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A Prospective study for assessing the role and significance of haematological parameters in diabetes in Southern Odisha

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ABSTRACT

Background: In the present situation globally, there is an increasing burden of diabetes mellitus in the developing and developed countries alike. With an increase in the carbohydrates intake due to the consumption of junk and unhealthy food, the cases of diabetes mellitus are alarmingly increasing. Diabetes is not a single disease in itself. It has been estimated that nearly 59.2 million patients around the world suffer from diabetes mellitus.
Aim: To assess the role and significance of haematological parameters in diabetes in Southern Odisha
Materials and Methods: It was a prospective study carried out at the Department of Pathology at the MKCG Medical College Berhampur, Ganjam (Odisha). The study period was from March 2019 to August 2019. One hundred subjects were registered for the study, among which 50 of the patients were in the diabetic group, and the remaining 50 were in the non-diabetic group (Group 1). The diabetics were further divided into two groups diabetics with HbA1c <7 with 25 patients (Group 2) and Diabetics with HbA1c >7 with 25 patients (Group 3). There are chances that patients with very low haemoglobin may show erroneous HbA1c values. Thus, to overcome this, we measure HbA1c of every patiente twice using Sebia Capillary Flex-Piercing instrument to acertain the accuracy and reliability of the study. The biological reference range in both males and females for RBC count is 3.8-6.5 million/cu.mm, Hb is 11.5-17mg/ dl, Hematocrit is 37-54%, MCV is 80-100μm3 , MCH IS 27-32 pg, MCHC is 32-36g/dl and RDW is 11-16%. All the patients who had hypo/hyperthyroidism, CKD, an inflammatory disorder, and congenital heart disease were excluded from the study.
Result: Most of the patients were aged between 41-60 years in group 1, group 2, and group 3. It was also evident from the above table that the number of female patients was more as compared to the number of males. Among different values of red blood cell parameters in group 1 and group 2, there was a statistically significant difference between the two groups with respect to RBC. Also, there was a statistically significant difference between the group 1 and group 3 with respect to Hb values.
Conclusion: In light of the above results, it was evident that the poor control diabetic subjects face more complex diseases along with anaemia. Therefore, it is required that the patients must undertake regular haemoglobin level tests so that the glycemic index is under control.

1. Introduction

In the present situation globally, there is an increasing burden of diabetes mellitus in the developing and developed countries alike.[1] With an increase in the carbohydrates intake due to the consumption of junk and unhealthy food, the cases of diabetes mellitus are alarmingly increasing. Diabetes is not a single disease in it self.[2] Being a metabolic syndrome, it homes the foundation of other disorders like micro and macrovascular malfunctions along with the other co-morbidities like hypertension and other related

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diseases that might finally increase the rate of mortality. Cardiovascular disease is one of the most common diseases being experienced by the majority of diabetic patients.[3]

It has been estimated that nearly 59.2 million patients around the world suffer from diabetes mellitus.[4] Along with diabetes mellitus, the patients have to face common issues such as metabolic syndrome or syndrome X. It is a syndrome associated with increasing the risk of cardiovascular disease, and insulin is a major factor playing a role in it.[5] When there is an increase in the plasma glucose, then a small amount of Hemoglobin A are glycated to form glycated haemoglobin (HbA1c).[6]

Furthermore, the slow increase in the volume of HbA1c results in altering the structure and functions of the haemoglobin molecule. There are numerous parameters to test the cytoplasmic viscosity of the red blood cells, including MCH, HCT, MCV, and MCHC. Changes in the function and structure of the haemoglobin are reflected by any one of these parameters.[7]

RBC count, Hematocrit(HCT), Mean Corpuscular Volume(MCV), Mean Corpuscular Hemoglobin(MCH) and Mean Corpuscular Hemoglobin Concentration(MCHC) are helpful in performing the qualitative and quantitative analysis of the red blood cell.[8] However, Red blood cell Distribution Width (RWD) has been significantly associated with the assessment of diabetic nephropathy in type 2 diabetic patients.[9]

2. Aim

To assess the role and significance of haematological parameters in diabetes in Southern Odisha

3. Material and Methods

It was a prospective study carried out at the Department of Pathology at the MKCG Medical College Berhampur, Ganjam (Odisha). The study period was from March 2019 to August 2019. One hundred subjects were registered for the study, among which 50 of the patients were in the diabetic group, and the remaining 50 were in the non-diabetic group (Group 1). The diabetics were further divided into two groups diabetics with HbA1c <7 with 25 patients (Group 2) and Diabetics with HbA1c >7 with 25 patients (Group 3). There are chances that patients with very low haemoglobin may show erroneous HbA1c values. Thus, to overcome this, we measure HbA1c of every patiente twice using Sebia Capillary Flex-Piercing instrument to acertain the accuracy and reliability of the study. The biological reference range in both males and females for RBC count is 3.8-6.5 million/cu.mm, Hb is 11.5-17mg/ dl, Hematocrit is 37-54%, MCV is 80-100μm3, MCH IS 27-32 pg, MCHC is 32-36g/dl and RDW is 11-16%. All the patients who had hypo/hyperthyroidism, CKD, an inflammatory disorder, and congenital heart disease were excluded from the study.

4. Results

The above table depicts that most of the patients were aged between 41-60 years in group 1, group 2, and group 3. It was also evident from the above table that the number of female patients was more as compared to the number of males.

The above table shows different values of red blood cell parameters in group 1 and group 2. There was a statistically significant difference between the two groups with respect to RBC. Group 1 RBC comes out to be significantly higher as compared to Group 2.

The above table shows different values of red blood cell parameters in group 1 and group 3. There was a statistically significant difference between the two groups with respect to RBC and Hb values. RBC and Hb values were significantly higher for Group 1.

5. Discussion

In the present study, it was evident that the mean RBC values of group 2 and group 3 were comparatively lower with respect to the RBC values of group 1. This signifies that the life of RBC decreases significantly due to the presence of diabetes mellitus. Similar results were obtained in the study of Farooqui et al., (2019).[10] It was also identified in the course of study that type 2 diabetes has been closely associated with anaemia ranging from mild to moderate intensity. Carvalho et al. (2006)[11] studied the same parameters and found similar results. In the current study, it was evident that the DM has been closely associated with the progression of chronic diseases such as CKD. Al khoury et al.,(2006)[12] also found that CKD the haemoglobin was lower in diabetic patients as compared to the non-diabetic patients.

6. Conclusion

In light of the above results, it was evident that the poor control diabetic subjects face more complex diseases along with anaemia. Therefore, it is required that the patients must undertake regular haemoglobin level tests so that the glycemic index is under control. One of the major limitations of the present study was that patients with very low haemoglobin may show erroneous HbA1C values, however.

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8. Conflict of Interest

The authors declare they have no conflict of interest.

Age (Years)	Group 1		Group 2		Group 3	
	Male	Female	Male	Female	Male	Female
21-40	1	1	1	1	1	2
41-60	15	17	5	9	4	9
61-80	2	9	2	4	2	2
81-100	1	4	1	1	2	1

Table 1: Comparison of RBC indices in Group 1 (Non-Diabetics) with Group 2 (Diabetics with HbA1c<7)

Parameters	Group 1	Group 2	P-value
RBC	5.6	5.1	<0.05
Hb	12.9	11.8	>0.05
HCT	36.9	34.5	>0.05
MCV	82.3	85.1	>0.05
MCH	26.8	27.6	>0.05
MCHC	31.8	31.5	>0.05
RDW	13.89	14.12	>0.05

Table 2: Comparison of RBC indices in Group 1 (Non-Diabetics) with Group 3 (Diabetics with HbA1c>7)

Parameters	Group 1	Group 3	p-value
RBC	5.6	4.1	<0.05
Hb	12.9	10.9	<0.05
HCT	36.9	32.8	>0.05
MCV	82.3	79.2	>0.05
MCH	26.8	26.1	>0.05
MCHC	31.8	31.8	>0.05
RDW	13.89	12.5	>0.05

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