Anemia Prevalence and Sociodemographic Factors among Patient with Cardiovascular Disease in Gaza-Palestine

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Abstract  Chronic anemia is a risk factor for cardiovascular diseases outcome in patients with heart failure, dilated cardiomyopathy and uncontrolled hypertension. This study was performed to analyze the prevalence of anemia among cardiac patients and to determine the relationship between anemia and socio demographic characteristics. The study design is a cross sectional based on 300 cardiac patients (≥ 19 years) who were hospitalized in ALShifa hospital (Gaza) for 3 months period during the year 2012. The analysis includes socio demographic data, traditional risk factors for cardiovascular diseases (CVD), and Laboratory test included (hemoglobin and clearance creatinine measurement). Collected data was analyzed by using statistical package for social science version 20.0. Anemia was defined as Hemoglobin less than < 12 g/dl in female and less than 13 g/dl in male based on World health organization criteria. Among 300 patients, 181 patients (60.3%) were anemic and 119 (39.7%) were non-anemic. The mean age for all population was 61.4 years. Mean age of patients with anemia tends to be higher (63.9 years) than non-anemic (57.7 years) and the differences between the two means reached statistical significant level (P value < 0.001). Anemia was more common in female (71.4%), older age (71.1%), diabetics (70%), impaired clearance creatinine (70%), hypertensive’s (65%) and low education level (64.5%). The highest proportion belonged to valvular heart disease (77.8%), congestive heart failure (74.6%) followed by hypertension (54%), and the lowest is coronary artery disease (46%). Logistic regression reveals that low education, low clearance creatinine level, smoking and diabetes are independently associated with anemia. We conclude that Anemia is common among cardiovascular disease patients, and worsens the prognosis of their clinical condition. Intervention policies to minimize anemia risk factors are needed.

Keywords: anemia, cardiovascular diseases, socio demographic factors, Gaza, Palestine


1. Introduction

One of the major health challenges to global development in this century is the rapid rise of Non-Communicable Diseases (NCDs) in both developed and developing countries. This growing challenge threatens economic and social development as well as the lives and health of millions of people [1].

The Eastern Mediterranean Region is facing a growing epidemic of CVDs provoked by ageing population and socioeconomic changes. Risk factors for CVDs among Palestinians are demonstrated in a combined observational and analytical cross sectional study conducted by UNRWA in NCD clinics. The study revealed that, most of the identified CVD risk factors were obesity (61.5%), hypercholesterolemia (37.8%), hypertension (30.7%), diabetes (46.7%), physical inactivity (46.8%) and smoking 16.3% [2].
main associated health morbidity and the socio
demographic factors.

2. Patients and Methods

This is a cross sectional study included 300 adults patient (≥19 years) who were hospitalized with a
diagnosis of cardiovascular disease in AL Shifa hospital
(Gaza strip) for 3 months period during the year 2012. The
patients were evaluated regarding their demographic data,
cardiovascular risk factors, main clinical diagnosis and
laboratory data.

In our study, the definition of anemia is Hemoglobin
less than 13 g/dl for men and 12 g/dl for women based on
World Health Organization (WHO) criteria. Chronic
kidney disease is defined by calculation of creatinine
clearance according to Cockcroft-Gault equation (140-age) × weight (kg)/ 72 x serum creatinine (mg/dl) multiply by
0.85 for women,(less than 85 ml/min impaired and equal or more than 85 ml/min normal clearance creatinine).

Cardiologist made the clinical diagnosis of hospitalized
cardiovascular patients. Socio demographic variables were
patient’s age, gender, level of education, citizenship
(citizen or refugee), family size and place of residence
(city, camp). In addition, traditional cardiovascular risk
factors were determined, hypertension, diabetes, cigarette
smoking, body mass index (≥30 kg/m^2 is obese).
Laboratory test included hemoglobin and clearance
creatinine level. Helsinki committee for ethical issues in
Gaza strip approved this study. Collected data was
analyzed by using statistical package for social science
version 20.0, Numbers and percentage were used to
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The odds ratio and confidence interval of each risk factor
was calculated. The differences between means were
tested by t-test. In the end, logistic analysis was used to
reveal the predictors that can be associated independently
with anemia. The P value less than 0.05 was considered
statistically significant.

3. Results

Out of 300 cardiac patients, 181 patients (60.3%) were
anemic and 119 (39.7%) were non-anemic. Table 1 shows
the characteristics of study population by anemia status.
Among the patients, there were 153 (51%) men vs. 147
(49%) women. The prevalence of anemia among female
patients 105 (71.4%) is higher than male patients 76
(49.7%). The difference between the two groups reached
statistical significant level (P value < 0.001). The mean
age for all study population was 61.4 years. Mean age in
anemic patients tends to be higher (63.9 years) than non-
anemic (57.7 years) and the difference between the two
means reached statistical significant level (P value <
0.001). Analysis of age group showed that the prevalence
of anemia increased by the age increase which is
progressive and statistically significant. The higher rate of
anemia prevalence in our population belongs to the age
group older than 70 years (71.1%), the difference between
age groups is statistically significant (P value <0.001).
Our findings revealed a relationship between education
level and anemia. The prevalence of anemia among low
educated patients is two times higher than the patients
with high education level (64.5% vs. 35.5%) and the
difference reached statistical significant level (P value <
0.001). A minor difference did not reach statistical
significant level is observed between patients classified by
citizenship, residency and family size.

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Anemic</th>
<th>Not Anemic</th>
<th>Total</th>
<th>OR (95%CI)</th>
<th>P value</th>
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<tbody>
<tr>
<td></td>
<td>NO</td>
<td>%</td>
<td>NO</td>
<td>%</td>
<td></td>
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<tr>
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<tr>
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<td>76</td>
<td>49.7</td>
<td>77</td>
<td>50.3</td>
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<tr>
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<td>105</td>
<td>71.4</td>
<td>42</td>
<td>28.6</td>
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<tr>
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The reported cardiovascular diseases in our study
include valvular heart disease (VHD), congestive heart
failure (CHF), hypertension (HTN) and coronary artery
disease (CAD) were demonstrated in Table 2. According to
our findings the highest prevalence of anemia is reported
in VHD, with the prevalence of (77.8%), patients with
CHF are at the second place with a prevalence of (74.9%),
followed by patients with HTN (54%), while patients with
CAD reported the lowest prevalence rate (46.10%).
To continue the summary of our estimations Table 3 shows that Anemia is more prevalent among hypertensive patients (65% vs. 47.5%) and the difference between hypertensive and normotensive is statistically significant (P value < 0.006). The same difference was observed among diabetics (70%) than non-diabetics (49.3%). Chance of anemia is less among smokers (38%) than non-smokers (67.2%) with statistical significant difference (P value < 0.001). Our findings also demonstrate that chances of anemia is 3.5 folds higher among patients with impaired creatinine clearance (P value < 0.001). Anemic patients have larger body mass index (31.4 vs. 30.1), this difference was statistically significant (P value 0.035).

To control for the confounding effects of the different risk factors we constructed multivariate analysis by the use of the logistic regression analysis. The dependent variable is anemia status and the covariates included clearance creatinine level, smoking, low education, diabetes Mellitus, hypertension, body mass index and age as demonstrated in Table 4. The significant predictors that can affect anemia independently are clearance creatinine level, smoking, low education and diabetes Mellitus.

4. Discussion

In the Palestinian community, neither the prevalence nor the prognosis of anemia has been well defined in patients with CVDs. In our study, it is clear that prevalence of anemia among cardiac patients is higher than the prevalence among the general population, and the risk is higher among women, poor and less educated people.

Most practical definition of anemia is the one given by the World Health Organization (WHO), hemoglobin concentration less than 13 g/dl for men and 12 g/dl for women [2,7]. Based on this definition, our findings revealed high prevalence of anemia among cardiac patients (60.3%), more in female than male (71.4%, 49.7% respectively). De Maria founds that the combination of heart disease and anemia is present in females and it was associated with 3.5 times greater risk of mortality than for nursing home resident without these dual co morbidity [8]. Prior studies have suggested that lower hemoglobin may be a risk factor for CVD outcome, in high-risk patients who already have CVD or have many risk factors for CVD, who Sarnak et al, found in a large study for 14,410 patients that (9%) of adults (men 5% and women 13%) of a normal USA population ages 45-64 years, have anemia [5]. Anemia predisposed patients to a risk of developing CVD and it is a risk factor in cardiovascular survival rate [9]. Our present study revealed significant increase in the prevalence of anemia by increasing age, (71.1%) in- patient older than 70  years, have anemia [5]. Anemia predisposed patients to a risk of mortality than for nursing home resident without these dual co morbidity [8]. Prior studies have suggested that
anemia [12]. In a study of northwest Iran 2011 shows the highest rate of anemia age group older than 70 years and patients younger than 40 years [13].

Also in our study we observed that cardiac patients with anemia were less educated (64.5%), hypertensive (65%), diabetics (70%), obese (BMI 30 kg/m² and more) and with impaired clearance creatinine (70%). Our data came in agreement with a study In Saudi Arabia completed, in the Cardiovascular Disease Management Program (CVDMP), showed that (27%) of patients of anemia, higher prevalence in females (33.4%), (63%) were 60 years, (74.7%) were hypertensive, (77.4%) had diabetes and (28.6%) had renal disease. The anemia prevalence rate (27%) is lower than our reported prevalence where anemia among general population is lower than the Palestinians percentage due to variation in socioeconomic status [14].

The presence of anemia if extended for a long period may result in ventricular remodeling and cardiac dysfunction [15,16]. It causes important physiologic effect on the cardiovascular system. Metabolic effect induced by anemia can result in direct myocardial toxicity, myocyte dysfunction, water retention which could be harmful in patients with heart failure [17,18,19]. As know Anemia is a common co morbidity and predictor of mortality in patients with chronic heart failure (HF). In recent years, the prevalence rate of anemia in patients with HF has received increasing attention; the rate of HF is 20% in developed countries. Chronic HF, affects 1-2% of the European population, is an important cause of mortality and disability [20,21]. Groenweld et al found that prevalence of anemia was 37.2% in a meta-analysis of 34 studies on 150,180 patients with HF between 2001 and 2007 and concluded that, during management of these patients, it is quite helpful to be aware of the factors that are associated with mortality and morbidity [22].

Over the past years, clinical surveys and trial, showed that the prevalence rate of anemia in HF patients have resulted in range from 9.9% in Valsatran HF trial (Val-Heft), to (55.6%) in the study by Silverberg, despite medical therapies, the annual mortality rate was 20% [23,24]. In addition 30-40% of patients with HF, die within the first year, and 60-70% of these patients die within five years following diagnosis [25]. OPTIME CHF trials showed that every 1 g/dl fall in hemoglobin level is independent risk factors for death and readmission [26].

The presence of anemia with other risk factors including chronic kidney disease, diabetes mellitus is associated with increased mortality, hospitalization and morbidity [27]. Different studies suggest that anemic patients with CHF are more likely to be older, female with more clinical symptom of HF, higher hospitalization rate, history of diabetes and renal insufficiency [20,28]. Our findings is coming in accordance with the data of all these studies, anemia was present in (74.9%) of study population with CHF, most of patients were females with high risk of co morbidity.

Considering profile and clinical implications of anemia in-patient with (CAD), several studies believe that presence of anemia has increased ischemic symptoms, and contributes to the occurrence of myocardial ischemia, associated with a worse prognosis[11,29]. In hospitals, anemia in patients presenting with acute coronary syndrome (ACS), varies between (15%) and (43%) [30,31,32]. The prevalence of anemia in patient presenting with ACS in a study found in Barcelona Spain during the period (2009-2010) was (25%), and it is a predictor of mortality and cardiovascular complication [33].

For the explanation of the anemia causes Salisbury et al, suggest that up to (57.5%) of patient admitted with normal hemoglobin value acquires anemia during hospital admission [34]. Patients with so-called nosocomial anemia have higher morbidity and mortality during first year of follow up than those who maintain normal hemoglobin value [35]. Bleeding in patients with acute coronary syndrome is not negligible and is due to anti platelets and anticoagulants therapy, and may influence the prognosis. Only a small number of authors have suggested that repeated blood sample, and an inflammatory state in ACS has been described as possible causes [36,37,38,39,40]. In northwest Iran, Azin et al, found that the prevalence of anemia in ischemic heart disease was less than other CVDs (22%), and the study did not discuss the various range of hemoglobin concentration affect the risk of hospitalization and mortality [13]. In our study we found that anemia in CAD was (46.10%).

There are scarce available data concerning the prevalence of anemia in patient suffering from VHD. Available data concerning the subject has been reported by Fyeza Hassan in case report study of Aortic stenosis and gastrointestinal bleeding [41]. In our analysis, the highest proportion belonged to VHD with prevalence rate of (77.8%). This could be explained by the use of dual anti platelet or warfarine therapy that increases the risk of gastrointestinal bleeding in cardiac patients.

Additionally, anemia in hypertension is characterized by pro atherosclerotic condition, with impaired endothelial function, which is an independent predictor of mortality [42]. In our study the percent is (54%) probably due to uncontrolled hypertension associated with others risk factors mainly diabetes, impaired kidney function and low education level. In a study in Australia about 187 hypertensive patients, the prevalence of anemia was (16%) and was higher in patients with uncontrolled hypertension [43]. Moreover, a study in Iran reported the prevalence of hypertension in anemic patients as (20.5%) [13].

5. Conclusion

Clinician should be aware that anemia is common among in-patients with cardiovascular disease and that it is associated risk of morbidity and mortality, and treatment of anemia may be helpful to reduce the risk.

References

Anemia has been identified as a Risk Factor for Cardiovascular disease in the Atherosclerosis Risk in Communities (ARIC) Study, as mentioned in the American Journal of Cardiovascular Disease Research. This area of research highlights the importance of understanding the mechanisms underlying anemia and its impact on cardiovascular health. Furthermore, the role of inflammation and long-term mortality after non-ST elevation acute coronary syndrome in patients with heart failure is also a critical aspect discussed in the same journal. The prevalence of anemia in patients with chronic heart failure and its clinical characteristics is an area of focus, as detailed in the Cardiac Failure journal. The effect of diagnostics phlebotomy on hemoglobin and hematocrit in mechanically ventilated patients is another topic of interest, as reported in the Heart Lung journal.