

IDENTIFICATION OF PREDISPOSING FACTORS TO MULTIPLE ORGAN DYSFUNCTIONS SYNDROME AMONG BURNED PATIENTS IN INTENSIVE CARE UNIT AT MANSOURA UNIVERSITY

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ABSTRACT

Background: Major burn is one of the most severe forms of trauma and usually associated with high morbidity and mortality. Multiple Organs dysfunction syndrome is common in patients with major burns and leading to poor outcomes. Multiple organ dysfunction syndromes are the presence of altered organ function of two or more organ systems in acute ill patients with severe trauma, burn, shock and infection. Patients with burn need critical care units with equipment, supplies and continuously monitoring and life-sustaining organ support until the patients recover and the wounds are healed. Patients with two or more organ systems involved have a mortality rate of approximately 75%, and patients with four organ systems involved have a 100% mortality rate. The skin or deep tissue damage caused by burns, the body's organs and systems will also experience functional changes or metabolic deterioration accompanied by shock, infection and other complications. However, there are few studies on the prognostic factors of multiple organ injuries after burns. So this study have a chance to identify risk factor of the development organs dysfunction for burned patients **Aim** of this study was identification predisposing factors to multiple organs dysfunction among burned patients in ICU at Mansoura University. **Research questions:** Q1: What are the predisposing factors to multiple organs dysfunction among burned patients in ICU? Q2: What is the rate of incidence organ dysfunctions among burned patients

occur? **Design:** A Qualitative exploratory descriptive design was used during the academic year 2018. **Sample:** fifty patients were selected through purposive sampling technique. **Setting:** this study was conducted at burned ICU, Mansoura University. **Tool of the study:** when collect data, two tools used to in this study as follows; demographic & health relevant data, SOFA assessment scale. **Results:** the current study reveals that mild degree of multiple organ dysfunctions was most noticed among the majority (76%) of the studied sample during the initial assessment (within 24 hours from admission). Also, about two third (66%) and (68%) of studied patients reported moderate multiple organ dysfunction after 24 and 48 hours from admission respectively. **Conclusion:** the current study can be concluded that, multiple organ(s) dysfunction is a common and serious problem among burned patients and affected (4.0%) of the total admitted ICU patients post 48 hours of admission. Identification of predisposing factors to MODS may lead to better secondary prevention, especially where the most common predisposing factors were shock, infection and cardiac disorders after 48hours. **Recommendations:** the result of current study can be recommended: Applying of SOFA scores for the assessment of patient with burn and MODS. Designing educational booklets MODS for critical care nurses about predisposing factors, early manifestation, prevention to promote patients' care.

Key Words: *risk factors, burn injury, multiple organs dysfunction, ICU*

INDRODUCTION

Burn injury is a common type of traumatic injury, causing morbidity and mortality (Luo et al., 2014 & Shankar et al., 2016). The patients with severe burn frequently sustain life-threatening injuries, requiring a multi-disciplinary approach providing intensive and long-term treatment (Clark, Imran, Madni & Wolf, 2017; Hurley, 2016). The burn injury can be one of the most serious and devastating form of trauma (Dries & Marini, 2017; Wu, Yang, Li & Huang, 2019). In the United States each year, approximately 2 million people are burned; 80,000 of these are hospitalized, (Romanowski & Palmieri, 2017; Fernando et al., 2018). A burn is defined as a tissue injury from thermal application, chemical contact, electrical injuries and radiation (Li et al., 2017). Burn is not only affecting the skin but involves all systems of the body as cardiovascular system, respiratory system, kidney and liver. This requires specialized treatment (Manson et al., 2016).

Sepsis, inhalation injury and multi organ failure were the most common causes of death in burned patients. Multiple organ dysfunction syndromes are the presence of altered organ function of two or more organ systems in acute ill patients with severe trauma, burn, shock and infection. MODS is a major cause of death in patients with major burns, and the mortality rates ranged from 29% to 86% in patients who develop MODS (Wang et al., 2014).

Multiple dysfunction syndromes are the presence of altered organ function in acutely ill patients such that homeostasis can not be maintained without intervention. Multiple organ dysfunction syndromes are presence of dysfunction in two or more organs induced by a variety of acute injuries. Although sepsis and septic shock are usually reported as the major causes of MODS (Mace et al., 2012). Approximately 50% of ICU patients will develop MODS, 20% to up to 75% mortality in patients having at least two-organ failure (Rosenberg, 2010).

MODS development was failed to predict by routine diagnostic study. However, there are few studies on the prognostic factors of multiple organ injuries after burns. So this study was to identify predisposing factors to multiple organs dysfunction among burned patients (Guttormsen, Onarheim, Thorsen, Jensen & Rosenberg, 2010).

Multiple organs dysfunction is one of the most problems in the intensive care units. It is requires more efforts from critical care nurses to monitor patient contentiously because the nurse is most closely involved in the daily care of critically ill patients.

SIGNIFICANCE OF THE STUDY

Multiple Organ dysfunction syndromes are caused frequently after injuries as major burn. This may involve organ as kidneys and lungs, liver and pancreas. There are many factor lead to MODS in burned patient as infection, wound, shock and this factor lead to life-threatening condition. Patients at risk for systemic inflammation should be continuously assessed for organ dysfunction by critical care nurses (Turner et al., 2011). MODS development was failed to predict by routine diagnostic study, however the comprehensive assessment and monitoring of patients at risk for, and who actually developed sepsis, and observation of the effects of treatment are key components of nursing care (Reinhart, Eyrich & Sprung, 2012). Therefore, the study was to assess predisposing factors to multiple organs dysfunction among burned patient.

SUBJECTS AND METHODS

Aim of the Study: The study aimed to Identification of predisposing factors to multiple organs dysfunction among burned patient in Intensive Care Unit (ICU) at Mansoura University.

Research Questions

1. What are the predisposing factors to multiple organ dysfunction syndrome among burned patients in ICU?
2. What is the rate of incidence organ dysfunctions among burned patients occur?

Research Design

A Qualitative exploratory descriptive design was used during the academic year 2018.

Research Setting

This study was conducted in Intensive Care Unit of the burn hospital, Mansoura University. The ICU consists of three beds, three cardiac monitor and two ventilators.

Subjects

A convenience samples of 50 patients both sexes with burn. The sample was selected according to the total patients admitted to the burn unit per year (150). The exclusion criteria included Patients who have severe hepato-renal dysfunction and major organ failure before burns, patients with severe chronic diseases.

Tool of the Study

When collect data, two tools used to in this study as follows:

Tool I: Demographic &Health Relevant Data - This tool was developed by the researcher after reviewing the recent literature; it consists of age, gender, marital status, past medical history, health relevant data such as causes of burn, Total body surface area of burn, degree of burn, burn location, ventilation status, and vital signs.

Tool II: SOFA Assessment Scale - This scale was adopted from Vincent, Nelson & Williams (2011). The score is based on six different items, (including the respiratory, cardiovascular, hepatic, coagulation, renal and neurological systems). The score tables only describe points-giving conditions. In cases where the physiological parameters do not match any row, zero points are given. In cases where the physiological parameters match more than one row, the row with most points is picked. The SOFA scoring system is useful in predicting the clinical outcomes of critically ill patients. These scores were classified as: 0 – < 8 point (mild organ dysfunction); 8 – < 16 point (moderate organ dysfunction); and 16 – 24point (severe organ dysfunction).

Validity and Reliability

The tool was tested for content validity, understanding and applicability by a group of 5 experts in the field of critical care nursing. The reliability of the tool was tested by using Cronbach's Alpha test that measures the internal consistency of the tool. The reliability of tools was 0.85

which indicates high reliability. The questionnaire was pilot-tested for validity and clarity by a random sample of 5 patients, minor modification was done and the pilot sample excluded.

Ethical Consideration

Before starting the study, an ethical approval was obtained from the Faculty of nursing. Also permission to conduct the study was obtained from administrative authority was attained. Confidentiality were assured through coding of all data, the data collected was used in the purpose of the research.

Data Collection Procedure

The current study was started since 2018 with preparation of different data collection tools after reviewing the related literatures. Data collection tools were developed and tested for content validity and reliability. Then official agreements to carry out the study were obtained from directors of the burned center. The researchers started actual data collection, by assessing patients for two different times. The first assessment was done at the first day from admission & final assessment was done after 48 hours from admission in ICU, where the investigators obtained patients' data from the medical records using tool (I). Then the researchers gathered data regarding factors predisposing to multiple organ dysfunctions. These data were obtained using tool (II). This assessment required about 20-30 minutes to be completed for each patient.

Statistical Analysis

It was performed using SPSS 20.0 software package (SPSS, Inc., Chicago, IL, USA). Categorical variables were compared using Pearson's chi-squared test. Means and standard deviation were used in quantitative data.

RESEARCH RESULTS

Figure 1 shows that near to two third (64%) of the studied patients were female and about one third (36%) of them were male. Also, near to half (48%) of them aged from 20 -<30 years) and the minority (4%) of them had less than 20 years.

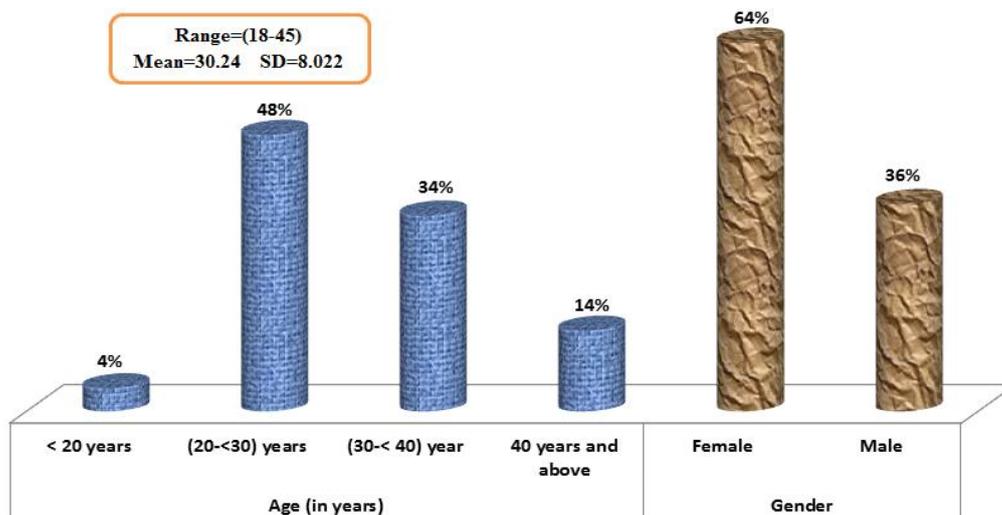


Figure 1: Respondents' Demographics

Table 1 illustrates that the majority (84.0%) of studied sample had burn caused by flame. On the other hand, 2.0% and 6.0% of them had chemical burn and burn caused by hot water respectively. In relation to total body surface area of burns, it was observed that more than one third (34.0%) of the studied patients had (10%-19%) and (20-40) % of the total surface area and near to one third (32.0%) of them had more than 40% of total surface area. As for degree of burn, about two third (66.0%) of the sample had second degree of burn and about one third (34%) of them had third degree burn. Regarding Presence of inhalation injury, about two thirds (68.0%) of the sample had inhalation injury due to burn. As for Burn location, about one third (32.0%) of the patients had burn in head, neck and had mechanical ventilation. Also, about two fifth (40.0%) of sample had invasive devices from 4 to 7 devices and near to two thirds (62.0%) of them had parenteral feeding. Also, more than one third (34.0%) of the patients were unconscious.

Table 1: Percent distribution of the studied patients related to health relevant data

Clinical Data	The studied patients (n=50)	
	N	%
Causes of burn		
▪ flame	42	84.0
▪ electrical	4	8.0
▪ chemical	1	2.0
▪ Hot water	3	6.0
Total body surface area of burns (%)		
▪ (10-19)	17	34.0
▪ (20-40)	17	34.0
▪ (>40)	16	32.0
Presence of inhalation injury		
▪ No	16	32.0
▪ Yes	34	68.0
Type of feeding		
▪ enteral feeding	19	38.0
▪ parenteral feeding	31	62.0
Degree of burn		
▪ second degree	33	66.0
▪ Third degree	17	34.0
Burn location		
▪ head and neck	16	32.0
▪ upper extremities	5	10.0
▪ Anterior trunk	20	40.0
▪ back	9	18.0
Level of consciousness		
▪ Semi conscious	33	66.0
▪ Unconscious	17	34.0
Ventilator status		
▪ Ventilated	16	32.0
▪ Not ventilated	34	68.0
Number of invasive devices used		
▪ 1-3	30	60
▪ 4-7	20	40

Table 2 shows that more than one third (40%) of the studies sample had hypothermia at the first day of admission and the percentage increased to tow third (66%) at the second day with $P = 0.004$. Regarding pulse rate, it was observed that more than one half (54%) of them had rapid pulse rate at the first day of admission and the percentage increased to 80%) at the second day with $P0.002$. Also, shallow rapid breathing was observed among more than half (58%) of the sample at the first day and it was (80%) at the second day of admission with significant difference where $P = 0.001$. As for blood pressure, no significant difference was observed where $P= 0.234$.

Table 2: Percent Distribution of the studied patients in relation to vital signs

Vital signs	The studied patients (n=50)				χ^2 P
	1 st day of admission N	%	2 nd day of admission N	%	
1. Temperature					
▪ Normal	29	58.0	8	16.0	6.841 0.004*
▪ Hypothermia	20	40.0	33	66.0	
▪ Hyperthermia	1	2.0	9	18.0	
2. Pulse					
▪ Normal	20	40.0	8	16.0	9.347 0.002*
▪ Rapid	27	54.0	40	80.0	
▪ Weak	3	6.0	2	4.0	
3. Respiration					
▪ Normal	20	40.0	8	16.0	10.258 0.001*
▪ Shallow	29	58.0	40	80.0	
▪ Deep	1	2.0	2	4.0	
4. Blood pressure					
▪ Normal	20	40.0	9	18.0	4.352 0.234
▪ Hypotension	30	60.0	41	82.0	
▪ Hypertension	0	0.0	0	0.0	

* Significance at level $P < 0.05$.

Figure 2 shows that more than one half (52%) of the sample had shock during the period of the study while the minority (6.0%) of them had inadequate oxygen. Also, about 14% of the sample had infection and only 2% wound.

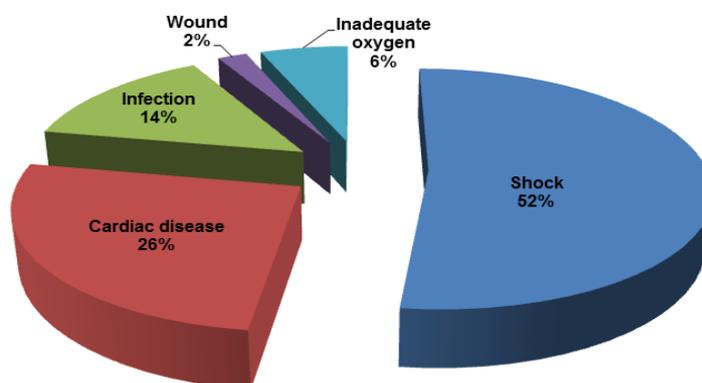


Figure 2: Patients' Condition

Table 3 shows the percent distribution of the studied patients according to the SOFA assessment scale. In this table, it was observed that no one of the sample had abnormality in respiration on admission and after 24 hours, while the minority of them (4. %) reported that respiration ratio (PaO2/FIO2) was < 100 and statistical difference was observed while P =0.000. Regarding Coagulation about half (50%) of the sample reported that the coagulation level was < 150 on admission and the percent increased to 62% after 24 hours and to 64% after 48 hours With P =0.000. Regarding cardiovascular alteration, a significant difference was observed among the studied sample where P=0.000. In relation to level of consciousness, this table shows that half (50%) of the sample had disturbed consciousness on admission and (4.0%) of them lost their consciousness where GCS scale was < 6. Regarding renal dysfunction among the burned patient, a significant difference was observed while P =0.000.

Table 3: Percent Distribution of the studied patient's relation to the items of SOFA assessment scale

SOFA Assessment Scale	The studied patients (n=50)						χ^2 P
	Admission		24 hours		48 hours		
	N	%	N	%	N	%	
1. PaO2/FIO2 (mm Hg) SaO2/FIO2							
▪ > 400	15	30.0	6	12.0	0	0.0	25.445 0.000*
▪ <400	10	20.0	14	28.0	16	32.0	
▪ <300	19	38.0	22	44.0	24	48.0	
▪ <200	6	12.0	7	14.0	8	16.0	
▪ <100	0	0.0	0	0.0	2	4.0	
2. Coagulation							
▪ >150	15	30.0	4	8.0	0	0.0	18.167 0.000*
▪ <150	25	50.0	31	62.0	32	64.0	
▪ <100	10	20.0	14	28.0	16	32.0	
▪ <50	0	0.0	1	2.0	2	4.0	
▪ <20	0	0.0	0	0.0	0	0.0	
Liver Bilirubin (mg/dL)							
▪ [<1.2	20	50.0	12	24.0	7	14.0	76.165 0.000*
▪ 1.2 - 1.9	20	40.0	30	60.0	32	64.0	
▪ 2.0 - 5.9	5	10.0	7	14.0	9	18.0	
▪ 2.0 - 5.9	5	10.0	1	2.0	2	4.0	
▪ ≥ 12.0	0	0.0	0	0.0	0	0.0	
3. Cardiovascular							
▪ No	20	40.0	6	12.0	1	2.0	25.473 0.000*
▪ MAP<70mmg	15	30.0	18	36.0	19	38.0	
▪ Dopamine ≤ 5	15	30.0	21	42.0	22	44.0	
▪ Dopamine ≥ 5 or Epinephrine ≤ 1	0	0.0	5	10.0	6	12.0	
▪ Dopamine ≥ 15 or Epinephrine ≥ 1	0	0.0	0	0.0	2	4.0	
4. CNS Glasgow							
▪ 15	15	30.0	8	16.0	0	0.0	10.859 0.003*
▪ 13-14	8	16.0	11	22.0	2	4.0	
▪ 10-12	25	50.0	27	54.0	33	66.0	
▪ 6-9	2	4.0	4	8.0	13	26.0	
▪ < 6	0	0.0	0	0.0	2	4.0	

5. Renal							
▪ <1.2	25	50.0	12	24.0	7	14.0	70.198 0.000*
▪ 1.2 -< 2	20	40.0	30	60.0	32	64.0	
▪ 2.0 -< 3.5	5	10.0	7	14.0	9	18.0	
▪ 3.5-< 5.0	0	0.0	1	2.0	2	4.0	
▪ ≥5.0	0	0.0	0	0.0	0	0.0	
6. Liver Bilirubin (mg/dL)							
▪ <1.2	25	50.0	12	24.0	7	14.0	70.198 0.000*
▪ 1.2 -< 2	20	40.0	30	60.0	32	64.0	
▪ 2.0 - 5.9	5	10.0	7	14.0	9	18.0	
▪ 6.0- 12.0	0	0.0	1	2.0	2	4.0	
▪ >12.0	0	0.0	0	0.0	0	0.0	

Table 4 reveals that mild degree of organ dysfunction was most noticed among the majority (76.0%) of the studied sample during the initial assessment (within 24 hours from admission). Also, about two third (66.0%) and (68.0%) of studied patients reported moderate multiple organ dysfunction after 24 and 48 hours from admission respectively.

Table 4: Percent distribution of the studied patients according to the total score of SOFA assessment scale

Total SOFA Assessment Scale	The studied patients (n=50)						χ^2 P
	On admission		Post 24 hours		Post 48 hours		
	N	%	N	%	N	%	
Total SOFA level							
▪ < 8 Mild	38	76.0	17	34.0	14	28.0	30.59 0.000*
▪ (8-<16) Moderate	12	24.0	33	66.0	34	68.0	
▪ ≥16 Severe	0	0.0	0	0.0	2	4.0	
Range	(2-10)		(2-11)		(4-17)		F=17.87
Mean ± SD	6.42±2.09		7.98±2.18		9.28±2.84		P=0.000*

Table 5 represents comparison between the predisposing factors for organ dysfunction of the studied patients and their characteristics. About one third (32%) of the sample aged between (20-<30) years had shock. No statistical significant observed regarding the predisposing factors and patient's age. On the other hand, more than one quarter (28.0%) of the sample with second degree burn had shock. Significant difference was observed in relation to degrees of burn and predisposing factors of multiple organ failure where P 0.045.

Table 5: Percent comparison between the predisposing factors for organ dysfunction of the studied patients and their characteristics

Characteristics	The studied patients (n=50)										χ^2 P
	Predisposing factors for organ dysfunction										
	Shock (n=26)		Inadequate oxygen (n=3)		Infection (n=7)		Wound (n=1)		Cardiac diseases (n=13)		
	N	%	N	%	N	%	N	%	N	%	
Age (in years)											
▪ < 20 years	1	2.0	0	0.0	0	0.0	0	0.0	1	2.0	
▪ (20-<30) years	16	32.0	1	2.0	2	4.0	1	2.0	4	8.0	9.161
▪ (30-<40) year	5	10.0	2	4.0	4	8.0	0	0.0	6	12.0	0.689
▪ 40 years and above	16	8.0	0	0.0	1	2.0	0	0.0	2	4.0	
Degree of burn											
▪ second degree	14	28.0	3	6.0	7	14.0	0	0.0	9	18.0	8.865
▪ Third degree	12	24.0	0	0.0	0	0.0	1	2.0	4	8.0	0.045*

* Significance at level P < 0.05.

DISCUSSION

Major burn is one of the most severe forms of trauma and usually associated with high morbidity and mortality. Multiple organ dysfunction syndromes (MODS) is defined as the presence of dysfunctions in two or more organs or organ systems induced by a variety of acute injuries response that requires patient's stay for long time in intensive care unit (ICU). A more complete description of organ dysfunction or failure is fairly complex and is frequent after major burn trauma. It is associated with high mortality rate depending on the number of organs involved. The uncontrolled systemic inflammation, triggered by multiple small infections, leads to multiple organ failure and death is a commonly held belief (Feng et al., 2018). In the current study we assess critically ill burned patients for presence of multiple organs dysfunction during the first 48 hours.

Regarding patients characteristics, the present study revealed that two thirds of the sample was female. This may be due to the nature of female work that makes them at higher risk for burn than men. This result was on line with Sadeghi et al. (2010) they showed controversy in their study about gender differences in the mortality of burn patients. Also, they demonstrated that female gender is a risk factor for mortality in burns patients. On the other hand, the study result was on contrary with Brusselaers, Juhász, Erdei, Monstrey & Blot (2009) who reported that a higher but statistically insignificant mortality rate was observed in male burn patients (1.6% male, 1.1% female). López et al. (2008) they reported that found dominance of males among their studied sample.

Regarding age, more than half of the patients that exposed to burn were from 20 to 30 years old and more than one third of them were between 30-40 years. This may be attributed that this age is the age of concern for many dangerous works that cause burn. This finding was agreed with

Feng et al. (2018) they stated that their patients were extremely young with the mean age of 21.3 years. On the other hand, this present finding was contradicted with Mehmet (2013) who illustrated that, older age should be categorized as high risk for mortality at the time of admission. These patients also need special attention and care during hospitalization.

In relation to the clinical data of the studied patients, the majority of them exposed to flame injuries. This may be interpreted that the flame injuries is a common cause of burn in our society. This result was supported by Aguayo et al. (2013) they reported that, flame burns have been associated with a higher mortality rate and have also been associated with more extended, deeper burns and the presence of inhalation injury. Also, Kraft et al. (2011) showed that flame burn injury resulted in more severe clinical complications, such as multi-organ failure and sepsis.

Concerning the degree of burn, two third of the studied patients had second degree burn. This is due to the effect of flame injuries. Also, less than one third of them were ventilated. Moreover, about one third of them were semiconscious. Regarding the number of invasive devices used, near one third of patients had from one to three devices. Regarding the total body surface area (TBSA), the present study revealed that near to one third of the sample had more than 40% of TBSA of burn. Also, more than one third had burn in anterior trunk. This result was on line with Feng et al.(2018) they revealed that > 50% of the patients in their study with major burns were on invasive ventilator support and also represented that the mean TBSA was 60.9% in their patients.

Concerning vital signs about two third of the studied patients had hypothermia at second day of admission, and the majority of them had rapid pulse, shallow respiration and hypotension. These findings were in contradicted with Feng et al. (2018) who reported that the incidence of hypotension in their study was lower. Moreover, Mehmet (2013) illustrated that tachycardia, tachypnea; hypotension, gradually increasing dyspnea, and leukocytosis (WBC > 12000/ μ L) are reported risk factors for mortality from severe burn. Also, Zarei et al. (2011) they reported that hyperthermia, hypothermia, hypocapnia are indicate that the critically ill patient is at risk of mortality from sever burn.

As regard predisposing factors for multiple organ dysfunctions, the present study revealed that greater than one half of patients had shock due to burn and predispose them to MOD and more than one quarter of them had cardiac disorders and the minority had inadequate oxygenation and infection. This is due to patients under these conditions are vulnerable to severe fluid loss. This finding is in concordance with that of Youssef, Elfeky & Mohammed (2013) who reported that cardiac diseases, shock, and respiratory diseases are the common diagnoses for ICU admission and MOD. As well, Westphal et al. (2011) who reported the prevalence of septic shock among more than two thirds of the studied sample predispose them to MOD.

Regarding SOFA assessment criteria for MOD, the present study showed that only two critically ill burned patients were at greater risk for MOD and need for prolonged ICU stay and had respiratory and cardiovascular alterations after 48 hours from admission. On the other hand, the minority of the sample reported renal dysfunction. These findings were on line with Youssef et al. (2013) who reported that more than half of the studied sample had two organs dysfunction. In

this regards, Brunner, Smeltzer & Bare (2010) described MODS as a sequential failure of two or more organ systems remote from the site of the original insult following injury. In addition, Alam & Begum (2010) reported that MODS may develop directly after shock.

Concerning degree of organ dysfunction, the current study reveals that mild degree was most noticed among the majority of the studied sample during the initial assessment (within 24 hours from admission). About two third of studied patients reported moderate multiple organ dysfunction after 24 and 48 hours from admission, and they remained alive. It was supported by Youssef et al. (2013) who revealed that reveals that mild degree was most frequently noticed among more than two thirds of the studied sample during the initial assessment. Also, Shankar et al. (2016) they was consistent with this finding, they reported that the mortality rate in the ICU increased with the number of failing organs and patients with four or more failing organs showed 90% mortality. In addition to Wig et al. (2009), studied correlates of organ failure in severe acute pancreatitis, and found that mortality increased with an increasing number of organ failures. Also, Alam & Begum (2010); they showed that 26 from the 54 patients with severe burns had Multiple Organ Dysfunction (MOD).

In addition, the most associated comorbidities in the current study were shock, inadequate oxygenation, wound, infection and cardiac disease. Statistical difference was observed regarding to degrees of burn and predisposing factors of multiple organ failure. This result was in accordance with Youssef, Elfeky & Mohammed, (2013), they reported that the most frequently associated comorbidities in the current study were heart failure; hypertension, and diabetes.

CONCULOSION

The current study can be concluded that multiple organ(s) dysfunction is a common and serious problem among critically ill burned patients and affected (4.0%) of the total admitted ICU patients post 48 hours of admission. Identification of predisposing factors to MODS may lead to better secondary prevention, especially where the most common predisposing factors were shock, infection and cardiac disorders after 48ours.

RECOMINDATIONS

Based upon findings of the current study, the followings are recommended:

1. Applying of SOFA scores for the assessment of patient with burn and MODS.
2. Designing educational MODS booklets for critical care nurses about predisposing factors, early manifestation, and prevention to promote patients' care.

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