Thi-Qar Medical Journal (TQMJ):Vol(8) No(1) 2014(83-93)

Prevalence of respiratory failure in medical intensive care unit in Slemani teaching hospital

Kosar M. ALI ,MBChB, MRCP (UK)* Aso F, Amin MBChB, MRCP (UK)*Mohamed Omer MBChB,FICMS*Ismaeel H.Amin,MBChB,FICMS**
Ghazwa Y. AL-Tamimi MBChB,HDFM***

ABSTRACT:

Aim of study: to determine the prevalence and types of respiratory failure RF in patients admitted to Medical Intensive Care Unit (ICU) in Slemani Teaching Hospital.

Patients and method: A descriptive study of (75) patients admitted to the Medical Intensive Care Unit (ICU) in Slemani teaching hospital between (the first of July 2012 and twenty eighth of February 2013), all patients had verbal consent taken and special questionnaire filled for each patient.

Results: 75 patients with female predominate (female to male ratio 1.3:1) participated in this study, majority of them were in their seventh decade, more than half (52%) of the cases were obese (BMI >30). RF found in (81.3%) of the patients and (31) patients were type I respiratory failure.

Conclusions: Most causes of admission to medical ICU were due to respiratory problems, respiratory failure found in more than (80%) of the cases. Obesity was found in more than (50%). Type I respiratory failure is commoner than type II.

Keywords: prevalence, respiratory failure, medical intensive care unit, sulaimani teaching hospital.

*Medicine Department of School of Medicine/Universty of Sulaimani Iraq.

**Department of Surgery School of Medicine/Universty of Sulaimani.

***Sulaimani General Hospital.

Prevalence of respiratory failure in medical intensive care unit in Slemani teaching hospital

Introduction:

Respiratory failure, was known as ('anoxic anoxia') until recently the term 'respiratory failure' was used [1]. It is a syndrome of inadequate gas exchange due to dysfunction of one or more essential components of the respiratory system [2]. It is not a disease by per se , defined as a PaO_2 value of < 8.0 kPa while breathing air with or without a $PaCO_2$ > 6.6 kPa [3,4,5,6]. Many processes will involve more than one components of the respiratory system, but assessment of each compartment can provide a basis for differential diagnosis [7,8,9,10]. Respiratory failure has many causes and can come on abruptly (acute respiratory failure) when the underlying cause progresses rapidly, or slowly (chronic respiratory failure) when it is associated over months or even years with a progressive underlying process [11,12,13,14]. The ARF Study Group which studied the Incidence and mortality after acute respiratory failure and acute respiratory distress syndrome in Sweden, Denmark, and Iceland, showed that the incidences of ARF 77.6, for ALI 17.9, and for ARDS 13.5 patients per 100,000/yr. Ninety-day mortality was 41.0% for ARF, including ALI and ARDS patients, 42.2% for ALI not fulfilling ARDS criteria, and 41.2% for ARDS, while a study in Berlin showed that During the study period, 508 patients were diagnosed as having ARF, representing an incidence of ARF of 88.6 per 100,000/yr. Twenty-four hours after Intubation + Mechanical Ventilation, Mild-Moderate Lung Injury occurred in 94% and Severe Lung Injury in 3.6% of the ARF patients. Overall mortality rate was 42.7%. Mortality rate in the No Lung Injury group was 36.4%; in patients with Mild-Moderate Lung Injury, 40.8%; and in patients with Severe Lung Injury, 58.8% [15,16,17,18,19].

Aim of the study:

To determine the prevalence and types of respiratory failure in patients admitted to the Medical Intensive Care Unit (ICU) in Slemani Teaching Hospital.

Patients and methods:

A cross sectional clinical study of (75) patients admitted to the Medical Intensive Care Unit (ICU) in Slemani Teaching Hospital between (the 1st of July 2012 and 28th of February 2013). Each of the (75) patients was informed (verbal consent was obtained) about the blood samples for ABG analysis and for data collection according to specific questionnaire form. The questionnaire form included personal details: age, sex, BMI (calculated as weight in kilograms divided by height in meter squared). Also the form included details of their present illness, previous admission to ICU, reason for admission, previous respiratory problem, the result of the ABG and types of respiratory failure. ABG analysis was done for all of the (75) patients based on

the outcome of Allen`s test.Only variables that had chance for ABG analysis were included in our study. In this study we depended on ABG analysis in the diagnosis of respiratory failure as type I has these results PaO_2 < 8 kPa (60 mmHg) and/or $PaCO_2$ < 6.6 kPa (50 mmHg) and type II has these results PaO_2 < 8 kPa (60 mmHg) and $PaCO_2$ > 6.6 kPa (50 mmHg), although a combination of both disorders is common.The ABG Analyzer's name is OPTI^{TM} Model CCA-TS OPTI Medical Blood Gas and Electrolyte Analyzer, made by USA 2008. Patient identification codes were used to avoid admitting patients repeatedly to prevalence calculations. Categorical variables were presented as numbers (percentages). Biostatical analysis of these data done by a computer program Statistical Package for Social Sciences (SPSS version 16), the test used was Chi-square with P value less than 0.05 is regarded significant.

Results:

The study sample consisted of (75) patients admitted to the Medical Intensive Care Unit (ICU) for different reasons. The age of patients ranges from bellow (20) years to above (61) years, more than half of our patients were female 42 (56%) patients. Regarding their weights, the majority of them had Body Mass Index (BMI) above 30 (52%), as shown in Table 1.

Respiratory problems were the main reason of admission to the ICU with percentage about (42%), followed by mixed problems 14 (18.67%) patients, while cardiac problems represent (13.3%), as shown in Figure 1.A forty five patients (60%) had previous respiratory problem while the rest didn't have.All the 75 patients had blood sample taken for Arterial Blood Gases (ABG) analyses. In 42 (56%) patients, blood samples were taken from right side. Radial artery was the most common artery the blood sample taken from 66 (88%) patients, and the least one used was the brachial artery (only1 patient) as shown in Figure 2.According to the results of ABG 61(81.3%) patients had respiratory failure, and 14(18.7%) patients were normal. Type I respiratory failure exceeded type II by one patient, 31(50.8%), 30 (49.2%) respectively. Type II respiratory failure patients divided into 3 groups, 19 (31.1%) patients had chronic respiratory failure, 6 (9.8%) had acute respiratory failure, while the rest had acute on chronic respiratory failure, as shown in table (4). The majority of our patients were in the seventh decade with percentage reaches more than (49%) as shown in Table 2.Female patients with respiratory failure were more than male with ratio 1.3:1. Approximately half of our patients were obese with BMI more than 30 as shown in Table 3.

Discussion:

This study aims to determine the prevalence of respiratory failure (type I,II) in the medical ICU of Slemani Teaching Hospital.We found that the mean age of our patients about (56) which is in agreement with study done in Brazil (University of Sao Paulo Medical School) the mean age of their patients was (54) [(20)], and also the study finding in respect to age is that the incidence rate of respiratory failure increases with age in both sexes (the majority of patients with respiratory failure are in their seventh decade, more than 49%), according to our study results, there is statistically significant relation between respiratory failure and ageing (P-value 0.005). While in a study done in Scandinavia (Luhr *et al* 1999) [(17)], the mean age was (62) and in a study done in Berlin, Germany (Lewandowski *et al* 1995) [(18)], the mean age was (63), several reasons may influence these figures, such as these studies done in European countries where the health system more developed compared to the health system in our country, also could be due to shorter life expectancy compared to other developed countries.In this study female patients represent more than half of the cases (57.4%), this result differs than other studies done in Scandinavia and Berlin as male patients represent 58%, 60% respectively, also differs than the result found in the study done in Brazil as males represent (53%), the explanation behind that could be due to higher percentage of female population relative to male in this governorate as stated in 2011 population count, females (50.2%) and males (49.8%). In our study the obesity represented > 50% (BMI > 30), while in a study done in Helsinki, Finland (Rita Linko 2013)[(19)] the obesity represented 8%of their patients, also in a study done by Brooks-Brunn[(21)] reported that patients with BMI of 27 or more were at increased risk for respiratory failure with significant percentage of 29% of study population, statistically there was significant association between obesity and development of respiratory failure (P-Value 0.001). Respiratory problems were the main reason of admission for our patients (42.67%), this is also found in that study done in Scandinavia (Luhr *et al* 1999)[(17)] (63.7%), and in the study done in Helsinki, Finland (Rita Linko 2013)[(19)] (58.5%). We found that the prevalence of respiratory failure (type I and II) is 81.3%, and the other studies calculated the prevalence of respiratory failure which are two European studies, one in 72 ICUs in Berlin, Germany (Lewandowski et al 1995) [(18)] 88.6 per 100,000/yr, and the other in 132 ICUs in Sweden, Denmark and Iceland (Luhr *et al* 1999)[(17)] 77.6 per 100,000/yr. Type I respiratory failure, in our study, exceeded type II by one patient. Unfortunately until now there is no

epidemiological study has assessed the types of respiratory failure in detail in this region. Among type II respiratory failure the chronic type was the commonest (31.1%).The author subjected to some limitations during the study, such as; this study was performed in a single medical ICU. The use of data obtained in just 8 months of a year places some limitations on their interpretation, as higher incidence may perhaps be expected during the winter months and the underlying etiology of respiratory failure may vary with season (e.g. chest infection).

Conclusion:

In this study sample, patients with respiratory failure form a large percentage of medical ICU admissions, because so many underlying causes contribute to it. We found that the respiratory problems were the main reason of respiratory failure. Among respiratory failure patients, type I respiratory failure was commoner than type II. To determine the true prevalence of a disease with a low anticipated frequency, a large study population has to be observed. This can be accomplished either by performing a large multicenter study during a short period of time or by using a restricted number of study centers and expanding the observation period.

References:

1. Macnee W. (1985), Treatment of Respiratory Failure; Journal of the Royal Society of Medicine ; 78 (1): 61-71.
2. Behrendt CF. Pathophysiology of respiratory failure and use of mechanical ventilation in the United States: Incidence of 31-day survival; Journal of the American Medical Association 2005; 118 (4):1100-1105.
3. Kaynar AM, Pinsky MR. (2011). Respiratory failure [Internet]. (cited 2012 Jan 5).
4. Carson SS, Cox CE, Holmes GM, Howard A, Carey TS. The changing epidemiology of mechanical ventilation: a population-based study. J Intensive Care Med 2006; 21: 173–182.
5. Mason R, Broaddus V, Murray J, Nadel J. Murray & Nadel's Textbook of Respiratory Medicine. 4th edition. Amsterdam, The Netherlands: Elsevier Health Sciences; 2005. Chapters 85 and 86.
6. Nava S, Hill N. Non-invasive ventilation for acute respiratory failure. Lancet 2009; 374:250-259.
7. Kasper DL, Braunwald E. Respiratory failure. Harrisons manual of medicine, 16th edition. McGraw-Hill medical publishing. 2005, Chapter 7, p 20-23.
8. Smyth, M. (2005) Acute respiratory failure: part 2. Failure of ventilation: Exploring the other cause of acute respiratory failure. American Journal of Nursing 2005;105: 6, 72AA–72DD.
9. Nicki R. Colledge, Brian R. Walker, Stuart H. Halston, Respiratory deseases. Davidson`s principles and practice of medicine, 21st edition. Churchill Livingstone. 2010, Chapter 19, p659, 668-670.
10. Peek GJ, Mugford M, Tiruvoipati R. Efficacy and economic assessment of conventional ventilatory support versus extracorporeal membrane oxygenation for severe adult respiratory failure (CESAR): a multicentre randomised controlled trial. Lancet. 2009; 374:1351-1363.
11. Lalit K Kanaparthi, MD, Klaus-Dieter Lessnau, MD, FCCP, respiratory diseases, Restrictive Lung Disease. Retrieved 2008-04-19.

12. Allal S, Khedher A, Ben Saida I, Azouzi A, Farjallah A, Chouchen I, Bouchoucha S and M Boussarsar (2012).” New severity score of acute respiratory failure”. *Critical Care* 2012, 16 (Supp l1): 415.

13. Arterial Blood Gases - Indications and Interpretation. (2010). [Internet]. (Cited 2013 Feb 10).

14. Baillie K.(2007). Arterial Blood Gas Interpreter. [Internet]. (Cited 2007 Jul 05). Available from :

15. Baillie, JK. "Simple, easily memorised "rules of thumb" for the rapid assessment of physiological compensation for acid-base disorders". Thorax 2008; 63 (3): 289-290.

16. Jarvis MA, Jarvis CL, Jones PR, Spyt TJ. "Reliability of Allen's test in selection of patients for radial artery harvest". Ann Thorac Surg 2000; 70 (4): 1362–5.

17. Luhr OR, Antonsen K, Karlsson M, Aardal S, Thorsteinsson A, Frostell CG, Bonde J, and the ARF Study Group: Incidence and mortality after acute respiratory failure and acute respiratory distress syndrome in Sweden, Denmark, and Iceland. Am J Respir Crit Care Med 1999;159:1849-1861.

18. Lewandowski K, Metz J, Deutschmann C, Preiß H, Kuhlen R,Artigas A, Falke KJ: Incidence, severity, and mortality of acute respiratory failure in Berlin, Germany. Am J Respir Crit Care Med 1995; 151:1121-1125.

19. Linko R, Okkonen M, Pettilä V, Perttilä J, Parviainen I, Ruokonen E, Tenhunen J, Ala-Kokko T, Varpula T, the FINNALI -study group. Acute respiratory failure in intensive care units. FINNALI: Aprospective cohort study. Intensive Care Medicine 2013; 35:1352–1361.

20. Franca AF, Junior CT, Hovanian AD, Rogers EB.(2011). The epidemiology of acute respiratory failure in hospitalized patients: A Brazilian prospective cohort study. Journal of critical care, 26(3), 330.

21. Brooks-Brunn J. Predictors of postoperative pulmonary complications following abdominal surgery. Chest 1997; 111: 564-571.

Table 1. General characteristics of study population.

Characteristics		No.	Percentage
Age	< 20 year	1	1.3%
	21- 40 year	15	20%
	41- 60 year	28	37.3%
	> 61 year	31	41.3%
Gender	Female	42	56%
	Male	33	44%
BMI	< 20	3	4%
	20-25	11	14.7%
	25-30	22	29.3%
	> 30	39	52%
Previous respiratory problem			
	Yes	45	60%
	No	30	40%
Previous admission to ICU			
	Yes	22	29.3%
	No	53	70.7%
Mode of admission			
	From clinic	23	30.7%
	Emergency unit	52	69.3%

Table 2. Shows the results of ABG of 61 patients.

Results of ABG	N	Percentage
Type I respiratory failure	31	50.8%
Type II respiratory failure including	30	49.2%
Acute respiratory failure	5	8.2%
Chronic respiratory failure	19	31.1%
Acute on chronic respiratory failure	6	9.8%
Total	**61**	**100%**

Table 3. Demographic characteristics of 61 patients with respiratory failure.

Characteristics	N	Percentage	P- Value
Age			
< 20 year	1	1.6%	0.005
21-40 year	8	13.1%	
41-60 year	22	36%	
>61 year	30	49.1%	
Gender			
Male	26	42.6%	0.03
Female	35	57.4%	
BMI			
< 20	3	4.9%	0.001
20-25	8	13.1%	
25-30	18	29.5%	
> 30	31	50.8%	

Figure 1. The main reasons of admission of 75 patients.

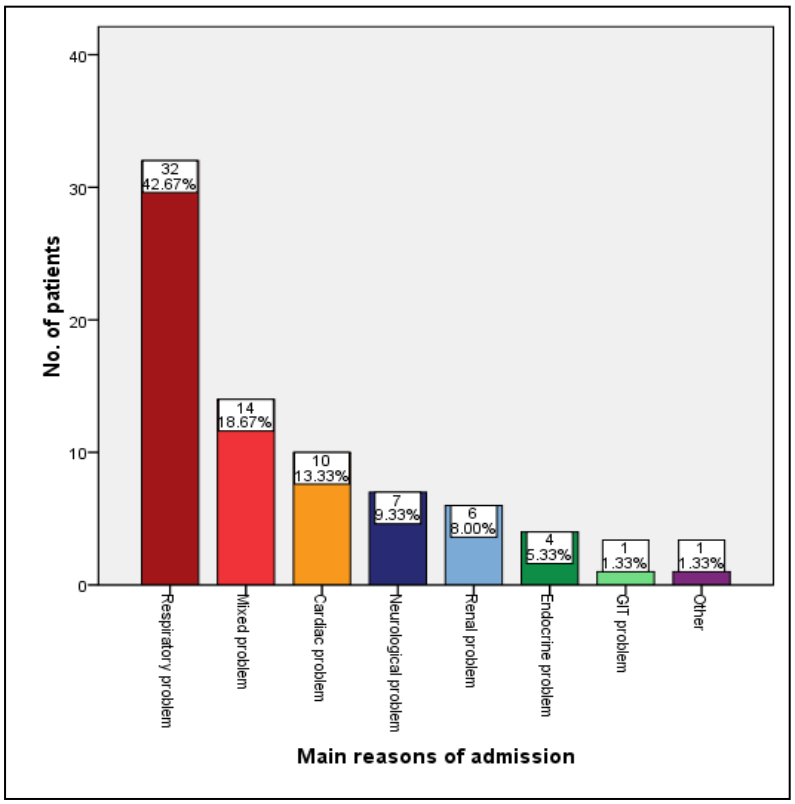

Figure 2. The arteries where blood samples taken from a study population.