Prevalence of diabetes in patients with Acute Coronary Syndrome: A hospital based study, Ajman, UAE

Mohammed Soror Alaithan[1], Mustafa S. M. AbuMuaileq[1], Saja Fadil Jabre[1], Majd Munir Farajallah[1]*, Shizana Mirza Rashid[1], Kawthar Ahmed Alabdouli[1], Elsheba Mathew[2], Jayakumary Muttappallymyalil[3], Ehab M Eshieba[4], Aji Gopakumar[5]

[1]MBBS students, [2]Former faculty, Department of Community Medicine, [3]Department of Community Medicine, Statistical Support Facility[5], Gulf Medical University, Ajman, UAE, [4]Department of Cardiology, GMC Hospital, Ajman, UAE

*Presenting Author

ABSTRACT

Objectives: This research was conducted to determine the prevalence of diabetes mellitus in patients admitted with Acute Coronary Syndrome at GMCHRC, Ajman, UAE, during the period (2010-2013).

Materials & Methods: A descriptive study was conducted among 175 ACS patients admitted to the cardiology department in GMC hospital in Ajman. The dependent and independent variables that were included in the checklist were chosen after reviewing several case records of patients with ACS. Patient records were viewed on the computer database and all the necessary information required to achieve the objectives was extracted and filled in the checklist forms. The data was analyzed by SPSS 20 and Chi square test was performed to check for any association between variables.

Results: Out of the 175 ACS patients, 75 (43%) were diabetic, of which 63 (84%), were Males and 12 (16%) females. Among different age groups, 27 (65.9%) above 60 years had ACS with DM. With regard to ethnicity, among Arabs 30 (46.9%) and among Non-Arabs 45 (40.5%) had ACS with DM. The most common co-morbid conditions observed in patients who had ACS with DM were hypertension 64 (85.3%) and dyslipidemia 60 (80%).

Conclusion: In the study population 43% of ACS patients were diabetic. Majority of the patients were male who had ACS with DM. Non-Arabs individuals appear to have more ACS with diabetes than Arabs. Patients aged 40-60 had the highest proportion of ACS with DM. The most influential factors which contributed to ACS with DM were dyslipidemia and hypertension and both can be considered as the main risk factor in the presence of diabetes.

Keywords: Acute Coronary Syndrome, diabetes, hypertension, dyslipidemia

INTRODUCTION

World Health Organization reported that around 57 million individuals died worldwide in 2008. Around 7 million of them died due to ischemic heart disease (IHD) and 6.2 million people died because of stroke[1]. In the United Arab Emirates, cardiovascular disease mainly myocardial infarction is the principal cause of death; representing 28% of total deaths[2]. Thus IHD represents a serious socio-medical problem[3].

As for diabetes, in 2030 diabetes mellitus will be ranked as the seventh cause of death[4] and the number of cases of DM is expected to be 342 million. The fifth edition of the Diabetes Atlas, released in 2011 by the International Diabetes Federation (IDF), about 19.2 % of the UAE residents flanked by 20 and 80 years of age suffer from diabetes[5].

In recent years, studies have shown that there is a high association between diabetes and coronary heart diseases (e.g. myocardial infarction), 10 to 24% of cases of myocardial infarction are actually diabetic and this makes DM a powerful risk factor for coronary heart disease[6, 7]. In addition, the risk of acute coronary syndrome is doubled if diabetes is present[8].

Acute coronary disease contributes to many other risk factors other than diabetes mellitus such as family history of non-communicable diseases. In the Middle East, the incidence of non-communicable diseases in acute coronary syndrome continuously rises especially in non-diabetics. A conducted to monitor the prevalence of family history of non-communicable diseases in ACS which showed in order first heart disease (10.9%), second diabetes mellitus (8%) and thirdly hypertension (5.1%)[9]. Worldwide, non-communicable diseases which involves heart disease, diabetes mellitus and hypertension, represents major risk factor that increase morbidity and mortality of ACS[10].

Cardiovascular disease (CVD) is rising in developing countries. However, the impact of modifiable CVD risk factors on acute coronary syndrome has not been studied in the Gulf Cooperate Council Countries (GCC). Therefore, this study was conducted to assess the prevalence of diabetes mellitus in patients admitted with Acute Coronary Syndrome at GMC hospital and research center, Ajman, UAE.

MATERIALS AND METHODS

This hospital record-based descriptive study was conducted among patients with Acute Coronary Syndrome reported to the Dept. of Cardiology, GMC hospital, Ajman, UAE. After the approval from the Director of the GMC hospital, permission was taken from the Medical Records Department for reviewing the case records. Patients' hospital numbers were collected from the coronary care unit (CCU) register. Patient records were reviewed on the computer database and all the necessary information required to achieve the objectives were extracted and filled in the checklist forms. Case records of all patients with ACS reported to the Cardiology between January 2010 and December 2013 were abstracted. The data was fed into the Excel spread sheet directly. Personal and family history of diabetes mellitus, hypertension, dyslipidemia, and cardiovascular diseases were extracted. After obtaining the data from the records, each option ticked was coded. After coding each option, it was imported to Statistical Package for the Social Sciences (SPSS) program version 20 for analysis. The results were then presented in frequency tables, figures and texts. Chi-square test was performed to test the association between variables. Statistical significance was set at $p < 0.05$.

RESULTS

The present study was undertaken among 175 patients with ACS reported to the Department of Cardiology from January 2010 till December 2013 to determine the frequency of Diabetes mellitus among them and the determinants associated with ACS.

Table 1: Socio-demographic characteristics of the participants (N=175)

Variables	Groups	Gender				
		Male		Female		
		No.	%	No.	%	
Age group in years	≤ 40 years	41	93.2	3	6.8	
	41-59 years	80	88.9	10	11.1	
	≥ 60 years	34	82.9	7	17.1	
Age	Mean ± SD	49.5±11.25		53.8±10.16		
Years	2010	42	93.3	3	6.7	
	2011	50	86.2	8	13.8	
	2012	42	87.5	6	12.5	
	2013	21	87.5	3	12.5	
Ethnicity	Arab	54	84.4	10	15.6	
	Non-Arab	101	91.0	10	9.0	

Table 1 shows the socio-demographic characteristics of the patients with Acute Coronary Syndrome (N=175). It was observed that of the total 175, 44 (25.1%) cases were ≤ 40 years, 90 (51.4%) between 41 and 59 years and 41 (23.4%) were in the age group greater than or equal to 60 years. Mean age of the total participants was 49.9 ± 11.19 years. The mean age of male patients was 49.5±11.25 years and in females the mean age was 53.8±10.16 years. With regard to gender 155 (88.6%) were males and remaining females. In 2010 93.3% (42) cases were males and 3 cases females (6.7%). In 2011, 86.2% (50 cases) were males and 8 cases females (13.8%). In 2012, 42 male patients were admitted to GMC hospital (87.5%), and only 6 female patients (12.5%). In 2013, the number of cases in both genders decreased significantly, 21 male patients (87.4%) and only 3 female patients (12.5%). As for the ethnicity of the ACS patients, we classified the patients into Arabs and non-Arabs. In the study group 54 cases were Arab males (84.4%) and 10 cases Arab females (15.6%). As for the Non-Arabs there were 101 cases of males (91.0%) and 10 cases of Non-Arab females (9.0%) with ACS.

The number of ever smoker males in this study was 79, on the other hand there were no females who were ever smokers. In the ever alcoholic there were 31 ever alcoholic males and no females
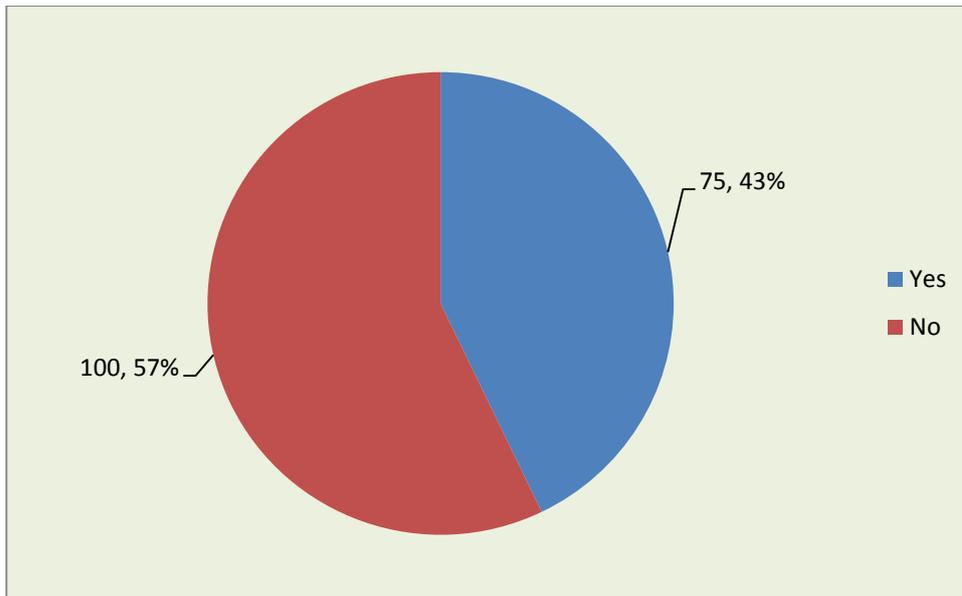
Figure 1. Distribution of participants according to History of Diabetes Mellitus (N=175)

This pie diagram (Figure 1) shows the distribution of participants according to history of Diabetes Mellitus. Out of the 175 participants, 100 (57.1%) were non-diabetic and 75 (43%) were diabetic.
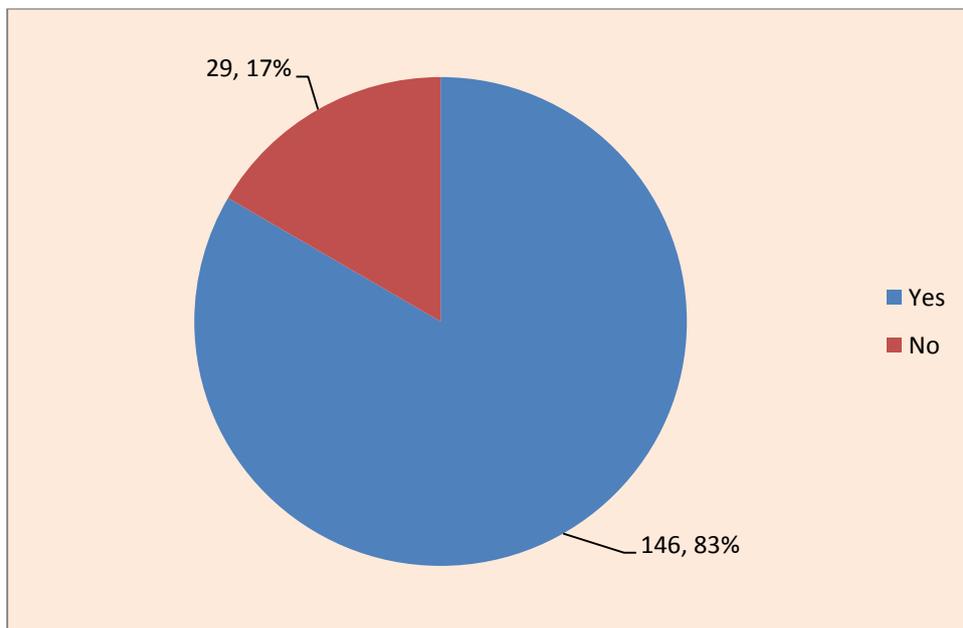

Figure 2. Distribution of participants according to History of Hypertension (N=175)

This pie diagram (Figure 2) shows the distribution of participants according to history of hypertension. Out of the total participants 146 (83%) were hypertensive and 29 (17%) normotensive.
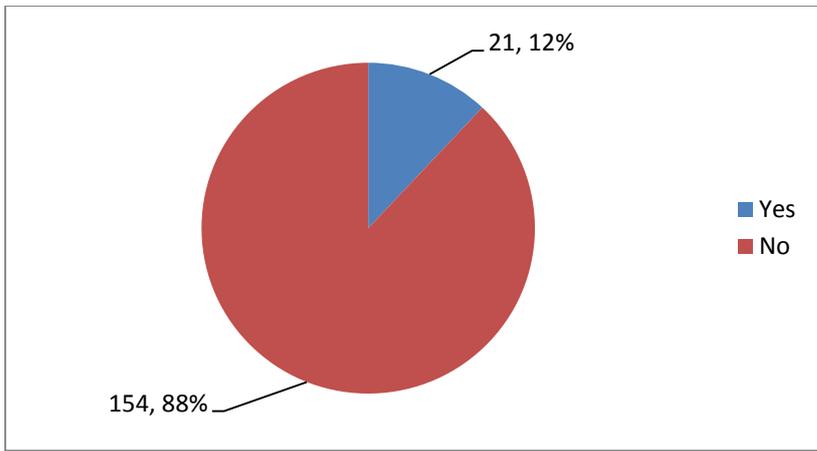
Figure 3. Distribution of participants according to Past history of Acute Coronary Syndrome (N=175)

This pie diagram (Figure 3) shows the distribution of participants according to the past history of Acute Coronary Syndrome. The majority, 154 cases (88%) did not have past history of ACS and the rest, 21 cases (12%) had a history of ACS.
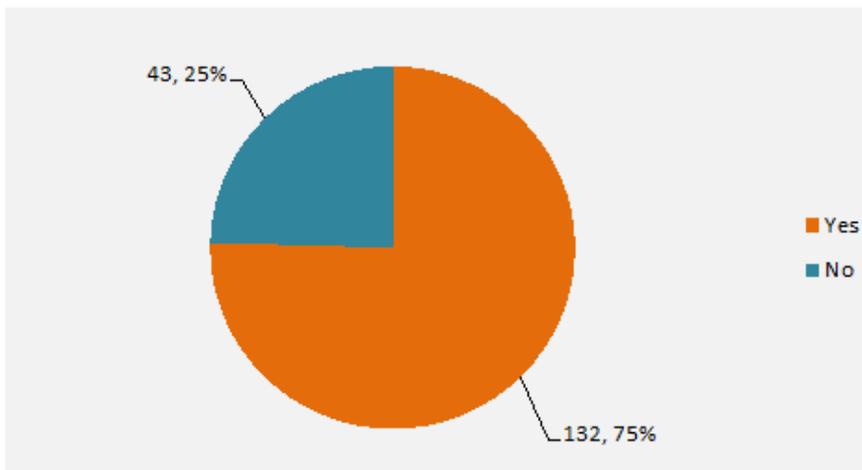

Figure 4: Distribution of participants according to History of Dyslipidemia (N=175)

This pie diagrams (Figure 4) shows the distribution of participants according to the history of dyslipidemia. Out of 175 participants, there were 132 (75%) cases with positive history of dyslipidemia and 43 (25%) cases without history of dyslipidemia.

The distribution of participants according to Family history of non-communicable (N=175) showed that there were 128 (73.1%) patients with ACS who did not have a family history of non-communicable disease; 14 (8.0%) patients have a family history of diabetes mellitus; 9 (5.1%) patients have a family history of hypertension and19 (10.9%) patients have a family history of heart disease. There was only 1 (0.6%) patient that had a family history of both diabetes and heart disease and 4 (2.3%) patients had hypertension, diabetes mellitus, and heart disease.

Table 2: Comparison of ACS patients with or without Diabetes mellitus by Socio-demographic characteristics (N=175)

Variables	Groups	ACS with DM		ACS without DM		P value
		No.	%	No.	%	
	≤40	7	15.9	37	84.1	p<.001
Age group in years	40-60	41	45.6	49	54.4	
	≥60	27	65.9	14	34.1	
Age in years	(Mean ±SD)	55.2±9.99		46±10.44		p<0.001
Gender	Male	63	40.6	92	59.4	NS
	Female	12	60.0	8	40.0	
Ethnicity	Arabs	30	46.9	34	53.1	NS
	Non-Arabs	45	40.5	66	59.5	

Table (2) gives the comparison of ACS patients with or without Diabetes mellitus by Socio-demographic characteristics. For age, we divided the sample to 3 age groups (≤40, 40-60 and ≥60 years). In the first group (≤40 years there were 7 cases (15.9%) with DM and 37 case (84.1%) without DM; for the second group (40-60 years there were 41 cases (45.6%) with DM and 49 (54.4%) without DM; for the third group (≥60 years) there were 27 cases (65.9%) with DM and 14 cases (34.1%) without DM.

The highest incidence of ACS with DM, was in the age group between 40-60 years with 41 cases (54.7%) and the lowest was in the age group of ≤40 years with 7 cases (9.3%). The highest incidence of ACS without DM was also in the same age group with 49 cases (49.0%) and the lowest was in the age group ≥60 with 14 cases (14.0%).

Regarding gender, in male cases there was 63 (40.6%) with DM and 92 (59.4%) without DM. In female cases there was 12 (60%) with DM and 8 (40%) without DM. The incidence of ACS with DM was higher in males with a 63 cases (40.6%) and for the incidence of ACS without DM it was also higher in males with 92 cases (59.4%)

As for ethnicity, this has been divided it to two categories, Arabs and non-Arabs. For the first one, there were 30 cases (46.9%) with DM and 34 cases (53.1%) without DM, for the second one, there were 45 cases (40.5%) with DM and 66 cases (59.5%) without DM.

Table 3. Comparison of ACS patients with or without Diabetes mellitus by Lifestyle factors (N=175)

Variables	Groups	ACS with DM		ACS without DM		P value
		No.	%	No.	%	
History of smoking	Ever smoker	25	31.6	54	68.4	p<.01
	Never smoker	50	52.1	46	47.9	
History of Alcoholism	Ever Alcoholics	11	35.5	20	64.5	NS
	Never Alcoholics	64	44.4	80	55.6	

Table (3) shows Comparison of ACS patients with and without Diabetes mellitus by Lifestyle factors. The table shows two lifestyle factors which are smoking and alcohol consumption.

The number of diabetics of ever smokers was 25 (33.3%) and the number of non-smokers was 50 (66.7%). Among the non-diabetics the total number of ever smokers was 54 (54%) and non-smokers 46(46%). This difference was statistically significant (P<0.01).

Among the diabetics the total number of ever alcoholics was 11(14.7%) and the number of non-alcoholics was 64(85.3%). Among the non-diabetics the total number of ever alcoholics was 20(20%) and the number of non-alcoholics was 80 (80%). The difference was not statistically significant.

ACS patients with DM were sub divided into those with hypertension and those without. ACS with DM with hypertension was 64 (43.8 %) and without hypertension was 11(37.9 %). ACS patients without DM were divided into those with hypertension and those without. The Number of ACS patients without DM but with hypertension was 82(56.2%) and without hypertension was 18(62.1%).

ACS patients with DM were divided into with dyslipidemia and without dyslipidemia. ACS patients with dyslipidemia were 60(45.5%) and without dyslipidemia were 15(34.9%). Also, ACS patients without DM were divided as those with dyslipidemia and without dyslipidemia. ACS patients without DM with dyslipidemia were 72(54.5%) and without dyslipidemia were 28 (65.1%).

The comparison of ACS patients with or without Diabetes mellitus by Family history of Non-communicable diseases was made. All 175 participants have been subdivided according to the presence or absence of family history of diabetes mellitus, hypertension, and heart diseases.

Among participants with family history of diabetes mellitus, 11 (57%) had ACS with DM and 8 (42.1%) had ACS without diabetes. However, among participants with no family history of diabetes, there were 64 (41.0%) cases of ACS with DM, and 92 (59%) with ACS but without DM. In addition, in participants with family history of hypertension there were 8 (42.1%) patients who suffered from ACS with DM and 11 (57.9%) with ACS but without diabetes. Participants with no family history of hypertension but with ACS and DM were 67 (42.9%), and 89 (57.1) of participants with no family history of hypertension were with ACS but without DM. Moreover, among participants with family history of heart diseases, 6 (25.0 %) had ACS with DM and 18 (75%) had ACS without DM. However, in patients with no family history of heart diseases, there were 69 (45 %) with ACS and DM, and 82 (54.3 %) had ACS without DM.

Cases of ACS with DM were 11 (14.7%) in the presence of family history of DM but 64 (85.3%) in the absence of family history of DM. In all cases of ACS without diabetes, there were 8 (8.0%) cases with positive family history of DM and 92 (59.0%) cases with no family history of DM. Moreover, in cases of ACS with DM, there were 8 (10.7%) cases associated with positive family history of hypertension and 67 (89.3%) cases associated with negative family history of hypertension. In addition, in cases of ACS without DM there were 11 (11%) with positive family history of HT and 89 (89%) with negative family history of HT. The number of cases of ACS with DM with positive family history of heart diseases was 69 (92%) but 6 (8%) cases were with negative family history of heart diseases. However, in cases of ACS without DM there were 82 (82%) with positive family history of heart diseases and 18 (18%) with negative family history of heart diseases.

DISCUSSION

Previous studies have found that individuals with diabetes mellitus are at increased risk for Acute Coronary Syndrome. Therefore the present study determined the prevalence of diabetes mellitus among patients with acute coronary syndrome reported to GMC hospital Ajman, UAE.

In this study, Male preponderance was seen among patients with acute coronary syndrome which was almost eight times higher as compared to females. This is similar to the results of studies conducted in Newcastle, New South Wales and Australia[11] and another study in UK[12].

Considering the risk of diabetes mellitus in ACS, in our study there were 75 (42.8%) diabetic patients which are comparable with a study done in Sri Lanka[13]. In the current study the majority of the diabetics were males which is in line with the results of a study conducted in Iran which showed that almost three fourth (73.5%) were males[14].

It is noteworthy that almost two-third of the female patients in the study were diabetics. This result goes in favor of that women are more prone to have Diabetes than men. The same observation was reported in a research[15].

In this study we got the maximum number of patients in the category of old adults which is equal to (51.4%) of all the cases. Many researches quoted "the risk of getting ACS increases with age" [16]. This result is in accordance with another study that reported that the risk increases for men after 45 years of age and for women after 55 years of age[17].

The highest frequency of ACS with DM, was in the age group between 41-59 years with a 41 cases (54.7%) and the lowest was in the age group of ≤40 with 7 cases (9.3%) and the highest incidence of ACS without DM was also in the same age group with 49 cases (49.0%) and the lowest was in the age group ≥60 with 14 cases (14.0%).

Similar results were observed in a cohort study which showed a male predominance in the incidence of diabetes in men aged 35 to 74 years[18]. In contrast with those findings a study done for Sex Differences in Acute Coronary Syndrome reported that women were more likely than men to have diabetes that was explained in their study by the fact that women have higher risk for diabetes and other risk factors associated with ACS like hypertension and depression[19]. Moreover, another study conducted in the Netherlands found that the prevalence of diabetes was higher in older women compared to similarly aged men. No significant differences were found between younger patients of both genders[20].

There is no doubt that DM has a huge contribution to ACS and it is one of the major risk factors, and the incidence of ACS is rising significantly in type 1 and type 2 DM and It is also associated with poor out-comes for ACS patients [21, 15], yet ACS is a multifactorial disease, and DM is not the only risk factor.

A lot of risk factors contribute in different levels in ACS like dyslipidemia which is a major risk factor and might be promoted to be the cause for ACS, and other factors like age, gender, smoking and substance abuse plays an important role in ACS, without forgetting to mention that cardio vascular disease is the major cause of death in DM patients [22]. A good control of blood sugar levels is essential to decrease the risk of ACS and also to reduce the poor outcomes and to improve the prognoses of the patient condition[13]

In this study the result came out indicating that DM is not a major cause of ACS in fact number of ACS patients with DM "75 out of 175" is less than those without DM "100 out of 175 ".The number also varies between different age groups

and different factors. The result in this study is in a degree of contrast with other researches which indicate that DM is a major factor, but the small sample size and the missing data from the record might be the cause of the differing results in this study. A study done by Karimi A et al reported diabetes as conventional CAD risk factor with a high prevalence rates (8-18%)[23].

Smoking is an important risk factor for coronary heart disease and it works synergistically with the other risk factors. This study has shown that the cases of acute coronary syndrome (ACS) in patients who ever smoked (i.e. 79 cases, 45%) are lower in number than the cases of ACS in patients who never smoked (i.e. 96 cases, 55%). However, a study has shown that smoking cessation decreases the risk of myocardial infarction compared with persistent smoking [24]. In addition, a study in Europe has shown that, 85% of the patients were past or present smokers and this shows how smoking can increase the risk of acute coronary event [25]. Moreover, a study in Iran, has also shown that smoking plays an important role in causation of coronary artery disease in men participant, and the longer the duration of smoking the more the risk (i.e. 3-4 times higher risk)[14]. However, in this study, the percentage of ACS in patients who ever smoked is lower than the percentage of participants who never smoked and this differs from the results found in other studies and this could be due to different issues. First, in this region (i.e. United Arab Emirates) of the world the percentage of female smokers is much lower than the percentage of male smokers. Involving female participants in the study has increased the percentage of non-smokers. Secondly, in this region, due to traditions it is sometimes inappropriate to ask a female if she is a smoker, and therefore the question might be avoided very often or the female patient can also give a wrong answer.

In this study, there were 31 (17.7 %) cases that gave history of alcohol consumption and 144 (82.3%) cases that were never-users. A case-control study showed a weak association between alcohol and myocardial infarction (p=0·03)[26]. Another study has shown that light to moderate alcohol intake has a low risk of acute coronary syndrome[27]. Therefore, this study and the other studies have shown that there is a weak association between alcohol intake and the risk of ACS.

With regards to the proportion of ACS in hypertensive patients, it was observed that there were 146 (83%) hypertensive patients, meaning half of Acute Coronary Syndrome patient suffer from hypertension as well. A study in Iran, reported that history of hypertension played a chief role in predicting ACS, and that men with positive history of hypertension had 6.9 times higher chances for ACS than those without hypertension[14].

In this research, 132 (75%) ACS cases were with history of dyslipidemia. In a study conducted in Iran, 61.8% had dyslipidemia[28]. Another study conducted in Iran reported that 25 to 37 percent have hyperlipidemia which is a major risk factor for ACS[14].

Among 175 participants, ACS with DM associated with family history of DM shows the highest with 11 (57%) and ACS with DM associated with family history of heart disease shows the lowest with 6 (25.0 %) whereas ACS without DM associated with family history of heart disease shows the highest with 18(75%) and ACS without DM associated with family history of diabetes shows the lowest with 8(42.1%) [29]. ACS is a multi-factorial disease and can't narrowed to one or two risk factors, but as a results of this study, hypertension and dyslipidemia can both be considered as the main risk factor in the presence of diabetes, yet diabetes alone can't be the major contributor in ACS, but those risk factors combined can produce a really high risk of ACS.

The limitations of the current research include a small sample that made it difficult to find significant relationships from the data between the variables, and lack of reliable data related to variables like duration of smoking, amount of cigarettes per day, duration of diabetes etc. made us to limit the scope of our analysis.

CONCLUSION

To conclude that the prevalence of DM among patients with ACS was 75 (43%) and ACS with diabetes was found more in males with 63(84%) while there were only 12 (16%) females. Non-Arab individuals appear to have more ACS with diabetes than Arabs. Patients aged between 40 and 60 had the highest proportion of ACS with DM 41 (54.7%).The most influential factors which contributed to ACS with DM were dyslipidemia and hypertension.

The observations of the current research recommend a nationwide research to be conducted for more generalizable results and a prospective study may be conducted among patients with ACS to assess the risk factors and to assess the prevalence of DM among patients with ACS.

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