ORIGINAL RESEARCH

Clinical Characteristics, Risk Factors, and Angiographic Profile of Syrian Refugees Admitted with Acute Coronary Syndrome in a Tertiary Center in Turkey

Türkiye'de Üçüncü Basamak Bir Merkeze Akut Koroner Sendromla Başvuran Suriyeli Mültecilerin Klinik Özellikleri, Risk Faktörleri ve Anjiyografik Profilinin İncelenmesi

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Abstract

Objective: To investigate the impact of refugee life on cardiovascular events has not been adequately studied. We examined the angiographic profile and risk factors of Syrian refugees who migrated to Turkey and presented to our clinic with acute coronary syndrome.

Method: In this retrospective descriptive study, 201 Syrian refugees who underwent coronary angiography for acute coronary syndrome were included. Demographic data, laboratory values, risk factors, and in-hospital outcomes were recorded. To assess the burden of coronary atherosclerosis, the SYNTAX 1 score, number of diseased vessels, TIMI thrombus burden, and flow grade were determined. Data not conforming to normal distribution were presented as median values.

Results: Most of the population was male (70.6%), with a mean age of 56 (49.5-61). The rates were 41.8%, 37.8%, and 20.4%, respectively. The prevalence of risk factors was as follows: hypertension (59.2%), diabetes (36.8%), hyperlipidemia (86%), smoking (65.6%), and previous coronary artery disease (21.3%). In 83% of the patients, the SYNTAX 1 score was >22; 50.4% had a high thrombus burden, 95% had multivessel disease, 74.1% underwent stent implantation, and 17.9% required coronary artery bypass grafting. The in-hospital mortality rate was 5% (10).

Öz

Amaç: Mülteci yaşamının kardiyovasküler olaylar üzerindeki etkisi yeterince incelenmemiştir. Türkiye'ye göç eden Suriyeli mültecilerden akut koroner sendrom ile kliniğimize başvuranlarda anjiyografik profil ve risk faktörlerini incelemeyi amaçladık.

Yöntem: Retrospektif tanımlayıcı çalışmamızda, akut koroner sendrom tanısıyla koroner anjiyografi yapılan 201 Suriyeli mülteci dahil edildi. Hastaların demografik verileri, laboratuvar değerleri, risk faktörleri ve hastane içi sonuçları kaydedildi. Koroner ateroskleroz yükünü değerlendirmek için SYNTAX 1 skoru, hasta damar sayısı, TIMI trombüs yükü ve akım derecesi belirlendi. Normal dağılıma uymayan veriler ortanca değer olarak sunuldu.

Bulgular: Popülasyonun çoğunluğu erkeklerden (%70,6) oluşuyordu ve yaş ortalaması 56 (49,5-61) idi. ST yükselmesiz miyokard enfarktüsü %41,8, ST yükselmeli miyokard enfarktüsü %37,8, kararsız anjina pektoris %20,4 oranındaydı. Risk faktörleri sıklığı; hipertansiyon %59,2, diyabet %36,8, hiperlipidemi %86, sigara kullanımı %65,6, önceki koroner arter hastalığı öyküsü %21,3 idi. Hastaların %83'ünde SYNTAX 1 skoru >22, %50,4'ünde yüksek trombüs yükü, çok damar hastalığı %95, stent implantasyon oranı %74,1, koroner arter baypas greftleme ihtiyacı %17,9 idi. Hastane içi ölüm oranı %5 (10) idi.

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Abstract

Conclusion: Our study revealed that Syrian refugees have a significant burden of coronary artery disease. These findings demonstrate the importance of cardiovascular care strategies for refugees.

Keywords: Acute coronary syndrome, immigrant health, Syrian refugees

Öz

Sonuç: Çalışmamız, Suriyeli mültecilerin ciddi koroner arter hastalığı yüküne sahip olduklarını ortaya koymuştur. Bu sonuçlar, mültecilerde kardiyovasküler bakım stratejilerinin önemini kanıtlamaktadır.

Anahtar kelimeler: Akut koroner sendrom, göçmen sağlığı, Suriyeli mülteciler

Introduction

Cardiovascular diseases (CVD) account for 31% of all deaths worldwide. Approximately three-quarters of these deaths occur in low-and middle-income countries. However, most clinical research data are from developed countries (1). Effective management of CVD-related health expenditures is possible by examining underdeveloped countries and special groups such as refugees (2). If the prevalence of modifiable risk factors in the mentioned groups can be determined through clinical studies, mortality and economic benefits can be achieved (3).

Social differences impact CVD. Modifiable risk factors for CVD are influenced by the development levels of countries. However, the development level is not the only determinant. Extraordinary situations, such as wars and natural disasters, also have an impact. Additionally, ethnic factors also play a role as well (4).

The epidemiological consequences of war impact societies. Long-term conflicts lead to economic problems, inadequate healthcare services, psychological stress, malnutrition, and unhealthy living conditions. Conflict environments lead to refugee migration, and refugees encounter issues such as increased smoking, unhealthy diets, and lifestyles (5). Turkey hosts more than 3.5 million Syrians because of the conflict in Syria. Syrian refugees living in Turkey have access to the same healthcare services as Turkish citizens, free of charge. However, there are no adequate clinical studies on CVD among refugees (6).

Syrian refugees have many conventional risk factors and a high risk of atherosclerosis. However, the number of studies in this field has been remarkably low. We believe that the prevalence of risk factors, clinical outcomes, stent implantation and coronary artery bypass grafting (CABG) rates, coronary artery structure, atherosclerosis burden, and in-hospital mortality in acute coronary syndrome (ACS) patients among refugees should be investigated. The effects of ethnic differences and geographical changes on CVD can also be examined through studies in this field. In this study, we analyzed the clinical and angiographic profiles and in-hospital results of Syrian refugees living in Turkey who were admitted to our clinic with a diagnosis of ACS.

Materials and Methods

Study Protocol

In this retrospective study, the angiographic, clinical, and laboratory features of 201 consecutive Syrian refugee patients who were admitted to the cardiology clinic of University of Health Sciences Turkey, İstanbul Bağcılar Training and Research Hospital with a diagnosis of ACS between January 1, 2017, and December 31, 2020, were analyzed. There was no financial support or interest in this study. Necessary patient consent was obtained. Patients who had previously undergone CABG were excluded from the study. Those of Syrian ethnicity who immigrated to Turkey as postwar refugees were included in this study. The diagnosis of ACS is based on evidence-based European guidelines. Patients were recorded as having ST-elevated MI (STEMI), non-ST-elevated MI (NSTEMI), and unstable angina pectoris (USAP) (7). By scanning our hospital's database, we obtained laboratory values, in-hospital mortality rates, and the number of patients who underwent CABG. Angiography images were monitored to create the angiographic profile. Using universal TIMI thrombus and flow gradings, the thrombus and flow grades in the infarct-related artery were determined. These gradings were recorded both before and after the procedure (8,9). Patients were classified into low (grades 1, 2, and 3) and high thrombus burden (grades 4 and 5). In the presence of >50% stenosis in non-infarct-related arteries, the vessel was considered a diseased coronary vessel. The number of diseased vessels was calculated. If there were two or three main vessel diseases, multivessel disease was considered. Infarct-related arteries were recorded as the left main coronary artery (LMCA), left anterior descending artery (LAD), circumflex artery (CX), right coronary artery (RCA), and their subbranches. A web-based score calculator (http://www.syntaxscore.com) was used to calculate the SYNTAX 1 score. Because the SYNTAX 1 score was not normally distributed, the median mean score was determined, and the scores were grouped as ≤22, 22-33, ≥33.

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The presence of hypertension (HT), hyperlipidemia (HL), and diabetes mellitus (DM) was determined according to the definitions of the European guidelines (10). History of previous coronary artery disease (CAD) was recorded. Only the presence of stent implantation was considered evidence of CAD. The smoking rate was recorded. Contrast-induced nephropathy (CIN) was determined and recorded according to universal definitions (11). Increases in creatinine levels within the first 72 hours were defined as non-CIN.

Ethical Approval

Ethics committee approval for this retrospective study was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Turkey, İstanbul Training and Research Hospital (date: 25.02.2022, decision no: 85). This study was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

The SPSS 16.0 statistical package was used in the evaluation. In cases where the data were not normally distributed, median values were calculated and minimum-maximum values were given. Means and standard deviations were calculated for normally distributed values. Because there was no comparison group, the p-value was not calculated.

Results

The aim of this retrospective descriptive study was to evaluate the demographic and angiographic characteristics of Syrian refugees who presented to our clinic with ACS. Additionally, it aimed to determine in-hospital outcomes and the prevalence of CVD risk factors. Of the 201 patients included in the study, men comprised the majority (70.6%). The overall average age was 56 (49.5-61). The average age of women (60) was higher than men (54). The average length of hospital stay was 4 (2-5) days. 59.2% of the patients had HT, and 36.8% had DM. Both risk factors were more common in women (HT in men: 58.4%, DM: 30.9%; in women: HT 61.01%, DM 50.8%). The HL rate was 86%, and the rate was similar in both gender groups. The smoking rate was 65.6%, and the history of previous CAD was 21.3% (43), both of which were more common in men (34). The most common form of presentation was NSTEMI (41.8%). In angiography, 76.1% of the patients underwent stent implantation, and 17.9% had a CABG decision. Medical treatment was applied without revascularization in 10 patients, and there was no critical stenosis in 6 patients. The in-hospital mortality rate was 5%, CIN was 6.5%, and non-CIN was 4%. Clopidogrel was used in 68.7% of the patients, Ticagrelor in 17.4%, and

Prasugrel in 0.5%. Basic demographic data, risk factors, laboratory values, and ACS subtypes are presented in Table 1.

Aneurysmal vascular structures were found in 4.5% (9) of patients. In the distribution of infarct-related arteries, the LAD had the highest rate at 48.3% (97); others were the RCA at 31.9% (64), CX at 25.9% (52), and LMCA at 1% (2). Vessels with more than 50% critical stenosis unrelated to infarction are presented in Table 2. In 30 of the 153 patients who received stents, a second intervention was planned. Multivessel disease was common; 137 patients having critical stenosis in 3 vessels, 54 patients in 2 vessels, and 2 patients in 1 vessel, unrelated to infarction. There were no additional critical stenosis in 8 patients.

The median SYNTAX 1 score was 29.5 (0-113.5). Only 17% of the patients had a SYNTAX 1 score ≤22. Of the 24 patients

Table 1. Basic demographic data, risk factors, laboratory values, and ACS subgroup analysis

Variables	Values
Age (year)	56 (49.5-61)
Gender n,%	
Male	142, 70.6
Female	59, 29.4
ACS subgroup n (%)	
NSTEMI	84, 41.8
STEMI	76, 37.8
-Anterior	36, 17.9
-Inferior	36, 17.9
-Lateral	3, 1.5
-Posterior	1, 0.5
USAP	41, 20.4
Risk factors (n)	
HT	119, 59.2
DM	74, 36.8
HL	173, 86.0
Complete blood count (n=200), 10^3	
WBC (10^3/µL)	10 (8-13)
LYMPH (10^3/µL)	2.4 (1.9-3.3)
HB (g/dL)	13 (12-14.1)
MCV (10^3/µL)	85 (81-89)
PLT (10^3/µL)	264 (216-314)
Kidney function values (n=200)	
Creatine (mg/dL)	0.8 (0.7-0.9)
BUN (mg/dL)	32.5 (25-40)
eGFR (mL/min/1.73 m^2)	97.5 (82.5-108)
Lipid profile (mg/dL)	
LDL-C (n=101)	136 (110-159)
HDL-C (n=95)	36 (31-44)
TG (n=92)	186.5 (126-255)
Glycemic profile	
HbA1c (%) (n=68)	7.45 (5.8-10.9)
Glucose (mg/dL) (n=200)	143 (108-228)

ACS: Acute coronary syndrome, BUN: Blood urea nitrogen DM: Diabetes mellitus, e-GFR: Estimated glomerular filtration rate, HB: Hemoglobin, HDL-C: High-density lipoprotein cholesterol, HL: Hyperlipidemia, HT: Hypertension, LDL-C: Low-density lipoprotein cholesterol, LYMPH: Lymphocyte, MCV: Mean corpuscular volume, NSTEMI: Non-ST Elevation myocardial infarction, PLT: Platelet, STEMI: ST elevation myocardial infarction, TG: Triglyceride, USAP: Unstable angina pectoris, WBC: White blood cell

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with a SYNTAX 1 score ≥33, 12% underwent CABG (Table 3). In 71% of the patients, the SYNTAX 1 score ranged from 22 to 33. High thrombus burden (grades 4-5) was observed in 50.4% of the patients (Table 4). Six of 10 patients who died in the hospital had a TIMI thrombus grade of 5, and this high thrombus grade was more common in the STEMI group.

Although the TIMI flow grade was initially 0/1 in 110 patients, it was determined as 3 in 160 patients after the procedure (Table 5). Of 34 patients with TIMI 0/1 flow after the procedure, 8 underwent STEMI, 16 underwent NSTEMI, and 10 underwent USAP. In 16 patients, CABG was decided without percutaneous revascularization or because flow could not be established. Five of the other 18 patients were hemodynamically unstable during the procedure and died.

Discussion

In this study, we found that Syrian refugees with ACS have complex coronary arteries and a high prevalence of risk factors. The high SYNTAX 1 score confirms this. The next step is to address this condition. The lifestyle of the country where refugee migrate affects CVD. High CVD risk should be identified early and poor outcomes should be reduced. Poor living conditions are associated with poor prognosis in patients with ACS (12). Cardiovascular risk factors are quite high among refugees. Depression is also associated with increased CVD mortality (13). Countries like Turkey that accept refugees have specific responsibilities. Cardiovascular risk factors among refugees should be identified early and treated. Factors leading to poor outcomes should be eliminated by evaluating living conditions. According to the WHO STEPS study, 58.7% of Syrian refugees in Turkey have at least three CVD risk factors

(14). Despite the presence of many risk factors among Syrian refugees, studies in this field are few. Conducting our study on patients with ACS will increase awareness of the importance of addressing modifiable risk factors. This, in turn, will contribute to better patient management. Ultimately, this approach will improve long-term patient outcomes.

Multivessel disease and a high SYNTAX 1 score indicate the prevalence of atherosclerotic disease. The SYNTAX 1 score is directly proportional to coronary TIMI thrombus burden and inversely proportional to flow grade. These parameters are interrelated and can predict mortality risk (15,16). Therefore, in our study, all these parameters were examined when assessing CVD severity.

According to the INTERHEART study, the highest rates of HT and DM were found in Southeast Asia at 59.2% and DM at 38.8% (17). However, in our study, the rates were even higher. In a study comparing 67 Syrians and 427 Turks who underwent CABG, HT was found to be 35.8% and DM 32.8% among Syrian refugees. The SYNTAX 1 score was also higher in the refugee group (6). In the TURKMI study examining Turkish AKS cases in Turkey , HT and DM were 49.5% and 37.9%, respectively. Compared with our study, the DM rates were similar (18). However, the HT rate in our study was higher than that of Turks in the TURKMI study.

Study Limitations

The major limitation of our study is its retrospective nature. The failure to evaluate family history and obesity as risk factors is a limitation. The single-center study design limits the study population and makes it insufficient. This was a descriptive study without a control group. Prospective studies with a control group are recommended.

Table 2. Vessels not related to infarction causing ≥50% stenosis

Coronary arteries	Number of patients with critical stenosis
LMCA	7
LAD	147
LAD side branch	38
CX	90
CX side branch	54
RCA	110
RCA side branch	13

CX: Circumflex artery, LAD: Left anterior descending artery, LMCA: Left main coronary artery, RCA: Right coronary artery

Table 3. SYNTAX 1 score distribution of patients

Score value	n, %
≤22	34, 17
22-33	143, 71
≥33	24, 12

Table 4. Distribution of pre-procedure TIMI thrombus grades

TIMI grade	Number of patients
TIMI 0	37
TIMI 1	47
TIMI 2	3
TIMI 3	12
TIMI 4	20
TIMI 5	82

Table 5. Preprocedure and postprocedure TIMI flow grade of the patients

TIMI flow grade	Pre-procedure	Post-procedure
0	97	17
1	13	17
2	8	7
3	83	160

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Conclusion

The Syrian civil war is a public health issue with serious health implications for refugees. We believe that this increases the risk factors for CVD. Lack of research in this area may lead to insufficient health services for refugees. Our study examining the angiographic profiles and in-hospital outcomes of patients with ACS can contribute to refugee health. Prospective studies on refugees will help develop prevention and treatment strategies.

Ethics

Ethics Committee Approval: Ethics committee approval for this retrospective study was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Turkey, İstanbul Training and Research Hospital (date: 25.02.2022, decision no: 85). This study was conducted in accordance with the Declaration of Helsinki.

Informed Consent: The study was designed retrospectively.

Authorship Contributions

Surgical and Medical Practices: E.M.F., S.G., İ.Y., M.E.A., M.Z., S.Ö., E.D., E.O., Concept: E.M.F., S.G., İ.Y., M.E.A., M.Z., S.Ö., E.D., E.O., Design: E.M.F., S.G., İ.Y., M.E.A., M.Z., S.Ö., E.D., E.O., Data Collection or Processing: E.M.F., S.G., İ.Y., M.E.A., M.Z., S.Ö., E.D., E.O., Analysis or Interpretation: E.M.F., S.G., İ.Y., M.E.A., M.Z., S.Ö., E.D., E.O., Literature Search: E.M.F., S.G., İ.Y., M.E.A., M.Z., S.Ö., E.D., E.O., Writing: E.M.F., S.G., İ.Y., M.E.A., M.Z., S.Ö., E.D., E.O.

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