ORIGINAL ARTICLE

ASSOCIATION OF MULTI-MORBIDITIES WITH SEPSIS IN ADULT PATIENTS ADMITTED IN A TERTIARY CARE HOSPITAL, KARACHI

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ABSTRACT

Background: Multi-morbid chronic diseases are increasingly placing a greater burden on individuals, communities and health care services. With advancing medical facilities, a growing proportion of the population is surviving longer with multiple chronic diseases. Sepsis is a life threatening infection with multiple organ dysfunctions leading to very high morbidity and mortality. Treating patients with multi-morbidities have always been more difficult when compared to patients with no co-morbid conditions. Hence, data from this study will empower us in exhibiting effective plans in the management of multi-morbidities with sepsis in our region. The study is aimed to determine the association of multi-morbidities with sepsis in adult patients admitted in a tertiary care hospital.

Methods: This is a case-control study conducted in the Medicine Wards and Intensive Care Unit of a tertiary care hospital in Karachi during the period of May 2018 to October 2018.

Results: In this study, 52 patients were enrolled. The mean age of patients was 59.35 ± 6.17. Socioeconomic Status showed significant association (*p*-value 0.034). The mean Sequential Organ Failure Assessment (SOFA) Score was 2.13 ± 1.86. The odds ratio of having cancer [OR: 3.10 (0.10 – 80.1), *p*-value 0.50] and other multi-morbidities like rheumatoid arthritis [OR: 3.30 (0.30 – 33.6), *p*-value 0.32] in cases of sepsis respectively were more than in controls but the data was not statistically significant. The mean length of hospital stay was 4.71 ± 2.08.

Conclusion: Despite our study limitations, a strong association of socioeconomic status with cases and controls in admitted patients was seen and among them, the upper income groups were the most. Although, an association of cancers and multimorbidities like rheumatoid arthritis with cases and controls has been identified, it requires to be researched further. Consensus regarding the definition of multimorbidity should be made.

Keywords: Multimorbidities; Sepsis; Age; Socioeconomic Status; SOFA Score; Cancers; Rheumatoid Arthritis; Length of Hospital Stay.

INTRODUCTION

Multi-morbid chronic diseases are increasingly placing a greater burden on individuals, communities and health care services. With advancing medical facilities, a growing proportion of the population is surviving longer with multiple chronic diseases[1]. Population based studies estimate that the prevalence of multi-morbidity is about 20–30% in the entire population. This prevalence increases to an alarming level of 55-98% in the geriatric population. Among the world's population, South Asia deserves special attention in the context of multimorbidity[2]. It has also been found that approximately one out of four adults have been reported with two or more chronic conditions, and half of the older adults with three or more chronic conditions[3].

Multi-morbidity has implications from a disease management point of view, as features of the

diseases can be much more complex than a single disease and conditions may overlap[4,5]. Sepsis is a life-threatening infection with multiple organ dysfunctions leading to very high morbidity and mortality. Infectious diseases are still amongst the leading causes of hospital admissions and mortality in South Asia including Pakistan[6,7]. It is a fact, that patients with multi-morbid diseases tend to have poor functional status and impaired quality of life. Age and gender differences played roles in the patterns of multi-morbidity in a study[8]. Also socio-economic status in addition to multimorbidities influences the quality of life[9]. Moreover, clinical guidelines and disease management programs focus on single conditions, and clinical research often excludes persons with multiple chronic conditions. Also there has not been consensus on the definition of multi-morbidity in the past[1,2]. In reality, however, clinical experience shows that chronic diseases tend to cluster in patients i.e., a person with one chronic disease is more likely to have another chronic disease[10,11].

Bringing together patients who have similar clinical management needs may be helpful, but doing so runs the risk of concealing the wider range of ways in which specific diseases may interact in relation to diagnosis, prognosis, treatment, and management or outcomes. Finding how conditions in combination impact the burden of disease and the costs and quality of care received is critical to improving care[12].

Presence of multi-morbid conditions in a patient with sepsis significantly worsens the outcome. Most of the outcome prediction scores or models in patients with sepsis ignore the significant impact of multi-morbid conditions for example; Simplified Acute Physiology Score II (SAPS), Apache II and SOFA score. The few multi-morbid conditions included in these models are not as prevalent as diabetes, hypertension, chronic liver disease (without cirrhosis), chronic kidney disease (not requiring dialysis), ischemic heart disease, stroke, cancer etc[13].

The present study aims to determine the association of multi-morbidities with sepsis in adult patients admitted in a tertiary care hospital, as there is paucity of local data and would help in establishing the local perspective. Treating patients with multi-morbidities have always been more difficult when compared to patients with no co-morbid conditions and in association with sepsis it has always been a debate[13]. Hence, data from this study will help us in improving our existing knowledge, guide future research and will enable us to exhibit effective plans in the management of multi-morbidities with sepsis in our region. Moreover, these plans can prosper in reducing mortality and the length of hospital stay in the future.

METHODS

This is a case-control study conducted in the Medicine Wards and Intensive Care Unit of a tertiary care hospital in Karachi during the period of May 2018 to October 2018. The sample size was calculated by using OpenEpi sample size calculator version 3.01 for group matched case-control study design, by taking 4.5% rate of exposure of multimorbidities[13] with 95% confidence interval and n = 52 with 26 cases (patients having multimorbidities and admitted with sepsis) and 26 controls (patients having multimorbidities and admitted without sepsis) were enrolled using Non-probability consecutive sampling technique. All cases and controls according to the inclusion criteria were taken. Inclusion Criteria for Cases was patients admitted to Medicine Ward and Intensive Care Unit admitted with sepsis, who give consent may either be taken from patient / attendant (next of kin), either gender, 30-70 years of age. Inclusion Criteria for Controls was patients admitted to Medicine Ward and Intensive Care Unit admitted without sepsis, consent may either be taken from patient / attendant (next of kin) and both gender having age 30-70 years.

Exclusion Criteria was patients who are drowsy or on Ventilatory support, having history of psychiatric disorders and those who are on treatment, pregnant females, patients with history of gynaecological and obstetrical diseases (pre-eclampsia, eclampsia, uterine prolapse, pregnancy induced hypertension diabetes, post-partum hemorrhage etc., patients with history of congenital diseases (Documented) and patients who leave against medical advice or get transferred to some other hospital. After getting permission from the ethical review committee of Ziauddin University, Karachi, the patients meeting the criteria for the study were approached and explained regarding the purpose of the study and the background details needed for the research. The patients who agreed to get enrolled were given a Consent Form to sign either by the patients or the next of kin. After signing the consent form, a brief history about the duration of illness and demographic information were taken from the patient and confirmed by the attendant.

The collected data was then analyzed on SPSS Version 20. For quantitative variables like age, SOFA score and length of hospital stay, mean and standard deviation were calculated. Chi-square test and Fischer Exact test were applied to find the association of cases and controls with gender, occupational status, socioeconomic status and educational status by taking the p-value of ≤0.05 as being statistically significant. Finally, Odd's ratio was calculated (OR) to find the association of multimorbidities with the cases and controls were calculated.

RESULTS

In this study, 52 patients were enrolled; n = 26 (50%) were cases and n = 26 (50%) were controls. The mean age of patients was 59.35 ± 6.17. The mean SOFA Score was 2.13 ± 1.86. The mean length of hospital stay was 4.71 ± 2.08.

Table 1: Association of gender, occupational status, socioeconomic status and educational status with sepsis cases and controls.

		GROUPS				p -value
		CASES		CONTROLS		
		n	%	n	%	
Gender	Male	10	43.5	13	56.5	0.289
	Female	16	55.2	13	44.8	
Occupational Status	Employed	4	44.4	5	55.6	0.5
	Unemployed	22	51.2	21	48.8	
Socioeconomic Status	Lower Income Group	1	100	0	0	0.034*
	Middle Income Group	5	100	0	0	
	Upper Income Group	20	43.5	26	56.5	
Educational Status	Illiterate	2	25	6	75	0.121
	Primary	6	85.7	1	14.3	
	Secondary	6	54.5	5	45.5	
	Higher	12	46.2	14	53.8	

* *p*-value is of Chi-Square Test.

Table 2: Odds Ratio of the different morbidities with sepsis cases and controls.

|		Groups		Odds Ratio	p -value	95% Confidence Interval
		Cases	Controls			
Diabetes Mellitus	Yes	24	24	1	1	0.13 – 7.7
	No	2	2			
Hypertension	Yes	26	26	1	1	0.00 – 52.3
	No	0	0			
Chronic Liver Disease	Yes	0	2	0.184	0.2	0.00 – 4.00
	No	26	24			
Pulmonary Tuberculosis	Yes	0	1	0.32	0.4	0.00 – 8.20
	No	26	25			
COPD	Yes	0	1	0.32	0.4	0.00 – 8.20
	No	26	25			
Chronic Kidney Disease	Yes	12	11	1.2	0.8	0.40 – 3.50
	No	14	15			
Hypo-/ Hyperthyroidism	Yes	3	3	1	1	0.18 – 5.50
	No	23	23			
Asthma	Yes	4	5	0.8	0.7	0.20 – 3.20
	No	22	21			
Ischemic Heart Disease	Yes	13	17	0.5	0.2	0.20 – 1.60
	No	13	9			
Stroke	Yes	2	4	0.5	0.4	0.10 – 2.70
	No	24	22			
Cancer	Yes	1	0	3.1	0.5	0.10 – 80.1
	No	25	26			
Others	Yes	3	1	3.3	0.32	0.30 – 33.6
	No	23	25			
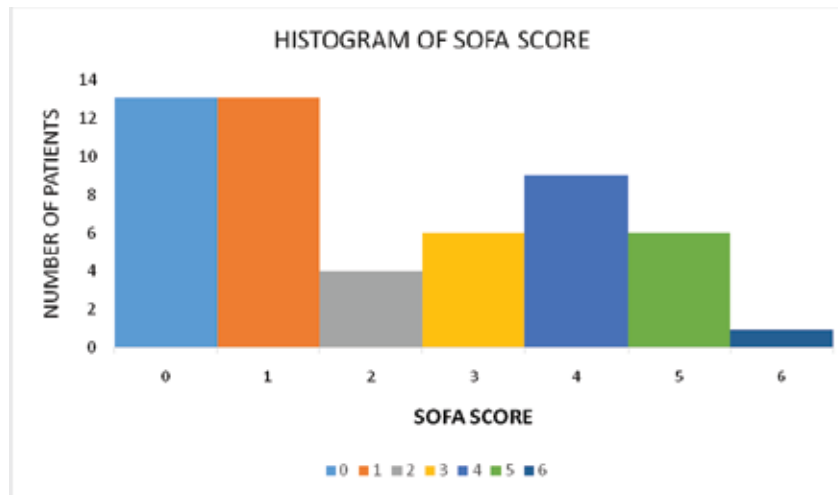
Figure 1: SOFA Score.

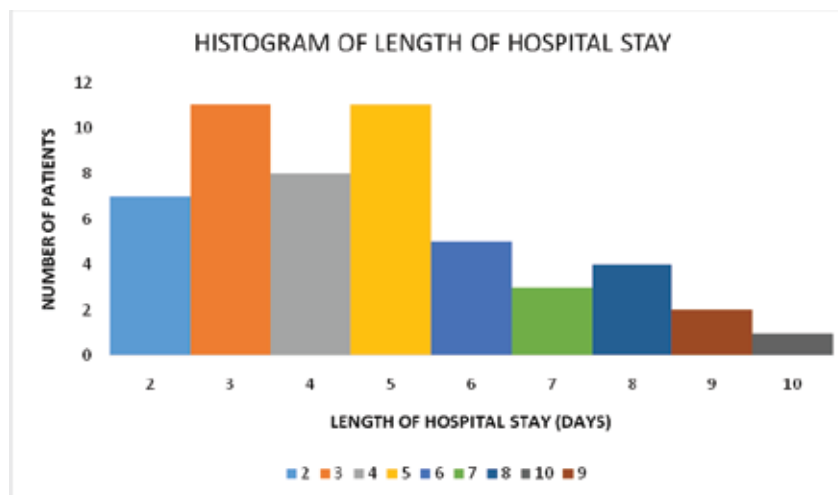The Score which we encountered had a mean of 2.13 ± 1.86.

Figure 2: Length of hospital stay.

The length of hospital stay was 4.71 ± 2.08 with no in-hospital mortality suggesting that the management was being followed as per the guidelines.

DISCUSSION

This case control study was conducted with the impression that there is an association of multimorbidities with sepsis in adult patients admitted in the tertiary care hospital but the results were surprising. There was no mortality seen and socioeconomic status was found to be associated with cases and controls and the results were similar to the previous studies[14-17]. An explanation to the more number of upper income group participants is that decisions regarding any measures in terms of laboratory tests, invasive or non-invasive procedures can be taken easily since they can bare the finances. Violan et al. in his study described the association with women dominating in number[18]. In considering the burden of illness on the SES, Lawson et al. used scores for measuring the burden of illnesses in order to develop interventions for lessening the impact of multi-

morbidities[9]. Quasim et al. in his study pointed out that occupational status was associated with sepsis and also affected the quality of life[19]. Poverty and income inequality could also be a reason for increasing multimorbidities especially in women than men[20].

In a health research, where there are multiple measures of SES utilized like income and occupation, educational status should also be looked upon. It was taken into consideration that the extent of education will direct to the type of occupation one pursues which then explains the socioeconomic outcome of the person[21]. Even Abad-Diez et al. drew the inference of significant age and gender differences with women being more in the prevalence of multimorbidity[8]. But unfortunately in our study gender, occupational and educational status was not seen associated.

It has been pointed out recently that certain infections can lead to cancers[22]. Even studies in the past have shown that patients having cancers also had

chronic conditions like chronic obstructive pulmonary disease (COPD), stroke, metabolic syndromes and myocardial infarction as they shared risk factors like, alcohol use, smoking, obesity and other diseases. For example, Yeh et al. pointed out some of the cardiovascular complications in cancer patients[23]. We also found a strong association of rheumatoid arthritis. The reason of this association could be as Sattar N. et al. in this study found that there was a twofold increased risk of coronary heart disease in patients with rheumatoid arthritis[24]. Radner et al. in his study found that 40% of patients with hypertension and 14% of patients with diabetes had an association with rheumatoid arthritis[25].

Also there are certain malignancies like lymphoproliferative disorders associated with rheumatoid arthritis[26]. Considering the above views, our finding of cancers and rheumatoid arthritis association with cases and controls were similar but the *p*-values of 0.50 and 0.32 respectively showed that the data was not statistically significant leaving us with the impression that there might be reasons which needed to be uncovered (Table 2).

The SOFA Score is a very helpful tool for predicting the in-hospital mortality and has brought advancement in the management of sick patients[27,28]. Yet incorporating conditions like the status of diabetes mellitus, thyroid functions, history of or ongoing stroke, presence or absence of pulmonary tuberculosis, cancers or autoimmune diseases would aid in predicting the outcome needs to be defined and whether this short stay in hospital affected the quality of life or not and to what extent needs to be investigated.

We did not find any association of other morbidities with the cases and controls which had put forward an impression that many studies in the past had included chronic physical and psychological conditions in the definition of multimorbidity which in our study were among the exclusion criteria[1,2, 29,30]. Moreover, consensus regarding the definition of multimorbidity should be made which may rule out the complexities and disparities in the results of the future studies.

CONCLUSION

Despite our study limitations, a strong association of socioeconomic status with cases and controls in admitted patients was seen which corresponded with the studies in the past and among them, the upper income groups were the most. Although, an association of cancers and multimorbidities like rheumatoid arthritis with cases and controls has been identified, it requires to be researched further as the data was not statistically significant. Consensus regarding the definition of multimorbidity should be made. Moreover, it will be possible for us to make effective plans focusing on the management and prevention of multimorbidities in patients admitted with sepsis which will not only help in improving the healthcare facilities but also lower the financial burden of the patients and will bring about an insight in improving the quality of life post hospitalization.

LIMITATIONS

There can be various reasons due to which some of our results were not in accordance with the previous studies. First, during our study period only 52 patients had been enrolled which can raise a possibility that sample size was not sufficient of suggesting an association. Second, participants enrolled were from the medical wards and there were not any from the intensive care unit (ICU) setting, as patients who fulfilled the inclusion criteria but were on ventilatory support were excluded from the study. Third, despite advising hospital admission, the patients were refusing or being transferred to another facilities as they had affordability issues.

CONFLICT OF INTEREST

There is no conflict of interest in between the authors.

ETHICS APPROVAL

The study was conducted after the approval from the Ethical Review Committee of Dr. Ziauddin University (Reference Code: 0180418SSMED).

PATIENTS CONSENT

A written Informed Consent Form in both English and Urdu was obtained from the patients or the next of kin who agreed to get enrolled in the study.

AUTHORS CONTRIBUTION

SS came up with the idea, initiated the relevant literature search and after getting permission from the Ethical Review Committee of Dr. Ziauddin University, wrote down the manuscript. EAV has helped in the literature search and in finalizing the discussion of the article and provided clinical support to the patients. FA has helped in the analysis of the article.

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