

Association between Time of Ambulation and Clinical Outcome of Patients after Cardiac Catheterization

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Abstract

Cardiac catheterization is the gold standard diagnostic test for coronary heart disease. **The aim:** the present study was conducted to assess the association between time of ambulation and clinical outcomes of patients after cardiac catheterization. **Methodology:** **Setting:** the study was conducted at the cardiac catheterization units at Ain Shams University Hospital and Ain Shams University Specialized Hospital. **Design:** The descriptive exploratory research design was utilized in this study. **Subject:** A purposive sample of 150 patients was used in the study. **Tools:** 1) Patients' interview questionnaire to assess patients' demographic characteristics data and patients' medical history. 2) Patient post cardiac catheterization clinical outcomes which included Vital signs: (temperature, blood pressure, respiration, pulse), O₂ saturation, lower peripheral perfusion and cardiac catheterization site assessment. 3) Visual Analogue Pain Scale to assess pain intensity. 4) Anxiety Scale to measure the level of anxiety. **Results:** there was a highly statistically significant relation between patients' age and vital signs reading at the fourth hour after ambulation p value is <0.001, and there was a statistically significant relation between patients' age and pain intensity in the first and the second hour p value is <0.05, also there was a highly statistically significant relation between them in the fourth hour after ambulation p value is <0.001. Where pain intensity decreased among the patients at the fourth hour'. And there was no statistically significant relation between patients' gender and pain after cardiac catheterization p value is >0.05. **Conclusion:** Patients on supine position with restricted on bed rest increased the intensity of back pain level at a time (1h) and then decreased at the time third and fourth hour after cardiac catheterization. **Recommendation:** early ambulation after cardiac catheterization is safe and its' suggested to improve patients' outcomes.

Key words: Cardiac catheterization, position, early ambulation, outcomes, patients.

Introduction

Cardiac Catheterization (CC) is the gold standard diagnostic test for coronary heart disease (Gaziano & Sesso, 2011). Cardiac catheterization has evolved over the last six decades to a highly specializes discipline for diagnostic purpose and an expanding repertoire of therapeutic advance to treat many problems (National Center for Health Statistics, 2011).

Cardiac catheterization is used for diagnostic evaluation in patient with cardiac disease. Despite progressive improvement in noninvasive technique, CC remains a key clinical tool for the assessment of the physiology and anatomy of the heart and its associated vasculature. Currently CC has become a routine diagnostic procedure performed in many hospitals (Rezaei-Adryani, Ahmadi, & Jafarabadi, 2009).

The procedure of CC approximately

takes an hour or more depending on the condition for which it is performed. In Egypt more than a thousand Egyptian have diagnostic CC done every year. More than half of those patients have angioplasty or bypass surgery to improve blood supply to their heart **Kumar & Canon, 2014**)

There are many insertion sites for CC procedure. It may be radial artery, ulnar artery, brachial artery, or femoral artery. But the most common insertion sites for the catheters are femoral artery (**Gallagher, Trotter, & Donoghue, 2010**).

Cardiac catheterization carries a slightly higher risk than any other heart tests. However, it is very safe when done by an experienced team. These risks include: cardiac tamponade, heart attack, irregular heartbeat, injury to coronary artery, low blood pressure and reaction to contrast dye (**Davidson & Bonow, 2012**).

Complications of CC are usually temporary and may include bleeding, infection, pain at the sheath or catheter insertion site, damage to the blood vessels, blood clots and kidney damage due to the contrast dye (more common in patients with diabetes or kidney problems) (**Carrozza, 2012**).

Early ambulation after CC is very important to prevent complication such as hematoma, bleeding and it can reduce back pain (**Biancarietal.,2010**).

Nursing care following CC is the same as general postoperative care. Patients are usually placed on cardiac monitor for the first few hours of recovery. Pulse, especially below the CC site should be measured, the nurse listens closely to heart and breath sounds. The nurse evaluates the peripheral circulation by noting peripheral skin color, temperature and sensation of the dorsal pedals and posterior tibia pulses (**Urduan, Stacy, &Loiugh, 2010**).

Aim of the study

This study aims to assess the association between time of ambulation and clinical outcomes of patients after cardiac catheterization through assessment of vital signs, pain intensity and anxiety level.

Research questions

1. What are the association between time of patient ambulation and vital signs?
2. What are the association between time of patient ambulation and pain intensity?
3. What are the association between time of patient ambulation and anxiety level?

Operational Definition

Time of ambulation in this study refers to:

4 h after CC, the patients were allowed to come out of bed (OOB), and to walk around and undertake self-care activities.

Patients' outcomes in this study refer to:

- Vital signs, lower peripheral perfusion and cardiac catheterization site.
- Back pain intensity.
- Anxiety level.

Subjects and Methods

Study designs:

The descriptive exploratory research design was utilized in this study.

Setting:

The study was conducted at cardiac catheterization unit at Ain Shams University Hospital and Ain Shams University Specialized. Hospital.

Subject:

A purposive sample of 150 patients undergoing cardiac catheterization.

Inclusion criteria: Adult patients from both sexes undergoing diagnostic cardiac catheterization. All included patients using right femoral artery access site.

Exclusion criteria: Chronic back pain, any bleeding disorder or apparent hematoma formation at the access site.

Study tools

Data collection tools were developed by the researcher based on extensive review of the relevant and recent literature, it was written in Arabic and filled by the researcher; it consists of four tools:

Tool one: Patients' interview questionnaire: this tool was developed by the researcher after reviewing the literature in an Arabic language and divided into two parts as follows:

Part I: Patients' demographic characteristics data: it included the studied sample characteristics such as age, gender, residence, marital status, level of education, occupational status, smoking, and date of admission.

Part II: Patients' medical history: It was used to collect the present and past history of the patients.

Tool two: Patient post cardiac catheterization clinical outcomes:

This tool was designed by the researcher and it included **Vital signs:** (temperature, blood pressure, respiration, pulse), **O₂ saturation, lower peripheral perfusion and cardiac catheterization site assessment.**

Tool three: Visual Analogue Pain Scale:

This scale was used to measure pain intensity; it is numerical linear scale ranged from zero to ten, corresponding to the degree of pain. Where (0) indicated no pain and (10) indicates worst possible pain. This scale marked by the patient; it was adopted from (Klein et al., 2009).

❖ **Scoring system**

- (0-1) Indicates no pain.
- (2-3) Indicates mild pain.
- (4-5) Indicates moderate pain.
- (6-7) Indicates sever pain.
- (8-9) Indicates very severe pain.
- (10)Indicates worst possible pain.

Tool four: Anxiety Scale:

This scale was used to measure the level of anxiety and consisted of 14 items, it is numerical linear scale ranged from zero to four, corresponding to the degree of anxiety level. Where (0) indicates the absence of symptoms and (4) indicates very severe anxiety. This scale according to the patients complains; it was adopted from Hamilton, (2012).

❖ **Scoring system**

- (0) Indicates absence of symptoms of anxiety.
- (1) Indicates mild anxiety.
- (2) Indicates moderate anxiety.
- (3) Indicates severe anxiety.
- (4) Indicates very severe anxiety

Upon the completion of the assessment, the researcher compiles a total, composite score based upon the summation of each of the 14 individually rated items. This calculation will yield a comprehensive score in the range of 0 to 56. It has been predetermined that the results of the evaluation can be interpreted as follows. A score of 14 or less indicates mild anxiety level. A score from 14 to 28 indicates mild

to moderate anxiety level. A 28 to 42 indicates severe anxiety level. Lastly, a score of 42 to 56 indicates a very severe anxiety level.

Methods

Administrative designs and ethical considerations:

An official letter from the faculty of nursing at Ain Shams University to the director of Ain Shams University Hospital for permission to carry out the study was obtained from the director of setting after explanation of the purpose of the study, the study protocol was approved by the research and ethics committees. The aim of the research was explained to the participants in the study. Verbal consent was obtained from each patient to participate in the study. Counselling and nursing services were provided to participants when needed. The study maneuver could not entail any harmful effects on participants.

Statistical analysis

Data were extracted from the interview questionnaire and computerized in Microsoft Excel 2010. Data analyzed was done using software package, while statistical analysis was done using the statistical package for social sciences (SPSS). Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables. The statistical analysis was done using percentage, range, and Chi square (X^2) and T- test.

Results

Table (1): demonstrates that demographic characteristics of patients participate in the study which indicates that, the patients' age ranged from 40 to 80 years with a mean \pm SD of (58.52 \pm 8.83). Eighty four (62.7 %) of them were males and coming from the urban area. And (49%) of them can read and write. Non- employment among of the studied patients represented (53.3%) and (52%) of them were smokers.

Table (2): Shows that there was a highly statistically significant relation between patients' age and O_2 saturation and respiration in the second and third quarter of the first hour after CC which (f=9.692,9.628,12.71,11.608 respectively) p value is <0.001 O_2 saturation and (f=5,662,6.931 respectively) p value is <0.001 respiration, and highly statistically significant relation between patients' age and blood pressure in the second and third quarter of the first hour after cardiac catheterization (f=5.751) p value is <0.001 , also there was a statistically significant relation between patients' age and blood pressure in the fourth and third quarter of hour and respiration in the first and fourth quarter of the first hour after CC.

A statistically significant relation was found between patients' age and pulse at the first hour after ambulation.

Table (3): shows that there was a highly statistically significant relation between patients' age and temperature, pulse in the first half hour at the first hour after CC which (f=6.866) p value is <0.001 temperature and (f=6.144) p value is <0.001 pulse, also, there was a statistically significant relation between temperature and pulse in the last half hour at the first hour after CC. A statistically significant relation was found between patients' age and blood pressure

Table (4): shows that there was a highly statistically significant relation between (f=5.710) p value is <0.001 temperature, also there was a statistically significant relation was found between patients' age and respiration, blood pressure during the third hour after CC.

Table (5): Shows that there was a statistically significant relation between patients' age and all vital signs, O_2 saturation, also there was a highly statistically significant relation was found between patients' age and temperature (f=11.429) p value is <0.001 temperature at the fourth hour after CC.

Table (6): Shows that there was a statistically significant relation between patients' age and pain intensity at 1h and 2h, while there was a highly statistically

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significant relation between them at 4th h which ($X^2=15.851$) p value is <0.001 pain intensity.

Table (7): Shows that there was no statistically significant relation between patients' age and anxiety level p value is>0.05.

Table (1): Frequency and percentages distribution of demographic characteristics of the studied patients (n =150).

Table (8): shows that there was a statistically significant relation between patients' gender and anxiety level, where 91.1 % females had mild anxiety level, 28.7% males had moderate anxiety level and 11.7% males had severe anxiety level.

Item	N	%
Age of the patient in years		
40-50	40	26.7
50>60	53	35.3
60>70	50	33.3
70≥80	7	4.7
Range	40-80	
Mean±SD	58.52±8.83	
Gender		
Male	94	62.7
Female	56	37.3
Weight		
Range	60-110	
Mean±SD	84.31±11.66	
Occupational status		
Employed	70	46.7
Non employed	80	53.3
Marital status		
Married	139	92.7
Widowed/divorced	11	7.3
Level of education		
Can't read and write	24	16.0
Read and write	74	49.3
Secondary school	52	34.7
Residence		
Rural	52	34.7
Urban	98	65.3
Are you smoker		
Yes	78	52.0
No	72	48.0

Table (2): Relation between patients' age and clinical outcomes during the first hour after cardiac catheterization (n=150).

Clinical outcomes		Age									
		40≥50		50≥60		60≥70		70≥80		ANOVA	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P-value
Temperature	1 st	37.15	0.58	37.13	0.51	37.05	0.73	37.5	0.41	1.179	0.32
	2 nd	37.13	0.58	37.06	0.45	37.03	0.71	37.5	0.41	1.474	0.224
	3 rd	37.15	0.46	37.11	0.48	37.02	0.61	37.56	0.1	2.37	0.073
	4 th	37.14	0.52	37.12	0.43	37.05	0.58	37.5	0	1.686	0.173
Pulse	1 st	85.73	9.73	81.91	10.8	88.46	10.35	83.14	6.62	3.658	0.014*
	2 nd	85.88	9.52	81.06	10.84	88.66	10.01	82	8.94	5.135	0.002*
	3 rd	85.25	10.12	81.81	10.25	87.88	8.4	82.86	6.69	3.625	0.015*
	4 th	85.18	10.9	82.42	10.16	88.3	7.67	80	9.57	3.893	0.010*
Respiratory	1 st	25.23	6.41	23.26	6.6	28.08	8.26	20.29	1.6	5.266	0.002*
	2 nd	25.23	6.42	23.91	6.32	28.66	8.52	20	1.91	5.662	<0.001**
	3 rd	25.38	6.4	24	6.55	29.5	8.45	20.57	1.4	6.931	<0.001**
	4 th	25.63	7.58	24.66	7.41	28.84	8.11	19.43	2.44	4.695	0.004*
Mean Arterial Pressure (MAP)	1 st	96.33	9.25	96.79	13.97	97.93	10	102.38	8.05	1.527	0.21
	2 nd	93	6.98	93.02	15.17	99.13	11.14	100.48	10.48	5.751	<0.001**
	3 rd	95.58	7.15	96.29	15.24	96.33	10.24	105.24	6.25	1.46	0.228
	4 th	93.33	7.77	96.61	14.47	96.8	9.12	104.28	6.82	3.037	0.031*
O ₂ saturation	1 st	96.13	4.01	97.94	2.89	96.36	4.24	89.43	8.18	9.692	<0.001**
	2 nd	96.15	3.45	97.66	3.01	96.4	3.83	89.71	7.76	9.628	<0.001**
	3 rd	96.38	3.29	97.4	2.76	96.9	3.48	88.29	9.93	12.71	<0.001**
	4 th	96.85	3.38	97.87	2.5	96.96	3.48	89.71	7.76	11.608	<0.001**

*Statistically significant at p < 0.05.

**Highly statistically significant at p < 0.001

Table (3): Relation between patients' age and clinical outcomes during the second hour after cardiac catheterization (n=150).

Clinical outcomes		Age									
		40≥50		50≥60		60≥70		70≥80		ANOVA	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P-value
Temperature	1 st	37.23	0.36	37.21	0.25	37.18	0.33	37.74	0.24	6.866	<0.001**
	2 nd	37.32	0.38	37.28	0.34	37.21	0.38	37.71	0.27	4.194	0.007*
Pulse	1 st	89	6.88	82.32	12.32	89.82	8.67	83.29	11.56	6.144	<0.001**
	2 nd	88.2	8.22	84.26	11.93	89.8	8.16	84.14	10.67	3.134	0.027*
Respiration	1 st	26.45	9.01	25.25	8.27	28.34	7.19	20.71	4.19	2.522	0.06
	2 nd	26.53	8.91	25.21	8.55	28.56	7.12	18.86	3.18	3.647	0.014
Mean Arterial Pressure (MAP)	1 st	92.83	7.84	97.99	12.66	93.67	8.32	105.24	17.45	3.061	0.030*
	2 nd	93.5	8.24	97.92	12.86	92.07	8.86	108.09	14.25	5.327	0.002*
O ₂ saturation	1 st	97.08	2.89	97.83	2.7	97.86	2.39	97.14	2.97	0.876	0.455
	2 nd	97.43	2.79	97.87	2.67	97.72	2.38	97.14	2.97	0.317	0.813

* Statistically significant at p < 0.05.

**Highly statistically significant at p < 0.001.

Table (4): Relation between patients' age and clinical outcomes during the third hour after cardiac catheterization (n=150).

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Clinical outcomes	Age									
	40≥50		50≥60		60≥70		70≥80		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P-value
Temperature	37.32	0.40	37.32	0.37	37.17	0.32	37.79	0.70	5.710	<0.001**
Pulse	86.98	9.27	84.34	12.43	89.06	7.23	82.43	13.07	2.276	0.082
Respiration	25.65	6.74	25.40	7.94	29.16	7.84	20.00	1.91	4.476	0.005*
Mean Arterial Pressure (MAP)	109.92	8.40	116.23	15.98	110.47	10.84	117.62	12.31	3.106	0.028*
O2 saturation	97.73	2.01	97.98	1.92	96.32	5.36	98.00	1.91	2.262	0.084

* Statistically significant at $p < 0.05$.

**Highly statistically significant at $p < 0.001$.

Table (5): Relation between patients' age and clinical outcomes during the fourth hour after cardiac catheterization (n=150).

Clinical outcomes	Age									
	40≥50		50≥60		60≥70		70≥80		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P-value
Temperature	37.15	0.23	37.32	0.35	37.13	0.24	37.71	0.27	11.429	<0.001**
Pulse	86.13	9.12	85.21	10.38	89.92	7.13	82.57	6.95	3.194	0.025*
Respiration	25.90	6.85	23.98	6.71	27.84	7.45	20.29	1.60	4.164	0.007*
Mean Arterial Pressure (MAP)	95.75	8.65	97.04	8.54	94.20	6.16	96.67	0.00	3.700	0.013*
O2 saturation	97.85	1.75	98.60	1.20	97.68	1.85	98.00	1.91	3.138	0.027*

* Statistically significant at $p < 0.05$.

**Highly statistically significant at $p < 0.001$.

Table (6): Relation between patients' age and pain scale every hour for four hours after cardiac catheterization (n=150)

Pain intensity	Age								Chi-square	
	40≥50		50≥60		60≥70		70≥80		X ²	P-value
	N	%	N	%	N	%	N	%		
Pain 1st hour										
Absent	0	0.0	13	24.5	10	20.0	0	0.0	26.336	0.002*
Mild	0	0.0	0	0.0	0	0.0	0	0.0		
Moderate	9	22.5	19	35.8	11	22.0	0	0.0		
Severe	20	50.0	8	15.1	15	30.0	4	57.1		
very severe	11	27.5	13	24.5	14	28.0	3	42.9		
Pain 2nd hour										
Absent	0	0.0	13	24.5	10	20.0	0	0.0	20.195	0.017*
Mild	0	0.0	0	0.0	0	0.0	0	0.0		
Moderate	9	22.5	7	13.2	5	10.0	0	0.0		
Severe	20	50.0	18	34.0	19	38.0	2	71.4		
Very severe	11	27.5	15	28.3	16	32.0	5	71.4		
Pain 3rd hour										
Absent	7	17.5	5	9.4	5	10.0	0	0.0	7.055	0.316
Mild	0	0.0	0	0.0	0	0.0	0	0.0		
Moderate	18	45.0	24	45.3	29	58.0	2	28.6		
Severe	15	37.5	24	45.3	16	32.0	5	71.4		
Very severe	0	0.0	0	0.0	0	0.0	0	0.0		
Pain 4th hour										
Absent	36	90.0	40	75.5	50	100.0	5	71.4	15.851	<0.001**
Mild	0	0.0	0	0.0	0	0.0	0	0.0		
Moderate	4	10.0	13	24.5	0	0.0	2	28.6		
Sever	0	0.0	0	0.0	0	0.0	0	0.0		
Very sever	0	0.0	0	0.0	0	0.0	0	0.0		

Table (7): Relation between patients' age and anxiety level after cardiac catheterization (n=150).

Anxiety level	Age (years)								ANOVA	
	40≥50		51≥60		61≥70		7≥80		F	P-value
	N	%	N	%	N	%	N	%		
Mild (0-14) (N=107)	33	82.5	37	69.8	34	68.0	3	42.9	4.876	0.061
Moderate (14-28) (N=31)	6	15.0	12	22.6	12	24.0	1	14.3		
Severe (18-42) (N=12)	1	2.5	4	7.5	4	8.0	3	42.9		
Total	40	100.0	53	100.0	50	100.0	7	100.0		

Table (8): Relation between patients' gender and anxiety level after cardiac catheterization(n=150)

Anxiety level	Gender				Chi-square test	
	Male		Female		x2	P-value
	N	%	N	%		
Mild (0-14) (N=107)	56	59.6	51	91.1	17.102	0.002
Moderate (14-28) (N=31)	27	28.7	4	7.1		
Severe (18-42) (N=12)	11	11.7	1	1.8		
Total	94	100.0	56	100.0		

Discussion:

Regarding the age of the patients, the mean age of the patients' participating in the study was 58.52 years old. This study revealed that the majority of patients' ages were ranged from 40-80 years old. This is in line with a study conducted by **Wang, Monticone, and Lakatta (2010)** entitled "Coronary Heart Disease Risk Factors in the Elderly" who indicated that CC increased among people over the age of 50 years where old age people are at more risk for cardiovascular disease because heart-related problem tends to increase in this advanced age.

Concerning gender of the patients, the study showed that males represented higher percentages than females. This is in line with a study conducted by **Towfighi, Zheng, and Ovbiagele,(2012)** entitled "Gender differences in coronary heart disease" who mentioned that the Ministry of Health and population in Egypt indicated that, a cardiovascular disease common in males than in females. On the other hand, this result may be is not in line with a study conducted by **Beltmare, Dreyer, and Tavella, (2012)** entitled "Sex differences in coronary heart disease" who reported that CAD is the leading cause of mortality for both adult males and females like worldwide.

Regarding educational level, the result of the present study revealed that less than half of all patients were educated at the level of primary school and this finding is supported by **Chair et al., (2012)** who indicated that less than half of the participants in the study received were educated at a primary school.

Concerning smoking, the result revealed that more than half of the patients were had a history of smoking. This result ascertains that increasing the smoker rate may increase the CC rate, as smoking is a modifiable risk factor for CAD.

The result of the study is supported by **Law and Wald (2013)** in his study entitled "Environmental tobacco smoke and ischemic heart disease" who evidenced the presence of a

significant effect of tobacco smoke exposure in causing ischemic heart disease.

Concerning residence, the study revealed that more than half of patients participating in the study were from the urban areas and this finding is supported by **Zadegan, Tabatabaei, Bashardoost, and Maleki (2013)** entitled "the prevalence of coronary artery disease in an urban population" who found that there is a high prevalence of CAD among the urban population.

Regarding the weight of the patients, the study revealed that the mean weight of the patients participating was 84.31 ± 11.66 kgm. This study revealed that the majority of patients' weight ranged from 60-110 kgm. This is in line with a study conducted by **Tuomilehto, Salonen, Marti, Jalkanen, and Puska (2014)** entitled "the relationship between obesity and coronary artery disease" who indicated that CC increased among people over the weight of 60 kgm where obesity is at more risk for cardiovascular disease because heart-related problems tend to increase in this advanced obesity

Regarding the relation between patients' age and vital signs, the study revealed that, there was a highly statistically significant relation between patients' age and temperature at the second, third, and the fourth hour, and a statistically significant relation between them in the second half hour of the second hour after CC.

This finding is in line with a study conducted by **Sund-Levander and Grodzinsky, (2010)** entitled "Time for a change to assess and evaluate body temperature in clinical practice" who indicated that, age related Thermoregulatory System changes with aging.

Regarding the relation between patients' age and pulse, the study revealed that, there was a statistically relation between patients' age and pulse at the first hour, first half of the second hour, and the fourth hour after CC, and a highly statistically significant between them in the second half of the second hour after CC.

This finding is in line with a study conducted by **Franklin and Weber (2010)**

entitled “Age Related Changes to the cardiovascular system” who stated that, pulse can be influenced by common age-related factor.

Regarding the relation between patients' age and respiration, the study revealed that, there was a statistically significant relation between them in first half, fourth quarter of the first hour, third, and the fourth hour, and a highly statistically significant relation between patients' age and respiration in the second and third quarter of the first hour after CC.

This finding is in agreement with a study conducted by **MacNee et al., (2010)** entitled “Age Related Changes to the Respiratory System” who stated that age-related physiological changes to the respiratory system, affect the chest wall, the shape of the diaphragm, and the lung parenchyma itself.

Regarding the relation between patients' age and mean arterial blood pressure, the study revealed that, there was a statistically significant relation between them at the fourth quarter hour of the first hour, second, third, and the fourth hour. And a highly statistically relation between them in the second half hour of the first hour after cardiac catheterization.

This finding is in line with a study conducted by **Mosnaim et al., (2010)** entitled “Age Related Changes to the cardiovascular system” who stated that, blood pressure can be influenced by common age-related pathologies, including atherosclerosis, hypertension, and arrhythmias.

These finding answered the first question related to the association between time of ambulation and vital signs.

Regarding the relation between patients' age and pain intensity, there was a statistically significant relation between patients' age and pain intensity in the first and the second hour. Pain intensity decreased among the patients in the fourth hour after ambulation with a highly statistically significant relation. This finding may be due to elevating the head of the bed, changing patient position and early ambulation after CC.

The findings in the present study are in line with another study conducted by **Rezaei-Adryani et al., (2009)** entitled “the effect of changing position and early ambulation after CC on patients' outcomes” who reported that if the patients are given permission to change their position in bed after CC, they experience significantly less back pain, and their satisfaction and comfort increase. Also, the results are in accordance with a study conducted by **Chairet al., (2012)** entitled “Effect of early ambulation after trans femoral cardiac catheterization” who reported that early ambulation after CC could reduce back pain of the patients.

These finding answered the second question related to the association between time of ambulation and pain intensity.

Regarding the relation between patients' gender and anxiety level, a study revealed that there was a statistically significant relation between patients' gender and anxiety level, where anxiety level is higher in males than females. This is in contract with a study conducted by **McLean and Anderson (2010)** entitled “A review of the gender differences in fear and anxiety” who stated that anxiety level is higher in females than males, due to physical and emotional symptoms of stress. These finding answered the third question which was related to the association between time of ambulation and anxiety level.

Conclusion and recommendation:

From the findings of the present study, it can be concluded that:

Regarding vital signs after cardiac catheterization, the study revealed that normal vital signs as temperature, pulse and blood pressure is recorded in all four hours after ambulation except respiration which was high in the first and the second hour after cardiac catheterization and then normal at 3rd and 4th hours.

Patients immobilization on supine position with restricted to bed rest increased the intensity of back pain level at time (1h) and then decreased at the time (2h), (3h) and after 4 hours according to the routine hospital care they received.

Association between Time of Ambulation and Clinical Outcome of Patients after Cardiac Catheterization

There was a highly statistically significance relation between patients' gender and blood pressure, where a mean arterial blood pressure higher in females with a mean \pm SD of (98.21 \pm 7.07) than males with a mean \pm SD of (94.26 \pm 7.64) at the fourth hour after ambulation, also there was a statistically significant relation between patients' gender and anxiety level, where anxiety level high in males than females.

Based on the forgoing conclusions, it is recommended to:

- Changing the patient's position in bed and time of ambulation from 1 hour to 4 hours rather than 6 hours, the traditional delivery of care after diagnostic cardiac catheterization with the aid of the nursing care is recommended.

- Further research is needed to determine the best positioning protocol that patients are required to remain after cardiac catheterization.

- Conduction of more Studies to other investigate clinical outcomes after changing position in bed and early ambulation after cardiac catheterization.

- Application of the present study with larger subjects at different places in Egypt to generalize the result.

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