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Factors Related to Delaying in Seeking Treatment Acute Coronary Syndrome

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ABSTRACT

Background: Acute coronary syndrome (ACS) encompasses a spectrum of conditions, including ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI), and unstable angina. It is a critical manifestation of coronary heart disease (CHD), a leading cause of mortality worldwide, accounting for one-third of deaths in individuals over 35 years of age. Unlike other forms of CHD that may be asymptomatic, ACS always presents with symptoms. This study aims to identify the factors contributing to delays in seeking treatment for ACS, a critical issue impacting patient outcomes. The objective was to identify the factors associated with delays in seeking treatment for acute coronary syndrome.

Methodology: The cross-sectional study was conducted at Department of Cardiology, MTI-Mardan Medical Complex, Mardan from 10 December 2021 to 10 June 2022. Patients diagnosed with ACS were thoroughly evaluated using standard clinical protocols. Factors contributing to delays in seeking treatment were recorded, including demographic, social, and clinical variables. Data was entered and analyzed using SPSS version 23.0. Post-stratification chi-square tests were applied, keeping P-Value ≤ 0.05 as significant.

Results: The study identified several key factors contributing to treatment delays. Increased age accounted for 25.1% (64 patients) of the delays, while being a single woman contributed to 18.0% (46 patients). Additionally, 24.3% (62 patients) delayed treatment while waiting for symptom improvement, and 32.5% (83 patients) attributed delays to low levels of educational awareness.

Conclusion: This study highlights significant pre-hospital delays in ACS patients, primarily due to low educational awareness, increased age, and waiting for symptoms to improve. Addressing these factors through public education and better access to healthcare can reduce delays and improve patient outcomes.

Keywords: Acute Coronary Syndrome (ACS), Delays, ST-elevation myocardial infarction (STEMI), Non-ST elevation myocardial infarction (NSTEMI), Factors.

INTRODUCTION

Acute coronary syndrome (ACS) is a life-threatening condition that encompasses a spectrum of clinical presentations, including ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI), and unstable angina¹. As a leading cause of morbidity and mortality worldwide, ACS represents a significant burden on healthcare systems, particularly in low- and middle-income countries where access to timely medical care is often limited. Prompt recognition and treatment are critical to reducing the complications and mortality associated with ACS, but delays in seeking care remain a pervasive issue².

The pathophysiology of ACS typically involves the rupture of an atherosclerotic plaque in the coronary arteries, leading to thrombus formation and a reduction in blood flow to the heart muscle³. This process results in ischemia and, if left untreated, myocardial infarction. The urgency of timely intervention, including thrombolysis or primary percutaneous coronary intervention, cannot be overstated, as delays in treatment are directly linked to poorer outcomes⁴.

Several factors contribute to delays in seeking treatment for ACS. These include patient-related factors such as misinterpreting symptoms, attributing chest pain to non-cardiac causes, waiting for symptoms to improve, and lack of awareness about the severity of the condition^{5,6}. Socio-demographic factors,

including age, gender, marital status, education level, and socio-economic status, also play a significant role. Additionally, healthcare system-related barriers, such as limited access to emergency services and delays in diagnosis or referral, further compound the problem.

This study aims to explore the various factors contributing to delays in seeking treatment for ACS in a tertiary care setting. By identifying these factors, the research seeks to inform targeted interventions to reduce pre-hospital delays, improve patient outcomes, and address gaps in public awareness and healthcare delivery.

MATERIALS AND METHODS

This was a descriptive study. The research was conducted in the Department of Cardiology at MTI-Mardan Medical Complex, Mardan, and lasted six months, from December 10, 2021, to June 10, 2022. The study included 255 participants. The sample size was determined using the WHO formula, based on a 21% proportion of patients with low educational awareness attributing symptoms to non-cardiac causes, a 95% confidence level, a 5% margin of error, and a 5% significance level. This study was approved by the Research and Ethical Unit (REU) of the College of Physicians and Surgeons Pakistan (CPSP) Ref No: CPSP/REU/CRD-2020-028-2344. The ethical considerations and guidelines outlined in the approval process were adhered to throughout the study.

The Non-probability consecutive sampling was employed to select participants.

Sample Selection

Inclusion Criteria

1. Patients diagnosed with Acute Coronary Syndrome (ACS) as per the operational definition.
2. Individuals aged between 40 and 80 years.
3. Patients of any gender.

Exclusion Criteria

1. Patients presenting with ACS alongside chronic kidney or liver disease, or those who were immunocompromised.
2. Patients admitted after resuscitation from cardiac arrest, those diagnosed with myocardial infarction secondary to other conditions, or individuals with an uncertain onset time of symptoms.

Data Collection Procedure

The study was conducted following approval from the CPSP REU Department. Patients visiting the Cardiology outpatient department (OPD) or referred from the Accident and Emergency (A&E) department and diagnosed with ACS were included. Written informed consent was obtained from all participants prior to their enrollment in the study.

Patients underwent thorough clinical evaluations based on standard operating procedures. Factors contributing to delays in seeking treatment were documented. Additional demographic and clinical data—including age, gender, duration of symptoms, social class, residence, marital status, smoking history, diabetes mellitus, hypertension, lifestyle, and family history of cardiac disease—were systematically recorded on a structured proforma.

Data was entered and analyzed using SPSS version 23.0. Mean and SD was calculated for continuous variables such as age and duration of symptoms. Frequencies and percentages were calculated for gender, marital status, hypertension, diabetes mellitus, social class, residence, family history of cardiac disease and factors related to delay in seeking treatment. Factors related to delay in seeking treatment were stratified with age, gender, marital status, hypertension, diabetes mellitus, smoking history, lifestyle, educational status, occupation status, social class, residence, and family history of cardiac disease to see effect modifiers. Post-stratification chi-square tests were applied, keeping P-Value ≤ 0.05 as significant. All results will be presented in the form of graphs and tables.

RESULT

The descriptive statistics show that the average age of the participants was 63.76 years, with a standard deviation of 9.763, indicating a broad age range. The mean duration of symptoms before seeking treatment was approximately 2.96 hours (± 0.910). Age stratification revealed that 58% of the participants were aged 60 years or older, while 42% were below 60. Men comprised a slightly higher proportion (54.5%) of the study population compared to women (45.5%). The majority of the

participants were married (64.7%), and a significant portion (74.1%) had a history of hypertension. Diabetes was also prevalent, with 82.4% of participants reporting the condition. Social class analysis highlighted that 63.9% belonged to the poor category, while only 16.9% were classified as rich. Smoking history was positive for 65.1% of participants. In terms of education, nearly half were illiterate (49%), with fewer participants attaining primary (29.8%) or secondary (21.2%) levels of education. Urban residents constituted 76.5% of the sample, indicating a greater urban representation, and 85.1% of participants reported leading a sedentary lifestyle. Employment status showed that two-thirds of the participants were unemployed (66.3%), and 70.6% had a family history of cardiac disease. Factors contributing to delays included increased age (25.1%), low educational levels (32.5%), waiting for symptoms to improve (24.3%), and being a single woman (18%).

Table 1: Descriptive Statistics and Frequencies Related to Delays in Seeking Treatment for Acute Coronary Syndrome (ACS)

Variable	Value/Category	Frequency (n)	Percent (%)
Age (Years)	Mean $\pm$ SD	63.76 $\pm$ 9.763	-
Duration of Symptoms (Hours)	Mean $\pm$ SD	2.96 $\pm$ 0.910	-
Age Groups	<60 Years	107	42.0%
	$\geq$ 60 Years	148	58.0%
Gender	Male	139	54.5%
	Female	116	45.5%
Marital Status	Married	165	64.7%
	Single	90	35.3%
Hypertension	Yes	189	74.1%
	No	66	25.9%
Diabetes Mellites	Yes	210	82.4%
	No	45	17.6%
Social Class	Poor	163	63.9%
	Middle Class	49	19.2%
	Rich	43	16.9%
Smoking History	Yes	166	65.1%
	No	89	34.9%
Educational Status	Illiterate	125	49.0%
	Primary & Above	76	29.8%
	Secondary & Above	54	21.2%
Residence	Urban	195	76.5%
	Rural	60	23.5%
Lifestyle	Active	38	14.9%
	Sedentary	217	85.1%
Occupation Status	Employed	86	33.7%
	Unemployed	169	66.3%
Family History of Cardiac Disease	Yes	180	70.6%
	No	75	29.4%
Factors Related to Delay	Increased Age (>75 Years)	64	25.1%
	Single Women	46	18.0%
	Wait for Improvement	62	24.3%
	Low Educational Information	83	32.5%

The stratification of delays by age showed that increased age (≥ 60 years) was significantly associated with delays in seeking treatment, with 43.2% of older participants reporting this factor compared to none in the younger group (<60 years). Similarly, 28.4% of participants aged 60 and above were single women who experienced delays, compared to only 3.7% of those younger than 60. Delays due to

waiting for symptom improvement were more common in younger participants (43%) compared to older ones (10.8%), showing a contrast in health-seeking behavior. Low educational levels were a dominant factor across all age groups but were more prevalent among participants under 60 years (53.3%) than those over 60 years (17.6%).

Gender stratification revealed that men were more likely to experience delays due to increased age (34.5%) compared to women (13.8%). In contrast, all delays attributed to being single women (39.7%) were understandably among female participants. Waiting for improvement was more common among men (32.4%) than women (14.7%). Educational status played a similar role across genders, with no significant differences noted.

Marital status analysis highlighted that married participants were more affected by increased age (28.5%) compared to single participants (18.9%). Delays due to being single women were exclusively seen among unmarried participants (51.1%). Waiting for symptom improvement was more frequently reported by married participants (30.9%) than singles (12.2%), as was low educational information (40.6% vs. 17.8%).

Hypertension did not significantly influence delays related to age or being single women, although those with hypertension experienced slightly higher rates of delays (27.5% vs. 18.2%). Social class analysis showed minimal differences in delays across poor, middle, and rich categories, with increased age and low educational levels being slightly more common in the poor category.

Lifestyle stratification revealed that sedentary individuals were more affected by delays related to increased age (26.7%) compared to those with an active lifestyle (15.8%). Delays due to being single women and waiting for improvement were also marginally higher in the sedentary group. Family history of cardiac disease showed no significant differences in delays, with similar proportions affected across categories.

Table 2 Consolidated Stratification of Factors Related to Delay in Seeking Treatment for Acute Coronary Syndrome (ACS)

(n = 255)

Stratification Variable	Factors	Categories	Frequency (n)	Percent (%)	P Value
Age Groups	Increased Age	<60 Years	0	0.0%	<0.001
		≥60 Years	64	43.2%	
	Single Women	<60 Years	4	3.7%	<0.001
		≥60 Years	42	28.4%	
	Wait for Improvement	<60 Years	46	43.0%	<0.001
		≥60 Years	16	10.8%	
	Low Educational Information	<60 Years	57	53.3%	<0.001
		≥60 Years	26	17.6%	
Gender	Increased Age	Male	48	34.5%	<0.001
		Female	16	13.8%	
	Single Women	Male	0	0.0%	<0.001
		Female	46	39.7%	
	Wait for Improvement	Male	45	32.4%	0.001
		Female	17	14.7%	
	Low Educational Information	Male	46	33.1%	0.839
		Female	37	31.9%	
Marital Status	Increased Age	Married	47	28.5%	0.091
		Single	17	18.9%	
	Single Women	Married	0	0.0%	<0.001
		Single	46	51.1%	
	Wait for Improvement	Married	51	30.9%	<0.001
		Single	11	12.2%	

	Low Educational Information	Married	67	40.6%	<0.001
		Single	16	17.8%	
Hypertension	Increased Age	Yes	52	27.5%	0.132
		No	12	18.2%	
	Single Women	Yes	33	17.5%	0.684
		No	13	19.7%	
	Wait for Improvement	Yes	44	23.3%	0.515
		No	18	27.3%	
	Low Educational Information	Yes	60	31.7%	0.643
		No	23	34.8%	
Social Class	Increased Age	Poor	46	28.2%	0.303
		Middle Class	10	20.4%	
		Rich	8	18.6%	
	Single Women	Poor	30	18.4%	0.947
		Middle Class	9	18.4%	
		Rich	7	16.3%	
Lifestyle	Increased Age	Active	6	15.8%	0.151
		Sedentary	58	26.7%	
	Single Women	Active	5	13.2%	0.396
		Sedentary	41	18.9%	
Family History	Increased Age	Yes	49	27.2%	0.225
		No	15	20.0%	
	Single Women	Yes	32	17.8%	0.866
		No	14	18.7%	

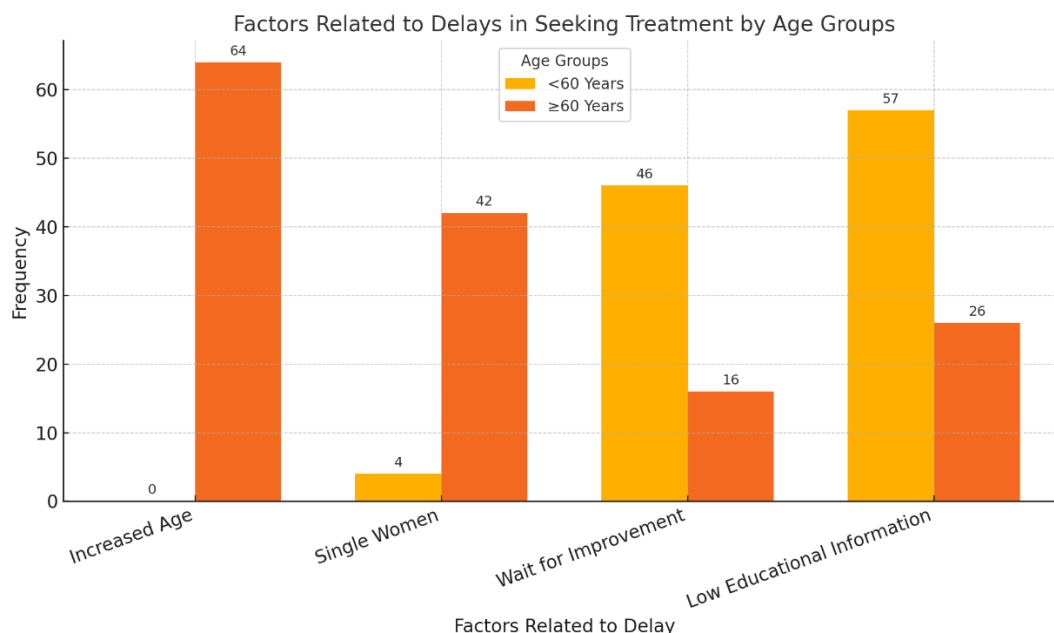


Figure 1: The bar graph highlights key factors contributing to delays in seeking treatment for ACS, comparing two age groups. **Increased age** exclusively affected older participants (64 cases), underscoring its role in delays among those aged ≥ 60 . **Being a single woman** was more common in older individuals (42 cases) than younger ones (4 cases), reflecting social and marital influences. In contrast, **waiting for symptom improvement** was more prevalent in younger participants (46 cases), suggesting a lack of urgency compared to older adults (16 cases). **Low educational information** was

a significant factor in both groups but more frequent in younger participants (57 cases vs. 26 cases). These findings highlight the need for tailored education and interventions for different demographics.

DISCUSSION

Acute coronary syndrome (ACS) encompasses conditions such as ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI), and unstable angina. It is a severe manifestation of coronary heart disease (CHD), responsible for a significant proportion of deaths in individuals over 35 years of age. Unlike some forms of CHD that may remain asymptomatic, ACS is always symptomatic. Common risk factors for ACS include smoking, hypertension, diabetes, hyperlipidemia, male gender, sedentary lifestyle, obesity, poor dietary habits, and a family history of early myocardial infarction. Cocaine use is also recognized as a potential cause of coronary vasospasm⁷⁻⁹.

The current study highlighted several factors associated with delays in seeking treatment for ACS. The mean age of participants was 63.76 years (SD $\pm$ 9.76), and the mean duration of symptoms before seeking treatment was 2.96 hours (SD $\pm$ 0.91). Stratification by age revealed that 58% of participants were 60 years or older. Gender distribution showed a slightly higher proportion of males (54.5%) compared to females (45.5%). A majority of participants (64.7%) were married, and a significant portion had hypertension (74.1%) and diabetes (82.4%). Socioeconomic analysis indicated that 63.9% belonged to the poor category, while only 16.9% were considered rich. Most participants were either illiterate (49%) or had minimal education, and 76.5% resided in urban areas. Additionally, a sedentary lifestyle was common among participants (85.1%), and 66.3% were unemployed in accordance with studies^{10 11}.

Key factors contributing to delays in seeking treatment included increased age (25.1%), low educational information (32.5%), waiting for symptom improvement (24.3%), and being a single woman (18%) in accordance with studies^{12 13}. These findings emphasize the influence of demographic, social, and psychological factors on health-seeking behaviors.

The prevalence of CHD is substantial, affecting over 15.5 million people in the United States alone. A heart attack occurs every 41 seconds, making CHD the leading cause of death. The pathophysiology of ACS often involves reduced blood flow to the heart due to plaque rupture or thrombus formation, leading to ischemia and myocardial infarction. Delays in recognizing symptoms and seeking treatment are critical in determining outcomes^{14 15}.

Previous research has identified three phases of delay: patient recognition and action, transportation, and hospital response. Older adults typically experience longer delays in the initial recognition phase. Studies have also shown that women tend to delay treatment more than men, with factors such as misinterpreting symptoms or attributing them to non-cardiac causes contributing to these delays^{16 17}.

The findings of this study align partially with existing literature. For instance, delays due to low educational levels and waiting for symptom improvement were consistent with previous research^{18 19}. However, this study found that increased age (25.1%) and single women (18%) were also significant contributors, highlighting the role of age and marital status in delaying treatment.

Addressing these delays requires raising public awareness about ACS symptoms. Digital platforms, such as mobile applications and online advertisements, can be leveraged to educate the public about the urgency of seeking prompt medical care²⁰. Strengthening healthcare infrastructure, including improving emergency care systems and integrating primary care centers with tertiary hospitals, can further reduce delays. Continuous medical education for healthcare providers, especially in remote areas, is essential to ensure timely diagnosis and treatment.

This study has certain limitations, including its single-center design and reliance on self-reported data, which may introduce recall bias. Despite these limitations, the findings underscore the need for targeted interventions to reduce pre-hospital delays and improve outcomes for ACS patients. A comprehensive approach involving public education, better healthcare access, and professional training is critical for addressing the gaps in ACS care.

CONCLUSION

This study highlights significant pre-hospital delays faced by patients with acute coronary syndrome (ACS). Key contributing factors include limited educational awareness, particularly among older patients, and the tendency to delay treatment while waiting for symptoms to improve. Additionally,

errors in diagnosis and management by healthcare professionals in peripheral settings further delay critical interventions, such as thrombolysis in STEMI patients.

To address these issues, public education about the symptoms and urgency of ACS treatment must be urgently enhanced. Increased accessibility to healthcare services and reliable transportation options are equally vital to reducing delays. Furthermore, ongoing medical education and training for healthcare providers are essential to improving early recognition and management of ACS. Implementing these measures can significantly improve outcomes and reduce preventable delays in treatment for ACS patients.

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