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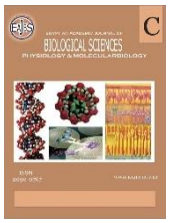

The Outcome of Diagnostic Coronary Angiography Regarding Patient Adherence to Routine Bed Rest Protocol at Ahmed Gasim Cardiac Center/Sudan

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ABSTRACT

Background: Cardiac catheterization is the common procedure undertaken to assess and treat coronary heart diseases. After the procedure, the patient remains on bed rest.for at least 6–24 hours in order to reduce the chance of vascular complications at the groin site. **Objectives**: to investigate the effect of noncompliance and compliance patients on the outcome of Diagnostic Coronary Angiography in terms of hematoma or bleeding, and pain. Methodology: It was a descriptive prospective cross-sectional hospital-based study conducted at Ahmed Gasim Cardiac Center in Sudan. Data collected among 151 Sudanese adult patients presenting for diagnostic coronary angiography, Data relevant to the study were collected by questioners and observational checklist and analyzed using (SPSS). **Result:** Fortunately, the majority of the participants, 76.2%, were compliant with the routine bed rest post-procedure and only 23.8% were non-compliant, the compliance of patients was not shown to have an effect on patients 94.4% up to 100% did not experience back pain.**Conclusion:** altering a patient's position by elevating the head of the patient's bed and side-to-side positioning was safe. This will enhance patient comfort, reduce back pain, and enable them to meet self-care needs. No difference in the incidence of vascular complications**.**

INTRODUCTION

Cardiac catheterization is one of the most used diagnostic and interventional tools available to cardiologists today. As advances have been made in medicine and technology, patient care has become much more complex. Prolonged bed rest in the supine position after cardiac catheterization is based on previous nursing. (Jakobsen *et al.*, 2022) and (Ali *et al.*, 2019).

Despite the trans-radial approach being more recently utilized, still traditional access femoral artery is performed in about half a million patients annually in Europe, (Busca *et al.*, 2023).After transfemoral cardiac catheterization, immobilization of the affected limb with strict bed rest is crucial to reduce the threat of vascular problems. Further bed rest for several hours in the supine position is needed for patients. This may lead to discomfort for most patients, fatigue, back pain, difficulty urination, and eating, and other vascular complaints. (Alaa Eldin *et al.*, 2021).To decrease groin pain, back pain, and urinary retention from the patient's post-cardiac catheterization without rising vascular complications. Various nursing approaches such as the elevation of the head of the bed, and the posture of the patient are useful. These approaches also decrease the workload of healthcare providers and hospital stays for patients. (Abouelala *et al.*, 2022).

Early movement post-percutaneous coronary intervention is effective and safe, therefore leading to more comfort and satisfaction and decreased back pain, urinary discomfort, and fatigue without endangering patient safety. (Sa'aleek *et al.*, 2016)

Operational Definition: Following trans femoral cardiac catheterization, the study's outcomes were defined as a detectable change in health and functioning (the presence of hematoma or bleeding, and pain).

Objectives: to investigate the effect of noncompliance and compliance patients on the outcome of Diagnostic Coronary Angiography in terms of hematoma or bleeding, and pain.

MATERIALS AND METHODS

Study Setting:

This study was a descriptive prospective cross-sectional hospital-based study conducted at Ahmed Gasim Cardiac Center in the cardiac catheterization ward, in Khartoum state, Sudan. This cardiac center was chosen because it is a good area with numerous patients who need diagnostic coronary angiography.

Inclusion Criteria:

Any patient aged 18 years or older who underwent diagnostic percutaneous coronary angiography, and is free of back pain.

Exclusion Criteria:

Any patient with emergency coronary angiography, a therapeutic coronary angiography, and a history of bleeding disorders.

Sampling Technique:

A statistical formula was used to establish the sample size for this investigation, taking into account variables including the estimated average prevalence (Zeinab Abd Allah *et al.*, 2021) , confidence level and desire margin of error.

A total of 151 consecutive participants constituted the final sample size, which was deemed adequate to meet the study's goals.

Data Collection:

Demographic data was collected first by the questioner, which included age and gender. The patients were observed for 6 hours for bed rest protocol to fill in the structured observational checklist. An observation checklist was used in assessing patient compliance regarding routine bed rest.

Instruments:

Subjective Data: Back pain was measured by the Visual Analogue scale of (0-10) which was categorized into 3 levels: "no pain (0), mild to moderate (3-7), and severe (7-10).

Also, a two-dimensional ruler with 1 cm precision was used to measure the hematoma and bleeding. This method is frequently used in the literature. (Sa'aleek et al., 2016) Bleeding was detected by observing the dressing on the puncture site and then measuring the distance between its borders with the same ruler. Hematoma was detected by observing the presence of skin discoloration at the puncture site and then measuring the distance between its borders with this ruler.

Noncompliance participants regard routine bed rest measured when patients change their position through 6 positions taken during bed rest of 6 hours (flex the right leg, turn to the right side, turn to the left side, sitting, standing and walking. And comparing the outcome noncompliant with those patients who were compliant (the outcome included in this study: back pain event and occurrence of vascular complications e.g. bleeding and hematoma post-diagnostic coronary angiography). Finally, the patient asked about the bed rest protocol.

Pilot Study:A pilot study was conducted to assess the validity and reliability of the instrument.

Statistical Analysis:

The data was analyzed using the statistical package of social science (SPSS) and was presented in tables, figures, percentages, Chi-square test, and cross-tabulation. A p-value of less than 0.05 was considered significant.

RESULTS

The background information about the study participants, including their age and gender, is provided in Table 1. Only

41.7% of the participants were female, with men making up the majority of the sample (58.3%). In terms of age, 50 to 65 years old accounted for the largest percentage of participants (57.0%).

Table 1: Demographic characteristics of the participants.

Variable		Frequency	Percent
Gender of patient	Male	88	58.3
	Female	63	41.7
Age group	18 - 33 years	2	1.3
	34 - 49 years	29	19.2
	50 - 65 years	86	57.0
	66 - 100	34	22.5

In terms of distribution, the participants were divided into compliant (115) and non-compliant (36) regarding adherence to routine bed rest protocol. Compare the outcome of noncompliance with those patients who are compliant (the outcome included in this study: back pain event and occurrence of vascular complications e.g. bleeding and hematoma post-diagnostic coronary angiography). There were six positions taken by patients observed during six hours of observations .3 participants (8.4%) flexed their right leg once, also 5 participants (13.5%) turned to their right side once. While 1 participant (2.8%) turned to their left side twice, 35 participants (97.2%) were not standing during all 6 hours of observation, while (2.8%) were standing twice. Table (2), represents participants' sitting. 5 participants (13.9%) were sitting more than three times.

Table 2: Frequency and percent for non-compliant Participants when sitting**.**

Participants Sitting	1st/h	2nd/h	3rd/h	4th/h	5th/h	6th/h
Not sitting	36 (100)	35 (97.2)	33 (91.7)	28 (77.7)	29 (80.5)	34 (94.4)
Once	0 (0)	0 (0)	1 (2.8)	2 (5.6)	1 (2.8)	2 (5.6)
Two	0 (0)	0 (0)	0 (0)	2 (5.6)	0 (0)	0 (0)
Three	0 (0)	0 (0)	0 (0)	0 (0)	1 (2.8)	0 (0)
More	0 (0)	1 (2.8)	2 (5.6)	4 (11.1)	5 (13.9)	0 (0)
Total	36 (100)	36 (100)	36 (100)	36 (100)	36 (100)	36 (100)

Table 3, represents the distribution of vascular complications (bleeding & hematoma) for participants compliant and, noncompliant during 6 hours of observations, there was no bleeding and hematoma in the subjects of both groups151(100%).

Table 4, represents the back pain complaints for compliant participants. (93.0%) of compliant participants did not feel back pain for the first hour while (3.5%) of them experienced mild to moderate pain and severe pain. Also, during six hours of assessment, participants complained of severe back pain. Compared with non-compliant participants, 35 (97.2) did not feel back pain for the first and second hours and only 1 participant (2.8) had mild to moderate pain. Severe pain was not registered during all 6 hours of observations.

Table 3: Effect of bed rest duration on vascular complications formation among compliant non-compliant patients.

Vascular complications / Time	Compliant patient				Non-compliant patient			
	a-Bleeding		b-Hematoma		a-Bleeding		b-Hematoma	
	Occur	Don't occur	Occur	Occur	occur	Don't occur	occur	Don't occur
1st/h	0 (0)	115 (100)	0 (0)	115 (100)	0 (0)	36 (100)	0 (0)	36 (100)
2nd/h	0 (0)	115 (100)	0 (0)	115 (100)	0 (0)	36 (100)	0 (0)	36 (100)
3rd/h	0 (0)	115 (100)	0 (0)	115 (100)	0 (0)	36 (100)	0 (0)	36 (100)
4th/h	0 (0)	115 (100)	0 (0)	115 (100)	0 (0)	36 (100)	0 (0)	36 (100)
5th/h	0 (0)	115 (100)	0 (0)	115 (100)	0 (0)	36 (100)	0 (0)	36 (100)
6th/h	0 (0)	115 (100)	0 (0)	115 (100)	0 (0)	36 (100)	0 (0)	36 (100)

Table 4: Effect of bed rest duration on back pain complication formation for compliant and noncompliant patients.

	Back pain distribution for compliant patients				Back pain distribution for non-compliant patients				
Back pain / Time	No pain	Mild to moderate pain	Severe pain	Total	Back pain Time	No pain	Mild to moderate pain	Severe pain	Total
1st/h	107 (93.0)	4 (3.5)	4 (3.5)	115 (100)	1st/h	35 (97.2)	1 (2.8)	0 (0)	36 (100)
2nd/h	105 (91.3)	8 (7.0)	2 (1.7)	115 (100)	2nd/h	35 (97.2)	1 (2.8)	0 (0)	36 (100)
3rd/h	111 (96.5)	3 (2.6)	1 (0.9)	115 (100)	3rd/h	34 (94.4)	2 (5.6)	0 (0)	36 (100)
4th/h	114 (99.1)	0 (0)	1 (0.9)	115 (100)	4th/h	36 (100)	0 (0)	0 (0)	36 (100)
5th/h	114 (99.1)	0 (0)	1 (0.9)	115 (100)	5th/h	36 (100)	0 (0)	0 (0)	36 (100)
6th/h	114 (99.1)	0 (0)	1 (0.9)	115 (100)	6th/h	36 (100)	0 (0)	0 (0)	36 (100)

Table 5, represents a comparison between the presence of back pain & patient description during six hours of observations. 104 of the complaint participants (90.4%) did not feel back pain while 11(9.6%) complained of back pain compared with non-compliant participants 33(91.7%) did not experience back pain and 3(8.3%) had back pain. Also**,** Table 6, presents the correlation between participants (non-compliant, Compliant) & back pain, with no significant p-value (0.824).

Table 5: Comparison between Back pain & patient description.

	Back pain		Total
Patient description	**No pain**	**Back pain**	
Patient compliant	**104** **90.4%**	**11** **9.6%**	**115** **100%**
Patient none compliant	**33** **91.7%**	**3** **8.3%**	**36** **100%**
Total	**137** **90.7%**	**14** **9.3%**	**151** **100%**

Table 6: Chi-Square test & Correlation between Back pain & Patient description

Chi-Square Tests	Value	df	P value	Correlation
Pearson Chi-Square	0.049[a]	1	0.824	0

Figure (1), represents participants' bed position (19.9%) were lying flat on their bed, while 121(80.1%) were lying at 30 degrees or with the elevated head of the bed, and no participant registered to lie in a semi-sitting position.

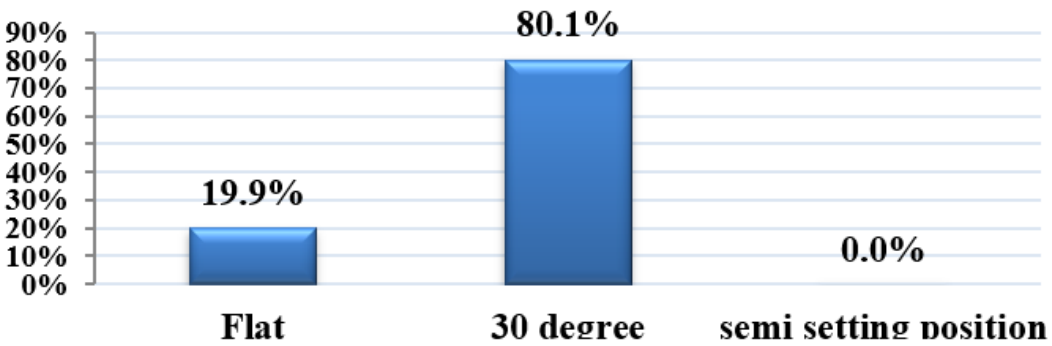

Fig. 1: Frequency and percent for patient's beds position distribution.

Table 7, represents a comparison between the presence of back pain & patient's beds position during six hours of observations, only 4.3% of the participants lying at 30 degrees feel back pain . Table 8, shows that there is a significant correlation between patients' beds and back pain. The elevation of the bed head affects patients' back pain, so back pain complaints increase when patients lie flat- P-value 0.000.

Table 7: correlation between Back pain complains & patient's beds position for all study populations.

Variable	Back pain		Total
patient's beds position	**No back pain**	**Present of back pain**	
Flat	**21** **70.0%**	**9** **30.0%**	**30** **100%**
30 degrees	**116** **95.7%**	**5** **4.3%**	**121** **100%**
Semi setting position	**0** **0%**	**0** **0%**	**0** **0%**
Total	**137** **90.5%**	**14** **9.5%**	**151** **100%**

Table 8: Chi-Square test & Correlation between Back pain & patient bed's position for all study population

Chi-Square Tests	Value	df	P value	Correlation
Pearson Chi-Square	19.123	1	0.000	-0.356

Table 9, represents the correlation between participants' noncompliance & their age, gender, and knowledge about the routine bed rest protocol. In terms of age is significant and the noncompliance of participants increases with aging, P value = 0.009.

Also, in terms of gender, there is a difference in patient compliance. Males are more noncompliant with bed rest protocol than females. It is a significant P value = 0.007. In terms of knowledge determining, there is no correlation between noncompliant participants and participants' knowledge about routine bed rest post cardiac catheterization p value 0.768.

Figure (2), represents141(93.4%) of participants know about the routine bed rest protocol post cardiac catheterization while (6.6%) do not know.

Table 9: Correlation between patients noncompliant & their gender age , and knowledge about routine bed rest :

Variable		Patient non-compliant	P value
Gender of patient	Male	28 (77.8%)	0.007
	Female	8 (22.2%)	
Age group	18 - 33 years	0 (0.0%)	0.009
	34 - 49 years	3 (8.3%)	
	50 - 65 years	18 (50.0%)	
	66 - 100	15 (41.7%)	
knowledge about routine bed rest post-cardiac catheterization	Yes	34 (94.4%)	0.768
	NO	2 (5.6%)	

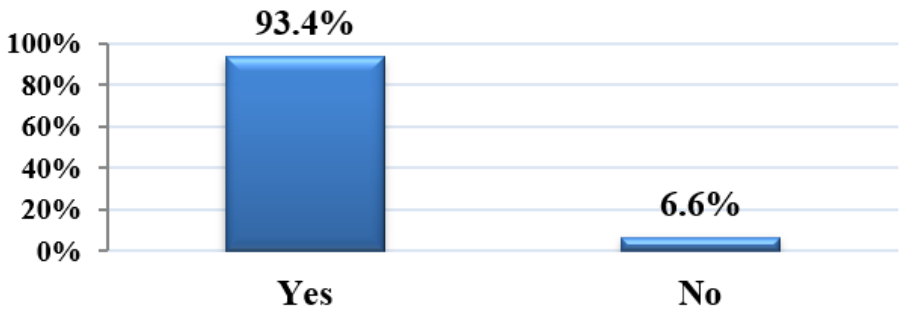

Fig. 2: the patient know the routine bed rest protocol post cardiac catheterization frequency and percent

DISCUSSION

Characteristics of Participants In Terms of Age and Gender:

The majority are aged 50–65 years. Based on gender, female patients make up a lower number of presentations for coronary angiography. This is consistent with the study done by Syara which found that the majority of participants were aged 50–60 years, and most of them were male. (Syara *et al.,* 2019) Also, agreements made by Abdelateif that most patients are elderly and male. (Abdelateif *et al.,* 2019).

A meta-analysis carried out by Busca found no evidence of an association between bed rest duration and vascular complications in terms of bleeding and hematoma formation. (Busca *et al.,* 2023) This may make our result comparable with those noncompliant participants who didn't report vascular complications all through 6 hours of observations and this reflects the manual application of firm pressure above the puncture site after sheath removal by a health care provider in the cardiac center and assist in avoiding vascular complication all through study population. This is agreed with a study done by Violeta Mattea that found that there were no significant hematomas or nearby neurological or motor issues. (Mattea *et al.,* 2017) also, a study done by Vahid Naseri agree no hematomas in most of the subjects. (Salahshour *et al.,* 2017)

Regarding back pain, our study revealed that participants who did not adhere to the routine bed rest protocol did not feel back pain during the first and second hours. This result is similar to a quasi-experimental study done by Sanaa that revealed that all patients in the intervention group reported that they felt comfortable and relaxed after mobilizing in bed. (Alaa Eldin *et al.,* 2021) Also, our study found that participants who complied with the bed rest protocol experienced back pain results similar to the study done by Abd, who found that patients who had strict bed rest experienced back pain. (Abd El Hafeez *et al.,* 2018)

This study mentioned that when we compared the outcome of non-compliant participants with the outcome of complaints during 6 hours of observation, we found that there were no significant correlations in patients' back pain. In contrast, a study done by Abouelala found that most patients (86.7%) in the study group had no pain compared to the control group (4). Also, Sarabi1 GREE found that position change after CATH is safe and effective for the reduction of back pain. (Sarabi *et al.,* 2021)

Our study revealed that there is a significant correlation between patients' bed position and back pain. The elevation of the bed head affects patients' back pain, so back pain complaints increase when patients lie flat. This is agreed and comparable with research done by Manueke *et al.,* (2019) shows that changes in position within a period of 6 hours after CATH reduced back pain and promoted well-being without an increase in vascular complications. (Manueke *et al.,* 2019) also Sarabi found that patients who use alternative resting techniques and adjust their bed angle by 15 to 45 degrees between 4 and 6 hours later could be discharged from the hospital more quickly and experience greater comfort After angiography. (Sarabi *et al.,* 2020)

The result shows that aging affects patient compliance. We found that there was a significant correlation between a patient's compliance and their age. The non-compliance of patients increases when patient age increases.

There was no significant correlation between knowledge about the bed rest protocol and non-compliant participants.

Conclusion:

All of the study population did not experience vascular complications through 6 hours of observations. Most of the compliant participants did not feel back pain for the first hour. Compared with non-compliant participants only 1 participant had mild to moderate pain. The elevation of the bed head affects patients' back pain, so back pain complaints increase when patients lie flat. the noncompliance of participants increases with

aging.

Recommendation: Use a systematic review as a basis for evidence-based practice in nursing and enhancing patient comfort through nursing research.

Declarations:

Ethical Consideration:A formal permission letter was submitted to the hospital. From the academic research committee of the faculty of Nursing science at the University of Alzaiem Alazhary, consent was taken from all participants before the beginning of the study. And informed that the information will be used only for the purpose of study.

Conflict of interests: The authors declare no conflict of interest.

Authors Contributions: I hereby verify that all authors mentioned on the title page have made substantial contributions to the conception and design of the study, have thoroughly reviewed the manuscript, confirm the accuracy and authenticity of the data and its interpretation, and consent to its submission.

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Availability of Data and Materials: All datasets analysed and described during the present study are available from the corresponding author upon reasonable request.

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