, 32.7% fair, and 9.3% good.

The result of the present study revealed that most of the studied patients had unsatisfactory level knowledge pre procedural preparations, this result was in line with **(Amin et al., 2020)** who studied, "level of knowledge and practice of patients undergoing cardiac catheterization" and concluded that most of study patients had unsatisfactory level knowledge pre intervention.

The result of the present study revealed that most of the studied patients had unsatisfactory level of knowledge post coronary angiography instructions and post discharge. This finding was consistent with the finding of a study done by **(Moatammed et al., 2023)** who report that more than half of the studied sample had unsatisfactory level of knowledge about cardiac electrophysiology study. And also in a study done by **(Chang et al., 2021)** who reported that, patients undergoing cardiac electrophysiology study had significant deficits regarding procedure-related knowledge and need comprehensive education. According to the researcher point of view, these results may be due to lowered educational level of the studied patient.

The result of the present study revealed that most of the studied patients had unsatisfactory total level of knowledge regarding coronary angiography. The present result was in line with **(Shaheen et al., 2022)** who reported that the participants did not have sufficient knowledge regarding coronary angiography. 17.88 ± 4.047(mean ± SD).

Regarding the correlation between total level of knowledge and patients' demographic data; In the current study, the results showed that there was no statistical significant correlation between level of knowledge and age, sex, occupation and family history of the studied patients with ($p < 0.05$). similar to this result in a study done by **(Zaghlol, 2018)** who reported that there is no significant correlation between patient needs before cardiac catheterization and their demographic characteristic because the characteristics are variable in each patient and do not affect health needs of patient before cardiac catheterization.

The results of this study show that there is a statistically significant relationship between total knowledge and educational level (p=.034). This finding is consistent with research by **Moatammed et al., (2023),** which found that total knowledge score

was associated to educational level. Additionally, a study by **Svendsen et al., (2021)**, which found that educational background is one of the factors influencing health literacy, also indicates that other factors influence the level of health literacy. The researcher interprets these findings as possibly having to do with the participants' capacity for self-learning, acquiring, and understand the knowledge.

Regarding correlation between level of knowledge and patients' medical data; The current study's findings demonstrated that there was no statistically significant relationship between the participants' level of knowledge and medical data regarding smoking, chronic illness, medical diagnosis, or coronary angiography results. According to the results of research conducted by **Amin et al. (2020)**, more than three quarters of the patients included in the study underwent cardiac catheterization (CC), and of those who did not smoke, 35% had stopped and 20% were smokers. 32% of them had diabetes, and 48% had hypertension as related medical conditions.

Conclusions:
It is possible to draw the following conclusions from the current study's findings:
Patients undergoing coronary angiography had unsatisfactory knowledge levels and a lack of basic knowledge regarding coronary artery disease and coronary angiography procedures.

Recommendations:
The present study's findings allow for the suggestion of the following recommendations:
1. Providing nursing instructions for patients with sufficient information before, during, and after coronary angiography procedure.
2. An educational booklet will be used to provide patients with needed instructions and knowledge about angiography.

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