

Incidence and Criteria of Acute Coronary Syndrome among the Population of North Sinai Governorate

Mohammad Gouda, Ahmed S Ammar, Tarek A Naguib, Amr A Ateya, El-Sayed A Ibrahim

Gouda M, Ammar AS, Naguib TA et al. Incidence and Criteria of Acute Coronary Syndrome among the Population of North Sinai Governorate. *J Heart Res* November 2018;1(1):14-17.

Background: Acute coronary syndromes (ACS) affect millions of individuals annually causing considerable morbidity and mortality; it remains the first killer in developed countries despite significant improvements in its management over the last several decades. Great importance of surveys as they provide a useful means of identifying variations in clinical practice and their effect on outcomes as well as reliable information on population incidence, prevalence, and case-fatality rates of coronary heart diseases (CAD) is essential for understanding, treating, and controlling the disease.

Aim of the work: Due to the privacy of the community in the governorate of North Sinai as coastal Bedouin environment where is little population number, less pollution and less stressful life, we aimed to find out the prevalence of ACS among the North Sinai population and identify the criteria of the disease in these patients.

Patient and methods: Our study included 258 patients of the North Sinai population who presented with ACS to El-Arish General Hospital, the only hospital providing cardiac health care to the North Sinai population. The study was carried out from March, 2012, to February, 2013. All patients presented with ACS (acute myocardial infarction or unstable angina) were included. Full history taking with stress on analysis of chest pain, scoring was done depending on physical activity, diet and stress. Full physical examination, ECG and Laboratory samples collected for cardiac markers, random blood sugar (RBS), serum uric acid and lipid profile.

Results: 105 cases (40.7%) had STEMI, 89 cases (34.5%) had UA, and 64 cases (24.8%) had NSTEMI. Annual prevalence, incidence, rate of 65/100,000 people in the whole governorate. Most of them, 223 cases (86.4%), are living in the urban region, El-Arish city, which has the highest annual prevalence, incidence, rate of 139/100,000 people. The rest, 35 cases (13.6%), are distributed in the rural regions with an annual prevalence, incidence, rate of 15/100,000 people. Mean age of the patients was 56.16 ± 10.83 years with BMI of 28.2 ± 3.7 and serum uric acid level of 5.2 ± 1.6 . 197 patients (76.4%) were males and 61 (23.6%) were females. 122 patients (47.3%) were diabetic, 86 patients (33.3%) were hypertensive and 139 patients (53.9%) were dyslipidemic. 47 patients (18.2%) were having moderate stress during the year prior to the attack with 50% chance of developing an illness and only 3 patients (1.2%) suffered from severe stress with 90% chance of having an illness according to Holmes and Rahe stress scale. The diet styles of 99 patients (38.4%) were far away from the Mediterranean diet while the majority of the patients, 159 patients (61.6%), were closed to the Mediterranean diet.

Conclusion: We tried to draw a portrait of ACS in North Sinai Governorate through finding out the volume of the disease and its risk factors among the population. We've succeeded in finding out the most important and easiest modifiable risk factors which are the overweight and physical inactivity. In addition, Mediterranean diet style probable significance in ACS primary prevention.

Key Words: Acute coronary syndrome, Prevalence, North Sinai Governorate

INTRODUCTION

ACSs affect millions of individuals annually causing considerable morbidity and mortality. In developed countries this disease remains the number one killer, despite significant improvements in its management over the last several decades [1,2].

In addition, ACSs are common causes of emergency hospital admission and a major burden on health care resources in industrialized countries [3]. Regarding age distribution of ACS; young patients in the Gulf region of the Middle East are mostly males. They are more aggressively treated on initial presentation and they have a better in-hospital outcome than older patients [4].

On the other hand, elderly ACS patients were less likely to present with STEMI, yet they were markedly less intensively treated and investigated [5]. Several studies have reported the incidence of ACS among women which was significantly lower than that among men [6] and nonwhite patients had a significantly worse prognosis than white patients, regardless of treatment approach [7].

After all, we must be sure of the importance of surveys as it provides a useful means of identifying variations in clinical practice and their effect on outcomes [3], as well as reliable information on population incidence,

prevalence, and case-fatality rates of CADs is essential to understanding, treating, and controlling the disease [2].

AIM OF THE WORK

Correlate parameters of heart rate variability (HRV) with positive or negative results of myocardial perfusion scintigraphy associated with pharmacological or physical stress.

PATIENTS AND METHODS

This study included 258 patients of the North Sinai population who presented with ACS to El-Arish General Hospital (the only hospital providing cardiac health care to the North Sinai population). The study carried out from March, 2012, to February, 2013. All patients presented with ACS (acute myocardial infarction or unstable angina) were included. We excluded patients were those with non-ischemic chest pain and non-resident patients. All patients were subjected to the following:

Full history taking with stress on analysis of chest pain type. Also stress on analysis of CAD risk factors as obesity, smoking, diabetes, hypertension, and hyperlipidemia.

Assistant Professor of Cardiology, Faculty of Medicine, Zagazig University, Egypt

Correspondence: Mohammad Gouda, Assistant Professor of Cardiology, Faculty of Medicine, Zagazig University, Egypt, Telephone +21019693393; e-mail cardioman77@yahoo.com

Received: November 08, 2018, Accepted: November 13, 2018, Published: November 21, 2018



This open-access article is distributed under the terms of the Creative Commons Attribution Non-Commercial License (CC BY-NC) (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits reuse, distribution and reproduction of the article, provided that the original work is properly cited and the reuse is restricted to noncommercial purposes. For commercial reuse, contact reprints@pulsus.com

Scoring

Physical activity: 3 physical activity variables; vigorous physical activity, moderate physical activity and less than moderate physical activity. Vigorous physical activity was defined if the patient participates in physical activity for at least 20 minutes that made him sweat or breathe hard. Moderate physical activity was defined if the patient participates in physical activity for at least 30 minutes that didn't make him sweat or breathe hard. Less than moderate physical activity is defined as activities like television watching [8].

Diet: We focused on the main 6 items that may be famous, easily recognize and widely served on tables; fishes, olive oil, vegetables and fruits, full cream milk and its product, eggs and meat. The consumption of these items transformed to a diet score of 30 through it we divided the patients regarding diet style into patients close to the Mediterranean diet style (score ≥ 15) and patients away from it (score<15) according to their diet score. Consumption of each item was evaluated according to their consumption per month as follows:

For items close to the Mediterranean diet style, fishes, we gave 0 score for 0 consumption, 1 score for 1 to 4 times consumption per month, 2 score for 5 to 8 times consumption per month, 3 score for 9 to 12 times consumption per month, 4 score for 13 to 18 times consumption per month, 5 score for >18 times consumption per month. The score reversed to the opposite with items away from the Mediterranean diet style as meat. Higher scores indicate greater adherence to the Mediterranean diet style, while lower scores indicate a diet style away from the Mediterranean diet style [9].

Stress: We used Holmes and Rahe stress scale which assess the stress through a asking the patient about 41 different stressors whether it occurred or not during the last year and for how many times. Each stressor scored with a certain value then multiplied with its frequency during the last year. By adding all scores of all stressors, we obtained a total stress score. A score of 150+ gives a 50% chance of developing an illness and a score of 300+ gives a 90% chance of developing an illness [10].

Physical examination

For evaluation of the patient state as blood pressure, pulse, height, weight and BMI as well as discovering any complications of ACS as ventricular septal rupture and valvular regurge.

Electrocardiogram

For diagnosis of ACS and its possible complications as arrhythmia

Laboratory samples

Collected for cardiac enzymes as CK-MB and troponin I on admission and after 12 hours as well as random blood sugar (RBS), serum uric acid, lipid profile

STATISTICAL ANALYSIS

Patients' data was collected and analyzed statistically in order to achieve the goal of the study. P value was set at <0.05 for significant results.

Annual incidence was calculated from the following equation:

=New cases of ACS who were collected during the year of study/ Population of North Sinai Governorate [11].

RESULTS

In our study, 258 patients were enrolled; 105 cases (40.7%) were diagnosed as STEMI, 89 cases (34.5%) were UA, and 64 cases (24.8%) were NSTEMI (Table 1). Prevalence of ACS: annual prevalence, incidence, rate of 65/100,000 people in the whole governorate. Most of them, 223 cases (86.4%), are living in the urban region, El-Arish city, which has the highest annual prevalence, incidence, rate of 139/100,000 people. The rest, 35 cases (13.6%), are distributed in the rural regions with

an annual prevalence, incidence, rate of 15/100,000 people. The regions of an intermediate annual prevalence, incidence, rate was Shaikh Zoyed with 15 cases (5.8%), 28/100,000 people, Nekhel with 3 cases (1.2%), 26/100,000 people, and Rafah with 14 cases (5.4%), 20/100,000 people. The lowest annual prevalence, incidence, rate regions were El-Hasanah 2 cases (0.8%), (7/100,000 people) and Bair El-Abd (1 case (0.4%), (1/100,000 people).

Prevalence of risk factors among the ACS patients throughout the whole Governorate of North Sinai: mean age of the patients was 56.16 ± 10.83 years with BMI of 28.2 ± 3.7 and serum uric acid level of 5.2 ± 1.6. 197 patients (76.4%) were males and 61 (23.6%) were females. 122 patients (47.3%) were diabetic, 86 patients (33.3%) were hypertensive and 139 patients (53.9%) were dyslipidemic. 134 patients (51.9%) were current smokers, 119 patients (46.1%) smoke cigarettes, 11 patients (4.3%) smoke shisha and 4 patients (1.6%) smoke both cigarettes and shisha with No history of other addictions.

TABLE 1 Prevalence of the 3 types of ACS

Diagnosis	Number of cases	Percentage (%)
NSTEMI	64	24.8
STEMI	105	40.7
UA	89	34.5
Total	258	100

47 patients (18.2%) were having moderate stress during the year prior to the attack with 50% chance of developing an illness and only 3 patients (1.2%) suffered from severe stress with 90% chance of having an illness according to Holmes and Rahe stress scale. The diet style of 99 patients (38.4%) were far away from the Mediterranean diet while the majority of the patients, 159 patients (61.6%), were closed to the Mediterranean diet. 152 patients (58.9%), were living a sedentary life (less than moderate activity), 94 patients (36.4%) were practicing moderate physical activity while the minority of the patients, 12 patients (4.7%), were practicing vigorous physical activity.

For more detailed analysis of the prevalence of risk factors in this study within the governorate, we divide the governorate into urban region (El-Arish city) and rural regions (Rafah, El-Shaikh Zoyed, Bair El-Abd, El-Hasanah and Nekhel). Regarding the diagnosis of ACS throughout these 2 main regions we found that in the urban region 88 patients (39.5%) were diagnosed as STEMI, 80 patients (35.9%) were UA and 55 patients (24.7%) were NSTEMI while in the rural region 17 patients (48.6%) were STEMI, 9 patients (25.7%) were UA and 9 patients (25.7%) were NSTEMI. Urban region, El-Arish, is a home land of 223 patients with a mean age of 55.81 ± 10.86, with BMI of 28.1 ± 3.8 and serum uric acid level of 5.2 ± 1.6, 168 males (75%) and 55 females (25%). 104 patients (46.6%) were diabetic, 75 patients (33.6%) were hypertensive and 121 patients (54.3%) were dyslipidemic. 111 patients (49.8%) were current smokers, 98 patients (43.9%) smoke cigarettes, 10 patients (4.5%) smoke shisha and 3 patients (1.3%) smoke both cigarettes and shisha with No history of other addictions. 41 patients (18.4%) had moderate stress during the year prior to the attack with 50% chance of developing an illness and only 3 patients (1.3%) suffered from severe stress with 90% chance of having an illness according to Holmes and Rahe stress scale.

Diet style of 91 patients (40.8%) were far away from the Mediterranean diet while most of the patients, 132 patients (59.2%), were closed to the Mediterranean diet. Majority of patients, 133 patients (59.6%), were living a sedentary life, 81 patients (36.3%) were practicing moderate physical activity per day while the minority of the patients, 9 patients (4%), were practicing vigorous physical activity.

Rural region: home land of 35 patients with a mean age of 58.3 ± 10.5, BMI of 29.2 ± 3.6 and serum uric acid level of 5.6 ± 1.6, 29 males (82.9%) and 6 females (17.1%), 18 patients (51.4%) were diabetic, 11 patients (31.4%) were hypertensive and 18 patients (51.4%) were

dyslipidemic, 23 patients (65.7%) were current smokers, 21 patients (60%) smoke cigarettes, one patient (2.9%) smokes Shisha and one patient (2.9%) smokes both, cigarettes and Shisha, with No history of other addictions. 6 patients (17.1%) had moderate stress during the year prior to the attack with 50% chance of developing an illness and No patients (0.0%) suffered from severe stress. The diet styles of 8 patients (22.9%) were far away from the Mediterranean diet while the majority of the patients, 27 patients (77.1%), were closed to the Mediterranean diet. Majority of patients, 19 patients (54.3%), were living a sedentary life, 13 patients (37.1%) were practicing moderate physical activity while the minority of the patients, 3 patients (8.6%), were practicing vigorous physical activity.

Difference between the 2 regions: There is no significant difference between the 2 regions regarding diagnosis, age, BMI, serum uric acid level, gender, diabetes mellitus, hypertension, dyslipidemia, smoking, addiction, stress and physical activity (p-value <0.05) while the only significant difference between these regions is the diet style (p-value >0.05).

DISCUSSION

Our study explores the prevalence of ACS and demonstrates the different risk factors distribution among the patients in the North Sinai Governorate as well as its urban and rural regions. 40.7% of ACS patients in our study were diagnosed as STEMI, 34.5% were UA, and 24.8% were NSTEMI. These are nearby values of a Middle East study handled this issue which shows that 39% of ACSs was STEMI [12].

Another study in Greece gave nearby values too, 38% had STEMI, 27% had NSTEMI and 35% had unstable angina [9]. On the other hand, the annual incidence, prevalence, of ACS was 65/100,000 of people in the whole governorate which was much less than in the Greek study where the annual incidence of ACS was 226/100,000 of people [9]. In our study, most of the patients, 86.4%, are living in the urban region, El-Arish city, which has a higher annual incidence and prevalence than rural regions. This diversity may partly relate to the life style difference between the people in urban and rural regions.

Mean age of our patients was 56.16 ± 10.83 years throughout the whole governorate with a little decrease in the urban regions, a mean age of 55.81 ± 10.86 years, and a little increase in the rural regions, a mean age of 58.3 ± 10.5 . Mean age of 56 ± 12 years was reported in Gulf region [12] which is of a nearby value to that in our study. But in Greece, the mean age of ACSs is 65 ± 13 years old in men and 62 ± 11 years old in women [9], that means a higher age than in our study as well as in the gulf region.

Males always unlucky with the ACS worldwide as well as in North Sinai Governorate, Men to women ratio among the patients of our study throughout the entire governorate was 3 to 1 as in the Greek study [9]. This is because of the positive influence of estrogens in women which are responsible for the higher impact of atherogenesis in men compared with women [13]. In the rural regions the men to women ratio was 4.8 to 1. The explanation of that may be the traditional life style of the people living in the rural regions, the Bedew, where the whole work, even the male work, are accomplished by the female. This provides her with extra guard, physical fitness, against ACS plus her natural hormones. Prevalence of most risk factors involved in our study was more evident in urban regions much more than in rural regions. Overweight is the general feature of ACS patients in North Sinai Governorate as no significant difference between urban and rural regions as BMI among the patients was 28.2 ± 3.7 , this was consistent with the gulf study as obesity represented 27% of the patients [12].

Physical inactivity is an important risk factor among the patients of ACS throughout the whole governorate as 58.9% of the patients exert only a minimal activity with no significant difference between urban and rural regions. Exercise is known to have beneficial effects on cardiovascular, respiratory, and musculoskeletal systems. Dyslipidemia represents another important risk factor in our study as 53.9% of the patients suffered from it which may be due to the unhealthy life style. Our study shows no

significant difference between patients in the urban and rural regions regarding dyslipidemia. On contrary of gulf study, dyslipidemia represented 32% of the patients which it was more prevalent among Bahraini and Kuwaiti patients than other gulf countries [12]. In Yadav's study, Indian study, the dyslipidemia was the least risk factors as it represented 12% of the patients [14].

Smoking: Our study showed no significant difference between urban and rural regions regarding smoking but overall current smokers represented 51.9% of the patients which considered a relatively high value if compared to the whole Arabian Gulf region where 38% of ACS patients involved in the gulf study were smokers while the percentage reached nearby value of us in United Arab Emirates, 49%, and in Yemen, 53% in the same gulf study [12]. On the other hand, in the Indian study [14], tobacco consumption was much higher than we have in our study where the percentage reached 65%. Diabetes mellitus (DM): 47.3% of the patients involved in our study were diabetics with no significant difference between urban and rural regions. The percentage is less in the gulf region as only 40%, while there is nearby values in Bahrain, 51%, and Kuwait, 50%. On the other hand, diabetes mellitus is extremely low in Yemen, 27% [12]. In the Indian study [14], DM represented 16% which is so much less than we have in our study or in the gulf study.

Canadian registry study shows 25.1% had DM among ACS patients [15] which is a nearby value, 24%, as in a Mid America Heart Institute study [16].

Diet is an important concern in our study as well as worldwide. Our study shows the diet style of 38.4% of patients were far away from the Mediterranean diet while the majority of the patients, 61.6%, were closed to the Mediterranean diet with significant difference between rural regions and the urban regions as in rural regions, the people, bedew, like to eat fishes and add olive oil to almost all kinds of their food. Among the all risk factors of ACS handled in our study, the only significant difference between patients in rural and in urban regions is the diet style, this may be due to the closer to the Mediterranean diet style in rural regions and this may be the explanation of a much lower annual incidence of ACS in rural regions, 15/100,000 vs 139/100,000 in urban regions.

Other studies explored the Interest in omega-3 fatty acids since the observation that Greenland's Eskimos have a low incidence of cardiovascular disease (CVD) in the setting of a diet rich in fatty fish [17].

Danish study shows a modest intake of fatty fish was associated with a lower risk of ACS in middle-aged men [18]. Furthermore, a greater adherence to the Mediterranean diet was associated with a lower risk of incident CHD [19]. In our study, hypertension represented 33.3% of the patients with No significant difference between patients in the rural regions and those in the urban regions. This percentage increased in the Arabian Gulf study that shows the general hypertension percentage was 49% among ACS patients involved in that study which reached its maximum value in Bahrain, 60%, and Kuwait, 56%, and reached its minimum value in Yemen, 33% in the same gulf study [12].

Substantially accumulated evidence demonstrates that transient emotional distress or mental stress is strongly linked to CAD. Mental stress induced myocardial ischemia (MSIMI) in the laboratory may occur in up to 70% in patients with clinically stable CHD and is associated with increased death and cardiovascular (CV) events. 20-70% of patients with CAD exhibit ischemia during mental stress testing. Mental stressors provoke constriction of coronaries that have a stenotic lesion or endothelial injury.

Activation of certain regions of the brain and neurohormones released during emotional arousals are thought to be the mediators of this pathologic process. Also, accelerated platelet aggregation triggered by mental stress is a key element in the underlying pathologic process, especially in individuals who are under chronic stress [20].

In our study, 19.4% of patients were suffering from stress that may raise the possibility of having an illness such as ACS which is the least contributor among the other risk factors in our study.

Addiction was a strange risk factor in our study as no one report addiction on any stuff rather than smoking cigarettes or shisha. This may be due to

the cultural barrier or the fear from going to jail or fear from losing respect from others, family and medical staff.

STUDY LIMITATIONS

There were missed cases as wide geographical zone of the North Sinai Governorate but minimal due to presence of charge free ambulance all over the governorate all the time, absence of traffic jam and available ICU beds. Our study provided us with valuable information about the potential effect of the diet style as a modifiable risk factor in primary prevention of ACS but it needs to be handled in more details especially in the rural regions where Bedew live.

CONCLUSION

In conclusion, we have tried to draw a portrait of ACS in North Sinai Governorate through finding out the volume of the disease and its risk factors among the population. We've succeeded in finding out the most important and easiest modifiable risk factors which are the overweight and physical inactivity. In addition, the Mediterranean diet style still have a probable significance in ACS primary prevention.

RECOMMENDATIONS

As most significant modifiable risk factors in our study were overweight, physical inactivity, dyslipidemia and smoking. The modification of these factors is highly recommended specially the Mediterranean diet style and its good effect in primary and secondary prevention of CAD. Also, the impact of these risk factors on the development of CAD must be studied in well-designed case-control and randomized-controlled clinical trials as including larger sample size. Also, we recommend to helping people of the North Sinai Governorate as well as the whole Egyptian people through publishing our results to allow people to gain its benefits as well as the Ministry of Health to build a successful strategy regarding CAD prevention.

COMPETING INTERESTS

The Author declares that there is no conflict of interest.

REFERENCES

1. Bavry A, Bhatt D. *Acute Coronary Syndromes in Clinical Practice*. Springer - Verlag London Limited. 2009.
2. Luepker R, Fred S, Robert H, et al. Case definitions for acute coronary heart disease in epidemiology and clinical research studies. *Circulation*. 2003;108:2543-9.
3. Fox K, Cokkinos D, Deckers J, et al. The ENACT study: A pan-European survey of acute coronary syndromes. *Eur Heart J*. 2000;21(17):1440-9.
4. Alanbaei M, Alawi A, Alsheikh A, et al. ACS in patients younger than 40 years of age in the gulf region of Middle East: Clinical presentation, management, and outcomes. *Heart Views*. 2010;11:1-2.
5. Rosengren A, Wallentin L, Simoons M, et al. Age, clinical presentation, and outcome of ACSs in the Euroheart ACS survey. *Eur Heart Journal*. 2006; 27(7):789-95.
6. Nedkoff L, Tom G, David B, et al. Age and sex specific trends in the incidence of hospitalized acss in Western Australia. *Circ Cardiovasc Qual Outcomes*. 2011;4(5):557-64.
7. Sabatine MS, Blake GJ, Drazner MH, et al. Influence of race on death and ischemic complications in patients with Non-ST-Elevation ACSs Despite Modern, Protocol-Guided Treatment. *Circulation*. 2005;111(10):1217-24.
8. Eisenmann JC, Bartee RT, wang MQ. Physical activity, tv viewing, and weight in U.S. Youth: 1999 Youth Risk Behavior Survey. *Obes Res*. 2002;10(5):379-85.
9. Christos P, Demosthenes B, Antonis A, et al. Epidemiology of ACSs in a Mediterranean country; aims, design and baseline characteristics of the Greek study of ACSs (GREECS). *BMC Public Health*. 2005;5(1):5-23.
10. Holmes TH, Rahe RH. The social readjustment rating scale. *J Psychosom Res*. 1967;11(2):213-8.
11. Dean JA, Coulabier D. A word processing database and statistic program for epidemiology on microcomputer CDC, Atlanta, Gorgia, USA. 2000.
12. Ayman E, Mohammad Z, Abdullah S, et al. Prevalence and impact of cardiovascular risk factors among patients presenting with ACS in the Middle East *Clin Cardiol*. 2011;34(1):51-58.
13. Genovefa K, Helen B, Apostolia M, et al. Aging men and lipids. *Am J Men's Health*. 2010;5(2):152-165.
14. Yadav P, Joseph D, Joshi P, et al. Clinical profile & risk factors in acute coronary syndrome. *National Journal of Community Medicine*. 2010;1(2):150-152.
15. Raymond T, Andrew T, Mary T, et al. Underuse of evidence-based treatment partly explains the worse clinical outcome in diabetic patients with acute coronary syndromes. *Am Heart J*. 2006; 152(4): 676-83.
16. Darcy L, Jonathan R, Jaime E, et al. Assessment of and physician response to glycemic control in diabetic patients presenting with ACS. *Am Heart J*. 2006;152(6):1022-7.
17. Andrew P, Laurence S. Understanding omega-3's. *Am Heart J*. 2006;151(3):564-70.
18. Bjerregaard L, Joensen A, Dethlefsen C, et al. Fish intake and acute coronary syndrome. *Eur Heart J*. 2010;31(1):29-34.
19. Teresa T, Kathryn M, Christos S, et al. Mediterranean Diet and Incidence of and Mortality from CAD and Stroke in Women. *Circulation* 2009;119(8):1093-1100.
20. Wei J, Eric J, Zainab S, et al. Responses of mental stress-induced myocardial ischemia to escitalopram treatment: Background, design, and method for the Responses of Mental Stress Induced Myocardial Ischemia to Escitalopram Treatment trial. *Am Heart J*. 2012;163(1): 20-26.