Medical

Short-term versus long-term fasting prior to elective coronary angiography

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Abstract

Aim: To compare the incidence of immediate complications and patient satisfaction amongst short-term versus long-term fasting groups underwent for elective coronary angiography.

Background: Before cardiac intervention procedures, patients usually kept Nil per oral for unexpected longer time to reduce the potential risk of inhaling acidic stomach content.

Introduction: Coronary Angiography, diagnostic procedure to diagnose coronary artery disease performed under local anaesthesia to achieve minimal sedation stated that no longer fasting is required for conscious sedation.

Methods: This was a quasi-experimental study with quantitative evaluative-comparative approach. Data gathered from the patients admitted for elective coronary angiography, collect baseline data and kept NPO either for 2 hours or 6 hours randomly. Assess the clinical profiles as pre, intra and post-procedural and assess the patient's satisfaction 30 minutes of the procedure. Immediate outcome included nausea, vomiting, hypotension and hypoglycaemia.

Results: 110 patients (55 in each group) participated in this study. On comparison, Similar incidence of nausea and vomiting among two groups were observed, hypotension was slightly more in short-term and hypoglycemic incidence were more in long-term fasting group. Short-term fasting group was strongly satisfied than another group.

Discussion: The current fasting practice results is more discomfort and dissatisfaction for the patients who may sometimes end up waiting several hours longer than the planned 6 hours of fasting.

Conclusion: This study revealed that short-term fasting improves the care quality and patient satisfaction regarding the procedure of coronary angiography.

Implications for nursing: It should be the responsibility of nurse to assess the impact of short-term fasting on care quality as there will be less risk of procedure cancellation, thereby reducing the risk of delaying the diagnosis.

Implications for nursing policy: Patient satisfaction affects clinical outcomes, patient retention, and medical malpractice claims. It affects the timely, efficient, and patient-centered delivery of quality health care.

Keywords: elective coronary angiography, patient satisfaction, hypotension, hypoglycaemia, fasting

Introduction

In the 1940s, preoperative fasting was first introduced in the delivery room to reduce the incidence and severity of lung aspiration. It is now a routine preparation stage for many surgeries that require general anaesthesia [1].

Coronary angiography is the most common procedure performed in the catheterization laboratory. Coronary angiography does not require general anaesthesia. It can be performed under local anaesthesia by injecting lidocaine injection at the puncture site [2]. A contrast medium is injected through the catheter into the coronary arteries and cine pictures are taken. This part of the procedure is called coronary angiogram or coronary angiography (CAG) [3]. The use of coronary angiography increased from 27.2% in 2000 to 43.9% in 2012, and PCI increased from 9.5% in 2000 to 24.1% in 2012 [4]. Before cardiac intervention procedure (such as diagnostic coronary intervention, percutaneous coronary intervention and other device treatments), patients usually kept nothing by mouth/fast for about 4-6 hours. These are considered procedures with potential risk of vomiting and lungs aspiration [5].

Fasting is important because medications used to induce anaesthesia can cause nausea and muscle relaxation. it can cause discomfort and can increase recovery time [6]. Prolonged fasting is reportedly unnecessary and can cause complications such as distress, confusion, instability, hypoglycaemia, headache, dehydration, electrolyte imbalance, postoperative nausea and vomiting (PONV), and increased insulin resistance [7]. It is safe to ingest clear liquids two to three hours before the operation. Solid and milky foods can be consumed up to 4 hours after surgery. Patients who fast for longer than the optimal time may be harmful to their health [8].

Recent evidence shows that even with general anaesthesia, traditional long-term fasting is no longer effective. Ingestion 2 hours before surgery does not increase the risk of aspiration. Despite local anaesthesia, preoperative fasting is still a routine preparation step for CAG in most cases [1].

Background

The typical sequence of "NPO after midnight" (no liquid or food after 12 am before the day of surgery) has been questioned

in recent years, so that in 1999 the American Society of Anesthesiology (ASA) reviewed their practice guidelines for healthy patients undergoing elective procedure. Based on research showing that pulmonary aspiration rarely occurs as a complication of modern anaesthesia, the latest and liberal recommendations allow the consumption of clear liquids within 2 hours and a light breakfast (such as tea and toast) before 6 hours of elective procedure, eat a heavier meal eight hours ago [9]. Long-term fasting will have various adverse effects on surgical patients. Physiological effects include dehydration, dizziness, headache, hypoglycaemia, electrolyte disturbances, and nausea and vomiting. In addition, various psychosocial effects are common, including confusion, irritability, unhappiness, hunger and thirst, and discomfort [10]. It is safe to reduce the preoperative fasting time with a carbohydrate-rich drink up to 2 h before surgery. Benefits related to this shorter preoperative fasting include the reduction of postoperative gastrointestinal discomfort and insulin resistance [11]. The clear fluid fasting times will not increase the incidence of lung aspiration, nor will it increase the morbidity and mortality [12]. Shortening the preoperative fasting time is beneficial to patients because it can improve postoperative comfort, improve insulin resistance and reduce stress response. However, the adoption and benefits of reviewed preoperative fasting guidelines are not consistent worldwide [13].

The traditional concept of "fasting from midnight" is a widely accepted policy, easy to apply, and rarely asked by staff or patients. Standard fasting times are usually 6-8 hours longer than expected and can be as long as 10-16 hours. Long-term fasting is detrimental to patients, an important determinant of postoperative outcome, and an independent predictor of increase postoperative hospitalization (length of stay) [14].

A single centre, prospective, randomized study was conducted to compared the two strategies including Fasting group was NPO for solids after midnight but could have clear liquids up to 2 hours prior to procedure. No Fasting group had no restrictions or oral intake. Both groups had baseline characteristics. As compared to the fasting group, No Fasting group had similar rates of primary outcomes: periprocedural hypotension (0.02% vs. 0.03%), aspirational pneumonitis (none vs. 0.009%), nausea/vomiting (0.05% vs. 0.07%), hypoglycaemia (0.007% vs. 0.008%) respectively. The conclusion was mainly included that No Fasting strategy is safe and cost effective as compared to traditional NPO practice in patients undergoing Cardiac Catheterization [15].

A study was conducted among patients undergoing elective cardiac catheterization over a six-month period between 7 August 2017 to 7 February 2018 at Auckland City Hospital, New Zealand. 1030 with a mean age of 66±12 years underwent catheterization. The mean duration of fasting was 11.6±4.9 hours with 80% fasting longer than recommended. The most common symptoms related to fasting were hunger (47 %), nausea (3.9%) and vomiting (0.8%). Hypertension (4.1%) and hyperglycaemia (0.8%) occurred due to missed medication. There were no reports of aspiration. Most patients were fasted for significantly longer than recommended and pre-hydration was underutilized in patients at high risk of contrast-induced nephropathy. There were no episodes of aspiration with

modern contrast agents [16].

Research was conducted to evaluate whether oral intake before surgery can improve the comfort and satisfaction of elderly patients with anaesthesia. After 9:00 pm, the control group (NPO) did not receive anything the night before the operation, when the patients were in the experimental group, they took liquids orally 2-4 hours before the operation. Patient characteristics, subjective perception, thirst and hunger, and satisfaction are determined in four steps. The U- Mann-Whitney test and the appropriate Fisher test are used to compare the control and experimental groups. A value of $p<0.05$ is considered significant. Surgical patient questionnaires can be a useful tool for assessing the quality of care. In conclusion, preoperative discomfort is reduced, and satisfaction with anaesthesia treatment is increased [17].

A study was conducted to compare the efficacy of fasting versus no fasting prior to elective cardiac catheterization at Blackpool teaching hospital, UK. This study shows that there is no difference with regards to potential complications between fasting and non-fasting groups of patients with less evidence of hypoglycaemia and hypotension in non-fasting group. This study has been designed to challenge the current practice. The patients were divided in two groups: fasting group i.e., clear fluids up to the time of procedure and no food for at least 2 hours before the procedure and no fasting group i.e., clear fluids and food up to the time of the procedure. Finally, once the patient is ready for discharge, they were asked to complete an anonymous questionnaire relating to their experience and satisfaction. When patients are allowed to eat freely before the procedure then patient satisfaction was improved and the catheter lab working ability were maximized [18].

Aim of the study
The main objectives of the study were to compare the incidence of immediate complications i.e., nausea, vomiting, hypoglycaemia and hypotension between two fasting groups and assess the patient's satisfaction amongst the two groups by patient satisfaction survey form.

Methods
Research design
The study was quantitative evaluative comparative approach with quasi-experimental two group post-test only design.

Theoretical framework
The conceptual framework for the study was taken from Primary Provider Theory for patient satisfaction and comfort. The primary provider theory proposed by Aragon mainly includes four factors. First factor was patient centeredness of provider include the coronary angiography as a diagnostic procedure to identify the coronary artery disease, second factor was patient centeredness of waiting includes the long-term fasting, third factor was patient centeredness of associates includes the short-term fasting and fourth factor was patient outcome which mainly included the immediate complications and patient satisfaction after the procedure of coronary angiography.
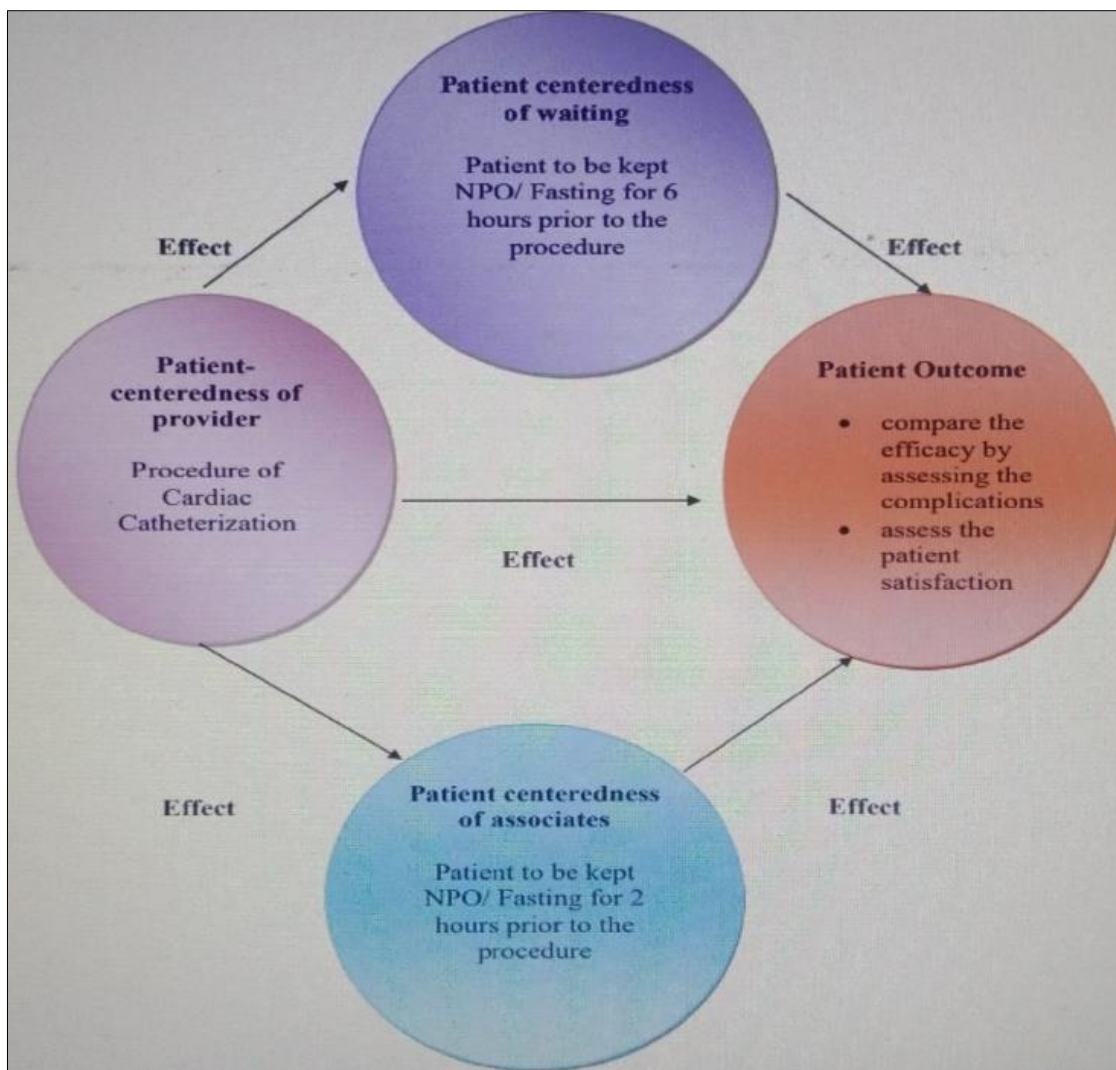
Fig 1

Sample and setting
The study is conducted at National Heart Institute, 49-50, community centre, East of Kailash, New Delhi-110065. Patient who are undergoing elective coronary angiography in National Heart Institute during the data collection period, are the sample for the study. As calculative value of sample size, 55 patients taken as the sample size for each group.

Inclusion criteria
The patients who would be;
- Above 18 years of age
- Undergoing Elective Coronary Angiography (CAG).
- Hemodynamically stable.

Exclusion criteria
The patients who would be;
- Undergoing emergency Coronary Angiography procedure
- Undergoing other Cardiac Catheterization procedures except Coronary Angiography (CAG)
- Unconscious Patients

Data collection
Data was collected between the periods of 11.01.2021 to 31.03.2021. On the date of permission, trace the patients or subjects got admitted in National Heart Institute for Elective Coronary Angiography. Informed consent taken and provide information booklet. Collect baseline data include demographic data and clinical profiles include vital signs. Kept the patient as NPO for either 2 hours or 6 hours randomly. Patient went for coronary angiography. Collect the post-procedural data including clinical profiles and immediate outcome. Assessed the patient's satisfaction after 30 minutes of the procedure with the use of satisfaction survey form. The satisfaction survey form consists of 16 items. Each item was to be answered YES/NO by the patient after the Coronary Angiography. If particular item was being followed 'one score' was provided and if not, then 'zero scoring' was obtained. The level of satisfaction was categorized based on the marks of questionnaire to be obtained.

Ethical consideration
Permission for conducted the study were taken from the ethical committee of All Indian Heart Foundation.

Data analysis
The data was analysed by applying descriptive and inferential statistics, data was analysed in terms of frequencies and percentages. Mean, median, mean percentage, standard deviation, mean difference and unpaired t test were computed to find the comparison of short-term fasting and long-term fasting prior to elective coronary angiography.

Results
Findings are discussed under the following headings:
- Findings related to demographic data of the patients participated in the present study.
- Findings related to comparison of biophysiological and clinical parameters of patients as pre-procedural, intraprocedural and post-procedural amongst the two group.
- Findings related to Evaluation of Satisfaction score of the patients regarding fasting duration prior to Elective Coronary Angiography.
- Findings related to testing of hypothesis.

Findings related to demographic data
Majority (70%) of patients were in the age group of 51-75 years, 71.8% of patients were male and remaining 28.2% were female, Length of stay for the coronary angiography was seen 1-3 days for 67.3% patients and 10-15 days for 0.9% patients and 47.3% of patients had normal BMI among total patients participated in the present study.

Findings related to bio-physiological parameters
Pre-procedural status
Majority of the patients had temperature range from 98.3°F-98.8°F among two group 49% in Group I and 52.7% in Group II, 63.6% in Group I and 69% in Group II had normal heart rate prior to coronary angiography, Majority of the patients had normal Systolic blood pressure amongst two groups (52.7% in Group I and 63.6% in Group II), Majority of the patients had normal Diastolic blood pressure amongst two groups (38.1% in Group I and 40% in Group II), SpO2 range lies within 95-100% among two group with 87.3% of patients in Group I and 80% in Group II and 61.8% in Group I and 63.7% in Group II had normal random blood sugar level.

Intra-procedural status
Majority of patients (65.5% in Group I and 61.8% in Group II) had normal heart rate lies within the range of 71-100 beats/min, Group I had higher incidence of hypertension with 41.8% whether in group II (56.3%) had normal systolic blood pressure, 54.5% in Group I and 56.4% in Group II had normal diastolic blood pressure and SpO2 range lies within 95-100% on room air among two group with 96.4%% of patients in Group I and 94.6% in Group II.

Post-procedural status
Majority of the patients (60% in Group I and 80% in Group II) were having normal body temperature, Both groups were having highest percentage (65.5%) of normal heart rate, Group I had higher incidence (36.4%) of hypertension whereas in Group II (60%) had normal systolic blood pressure, Majority of the patients (63.6% in Group I and 61.8% in Group II) had normal diastolic blood pressure, SpO2 range lies within 95-100% on room air among two group with 94.6% of patients in Group I and 96.4% in Group II and Group I had normal random blood sugar with 41.9% of the patients where in Group II had incidence (45.5%) of low blood sugar lies within 51-100 mmHg.

Clinical parameters
3.6% of the patients showed the similar incidence of nausea and vomiting among two groups with same frequency and percentage, incidence of hypotension was more in Group I (3.6%) as compared to Group II (1.8%) and hypoglycaemia was relatively more in Group II (7.27%) as compared to Group I (1.8%).

Findings related to evaluation of satisfaction score
Group I satisfaction score showed majority of the patients (94.5%) were strongly satisfied whereas Group II showed majority (92.7%) of the patients were satisfied with the fasting duration which indicated that the patient's satisfaction was higher with the short-term fasting duration prior to coronary angiography and the overall mean satisfaction score of Group I was (14.9±0.17) which is 93.75% whereas in Group II the mean satisfaction score was (10.43±1.51) which is 80.23% of the total score.

Findings related to testing of hypothesis
Significant difference between Group I (Short-term fasting group) and Group II (long-term fasting groups) regarding incidence of immediate complications
To test the significance of incidence of nausea and vomiting among two groups, unpaired t test was used. There was non-significant difference, t=0.00 at p>0.05 between the shortterm and long-term fasting groups, test the effectiveness of fasting duration in incidence of hypotension and hypoglycaemia, unpaired t test was used. The mean score of hypotension in short-term and long-term fasting were not found to be significant (t=0.06) at p>0.05 and the mean score of hypoglycaemia in short-term and long-term fasting were not found to be significant (t=1.37) at p>0.05.

Significant difference of satisfaction scores between short-term and long-term fasting group
To test the significance of the patient satisfaction in short-term and long-term fasting groups, unpaired t test was used. There was a significant difference, t = 21.57 at *p*<0.05 between the two groups indicated that the short-term fasting prior to coronary angiography was effective in increasing the satisfaction of patients.

Discussion
Study limitations
The limitations of the study were included that it was difficult to get the actual time of the procedure which affects the fasting duration and Non probability sampling was used to select the sample which limits the generalizability.

International comparison with similar studies
The findings of the study revealed that the incidence of immediate complications between two groups were similar. 3.6% of the patients showed the similar incidence of nausea and vomiting among two groups, incidence of hypotension was more in Group I (3.6%) as compared to Group II (1.8%) and hypoglycaemia was relatively more in Group II (7.27%) as compared to Group I (1.8%). The finding is consistent with the previous study by Mr. Abhishek Mishra et.al. (2020) who reports that there was no significant difference in incidence of hypotension (1.6% vs. 2%), nausea/ vomiting (3.6% vs. 5.1%) and hypoglycaemia (1% in both) among fasting and no fasting groups [19]. Yet another study by Mr. Katie Kalvaitis et.al.

(2020) who found that there was no significant difference in the rate of overall adverse events with an approach of unrestricted oral intake prior to coronary angiography compared to standard fasting practice [20].

The findings of the present study revealed significant difference in mean satisfaction score between short-term and long-term fasting group with p = 0.0 or 0%. Findings shows the increase in satisfaction among short-term fasting group was more as compared with long-term fasting group. This finding was supported by previous study by Mr. Hesham Abdelaziz et.al. (2020) according to which the patient satisfaction was improved when patients were allowed to eat freely before the procedure and the catheterization lab worked efficiently [21].

Table 1: Description of structured tool to compare short-term versus long-term fasting status prior to coronary angiography

TOOL	Name of the Tool	Description	Techniques
Tool I	Health Record	It includes age, gender, length of stay and BMI.	Data obtained from patient's file
Tool II	Biophysiological Parameters ▪ Pre-procedural ▪ Intra-procedural ▪ Post-procedural	It includes Temperature, heart rate, Systolic Blood pressure, diastolic blood pressure, SPO2 (Oxygen Saturation) and Random blood sugar level.	Data obtained by assessing the vital signs as pre, during and post procedural period.
Tool III	Patient Satisfaction Survey Form	It consisted of 16 self-structured questions which measured to assess the patient satisfaction after the Coronary Angiography. The answering of the questionnaire was YES/NO.	The satisfaction form filled by the patient after 30 minutes of the procedure.

Table 2: Scoring revealing level of satisfaction among patients undergoing Coronary Angiography

Level of Prevention	Actual Score	Percentage of Scores
Strongly Satisfied	13-16	81-100%
Satisfied	7-12	43-80%
Strongly Dissatisfied	0-6	0-42%

Table 3: Comparison of mean value and standard deviation of group I (short-term fasting) and group II (long-term fasting) regarding the incidence of immediate complications includes nausea, vomiting, hypotension and hypoglycaemia (N = 110)

S. No.	Parameters	Comparison	Mean Value	Standard Deviation (SD)	SEM	Calculated 't' value	'p' value
1	Nausea	Group I	0.04	0.2	0.14	0.00	1.00**
		Group II	0.04	0.2	0.14		
2	Vomiting	Group I	0.04	0.2	0.14	0.00	1.00**
		Group II	0.04	0.2	0.14		
3	Hypotension	Group I	0.036	0.18	0.024	0.6	0.54**
		Group II	0.018	0.13	0.017		
4	Hypo-glycemia	Group I	0.018	0.13	0.017	1.37	0.17**
		Group II	0.072	0.26	0.035		

Level of significance: 0.05, df=108, **Nonsignificant

Table 4: Comparison of group I (short-term) and group II (long-term) of satisfaction among patients regarding fasting duration prior to invasive coronary angiography using unpaired 't' test (N=110)

Comparison	Mean	SEM	SD	MD	Calculated 't' value	Table 't' value	p value
Group I (Short-term fasting)	14.9	0.0229	0.17	4.42	21.57	1.96	0.0* or 0.0%
Group II (long-term fasting)	10.48	0.2036	1.51				

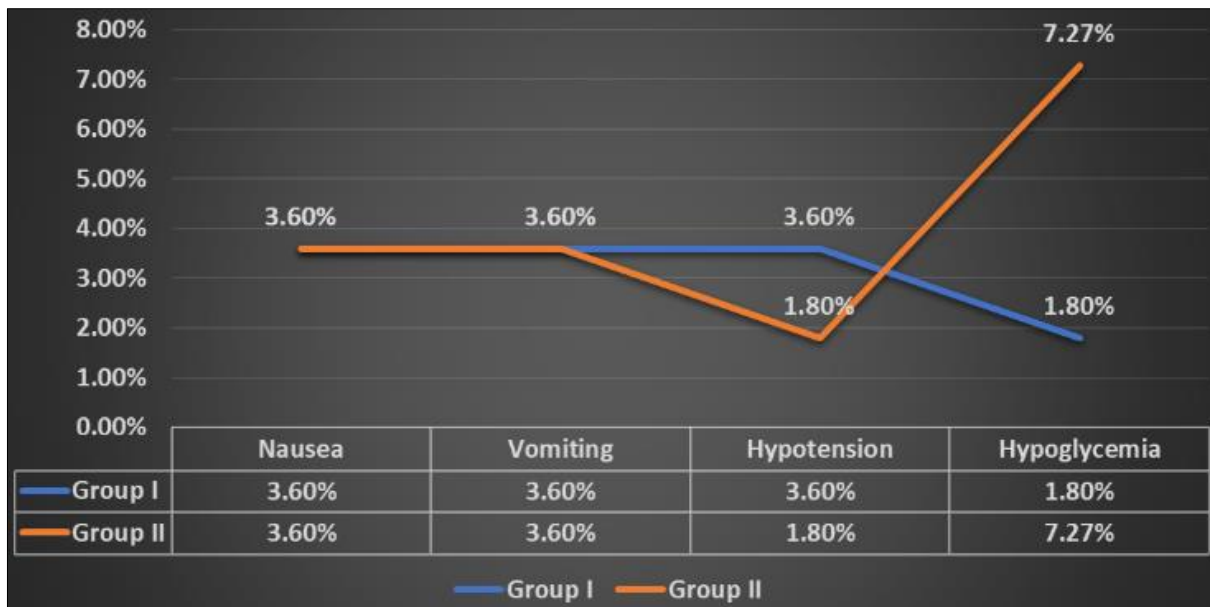Level of significance: 0.05, df=108, *significant

Fig 2: Line diagram showing the frequency and percentage wise distribution of patients amongst two groups according to their clinical parameters
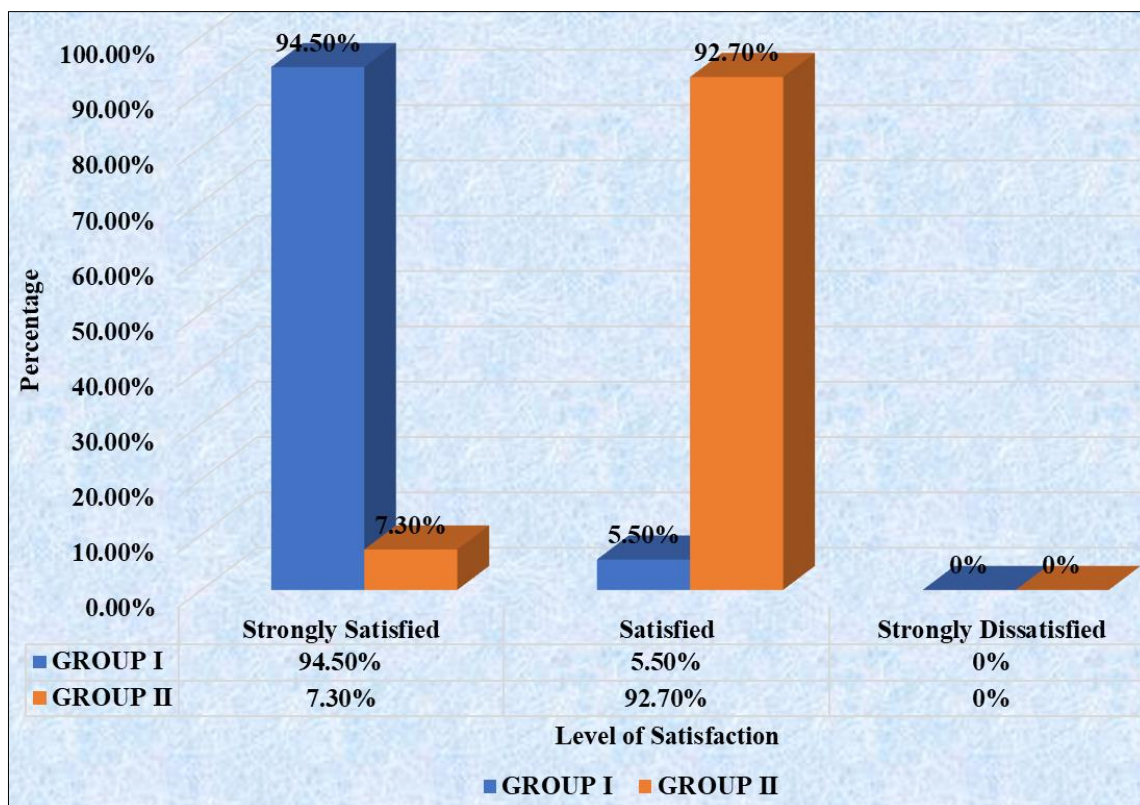

Fig 3: Bar diagram showing the comparison of group I and group II satisfaction scores of patients regarding fasting duration prior to coronary angiography

Conclusion
The present study compared the short-term versus long-term fasting status prior to elective coronary angiography among patients undergoing elective coronary angiography. Th findings shows that:

- Patients who underwent coronary angiography were in the age group of 51-75 years.
- Male were more commonly underwent coronary angiography as compared to female.
- Length of stay for the patients who underwent coronary angiography was 1-3 days.

- Similar incidence of nausea, vomiting and hypotension among two groups and hypoglycaemic incidence was more in long-term fasting group as compared to short-term fasting group.
- Short-term fasting group were strongly satisfied whereas the long-term fasting group were not strongly satisfied. Extremely significant difference found between the short-term and long-term fasting group satisfaction scores ($p<0.05$).

The results revealed that short term fasting was more effective in comparison to long-term fasting duration. It improves the

care quality and patient satisfaction regarding the procedure of coronary angiography and decrease the incidence of delayed procedure due to fasting duration. It improves the working efficiency of cardiac catheterization laboratory.

Recommendations

A study can be replicated with larger sample for better generalization:

- Similar study can be conducted to compare fasting versus no fasting prior to coronary angiography.
- Similar study can be conducted to find out association between demographic variables and fasting duration prior to coronary angiography.
- Similar study can be carried out to consider percutaneous coronary interventions as the procedure and comparison of short-term and long-term fasting duration prior to PCI.
- Similar study can be conducted to compare incidence of other adverse events such as pulmonary aspiration, endotracheal intubation with two fasting groups.
- Similar study can be conducted to compare the ionic and non-ionic contrast with two fasting durations.

Implications for nursing practice

Long-term fasting duration decreases the patient comfort and satisfaction. This study has revealed the strong satisfactory effects of short-term fasting duration prior to coronary angiography among patients undergoing elective coronary angiography. Nurse is the first member of the health team to come in contact with the patients. The nurse therefore has a responsibility to keep the patient on fasting for 2 hours prior to the procedure of coronary angiography. It should be the responsibility of nurse to assess the impact of short-term fasting on care quality as there will be less risk of procedure cancellation, thereby reducing the risk of delaying the diagnosis.

Implications for nursing/ health/ social policy

Patient satisfaction is thus a proxy but a very effective indicator to measure the success and quality of health care. Patient satisfaction affects clinical outcomes, patient retention, and medical malpractice claims. It affects the timely, efficient, and patient-centred delivery of quality health care. As this study revealed that the short-term fasting prior to coronary angiography helps to increase the patient satisfaction. Hospital administration should formulate the fasting policy regarding coronary angiography procedure. The nursing administrator should supervise the intervention done for the patients by nurses and also monitor the standard of practice to promote excellence in quality care.

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