

## **Effect of Foot Massage on Pain Level among Patients Undergoing Cardiac Catheterization**

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**Abstract:** Background: patients undergoing cardiac catheterization are reliable to pain that could be changed to emotional, psychological and physical distresses that leave negative effect on the prognosis and outcome of the disease and surgery. Therefore, this study was done to evaluate the effect of foot massage on pain level among patients undergoing cardiac catheterization. Design: a quasi-experimental research design was utilized. Setting: The current study was conducted in cardiac catheterization unit of Menoufia University Hospital. Samplings of 120 patients undergoing cardiac catheterization were assigned randomly into two equal groups, 60 patients for each group: Study group (1): received foot massage therapy. Control group (2): received routine hospital care only. Two instruments were used by the researcher for collecting the necessary data, these tools were: Instrument 1: Structured Interview Patient Assessment Instrument. Instrument 2: a Visual Analogue Pain scale (VAS). Results: Patients in the study group experienced less pain than control group post foot massage. Conclusions: The study concluded that foot massage had a positive effect in reducing pain level among patients underwent cardiac catheterization. Recommendations: The study recommended that foot massage should be part of the overall patient's management and must be routinely carried out.

**Key Words:** *pain level, cardiac Catheterization, Foot massage.*

### **Introduction**

Cardiovascular diseases (CVD) are currently the single most deadly and costly disease in the world. CVD is the primary cause of death worldwide. An estimated 17.7 million people died from CVD in 2015, representing 31% of all global deaths of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke (World Health Organization, Fact sheet, 2017)).

Cardiac catheterization comprises a group of therapeutic or diagnostic procedures in which placement of cardiac catheter are performed by skin puncture rather than by incision (Prasad & Herrmann, 2011). Examples of such procedures include angiography which is undertaken for diagnostic purposes, and percutaneous coronary

intervention, which is carried out for both diagnostic and therapeutic purposes (Chair, Thompson & Li, 2007). It was estimated that approximately 2.2 million patients receive percutaneous coronary intervention (PCI) worldwide every year (Lansky & Stone, 2010).

Acute pain which is not relieved can be changed to emotional, psychological and physical distresses that leave negative effect on the prognosis and outcome of the disease and surgery (Gélinas, Arbour & Michau, 2012). Inadequate pain relief also can increase sympathetic response which stimulates cardiac function and increases myocardial oxygen consumption. So, patients with limited cardiac reserve and ventricular dysfunction are not able

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to increase oxygen supply for keeping appropriate balance between demand and supply of oxygen that leads to tissues deprivation of oxygen, changes in normal cell function and hemodynamic changes; therefore, lack of controlling pain can leave negative effects on individuals' health (Barnett & Akhtar, 2013; Hwang & Platts-Mills, 2013).

Massage is considered a complementary and alternative medicine used by millions to relieve pain. Foot reflexology massage involves applying pressure to specific points on the feet in order to affect various parts of the body. By massaging key reflex points in the feet, energy blocks are released within the human body, the immune system is stimulated, and toxins are dislodged so that the body can eliminate them naturally (Anderson & Cutshall, 2007; Covelli, 2014).

### **Significance of the Study**

In many countries massage is increasingly playing an important part as an adjunct to traditional medicine as a method of pain relief. Using complementary medicine methods such as massage have been increased in treatment units in recent years that cause relaxation, and pain relief (Albert et al., 2009; Gwen, 2010; Trish & Christopher, 2012). The gate-control theory of pain postulates that massage may be effective in "closing the gate" that is, inhibiting the transmission of noxious stimuli by stimulating large nerve fibers that have been shown to alter pain perception (Cassileth, Trevisan & Gubili, 2007). Patients undergoing cardiac catheterization suffer from pain before procedure, so, it is important to perform foot massage as an essential part of an integrative approach to the management of pain among cardiac catheterization patients. So, the purpose of this study was to evaluate the effect of foot massage on

pain level among patients underwent cardiac catheterization

### **Research Hypothesis:**

There will be a reduction of pain level among patients who received foot massage than patients who didn't receive it.

### **Methods:**

#### **Research design:**

A quasi experimental research design (study and control) was utilized to achieve the purpose of this study.

#### **Research Setting:**

The study was carried out at cardiac catheterization unit, at Shebin Al-Kom, Menoufia University Hospital.

#### **Subjects:**

A convenient sample of 120 patients undergoing cardiac catheterization was assigned randomly into two equal groups (60 patients for each group).

- Study group (1): received foot massage therapy.
- Control group (2): received routine hospital care only.

#### **Inclusion criteria**

- Adult patients (19 - 65 years old) male and female.
- The patients had normal lower limbs

#### **Exclusion criteria**

- Emergency angiography cases and patients with the symptoms of myocardial infarction were excluded from this study because patients' condition may not allow performing foot massage for them and delay cardiac catheterization may affect patients' prognosis.
- Patients with deep venous thrombosis and varicose vein were excluded for fear of the pressure applied with massage could damage the already weak structure and cause parts of the vein or a blood clot to be released into the circulation (an emboli) placing the person at risk of pulmonary embolism causing a stroke or heart attack.

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### **Instruments:**

Two instruments were used by the researcher for collecting the necessary data, these instruments were:

#### **Instrument 1: Structured Interview Patient Assessment Instrument:**

It was developed and used by the researcher after reviewing the related literature (Aboalizm, El Gahsh & Masry, 2016; Elsay, Elshemy & Elsays, 2016) to assess sociodemographic & medical data as follow:

- ❖ Part one: Patient's sociodemographic data including age, sex, level of education, occupation, marital status, smoking, etc.
- ❖ Part two: Medical data including patient's past, present medical history, duration of cardiac disease, other associated diseases, type of cardiac catheterization and if it's first time for catheterization or not.

#### **Instrument 2: Visual Analogue Pain scale (VAS):**

This scale was developed by Bain, Kuwahata, Raymod & Foster, (2005): It was used to assess level of pain intensity. The total score was from zero to ten, in which zero mean no pain while a score from 1 to 3 denoted mild pains, a score from 4 to 6 indicated moderate pain and a score from 7 to 10 illustrated worst pains.

### **Reliability:**

All instruments were tested using a test retest method. The period between each test was two weeks. It was 0.97 for instrument one and 0.86 for instrument two.

### **Pilot study:**

It was conducted prior to the actual study on 10% of the study sample (12 patients) to test the clarity and applicability of the tools and estimate the time needed to collect data. Necessary modifications were done. Data obtained from the pilot study was excluded from the current study.

### **Ethical Consideration:**

A written and oral consent was obtained from all patients' to participate in this study after explanation of the purpose of the study. Each patient was reassured that any information obtained would be confidential and would only be used for the study purpose. The researcher emphasized that participation in the study was entirely voluntary and anonymity of the patients were assured through coding of data. Patients were also informed that refusal to participate in the study wouldn't affect their care.

### **Procedure:**

Data collection was extended over a period of five months from February 2018 to the end of July 2018. An official permission to carry out the study was obtained from the directors of the selected setting after submitting an official letter from the Dean of the faculty of nursing at Menoufia University explaining the purpose of the study and methods of data collection to obtain the acceptance for data collection. Then, this letter was provided to the head of department.

Patients who agreed to participate in the study and fulfilled the inclusion criteria were divided randomly and alternatively into study and control group 60 patients each. Study group on a week and the control group on another week to avoid the contamination of the sample. Study group (1) received foot massage therapy besides the routine hospital care and control group (2) received routine hospital care only. The study group received a reflexology treatment at the same day before angiography in a supine lying position in a quiet room of cardiac catheterization.

At the beginning the researchers applied a lubricating cream on the patient' feet and provide general foot massage at both feet for one minute. Foot was held with one hand and the other hand rotated the foot at the ankle.

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Foot massage was done for each patient for 30 minutes, first for the left foot and then for the right foot (15 minutes each). Foot was massaged from ankle to toe with moderate pressure using both hands for 10 times. This procedure was repeated eight times.

After general foot massage, the three reflexology areas of solar plexus, pituitary gland, and heart were used for stimulation. The researcher applied a firm downward pressure with her thumb on each area for two minutes in every area. Then circular massage was applied to the specific points. The massage was finished with light manual compression.

Each patient in the study group (1) and control groups (2) were assessed by researcher for pain level using tool 2 before intervention, post intervention, after catheterization and before discharge. A comparison between both groups (study group 1 and control group 2) were done four times interval: 1) on admission (pre intervention), 2) immediately after performing foot massage for study group and for control group immediately before entering cardiac catheterization, 3) after performing cardiac catheterization and 4) before discharge for both groups to examine the effect of foot massage on pain level among patients undergone cardiac catheterization.

### **Statistical Analysis**

The collected data were tabulated and analyzed by SPSS (statistical package for the social science software) statistical package version 20 on IBM compatible computer. Two types of statistics were done:

- 1) Descriptive statistics: were expressed as mean and standard deviation ( $X \pm SD$ ) for quantitative data or number and percentage (No & %) for qualitative data.
- 2) Analytic statistics:  
Pearson Chi-square test ( $\chi^2$ ): It is the test of significance used to study

association between two qualitative variables.

P-value at 0.05 was used to determine significance regarding:

- P-value  $> 0.05$  to be statistically insignificant.
- P-value  $\leq 0.05$  to be statistically significant.
- P-value  $\leq 0.001$  to be highly statistically significant.

### **Results**

**Table 1:** illustrated that the mean age of participants were between the ( $57.31 \pm 7.54$  yrs.) and ( $57.50 \pm 6.07$  yrs) of study and control groups respectively. More than half of both study and control groups (56.7%, 60%) respectively were males. Almost half of both study and control group were secondary educated (31.7%). The majority of both study and control group were married (85%, 90%) respectively. As regards to residence, the majority of studied groups lived in rural area (78.3%, 63.3%) respectively. Half of the study group were smokers and more than half of control group were smoker (50%, 56.7%) respectively, There were no statistically significant differences between both study and control group regarding to all socio-demographic characteristics.

**Table 2:** showed that about half of studied groups complained from cardiac disease for less than one year (48.3%, 53.3%) respectively. Regarding other co-morbidities about (30%) of study group had hypertension only and (31.7%) had diabetes & hypertension beside cardiac disease and about (40%) of the control group had hypertension only and (40%) had diabetes & hypertension beside cardiac disease. More than (90%) of the studied groups underwent diagnostic cardiac catheterization. About (61.7%) of the study group and (76.7%) of the control group underwent their first cardiac catheterization, There was no

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statistically significant difference between both study & control group regarding to medical history of studied groups.

**Figure 1 :** showed that there was no statistically significance difference related to pain level between studied groups pre-intervention ,it was moderate (36.7%, 35%) and severe (63.3%, 65%) in study and control groups respectively .While there was a statistically significance difference

related to pain level between studied groups post-intervention ,it was moderate (33%, 21%) and severe (27%, 39%) in study and control groups respectively .After catheterization ,it was mild( 29%,15%) , moderate (31%, 43%) and severe (0%, 2%) in study and control groups respectively and before discharge ,it was mild (29%,15%) and moderate (31%, 45%) in study and control groups respectively.

**Table 1:** distribution of Socio-demographic characteristics of the studied groups

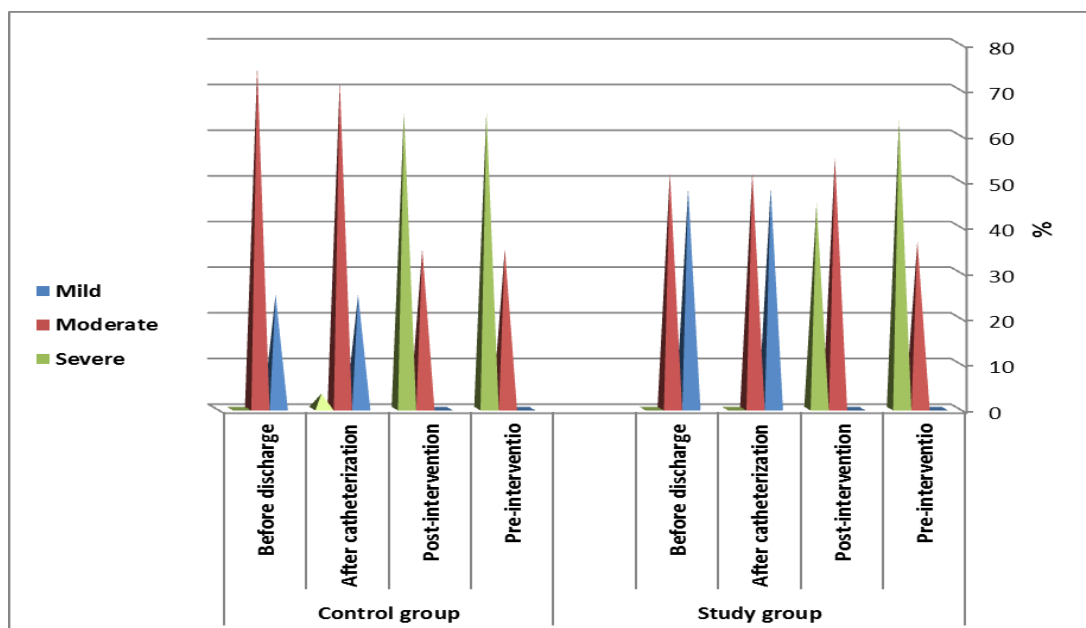
Socio-demographic characteristics	Studied groups				$\chi^2$	P value
	Group I (Study) (n=60)		Group II (Control) (n=60)			
	No.	%	No.	%		
<b>Age (years):</b> Mean±SD Range	57.31 ± 7.54 30.0 – 65.0		57.50 ±6.07 39.0 – 65.0		t=0.14	0.88 NS
<b>Age (years):</b> 19-29 30-39 40- 49 50-59 60-65	0 2 5 28 25	0.0 3.3 8.3 46.7 41.7	1 1 6 27 25	1.7 1.7 10.0 45.0 41.7	1.44	0.83 NS
<b>Gender:</b> Male Female	34 26	56.7 43.3	36 24	60.0 40.0	0.13	0.71 NS
<b>Education:</b> Illiterate Read & write Primary & Prep Secondary University	18 12 3 19 8	30.0 20.0 5.0 31.7 13.3	15 11 9 19 6	25.0 18.3 15.0 31.7 10.0	3.60	0.46 NS
<b>Occupation:</b> Working Not work Housewife	28 12 20	44.0 20.0 36.0	26 18 16	43.3 30.0 26.7	1.71	0.42 NS
<b>Marital status:</b> Married Widower	51 9	85.0 15.0	54 6	90.0 10.0	0.68	0.40 NS
<b>Residence:</b> Urban Rural	13 47	21.7 78.3	22 38	36.7 63.3	3.26	0.07 NS
<b>Smoking:</b> Yes No	30 30	50.0 50.0	34 26	56.7 43.3	0.53	0.46 NS

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**Table 2:** The description of Medical history of the studied groups

Medical history	Studied groups				$\chi^2$	P value
	Group I (Study) (n=60)		Group II (Control) (n=60)			
	No.	%	No.	%		
<b>History of cardiac disease:</b>					NA	NA
Yes	60	100.0	60	100.0		
No	0	0.0	0	0.0		
<b>Duration of cardiac disease:</b>					4.83	0.18 NS
<1 yr	29	48.3	32	53.3		
1—5 yrs	18	30.0	20	33.3		
6—10 yrs	6	10.0	7	11.7		
> 10 yrs	7	11.7	1	1.7		
<b>Other co-morbidities:</b>					6.92	0.22 NS
Diabetes Mellitus(DM)	10	16.7	8	13.3		
Hypertension(HTN)	18	30.0	24	40.0		
DM & HTN	19	31.7	24	40.0		
Chest diseases	1	1.7	0	0.0		
Others	4	6.7	2	3.3		
No other co-morbidity	8	13.3	2	3.3		
<b>Type of cardiac catheterization:</b>					0.10	0.75 NS
Diagnostic	55	91.7	54	90.0		
Therapeutic	5	8.3	6	10.0		
<b>Is it first time to have cardiac catheterization:</b>					3.16	0.07 NS
Yes	37	61.7	46	76.7		
No	23	38.3	14	23.3		

**Figure 1:** Pain level of the studied groups' pre-intervention, post intervention, after catheterization and before discharge



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### **Discussion:**

Acute pain which is not relieved can be changed to emotional, psychological and physical distresses that leave negative effect on the prognosis and outcome of the disease and surgery (Gélinas, Arbour, Michau, 2013). Also, it can increase the sympathetic response which stimulates cardiac function and increases myocardial oxygen consumption. Foot massage is an alternative non-pharmacologic method that improve outcome of pain management. Foot massage can be applied independently by the nurse and does not need prescription from the doctor. Foot massage is effective, easy, low cost, and safe for patients and can be applied to patients in some cultures (Chanif, Petpichetchian & Chongchareon, 2013).

Regarding to Socio-demographic characteristics & medical data of the studied sample: The result of the present study revealed that, there was no statistical significant difference between studied groups regarding their socio-demographic characteristics & medical data at baseline and this was consistent with Ali (2015) ; Rahmani et al.,(2018); Pouyesh et al.,(2018) ; Haddad ,Saleh and Eshah, (2018) who reported that the studied groups didn't differ significantly at baseline regarding bio-sociodemographic characteristics.

Regarding to pain score of the studied groups, the present study revealed that although there was no statistically significant difference related to pain score between studied groups pre-intervention, there was a statistically significant difference related to pain score between studied groups post-intervention. This may be due to the result of foot massage provided by the researcher to the study group. This result agree with Shehata, Abd Elhy and Abd Elsalam,(2016) who showed

that, there was a statistically significant reduction of subjective pain score among study group rather than control group after foot massage.

This result was in the same line with Chanif (2012) and Wang and Keck (2004) who revealed that, there was a statistical significant difference in the pain score compared between the experimental and the control group after administration of foot massage. A significant difference between intervention and control group was found. This may be due to that the massage stimulated the non-painful nerve fibers which helped to release endorphins and assist in pain relief. This results was supported by Rodrigues and Sams,(2018) who demonstrated foot and hand massage as an effective non-pharmacological methods to reduce pain in postoperative open heart surgery' patients.

### **Conclusions:**

The study concluded that foot massage had a positive effect in reducing pain level among patients underwent cardiac catheterization.

### **Recommendations:**

The study recommended that foot massage should be part of the overall patient's management and must be routinely carried out.

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