

# Previously Undiagnosed Anaemia in Diabetic Adult Patients Admitted at Emergency Department

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## ABSTRACT

Commonly, anaemia is defined as a medical condition with an insufficient mass of red blood cells (RBCs) moving in blood circulation; anaemia is also defined as a blood disorder with haemoglobin (Hb) concentration below the thresholds given by world health organization (WHO). Several diseases and pathologic disorders found to be associated with anaemia incidence. Anaemia might presented with several health complications according to its severity. However, most patients with anaemia do not show severe symptoms, and therefore they cannot know if they have the disease to look for medical attention. Thus, this study aimed to assess the incidence of undiagnosed anaemia in diabetic adult patients who aged between 22- 90 years and admitted at emergency department (ER) in Al-Huda hospital. The results of this study showed that 36% of patients who admitted to the ER during the study period were diabetic and have not been diagnosed with anaemia previously. All patients were Saudi's, the majority were female, and non-school completed. Many of these patients did not present with clinical findings of anaemia. The admission causes were different including: shortness of breath, abdominal pain, chest pain, drowsiness, flank pain, nausea and vomiting. Out of the diabetic patients there were five cases noted with low mean Hb and low RBCs level. According to the WHO criteria, those patients had anaemia. However, further laboratory investigations were needed to determine the specific type of anaemia. This study suggested an integrated strategy for anaemia control and prevention including education to encourage community to improve their dietary nutrition, reducing inhibitors of iron absorption (such as tea) and taking iron supplementation pills specially among high risk and diabetic individuals.

**Keywords:** Undiagnosed; Anaemia; Diabetic; Emergency department; Saudi Arabia

## INTRODUCTION

Anemia is a common public health problem in developed and developing countries, characterized by low level of red blood cell (RBCs) or decreased hemoglobin (Hb) concentration [1]. Commonly, anaemia defined as that condition with an insufficient mass of RBCs in blood circulation; anaemia is also described in public health term as a blood disorder with haemoglobin concentration below the thresholds given by WHO, UNICEF & UNU [2]. This will lead to low oxygen-carrying capacity of RBC and affecting the body's physiological requirements [3]. According to the world health organization, about one third of the global population are anaemic [4].

Anaemia can be generated because of several diseases and pathologic disorders. It has been found that anaemia common

causes of high morbidity and mortality in diabetic patients and highly affects older population [5]. Several health complications are related to anaemia according to its severity, in adults my cause fatigue, lack of concentration, shortness of breath, palpitations and impaired work performance. However, most patients with anaemia do not show severe symptoms, and therefore they cannot know if they have the disease and often think symptoms are a result of their daily activities rather than the resulting of anaemia. It has been found that various factors were responsible for elevated prevalence of anaemia including; poor iron and folic acid intake, poor absorption of iron, sever blood loss (haemorrhage), genetic disorders (sickle cell disease), infection, malaria, parasite infestation (hookworm) and chronic diseases [6,7]. However, nutritional deficiency of iron, folate and vitamin B12 reported to be the major cause of anaemia [8,9].

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In 2008, high prevalence of anaemia was noted among women aged between 22 to 25 years, which may be due to the menstruation effect and puberty –menorrhagia [10]. Within the same study, they also found that the prevalence of severe anaemia in women aged 13-25 years in low income and middle-income area was 42% and 58% respectively [10]. More recent study was performed in 2018, among young women seeking abortion care at a county hospital in Chicago showed high prevalence of undiagnosed anaemia with 91% (412 of 451) of anaemic women did not have a preexisting anaemia diagnosis [11]. In Saudi Arabia, higher incidence of iron deficiency anaemia (IDA) was reported among Saudi female in a comparison with Saudi male in Riyadh city [12]. Another study, in the Western region of Saudi Arabia showed that the majority of female (aged between 18-40 years) who attended to before marriage clinic examination and were free of any chronic diseases presented with undiagnosed anaemia [13].

According to the Third National Health and Nutrition Examination Survey, anaemia is significantly twice higher in individuals with diabetes than individuals without diabetes with a similar degree of renal impairment [14]. In diabetic patients, anaemia affects both type 1 and type 2 diabetes, although the prevalence may be greater in type 1 with higher prevalence in women than men. Anaemia in patients with diabetes have been reported to be at high risk of cardiovascular morbidity and mortality thus, early detection and treatment of anaemia is essential for the protective effects on the cardiovascular system and renal disease and complications. Other research study reported a high incidence of anaemia among patients with poorly controlled diabetes, and more than two third had a hemoglobin concentration less than 11.16 in males and less than 10.41 in females requirements [3]. Raised awareness about risks factors associated with the high anaemia incidence in diabetic, together with periodic laboratory investigation and appropriate treatment, will significantly contribute to improving long-term outcomes.

The aim of this study was to assess the prevalence of undiagnosed anaemia among group of Saudi male and female diabetic patients and did not have a preexisting anaemia diagnosis when admitted to the ER.

## METHODS

The study performed in a large armed forces hospital in Taif city at the Western region of Saudi Arabia. It was conducted in June 2019 to assess the presence of undiagnosed anaemia presented with low level of red blood cells (RBCs) and haemoglobin (Hb) among diabetic patients who admitted to the emergency department (ER) during the study periods. Sixty-three adult patients who aged over 20 years were agreed to participate in this study. Of these, 23 patients were diabetic and completed paper questioner regarding their age, nationality, previous anaemia diagnosis, cause of admission, medication, family history and educational level. Followed by testing their complete blood count (CBC) to investigate the level of red blood cells (RBCs) and haemoglobin (Hb) using CELL-DYN

Ruby machine and calibrated by standard quality assurance at the hematological laboratory. Patients younger than 20 years old and non-diabetic were excluded from the study. Moreover, smoker patients were not included since the CBC results might be affected with the product of cigarette smoke [15].

The proposal of this study was approved by the research ethical committee of medicine college at Taif University and committee of Al-Huda hospital for armed forces in Taif. All patient's personal and health information were highly confidential

Data were exported to Statistical Package of Social Sciences (SPSS) and Microsoft Office Excel. All data were manually input SPSS and analyzed by statistical program SPSS, version 16.0 for Windows.

## RESULTS

Data from our study showed that 63 patients admitted to the emergency department during the study period, 23 (36%) were diabetic and have not been diagnosed with anaemia previously. All patients (n=23) were Saudi's, aged between 22- 90 years and 52% (n=12) were female. Sixteen patients (69%) were non-school completed, 21% (n=5) high school graduates and the remaining 10% (n=10) were having bachelor's degree. Many of these patients did not present with clinical findings of anaemia. The admission causes for those patients were different including shortness of breath, abdominal pain, chest pain, drowsiness, flank pain, nausea and vomiting. All the 23 patients proceeded to complete blood count, resulting in 22% (n=5) cases of diabetic patients were having low mean hemoglobin (Hb) levels with less than 13 g/dl in males and less than 12 g/dl in females and RBCs lower than  $4.7 \times 10^{12}/L$  in males and lower than  $4.2 \times 10^{12}/L$  in females [16]. According to the WHO criteria, those patients had anemia (Table 1). In addition, low mean corpuscular volume (MCV) ( $\leq 80$  FL) and low mean corpuscular hemoglobin (MCH) ( $\leq 26$  PG) were detected among only two anemic patients suggested the incidence of microcytic hypochromic iron deficiency anaemia (IDA) (Table 1). However, normal and high MCV and MCH were reported among the remaining patients. All patients presented in this study with previously undiagnosed anaemia were non-school completed.

## DISCUSSION

One of the common causes of high morbidity and mortality rates in patients with type 1 and type 2 diabetes is anemia [17,18]. A number of several research studies found that anaemia is a major feature in diabetes, with 13 % of prevalence reported in European individuals [19] and 23 % among Australian individuals [20]. Anaemia has a significant impact on the quality of life on patients with diabetes, however, its burden has been less well characterized among several communities. Unfortunately, there are limited number of research to study the prevalence and incidence of undiagnosed anaemia among diabetic patients. In this study the prevalence of undiagnosed anaemia in diabetic patients admitted to the emergency department and did not have diagnosed with

**Table 1:** Shows the haemoglobin, RBC, MCV and MCH results for five patients with diabetic.

Diabetic patients	RBC $10^{12}/L$	HB g/dl	MCV FL	MCH PG
Patient 1	10.3	4.1	86	28
Patient 2	7.6	3.2	70	22
Patient 3	9.7	4	68	20
Patient 4	9.1	3.2	90.5	28.4
Patient 5	4.5	1.6	90	30

anaemia previously was determined.

The result of this study showed that 22% of diabetic patients were having low hemoglobin (Hb) and low RBCs level and according to the WHO criteria, they were diagnosed with anaemia, although the type of anaemia was not determined. Similar to our results, Paul and colleagues has reported 14% of diabetic patients in six European countries (Belgium, France, Germany, Greece, Italy and the UK) aged between 18 to 85 years had unrecognized and undetected anaemia [21]. This study revealed that, all male and female patients with previously undiagnosed anaemia were non-school completed, suggesting the association between unrecognized anaemia and educational level, however, this was not significant.

This study also suggested some strategy that might be possible to achieve substantial reduction in prevalence of anaemia in patients with diabetes and contribute to improving long-term outcomes. Firstly, raised awareness about risks factors associated with anaemia incidence in diabetic, Secondly, periodic laboratory investigation for early identification and appropriate treatment. Thirdly, encourage community to improve their dietary nutrition and taking iron supplementation pills specially among high risk and diabetic individuals.

## CONCLUSION

This study found that some diabetic patients who admitted to the ER were not aware of their condition of having anaemia, which, might lead to impaired their quality of life. Integrated strategy were suggested for anaemia control, prevention and improving survival lime including; education to encourage community to improve their dietary nutrition, taking iron supplementation and early detection and treatment.

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## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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