

An Evaluation of Hemoglobin Concentration in Patients with Diabetes Mellitus Type 2

Saba Ibrahim Salih², Karem Kdaer Karem¹, Wafaa Kadhim Jassim²

¹Department of Environmental Health, College of Applied Medical Sciences/ University of Kerbala, Iraq

²Department of physiology and pharmacology/College of Veterinary Medicine/University of Kerbala, Iraq

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ABSTRACT

The second type of diabetes Mellitus is the most common type of diabetes, its represent about 90-95% of diabetes cases. In this disease, the response of the body to insulin does not occur properly in a condition known as insulin resistance. The diabetes may accompany with anemia because the hormone erythropoietin (EPO) which is produced by the kidneys is regulates red blood cell production and the Kidney has been damaged at several levels as a complication of diabetes, the complication range from diabetic nephropathy to chronic kidney disease. This study was conducted at the AL-Kafeel Hospital, Kerbala from October 2016 to December 2016. The study included 60 adult patients with age range from 43-67 years and having diabetes mellitus type 2. Fasting blood sugar and Hb tests were made and accompanied with other information like age and duration of diabetes mellitus. The results show that 43% of diabetic patients had anemia and there is a strong negative connection between Hb levels and the duration of getting diabetes ($p < 0.01$). We conclude from this study that anemia is may developed in Type 2DM patients and the diabetic patients should be taken care of to prevent the development of diseases and other complications.

Keywords:

INTRODUCTION

Diabetes mellitus (DM) is one of the most common metabolic disorders in the world. Epidemiological statistics in 2010 showed that there were 285 million people infected with the Diabetes in the world wide and its predestined that in 2030 the world will have about 440 million diabetics patients¹. Is a widespread and rapidly growing disease in developing countries and Type II diabetes affects about 7% of the world's population².

Anemia is usually defined as a decrease in the number of red blood cells or a lack of hemoglobin in the blood³. It can be also defined as low blood viability to carry oxygen⁴. Anemia is more predominant in people with diabetes than in non - infected people⁵. Anemia also develops earlier and more severely in people with diabetes than in renal impairment caused by other diseases⁶. The World Health Organization (WHO) guidelines recommend screening for anemia when Hb is less than 12 g / dL in women and less than 13 g / dL in men⁷. According to this definition, the 1 per 4 (23%) patients with diabetes type I or II they are infected with anemia. Also the development and progression of both microvascular and macrovascular complications of diabetes has been a role in developing of anemia⁵.

Diabetes mellitus (DM) is a metabolic disease in which there is high blood sugar levels for a long period⁸. Symptoms include polyuria, thirsty, and hungry person. If don't treated, diabetes may cause many other complications⁹. Acute complications may occur which

include diabetic ketoacidosis, nonketotic hyperosmolar coma, or even death¹⁰. Serious complications involve disease of the heart , stroke, chronic kidney failure, foot ulcers, and harm to the eyes⁹. Two causes for Diabetes, either the pancreas not producing proper amount of insulin or the body's cells not adequate respond to the insulin produced by pancreas¹¹.

anemia will comes in two way, either slowly and its symptoms include feeling tired, weakness, shortness of breath or a poor ability to exercise, or quickly which often include greater symptoms like confusion, loss of consciousness and increased thirst. Anemia must be noticeable before a person becomes pale¹².

After eating, the body breaks the blood sugar and turns it into glucose. Glucose passes through the bloodstream and supplies the body with energy. To complete this work, the pancreas produces the hormone insulin. In a person who had diabetes (diabetes mellitus), the pancreas either produces too little amount of insulin or none at all, or the insulin can't be used in effective way and this caused the levels of blood glucose to increase whereas the rest of cells are forbade from energy. Type 1 Diabetes (juvenile diabetes or insulin-dependent diabetes) is an immune disorder that occurs when the immune system attacks insulin-producing cells in the pancreas, destroying the ability to manufacture insulin. Therefore, a person with this type of diabetes should take insulin constantly and most of the infected are children and young people¹³.

In type 2 diabetes or insulin resistance, the pancreas

Table 1: show the descriptive Statistics for this study.

	N	Minimum	Maximum	Mean	Std. Deviation
age	60	43	67	53.40	±7.126
Hb	60	9.3	16.0	12.677	±1.8093
sugar	60	122	566	259.28	±118.303

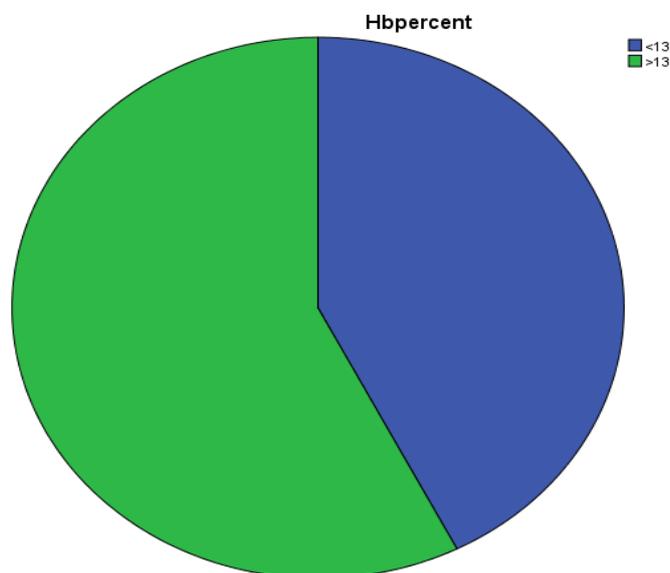


Figure 1: show 43 percent of diabetic patient who had anemia.

creates insulin in normal quantities but what happens is that the cell response to insulin is abnormal Forcing the pancreas to form much higher levels of insulin to control blood glucose levels. Constantly, insulin-producing cells will be damaged because of this excess production. In this case, the patient with diabetes type 2 will begins to request insulin as a treatment.

Blood parameters are often changed in diabetes mellitus. These include packed cell volume, plasma proteins, erythrocyte aggregation, and erythrocyte deformability²³

MATERIALS AND METHODS

The present study was conducted at the AL-Kafeel Hospital, Kerbala From October 2016 through December2016. The subjects for the study included 60 adult patients with age more than 45 years and having diabetes mellitus type 2, attending the outdoor patient department (OPD) or admitted in ward as indoor patient department (IPD) of AL-Kafeel Hospital. Samples of blood were collected for investigation of blood glucose and hemoglobin.

Study includes male only. The patients with the following diagnosis were excluded from the study: Age <43 years, taking drugs causes of chronic kidney disease (CKD) other than diabetes mellitus, Type 1 diabetes mellitus, malignancy, alcoholic, post-surgery patient. Blood samples were collected into anticoagulant tubes for indicating of fasting blood glucose (FBG) and hemoglobin concentration. Diabetes was diagnosed by fasting blood glucose values more than 125 mg/dl and anemia by hemoglobin values less than 13 g/dl.

The subject group divided to 4 groups according to the duration of getting DM. the first group (1-3 years) second

group (4-7 years) third group (8-11 years) and fourth group (11-15 years).

Statistical analysis

Statistical analysis was done by using SPSS for Windows version 22.0. Significance was set as $p < 0.01$ and 0.05

RESULTS AND DISCUSSION

The subjects for the present study included 60 adult patients with age range from 43-67 years and having Diabetes Mellitus type 2. The Descriptive Statistics for this study was show in table (1).

This study showed that 43% of patients) figure 1) were diagnosed with anemia (Hb <13 mg/dl) when compare with other study that reports 15.3% and 19.6%^{25,26}. Anemia is more common in patients with diabetic nephropathy. Leading to decreased production of erythropoietin is the leading cause of renal vascular disease²⁷. The results also show that the fourth group (11-15 years of getting diabetes mellitus) has the highest percent (83%) of Hb range from 8-10 mg/dl. and the third group (8-11 years of getting diabetes mellitus) has the percent (71%) of Hb range from 10.3-12 mg/dl. As show in table (2).

Also the results show there is a strong negative relationship ($r = -0.772$)

between Hb levels and duration of getting diabetes type 2 as show in figure (2).

The high relationship between duration of DM and the level of Hb and this results is agreement with other results which find that People with diabetes for periode more than 5 years have a 1.56 times have a greater risk of anemia more than those with diabetes for less than 5 years. These results propose that anemia estimate should

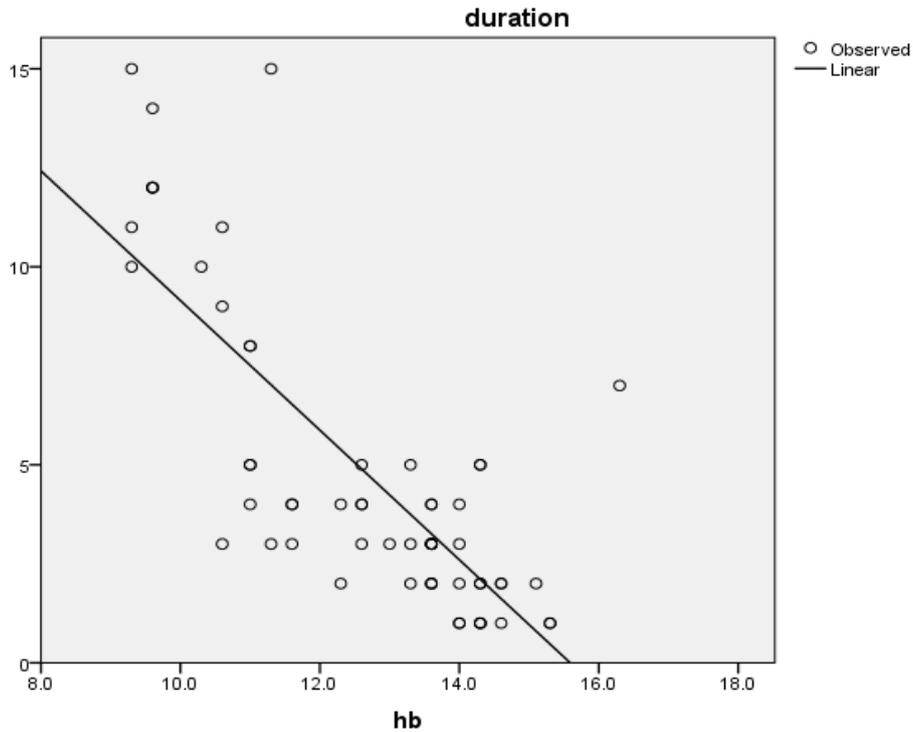


Figure 2: show Regression Coefficient of correlation between Hb levels and duration of getting diabetes type 2. Correlation is significant at the 0.01 level. $r = -.772$.

Table 2: show duration_group * hb_mean Crosstabulation.

Duration of DM		Heamoglobin level (mg/dl)				Total
		1 (8-10.)	2 (10.3-12)	3(12.3-14)	4 (14.3-16)	
1-3 year	Count	0	3	17	11	31
	% within duration_group	0.0%	9.7%	54.8%	35.5%	100.0%
4-7 year	Count	0	6	8	2	16
	% within duration_group	0.0%	37.5%	50.0%	12.5%	100.0%
8-11 year	Count	2	5	0	0	7
	% within duration_group	28.6%	71.4%	0.0%	0.0%	100.0%
11-15 year	Count	5	1	0	0	6
	% within duration_group	83.3%	16.7%	0.0%	0.0%	100.0%
Total	Count	7	15	25	13	60
	% within duration_group	11.7%	25.0%	41.7%	21.7%	100.0%

be taken into account in the routine monitoring of people with diabetes and must be treated to reduce the risk of complications of microvascular complications such as nephropathy and retinopathy. There is some evidence that the level of erythropoietin (EPO) in patients with diabetes plus anemia is low compared to patients with iron deficiency anemia²⁸. Scientists have found that the lack of Erythropoietin occurs early from diabetic nephropathy compared with other causes of nephropathy, because of involuntary nephropathy that leads to sympathetic blockage of the kidney²⁸⁻³⁰.

Renal denervation attributable to diabetic autonomic neuropathy can reduce splanchnic sympathetic stimulation of erythropoietin production^{28,30,31}. Diabetes may also affect the sites of the production of erythropoietin which found in the peritubular and interstitial structures of the renal cortex, thereby reducing

the release of erythropoietin in response to hypoxic anemia^{28,32}.

In addition, there is a link between diabetes and low function of the kidney with low levels of androgen³³. The Androgen hormone stimulates the production of red blood cells by increasing the production of erythropoietin and direct amplification of the stem cells of the marrow³⁴.

CONCLUSION

This study shows that anemia is present in patients with type 2 diabetes. Hemoglobin screening should be done periodically for diabetic patients to take the necessary precautions and avoid anemia that leads to other complications of diabetes.

RECOMMENDATION

Other studies include more data for patients taking medications, studying their effect on the kidney, as well

as comparing males and females and studying the effect of DM 2 on other body organs.

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