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Comparative Assessment of The Difference Between Men and Women Hospitalized for ACS During COVID-19 PANDEMIC

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ABSTRACT

Aim: We assessed whether women were more affected by the dramatic drop in hospital admissions for ACS during the Covid-19 pandemic.

Methods: This evaluation is an Institutional Review Board (IRB) exempt retrospective, observational study performed inBurdwan Medical College, Burdwan, West Bengal, India . We performed chart review of 1000 patients who presented to Burdwan Medical College, Burdwan, West Bengal, India Catheterization lab for elective and emergency catheterization for non ACS and ACS [NSTEMI, Unstable angina (UA), STEMI] during a 4-week period fromFebruary 26 to March 10 and from March 25 to April 8 and compared with the equivalent weeks in the last year.
Results: Out of 1000, only 450 patients underwent cardiac catheterization for acute coronary syndrome. Remaining patients underwent cardiac catheterization for causes other than acute coronary syndrome, such as atrial septal defect closure, pulmonary arterial hypertension to assess hemodynamics in the heart chambers, cardiac myxoma, treatment of valvular heart disease (e.g., transcatheter mitral valve repair), assessment of the congenital heart diseases like cor triatriatum.
Conclusion: In conclusion, the pandemic period reduced the gap between men and women in ACS: the extraordinary reduction in admission rates observed during the Covid-19 pandemic seems to have strongly affected women as men, with similar rates of reduction of hospitalized STEMI and NSTEMI and a trend toward greater reduction in UA admission among women.

Keywords: Gender, acute coronary syndromes, COVID-19

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INTRODUCTION

During the Covid-19 pandemic and the associated lockdown period, the pattern of hospital admissions for conditions other than Covid-19 has been deeply influenced, with a tragic 40% average reduction in MI admissions.[1-4] The pandemic may have reduced the possibility of screening for atypical or short-term symptoms, this behavior potentially leading to an increase in cardiovascular mortality and late complications, especially for women for whom late admission and longer time from symptoms onset were already more frequent before the pandemic.[5,6]

Acute coronary syndromes (ACS) encompass a spectrum of clinical presentations, predominantly differentiated on the basis of the presenting electrocardiogram as either ST-segment elevation myocardial infarction (STEMI) or non-ST-segment elevation ACS (NSTEACS). The presentation is wide-ranging and includes cardiac arrest, electrical or hemodynamic instability with cardiogenic shock due to ongoing ischemia or mechanical complications such as severe mitral regurgitation to patients who are already pain-free again at the time of presentation.[7]

Sex differences are the biological and physiological differences in the cardiovascular system that are a result of different gene expressions due to sex chromosomes. Some well-documented sex differences in ACS include that women are older and have more co-morbidities when compared to men.[8-10]Timely recognition of ACS is essential to the timely initiation of therapies and ultimatelyaffects the outcomes of ACS. Delayed recognition of ACS in both patients andproviders has contributed to delays in treatment initiation and outcomes.[11]The SEAR is home to a large population, additionally predisposed to the SouthAsian phenotypeof CAD. The SouthAsian nations of India, Pakistan, Bangladesh, Sri Lanka, andNepal account forabout a quarter of theworld's population and contribute the highest proportion of theworld's CVDburden,many ofwhomare also young.[12]

Women are known to have smaller epicardial coronary arteries, even after correction for age, body habitus and LV mass.[13] However, in spite of smaller vessels, the presenceof higher baseline myocardial flow results in an equivalent coronary flow reserve (CFR) for men.[14] As a consequence, the coronary vessels of female patients are then susceptible to higher endothelial shear stress, which may result in a difference in susceptibility tocoronary artery disease (CAD).[15]

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The aim of the present study was to analyze differences between men and women hospitalized for ACS during the lockdown in order to provide results that could help in projecting more focused preventive and therapeutic actions in the next months.

METHODS

This evaluation is an Institutional Review Board (IRB) exempt retrospective, observational study performed inBurdwan Medical College, Burdwan, West Bengal, India.

Methodology

We performed chart review of 1000 patients who presented to Burdwan Medical College, Burdwan, West Bengal, India Catheterization lab for elective and emergency catheterization for non-ACS and ACS [NSTEMI, Unstable angina (UA), STEMI] during a 4-week period fromFebruary 26 to March 10 and from March 25 to April 8 and compared with the equivalent weeks during the COVID lockdown.

RESULTS

Table 1: Characteristics of the Patients

	(Feb 26 - Mar 16)	**(Mar 25 - Apr 8)**	**(Feb 26 - Mar 16)**	**(Mar 25 - Apr 8)**
Total number of ACS patients	115	145	110	80
NSTEMI/UA	95 (82.60%)	118 (81.37%)	86 (78.18%)	53 (66.25%)
STEMI	20 (17.39%)	27 (23.47%)	24 (21.81%)	27 (33.75%)
Age (years, mean)	65	64	63	61
Males	65 (56.25%)	85 (58.63%)	63 (57.27%)	72 (90%)
Diabetes	37.90%	45.80%	39.50%	15.50%
HTN	90.50%	83%	80.20%	27%
Tobacco	45.30%	46.60%	52.30%	16.90%
H/O PCI	32.70%	39.80%	50%	19.60%
H/O CABG	6.30%	15.20%	2.30%	10.10%
CHF	28%	11.90%	20%	6.70%
Stroke	8.40%	9.30%	4.60%	2.70%
Atrial fib	20%	5.80%	8.50%	2.70%

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Out of 1000, only 450 patients underwent cardiac catheterization for acute coronary syndrome. Remaining patients underwent cardiac catheterization for causes other than acute coronary syndrome, such as atrial septal defect closure, pulmonary arterial hypertension to assess hemodynamics in the heart chambers, cardiac myxoma, treatment of valvular heart disease (e.g., transcatheter mitral valve repair), assessment of the congenital heart diseases like cor triatriatum. Demographic information, type of ACS, initial and peak troponin levels, initial CKMB, past medical history [hypertension (HTN), diabetes (DM), stroke, atrial fibrillation, congestive heart failure (CHF)], and past surgical history [percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG)] were also collected and analyzed.

Table 2: COVID impact on ACS and gender

	(Feb 26 - Mar 16)	**(Mar 25 - Apr 8)**	**(Feb 26 - Mar 16)**	**(Mar 25 - Apr 8)**
Total number of ACS patients	115	145	110	80
Females	50 (43.47%)	60 (41.37%)	47 (42.72%)	8 (10%)

Total 115 patients, with 43.47% of them being females, presented with ACS in February/March while 110 patients, with 42.72% females, presented with ACS during the same period (February/March) in 2020. In March/April 145 patients with 41.37% females presented with ACS, while only 80 patients with 10% females presented with ACS during the same period (March/April). This represents a decrease by 30.56% of female patients during the COVID-19 pandemic.

DISCUSSION

From this observational cohort of patients presenting with ACS during the Covid-19 pandemic, some main observations must be highlighted: the number of patients admitted to our hospital because of ACS dramatically reduced during the lockdown, this trend affecting both men and women and all kind of ACS; women with ACS were older than men; atypical symptoms

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(especially dyspnea) increased among women during the pandemic but, conversely, many typically gender-related differences attenuated.

ACS events are well known to increase mortality and morbidity: they can lead to heart muscle damage which in turn may evolve into heart failure, induce arrhythmic events and even lead to sudden cardiac death.[16] To reduce such complications, efforts have been made on increasing people knowledge of cardiac symptoms and on the importance of shortening delay times, since a clear association between longer intervals from symptoms onset to treatment and a worse prognosis has been found.[17,18]

De Rosa et al. recently described a greater STEMI rate decline for women than men (41.2% vs 17.8%), while NSTEMI showed a similar rate between the two sexes (66.7% vs 65.4%) and UA rate was not reported.[1] Inour study the only statistically significant difference among sexes is between the study period the inter-year control period, driven by the fact that UA trended higher in men than womenand by a lower reduction in percentage of STEMI among men. This diversity may be explained by the different time frames analyzed (1 week vs 6 weeks) between the two studies.The delays in seeking medical advice among women have previously been ascribed to sex differences related to social, environmental and community factors in the way men and women experience cardiac symptoms, to the common misjudgment that heart disease is a ‘man’s disease’ and to the suggestion that women prioritize their role as the family primary caregiver above their own health needs.[16,19]

During the Covid-19 outbreak, however, the reduction in MI hospital admissions was consistent between men and women, while we also saw a significant increase in women presenting with dyspnea, thus allegedly inducing diagnostic and treatment delays. What really transpires from our data however, is quite a flattening ofthe differences traditionally observed between men and women in ACS registries: the number of MINOCA among women in our registry was far distantfrom the nearly 60% of symptomatic women previously reported.[20] Furthermore, disease distribution into the coronary vessel does not show any particular difference apart for a more common left main involvement in men.

Given all that, the fact women experienced their first myocardial infarction at an older age may appear counterintuitive, but is largely- and simply-explained by the higher risk factor levels in

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younger men compared to women. The women enrolled in our registry were significantly ly older than men but this difference was again lower than usually reported [17,21], and this fact might be explained by the greater lethality of Covid-19 in older patients and the fear of that may have prevented the older and atypically-symptomatic women to report their discomfort.

Finally, since coronary plaques show different pathophysiologic features between sexes[20] with women having a higher prevalence of plaque erosion and men more commonly plaque rupture[22], female patients present with fewer STEMI and more MINOCA. In our registry the percentage of women with MINOCA is much lower thanusual, but still this diagnosis is strongly sex-related and consistent throughout the study periods. It is reasonable that these low numbers of MINOCA may be related to a further decrease of medical admissions of such patients, who usually have atypical symptoms.

CONCLUSION

In conclusion, the pandemic period reduced the gap between men and women in ACS: the extraordinary reduction in admission rates observed during the Covid-19 pandemic seems to have strongly affected women as men, with similar rates of reduction of hospitalized STEMI and NSTEMI and a trend toward greater reduction in UA admission among women. Indeed, the typical differences between males and females regarding ischemic heart disease presentations were flattened and clinical presentation and distribution of the atherosclerotic burden were overall similar between sexes.

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