DIFFERENCE IN THE MORTALITY BETWEEN WEEKEND AND NON-WEEKEND CORONARY ARTERY DISEASE ADMISSIONS

M. Sandeep, K. Satish

ABSTRACT:

Background: *Acute coronary syndrome requires urgent diagnostic and therapeutic procedures, which may not be uniformly available throughout the week. So, we sought to examine the effects of admission on clinical outcomes in patients with wide spectrum coronary artery diseases.*

Methods: *A retrospective analysis of ICCU Inpatient sample database of 17 months from 2015 to 2016 used to compare differences in in-hospital mortality between patients admitted on a non-weekday versus weekend for wide spectrum ACS which include STEMI, NSTEMI and unstable angina and patients with cardiogenic shock. Out of these 75% had higher TIMI risk score (5-7).*

Results: *Total 2700 patients with ACS were included in the present study with wide spectrum coronary artery diseases. Out of that 20 % (n=541) were admitted in weekends and 79.9% (n=2159) were admitted in non-weekends. Total 804 females admitted on non-weekend had a mean age of 61.05±12 years and 162 females admitted on weekend had mean age 58.5±13.3 years (p value=0.025). Out of 2159 admitted on non-weekend, 1355 were males with mean age of 57.65±15.55 years and 379 were males admitted on weekend out of 541 patients with mean age of 56.85±13.1 years (p value =0.314). In-hospital mortality rate of these patients admitted on non-weekends was 9.4% (n=204) and those admitted on weekends was 5.9% (n=32) with statistically significant difference (95% CI; p= 0.003). The mortality rate of ACS without STEMI in non-weekend group was 8.6% (n=170) which was statistically significant (p = 0.006) with mortality of weekend group 5.3% (n=26).*

Conclusion: *Our study shows that there is no added mortality in patients with coronary artery disease on weekend days compared with non-weekend days. As the patients admitted during non-weekend were elder and sicker than the weekend admissions (having the high risk score), the in-hospital mortality is higher on non-weekends. Efforts to improve health care system should ensure comparable outcomes for patients irrespective of time of hospital admission.*

Keywords: AcuteCoronarySyndrome,Weekend Effect,Mortality

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INTRODUCTION

Coronary artery disease (CAD) is the leading cause of mortality worldwide [1] and by the year 2020, will be first in the leading causes of disability [2]. While the death rates have been declining for the past three decades in the west, these rates are rising in India. In the last three decades, the prevalence of CAD has increased from 1.1% to about 7.5% in the urban population and from 2.1% to 3.7% in the rural population [3].

Increasing evidence has accumulated over the past few years demonstrating a difference in mortality among emergency admissions to hospital at the weekend compared with weekdays. This effect is also true when considering only deaths within the first two days of admission [4, 6].

Some studies have shown that patients with acute myocardial infarction (MI) and heart failure admitted on weekends were at increased risk of mortality compared with similar admissions on weekdays [7, 9]. Other studies, however, were less conclusive on the relation of admission day and increased mortality in patients with MI [10, 12].Acute coronary syndrome requires urgent diagnostic and therapeutic procedures, which may not be uniformly available throughout the week. So, we sought to examine the effects of admission on clinical outcomes in patients with wide spectrum coronary artery diseases.

METHODS:

Study design and study population:

Patients who were admitted to the intensive coronary care unit (ICCU) from April 2015 to August 2016 were retrospectively analyzed. The inclusion criteria included the diagnosis wide spectrum coronary artery diseases of unstable angina pectoris (UA), non-ST-segment elevation myocardial infarction (NSTEMI), ST-segment elevation myocardial infarction (STEMI). The exclusion criteria were patients diagnosed with MI but admitted to the general ward due to stable condition and not within 5 days of MI. These patients were divided into two

groups, admission of patients on weekend and on non-weekend. Patients who were admitted to the ICCU on Saturday and Sunday were allocated to the 'weekend group'. Patients who were admitted to the ICCU during all other time periods were classified as the 'non-weekend group'. Our hospital has only one day as a holiday, even on that day critical cases are being managed by trained and qualified persons. As most of the studies been considered 2 days as the weekend, our study also conducted on the same basis. The risk stratification was done using thrombolysis in myocardial infarction (TIMI) risk scores and the scores classified as low (TIMI risk score 0-2), intermediate (TIMI risk score 3-4), and high risk (TIMI risk score 5-7) [13, 14].

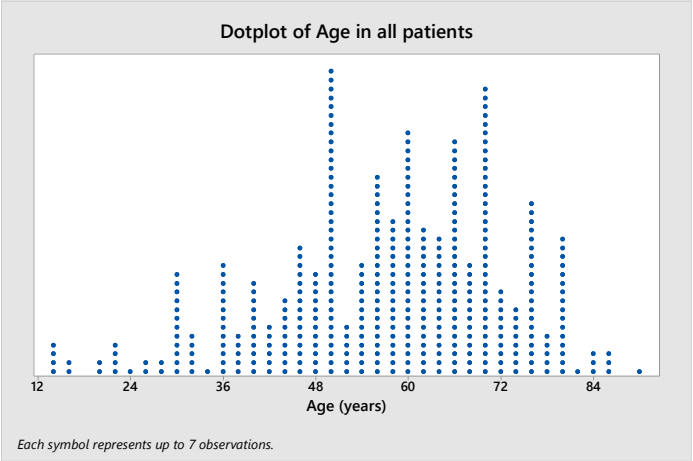
Statistical analysis:

Descriptive statistics were used to summarize the data. For categorical variables, frequencies and percentages were reported. Differences between groups were analyzed using Pearson's χ^2. For continuous variables, means and standard deviations were used to present the data while analyses were performed using Student t-test. A binary logistic regression model was used to determine the mortality difference between patients admitted on weekends and non-weekends while accounting for the confounding effects of patient's demographics and comorbidity variables. A p value of less than 0.05 was considered statistically significant.

RESULTS:

Total patients of 2700 were admitted to our hospital (in 17 months - April 2015 to October 2016) with wide spectrum of acute coronary syndrome. Out of which 20.1% (n=541) were admitted in weekends and 79.9% (n=2159) were admitted in non-weekends. Dot plot of the age of all these is depicted in Fig 1.

Fig 1: Dot plot of the all patients age admitted during study period.



According to the TIMI risk score majority 2403(89%) of patients were in high risk score, as this is a tertiary referral center hospital. Aarogyasri is the governmental funding scheme for poor MI patients, which can be availed by many peripheral cardiac care centers.

Among 2159 patients of non-weekend group 170 patients were admitted with acute STEMI and 1989 patients were with ACS without STEMI. Of541 patients of weekend group 49 patients were admitted with acute STEMI and 492 weekend patients with ACS without STEMI. The mortality rate of ACS without STEMI in non-weekend group was 8.6% (n=170) which was statistically significant (p = 0.006) with mortality of weekend group 5.3 %(n=26). The mortality rate of STEMI in non-weekend was 20% (n=34) which was not statistically significant (p=0.17) with mortality of 49 patients of weekend STEMI which was 12.2% (n=6) (Table 1).

Number of ACS without STEMI cases admitted in a week on average was 36.5cases, out of which non-weekend average was 29.25 cases and the weekend average was 7.2 cases. Total number of STEMI cases admitted in a week on average was 3.2 cases, out of which non-weekend average was 2.5 cases and weekend average was 0.7 cases. The proportion of ACS without STEMI cases in the non-weekend average was 0.812(81.2%), Proportion of ACS cases without STEMI in the weekend average was 0.198(19.8%). The proportion of STEMI cases in the non-weekend average was 0.781(78.1%); proportion of MI cases in the weekend average was 0.219(21.9%).

Table 1: Patients Admitted on Weekdays and Weekends with ACS.

Variables	Non week end ACS without STMI	week end ACS without STMI	p valve	Non week end STMI	week end STMI	p value	Non week end ACS	week end ACS	p valve
No of admissions	1989	492		170	49		2159	541	0.003
No of deaths	170 (8.6%)	26(5.3%)	0.006	34(20%)	6(12.2%)	0.17	204(9.4%)	32(5.9%)	

The mean age of 2159 patients admitted on non-weekend was 58.7±14.6 years, when compared to that on weekend admission of 541 patients it was 57.35±8.1 years (p value=0.004) (Fig 2). Non weekend patients were more elder than weekend admissions. Total 804 females admitted on non-weekend had a mean age of 61.05±12 years and 162 females admitted on weekend had mean age 58.5±13.3years (p value=0.025). Female patients admitted on non-weekend were more elder than weekend. Out of 2159 admitted on non-weekend 1355 were males with mean age of 57.65±15.55 years and 379were males admitted on weekend out of 541 patients with mean age of 56.85±13.1years (p value =0.314) (Fig 2). Description of patient characteristics was given in Table 2.

Fig 2: Mean age of females and males in non-weekend and weekend ICCU admissions.

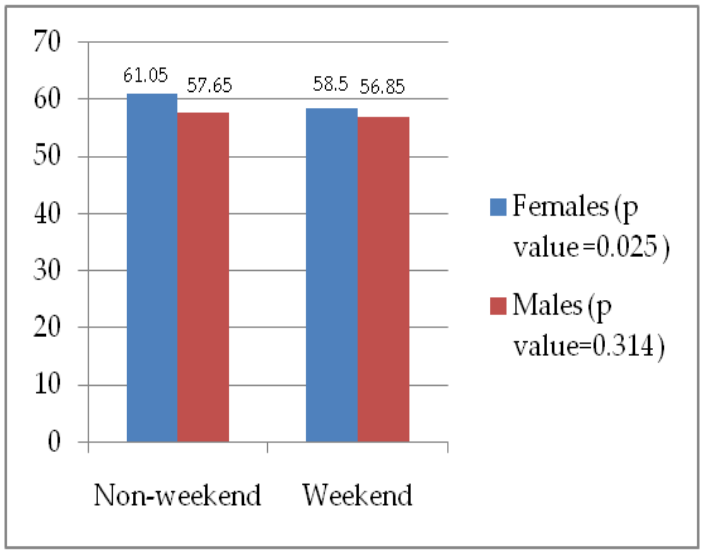


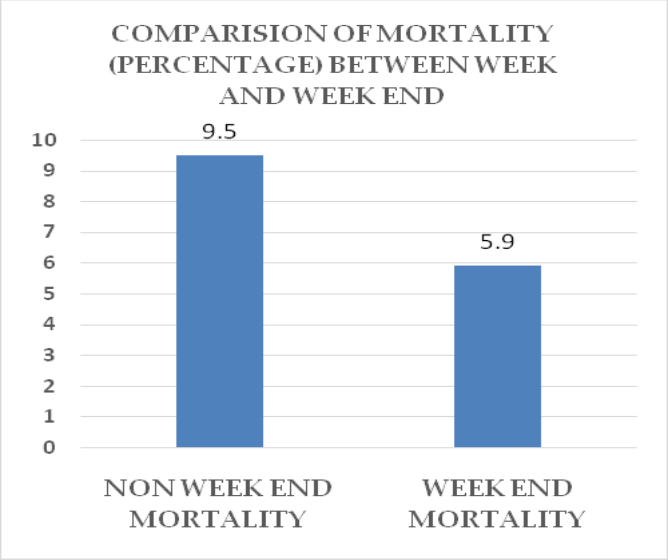
Table 2: Description of patient characteristics

	Non-weekend	Weekend	p value
Total admissions	2159	541	
Males	1355	162	
Mean age of total patients	58.7±14.6	57.35±8.1	0.004
Mean age of males	57.65±15.55	56.85±13.1	0.314
Mean age of females	61.05±12	58.5±13.3	0.025

Mortality rate of these patients admitted on non-weekends was 9.4 %(n=204) and those admitted on weekends is 5.9 %(n=32). Binary logistic regression data of mortality of CAD in weekend versus age was done (z=2.13, p=0.033, OR=1.04, 95% CI=1.00 to 1.08). Patients were divided into four groups with age between 21 to 40, 41 to 60, and 61 to 80 and above 80 years. Details and chi square analysis for subgroup of age was done, which showed between 41 to 60is contributing to the mortality most(x^2=2.744, DF = 3, contribution to mortality by age group of 41 to 60 years is 1.131, out of 2.744).

Hence patients in the age group between 41 to 60 years had higher risk of mortality comparing with other age groups. Mortality was lower in the weekend group compared with the non-weekend group with statistically significant difference (p=0.003), as the patients admitted during non-weekend were more elder and sicker than the weekend and there was no difference in the care provided during the weekend (Fig 3).

Fig 3: Mortality between non-weekend admission and weekend admission



DISCUSSION:

This study shows that there is no added mortality in patients with coronary artery disease on weekend days compared with non-weekend days. As the patients admitted during non-weekend were elder and sicker than the weekend admissions, the in-hospital mortality is higher on non-weekends.

In contrary to our study where patients admitted on non-weekend were had more risk factors, Cram et al. [15] showed that patients who were admitted during the weekend were older and had higher in-hospital mortality. Ryan et al. [16] also showed that patients admitted during the weekend tended to have high-risk characteristics including older age, more prior CABG and more positive cardiac markers.

Berger a et al. [17] study in patients with acute MI, from United States (n = 62,814), also could not show higher in-hospital mortality in weekend and off-hours admissions compared with those presenting during weekdays and regular hours.

Jneid H et al. [18] study from Switzerland (n = 12,480), after adjusting for several confounding variables, could not demonstrate the "weekend effect" in patients with acute MI, and reported equal survival rates (P = 1.00) for weekday and weekend groups.

In contrast our results showed that admission either on weekends or on weekdays did not influence both the 30-day mortality and the long term mortality. This indicates high quality of care. Probably these findings are due to the proper availability of staff and the possibility to perform invasive procedures during the weekends.

Consistent with our results, three studies Sanne M. Snelder et al. study [19] revealed no difference in mortality rates between weekend and weekday admissions for acute myocardial infarction patients.

Recently a study by Sahil Agrawal et al. [20] demonstrates that among patients admitted with a diagnosis of an acute NSTEMI, admission on a weekend was associated with higher in-hospital mortality compared with admission on a weekday and that lower rates of utilization of EIS contributed significantly to this disparity.

In a study by Mahdi Khoshchehreh et al. [21]for ACS patients, weekend admission is associated with higher mortality and lower utilization of invasive cardiac procedures, and those who did undergo these interventions had higher rates of mortality and complications than their weekday counterparts.

Efforts to improve health care system should ensure comparable outcomes for patients irrespective to time of hospital admission.

LIMITATIONS:

1. Unmeasured confounders may have contributed to the reported differences in mortality between patients admitted on weekends and those admitted on weekdays.
2. Enrollment from a single study center.
3. Despite a large portion of mortality occurring in the post-discharge period and upon hospital readmission, our results are only reflective of in-hospital ICCU mortality during study period.

CONCLUSION:

Our study shows that there is no added mortality in patients with coronary artery disease on weekend days compared with non-weekend days. As the patients admitted during non-weekend were elder and more sick than the weekend admissions (having the high risk score), the in-hospital mortality is higher on non-weekends. Efforts to improve health care system should ensure comparable outcomes for patients irrespective to time of hospital admission.

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