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Comparative Study between "COMFORT Scale" and "Facial Expression" as Pain Assessment Tools in Ventilated Patient after Adult Cardiac Surgeries

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Abstract

Pain is an unpleasant subjective and multidimensional experience related to actual or potential tissue damage. Intensive care unit (ICU)-admitted patients experience pain because of the painful interventions and routine daily care procedures. The aim of this study was to evaluate convergence between these two tools for pain assessment and their consistency with hemodynamic changes due to pain in tracheal intubated patients after cardiac surgery This was a prospective study was conducted on 50 patients who had undergone cardiac surgery and met the necessary criteria for the research. Pain score at 24hr after extubation Secondary outcomes - Postoperative opioid consumption (in first 24 hrs), Intraop, postoperative, totalPatient satisfaction with pain management score: in the first 24 hrs measured at above intervals.Our study shows that the 38% of the studied patients were with mild pain and 52% showed moderate to severe pain according to facial expression tool for pain assessment. Our study shows that the 70% of the studied patients were with moderate to severe pain according to COMFORT too scale for pain assessment. our study shows that a highly significant moderate level of agreement was observed According to high correlation between the pain score measured by comfort scale and facial expression , both scales could be used successfully for monitoring of pain in critically ill patients. Both scales are sensitive for capturing changes in pain response and discriminate between painful and nonpainful procedures .

1. Introduction

Pain is an unpleasant subjective and multidimensional experience related to actual or potential tissue damage [1] .

Intensive care unit (ICU)-admitted patients experience pain because of the painful interventions and routine daily care procedures [2] .

There are barriers to effective verbal communication in these patients such as sedation, decreased level of consciousness, endotracheal intubation, and mechanical ventilation, which are limiting factors for patient's self-report of pain [3]. The inability to report pain does not exclude the possibility of its existence. The comfort scale is a pain scale that may be used by a healthcare provider when a person cannot describe or rate their pain [1].

The Behavioral pain scale form of facial expression including only expressions of patient`s face was completed by the colleague of the project to create blinding [4].

The aim of this study was to evaluate convergence between these two tools for pain assessment and their consistency with hemodynamic changes due to pain in tracheal intubated patients after cardiac surgery.

2. Patient and method

An interventional study was conducted. It will compare the change in knowledge and self-care practices among participants before and after implementing a health educational program.

Study period: The study was carried out in the academic year 2019/2020 at Benha University Hospital.

The study was conducted on patients who had undergone cardiac surgery and met the necessary criteria for the research.

This was a prospective study. After the research was approved by the institutional ethics committee, evaluating the diagnostic tests were started in a referral university cardiovascular, medical and research center. The study was conducted on patients who had undergone cardiac surgery and met the necessary criteria for the research and were studied until the target sample size (n = 100) was reached.

Inclusion criteria was coronary artery bypass grafting surgery, replacing or repairing heart valve by sternotomy and lack of verbal communication due to tracheal intubation, lack of extreme facial damage, movement in at least one body part, patient's age at least 18 and at least 3 hours after any administration of sedatives, analgesics and muscle relaxing agents.

Exclusion criteria was Re-do cardiac surgery, Acute endocarditis, Circulatory arrest, Emergent cases, Shock, LVADs, Transplantation, TAVR, contraindications for neuraxial including coagulopathy and Clopidogrel 2 times normal) and Renal dysfunction (Cr > 2 mg/dL).

Drop outs: If a patient in the study group appears to require more narcotics than 250mcg of Fentanyl or midazolam >2mg, the patient will receive so and be dropped from the trial. Circumstances where the study protocol is not followed will lead to dropping out of those patients from the trial.

Primary outcomes - Pain score at 24hr after extubation Secondary outcomes - Postoperative opioid consumption (in first 24 hrs), Extubation time, ICU Length of stay, Delirium scores, Inotropic requirement, patient satisfaction scores (in first 24 hrs). (Post op - Pain scores, sedation, nausea, vomiting, itching, hemodynamics, and respiratory parameters were measured at 2, 4, 8, 12, 24, 48 & 72 hrs post extubation)

Pain scores – starting from 2hr post extubation, 11 point verbal rating scale, timing as above. Opioid consumption – first 12 hrs, thereafter daily and total (iv and PO) Time of Extubation.

Lengths of stay: ICU LOS, In-hospital LOS, 30 day readmission rate Delirium: CAM-ICU measured at 24, 48 and 72 hrs . Inotrope requirement – Intraop, postoperative, totalPatient satisfaction with pain management score: in the first 24 hrs measured at above intervals.

An official permission was obtained from the Dean of Benha Faculty of medicine and the administrators of Benha University Hospital.

An informed written consent was obtained from all participants . it will include data about aim of work, study design, site, time, subject, confidentiality.

An approval from Research Ethics Committee in Benha faculty of medicine was obtained. The collected data was and analyzed using the Statistical package for Social Science (SPSS). Categorical data was expressed as number and percentage, Continuous data was expressed as mean and standard deviation.

3. Results

Our results show that the mean age in the studied group was 39.22 ± 10.13 SD and it included 74% males and 26% females , 54 % of patients were hypertensive and 74% of them were diabetics.

Table (1) shows that 62% of the studied group had CABG and 38% undergo PCI operation.

Table (1) Distribution of the participants according to the type of cardiac surgery (n=50).

Variables		Values	
		No.	%
Cardiac surgery	CABG	31	62
	PCI	19	38

Table (2) shows that the mean HR, RR, temperature and CVP in the CABG patients was 90.77 ± 16.85, 21.77± 3.44, 37.57 ± 0.77 and 13.38 ±5.33 respectively. The mean HR, RR, temperature and CVP in the PCI patients was 86.31 ± 16.84, 23.15± 4.04, 37.69 ± 0.84 and 11.89 ±4.3 respectively. There were no significant statistical differences in HR, RR, temperature and CVP between the two groups p value >0.05.

Table (2) comparisons between vital signs according to type of surgery.

Variable	CABG group (n=31)	PCI group (n=19)	Total (n=50)	Independent t-test	P
	Mean ± SD	Mean ± SD	Mean ± SD		
HR	90.77 ± 16.85	86.31 ± 16.84	89.08±16.82	t=0.9	0.3 (NS)
RR	21.77 ± 3.55	23.15 ± 4.04	22.3±3.77	t=1.2	0.2 (NS)
Temp.	37.57 ± 0.77	37.69 ± 0.84	37.61±0.79	t=0.5	0.5 (NS)
CVP	13.38 ± 5.33	11.89 ± 4.3	12.82±4.97	t=1.03	0.3 (NS)

Table (3) shows that the 52% of the studied patients had vomiting, sedation and delirium symptoms . There was no significant statistical differences between the two groups regarding theses symptoms p value >0.05.

Table (3) comparisons between symptoms according to type of surgery**.**

Variable		CABG group (n=31)		PCI group (n=19)		Total (n=50)		Pearson Chi-Square test	P
		No.	%	No.	%	No.	%		
Vomiting	**Yes**	13	41.9	11	57.9	24	48	$\chi 2=1.2$	0.2
	No	18	58.1	8	42.1	26	52		(NS)
Sedation	**Yes**	16	51.6	10	52.6	26	52	$\chi 2=0.05$	0.9
	No	15	48.4	9	47.4	24	48		(NS)

Table (3) Continue

Delirium	**Yes**	16	51.6	10	52.6	26	52	$\chi2$=0.05	0.3
	No	15	48.4	9	47.4	24	48		(NS)

Table (4) shows that the 38% of the studied patients showed mild pain and 52% showed moderate to severe pain according to facial expression tool for pain assessment.

Table (4) Levels of pain using facial expression tool**.**

Variable		**CABG group (n=31)**		**PCI group (n=19)**		**Total (n=50)**		**test**	**p**
		No.	**%**	**No.**	**%**	**No.**	**%**	**$\chi2$=**	**0.14**
Facial expression scale	No pain	3	9.7	2	10.5	5	10	**3.9**	**(NS)**
	Mild pain	15	48.4	4	21.1	19	38		
	Moderate to severe pain	13	41.9	13	68.4	26	52		

Patients with a score 0 are over-sedated (no pain), scores between 1 (mild pain) adequately sedated, and scores between 2 under-sedated (Moderate to severe pain) .

Table (5) shows that the 70% of the studied patients showed moderate to severe pain according to COMFORT too scale for pain assessment.

Table (5) Levels of pain using COMFORT scale tool.

Variable		**CABG group (n=31)**		**PCI group (n=19)**		**Total (n=50)**		**test**	**p**
		No.	**%**	**No.**	**%**	**No.**	**%**	**$\chi2$=**	**0.6**
COMFORT Scale	**No pain**	2	6.5	2	10.5	4	8	**0.8**	**(NS)**
	Mild pain	8	25.8	3	15.8	11	22		
	Moderate to severe pain	21	67.7	14	73.7	35	70		

Patients with a score between 8 – 17 are over-sedated (No pain), scores between 17 – 26 are adequately sedated (mild pain), and scores between 27 – 40 are under-sedated (moderate to sever pain) (COMFORT Scale for Pediatrics, ND).

Table (6) shows that a highly significant moderate level of agreement was observed.

Table (6) Convergence between the two tools of pain assessment Facial expression and COMFORT scale in evaluating patients' pain**.**

Variable		**COMFORT scale**			**Total**
		No pain	**Mild pain**	**Moderate to severe pain**	
Facial expression scale	No pain	2	0	3	5
	Mild pain	2	9	8	19
	Moderate to severe pain	0	2	24	26
Total		4	11	35	50

Measure of agreement Kappa = 0.44 p valve < 0.000.

4. Discussion

Effective pain mangement is an important goal for all paitients and improves patient out come, especially in critically ill patients. Although pain assessment is difficult in noncommunicative ICU admitted paitient ,in order to optimal pain control, pain score must be measured in avalid and reliable manner [5.]

Facial expression and comfort scale are used to assess pain severity in critically ill patients and this study was aimed to evaluate the use of facial expression and comfort scale as pain scales and their agreement in detecting pain among patients hospitalized in IcU.

The results of our study showed that critically ill noncommunicative patients experience pain during seemingly nonpainful care procedures [mouth wash]and even during resting. Both study scales,facial expression and comfort scale ,demonstrated an increase inpain score from resting to turning or suctioning of endotracheal secretions. the results of the present study, in addition to the positive and strong correlation of the facial expression and comfort scale, indicated that despite the similarities and differences between these tools , both are suitable scales for assessing pain among critically ill patients in IcUs and could discriminate between painful and nonpainful procedures in both groups of conscious and unconscious patients. In both scales , there no defference value between comfort scales and facial expression as pain assessment after adult cardice surgeries .

In another study by Severgini et al., comparing two scales of comfort scales and facial expression to assesspain in critically ill conscious and unconscious patients , it was found that comfort scaled and facilal expression increased during nursing care in icu and the results were significantuiy correlated . this finding is consistent to our findings that astrong correlation was found between the scores of facial expression and comfort scales .Although both scales can be used for assessment of pain intensity , comfort scale was found to be more specific than facil expression but less sensitive . the compination of comfort scales and facial expression resulted in better sensitivity and better results in the assessment of the pain in the patients during post operation [6].

Many researches performed with an emphasis on the fact that pain control is not enough in ICU patients, and pain is not assessed adequately by caregivers. Anumber of researches performed to fined out the best way to evaluate pain with physiologic and behavioral criteria in un conscious and tracheal intubated patients [4].

This study aimed to evaluate the use of two tools, comfort scale and FE, and their agreement in detecting and evaluating pain levels in intubated patients in ICU , after cardiac surgery . In this research , intubated patients experienced different level of pain and when their evaluated pain was in highest and lowest levels , the highest level of agreement observed between the two tools . Whereas , there was lack of strong agreement between the tools when there was moderate and low level pain ,so that in T4 , the change was reported in the pain by comfort scale tool , but FE tool was unable to detect this change . This would suggest higher sensitivity of comfort scale tool in assessing pain compared to FE .

In the study of Gelinas et al . on intubated patients , over a half of patients experienced pain while resting [7] .

The researcher here concluded that patients would experience pain during their time in ICU in situations such as low consciousness levels and when trachea was intubated .Also in Gelina's study on intubated patients , most nurses expected body movement to detcted patient pain and rarely used FE. Whereas ,Arif-Rahu and grap specified FE as one of the most widely used methods of pain detection due to its behavioral expression and feelings richness [7].

However, he considered it as an incomplete tool, since patient's lower half of face [mouth and lips] is covered by tapes used to fix tracheal tube and \ or nasogastric tube , therefor , patient's face is not exposed fully to evaluate expressions and muscle movements and recommends FACS [facial action coding system] to evaluate and detect pain using FE, also pain detection is not limited to patient's grimace and patient's face facial muscles retractions [8] .

Moreover , as pain is an occurrence that would happen to the whole body and is not limited to one location [presented in chest, lower body parts , hands and etc.] apain as sessment tool can evaluate whole body reaction , logically. On the other hand , some patients would grimace unaware when they are awake ,and every such expression in awareness cannot be interpreted as pain . thus , all the mentioned reasons and deficiencies for FE tool can cause underestimate and overestimate in results and cause inappropriate administration of analgesic medactions for these patients just like the first step [T0] .in our study where FE tool recorded higher level of pain compered to comfort scale tool [9] .

Of hemodynamic variables , systolic blood pressure was consistent with pain level changes before and after analgesic drugs were used , and increase in systolic blood pressure was consistent with reported pain increase by comfort scale tool. Aurbor and Gelinas showed that physiologic indicators would increase with sever pain [10].

Mccaffrey and loscin reported that physiologic indicators would be affected by environmental conditions such as physiologic and hemodynamic conditions and medications [analgesics , sedatives and tranquilizers, they are not constant indicators of proving pain and recomnded physiologic indicator to detect pain . in this research the agreement between comfort scale and changes in physiologic changes because of pain , like systolic blood pressure , was more than FE , which could suggest that comfort scale is more sensitive compared to FE [11].

Pain assessment has always been a challenge in patients hospitalized in ICU, who are unable to communicate asequately and express their pain due to numerous reasons [low level of consciousness, tracheal intubation , ect] [9] .

Since pain is a mental and complicated phenomenontive usually felt throughout the body , comfort scales tool is more sensitive due to having multiple items and evaluating different behavioral indicators for pain in intubated patients compared to FE tool with only one critertion [9] .

Moreover comfort scale is more consistent with physiologic changes due to pain in patients . the researcher suggests more studies to confirm the sensitinity of comfort scale tool . there were some limitations in our study , such as research unites limited to a single center and only intubated patients undergoing cardiac surgery were study , therefore , our findings are generalizable to these patients . second , some behaviors such as stress were considered as pain by the evaluations tool and unpredictable changes in patients condations returne to the operating room , administration of tranquilizers instead of analgesics , changing hemodynamics \ hypotension or low cardiac output syndrome to make patients fully unwake happened that resulted in the samples being less than what was originally intended [12] .

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