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Study of Implication of Wbc and Platelet Count among Sickle Cell Disease Patients in Waghodia Region, Vadodara, Gujarat

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Introduction: Hematological parameters are very useful profiles in the effective management of the disease However, there is scarcity of studies on the hematological parameters of SCD in Gujarat.
Objective: The objective of the study was to changes in hematological finding in patients of sickle cell disease.
Materials and Methods: This Prospective studyincludes total 150 participants who suffering from sickle cell anemia and attending at our Institute Complete blood count (CBC) and sickling test was done from all participants Comparison of results was done between Sickle cell trait and Sickle cell disease Group.
Results: The mean age of the SCA patients was 25 54±10 years. Maximum participants are found to be from age group 25-30 yr(n=35) followed by 20-25 yr(n=30) of the 150 SCA patients, 89 (59 33%), and 61 (40 6%) were males and females, respectively. The Mean value of WBC count(**/**cumm) in SCT group is10611±3015 and SCD is 14427±3693 while the Mean value of Platelet count (lacs/cumm) is 3.75±1 i10 and 4 04±0 94 SCT and SCD Group.
Conclusions: The present study found elevated levels of WBC and PLT among the SCD patients, possibly reflecting spleen effect in these patientsi These hematological parameters present a more descriptive data on SCD patients in Gujarat and may as well provide a useful tool and assist clinicians in the management of SCD patients in india.

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Keywords: Sickle cell; WBC (White blood cell); platlet count; vasoocclusion crisis (VOC).

1. INTRODUCTION

"Sickle cell disease (SCD) and its variants are genetic illnesses caused by a mutant type of haemoglobin in the blood" [1,2]. "Renal illness is one of the most common consequences, and kidney damage can begin as early as childhood and progress throughout life, creating serious difficultiesi India is thought to be home to more than half of the world's SCD patients [3-6]. The HbS gene is largely found among scheduled tribal, scheduled caste, and other backward caste groups of Madhya Pradesh, Orissa, Chhattisgarh, Jharkhand, Gujarat, Andhra Pradesh, and Kerala states, where carrier frequencies range from 5% to 40% or more" [7,8].

Complications resulting from a vasoocclusivecrisis(VOC) characterize the clinical picture of sickle cell disease (SCD) VOC is produced as a result of a complicated process.

2. MATERIALS AND METHODS

This cross sectional study was conducted at Parul Institute of Applied Sciences in collaboration with Parul Sevashram Hospital, Vadodara, Gujarat from 2017-2018.

2.1 Inclusion Criteria

Sickle cell disease patients already diagnosed by any of the confirmatory method like Hb gel electrophoresis, capillary electrophoresis and genetic analysis along with investigated for complete blood count (CBC) aged 5 years and above will be considered for enrolment.

2.2 Sample Size

The sample size will be 150 already diagnosed Sickle cell disease patientsi

2.3 Data Collection

Data collection of following parameters will be done

1 Age, sex and weight of the patients
2 BMI(Body mass index)
3 Hemogram(CBC)

2.4 Specimens and Investigations

Blood samples for Complete blood count was collected aseptically in 5 ml EDTAvaccutainers.

An Uniq ID was mentioned in all samples to hidden the identity of patients.

WBC and platelet count estimation done by using 6 part cell counter (Impedence Method) at central laboratory of our hospital.

Results of all collected samples were analysed statistically and calculate the Mean, SD and CV.

3. RESULTS

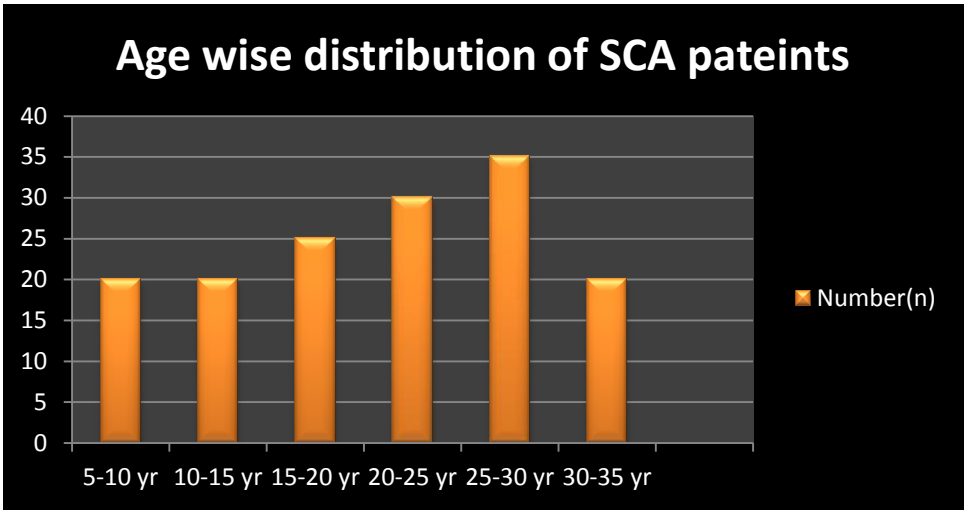
The mean age of the SCA patients was 25 54±10 years (Table 1).

Maximum participants are found to be from age group 25-30 yr (n=35) followed by 20-25 yr(n=30) of the 150 SCA patients, 89 (59 33%), and 61 (40 66%) were males and females, respectively.

Table 1. Demographic characteristics of participants

Age Group(yr)	Number(n)
5-10 yr	20
10-15 yr	20
15-20 yr	25
20-25 yr	30
25-30 yr	35
30-35 yr	20
Total	150

The Mean value of WBC count(**/**cumm) in SCT group is 10611±3015 and SCD is 14427±3693, the difference among them was found to be significant, p value is less than 0 05 while the Mean value of Platelet count((lacs/cumm) is 3 75±1 10 and 4 04±0 i94 SCT and SCD Group respectively and the difference among them was found to be significant, p value is less than 0 05 (Done by doing online student t test calculator) (Table 4).



Graph 1. Graphical Distribution of participants according to Age group

Table 2. Distribution of participants Based on type of sickle cell anemia (SCA)

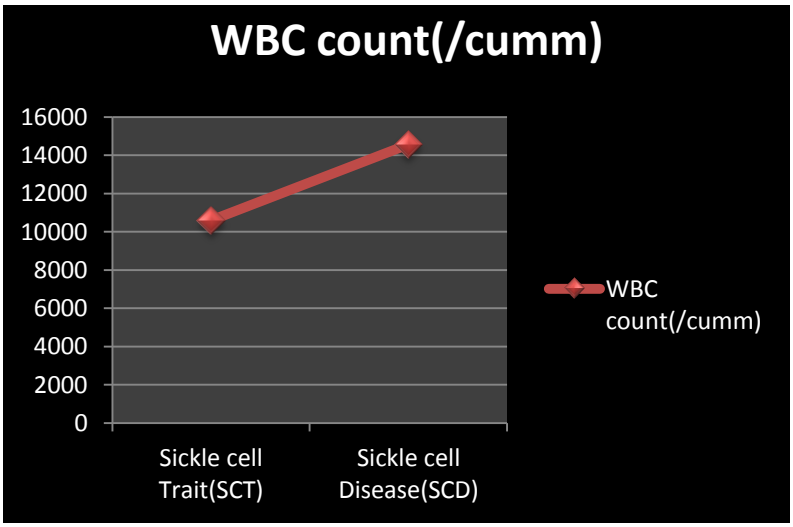
Total	Sickle cell trait(SCT)	Sickle cell disease(SCD)
150	92(61.33%)	58(38.66%)

Table 3. Gender wise distribution of participants

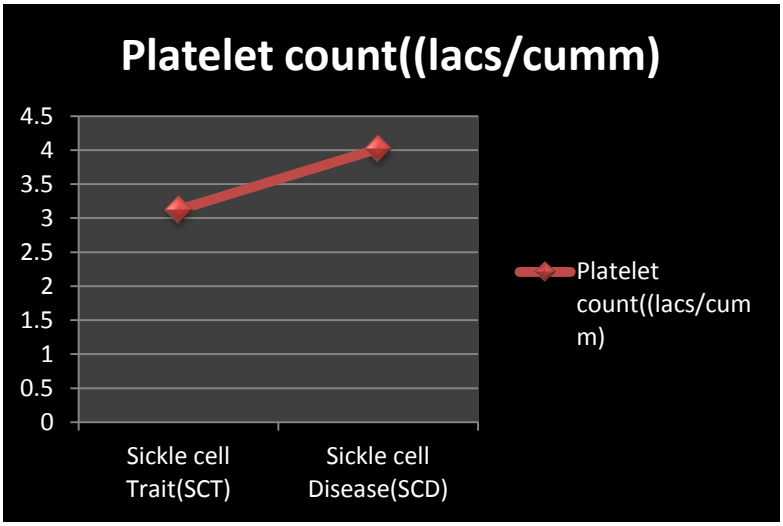
Total	Gender	Ratio
150	Male: female	89:61

Table 4. Hematological changes in SCT and SCD patients

	WBC count(/cumm)	Platelet count (lacs/cumm)	P-value
Sickle cell Trait(SCT)	10611±3015	3.75±1.10	<0.05
Sickle cell Disease(SCD)	14427±3693	4.02±0.94	<0.05



Graph 2. Showing correlation of WBC count with SCT and SCD group



Graph 3. Showing correlation of Platlet count with SCT and SCD group

4. DISCUSSION

"Hematological features and clinical severity of SCD are influenced by gender, genetic, and environmental factorsi The presence of α-thalassemia, variation in Hb F level, and haplotype background that is linked to the β globin gene play an important role in the severity of disease" [9,10]. "This study highlights the association of hematological parameters with SCD vaso-occlusion (VOC) in india Several reports indicate that changes in hematological parameters may account for clinical complications observed in patients with SCD" [11,12]. Therefore, good management of SCD can be achieved when hematological parameters are regularly evaluated and the causes for the changes in the hematological parameters rectified.

A similar study in india done by Francis RB et al reported elevated levels of PLTs among SCD patientsi [13] in our study also we got same finding iElevated WBC has been linked with SCD patients in previous studies "Therefore, WBC and PLT counts are expected to increase in all patients who may present with any form of complication associated with SCD, as observed in the current studyi In particular, a significant part of this study was the inclusion of patients with VOC (HbSS VOC and HbSC VOC), which is the hallmark of SCD, as well as the greater sample size of subjects [14,15]. The higher PLT count seen in patients with SCD could be attributed to a possible splenic sequestration, reduction or absence of spleen resulting from hyposplenism in SCD or autosplenectomy, as well as the underlying chronic inflammation Reports indicate that, there is a correlation between PLT count and SCD, [16] which corroborates the higher counts of PLTs among SCD patients in this study, although a correlation was not determined in this study Findings from the our study on increased steady PLT count in SCD patients agree with the work of Freedman and Karpatkin" [17,18].

In contrast to platelet counts in crisis, thrombocytosis is a common observation in our study that is matched with previous study done by Okpala Ii et al. [19]. The prognostic implication of elevated baseline platelet counts is debatable with no conclusive evidence of its associations with disease severity or complicationsi The literature is silent on the question of thrombocytosis in sickle cell crises and its relevance to outcomei Findings in our study demonstrate that higher platelet counts during crises are linked to lower disease severity scores and predict higher survival chance [20-22].

"A previous report indicated that SCD patients have elevated white blood cell (WBC) counts, activated granulocytes, monocytes, and endothelial cells, enhanced expression of endothelial cell adhesion molecules, elevated cytokine levels and elevated acute-phase reactants Moreover, another study has reported that the use of drugs, such as Hydroxyurea, lowers WBC count and thus improves the clinical outcome of SCD patientsiAnemia, which is generally observed in SCD patients, is a reflection of an overall severity of SCD While higher counts or values of Hb are linked with

higher rates of severe pain in SCD patients," [23] "lower steady-state Hb usually accounts for higher risk of stroke in these same patientsiPrevious reports have demonstrated that high leukocyte count appears to be a risk factor for several severe complications of SCD, such as rates of severe pain,acute chest syndrome,and mortality The study by Balkaran et al established an association of increased WBC with cerebrovascular accident" [24,25].

"Omotiet al in his study, also recorded high PLT counts among SCD patients with vaso-occlusion as well as those in the steady statei Although WBC counts were generally elevated in SCD patients, it is worth noting that the difference in counts was significantly higher in patients with HbSS VOC. Therefore, as the condition of SCD progresses from mild to severe with hemolysis, an elevated WBC count is expected in such patients" [26].

5. CONCLUSION

The present study found elevated levels of WBC and PLT among the SCD patients, possibly reflecting spleen effect in these patients These hematological parameters present a more descriptive data on SCD patients in Gujarat and may as well provide a useful tool and assist clinicians in the management of SCD patients in India.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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