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RESEARCH PAPER

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Haematological Profile in Children with Sickle Cell Disease the Regional Hospital Center in Kenitra in the Area of Rabat-Sale-Kenitra, Morocco

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ABSTRACT

Sickle cell disease, also called sickle cell anemia, it has a large variability of expression and biological c Linique dependent on genetic factors and environmental modulators. The objective of this study is to determine the profile of haematological parameters of the affected children of the Gharb region Chrarda Beni Hssen Kenitra in Morocco in order to know the normal values and the peculiarities of its own.

We conducted a comparative prospective descriptive study of two groups children including one with 60 middle-aged subjects with sickle cell disease 11 ± 0.7 years and one control group with 65 normal subjects average age of 11.7 ± 0.32 years. The blood counts

were performed using an automated Coulter counter. The average observed values were compared with those of non sickle cell control group. Complete blood counts in the first series showed the following values: Hb: 6.45 g/dl; Hct 20.9%, erythrocytes: 2.63 tera/L leukocytes: 11.78 giga/L; VGM: 82.75 fL; MCHC: 31.7%, with a highly significant difference between the two groups (P<0.001). The linear combination of MCH and MCV revealed that anemia normocytic normochromic are the most frequent (42%) followed by normocytic hypo chrome anemia (15%) and anemia microcytic normochromic (13%) compared to controls that when they have a hemoglobin level below their dominant type of anemia is normocytic normochromic 48%.

After this study we can conclude that the haematological profile of sickle cell disease in the region, shows data similar to those reported in the literature with a significant disruption of hemoglobin.

Keywords: Sickle Cell, Haematological, Children and Blood count formula.

INTRODUCTION

Sickle cell anemia also called sickle cell anemia is a structural hemoglobin pathies due to substitution of a glutamic acid by a valine at position 6 of the β chain of the globin (β6Glu → Val) and leading to the synth of modified hemoglobin: hemoglobin S (HbS) [**Girot et al., 2004**]. Sickle cell disease is one of the most common hemoglobin disorders in the world. And is a real public health problem in endemic areas and immigration; and migration to Europe have provided a significant flow risk population for these anomalies. [**Diagne et al., 2010**]. A large variability of haematological data is observed in those patients with sickle cell disease by genotype, age and sex of patients, with differences according to the review is conducted to u in a stable phase or during a crisis or complication [**Brissot, 1998)**]- [**Marie et al., 2003**].

It is characterized by three major categories of clinical manifestations [**Nouhoum Traore Sickle 2013**] chronic hemolytic anemia with clinical symptomatology has often splenomegaly especially in infants and small children, and rarely beyond this age [**Bouzid et al., 2011**], extreme susceptibility to bacterial infections and vaso-occlusive crises that can affect various organs and that are statistically associate with cognitive deterioration [**Schatz** et al., 2001- **Bernaudin et al., 2000**] but also to other genetic factors not fully understood.

Few data in the literature focus on the hematologiques parameters Moroccan sickle. Thus we propose in this study to analyze the blood count of u about drépanocytaire the Gharb region chrarda beni hssen kénitra Morocco, in order to know the normal values and the peculiarities of its own or it shares nt with other African sickle.

Population of the study

This study examined a cohort of 60 affected children hospitalized in the pediatric ward of the Hospital El Idrissi Kenitra. Data collection taken for a period of 24 months (July 2010-June 2012). It s' t done a systematic random drawing that included all about sickle cell service received during the period of the study, aged 7 to 14 years. Verbal consent of parents or guardians was obligatorily sought.

The witnesses were children and adolescents in the same age bracket non sickle cell belonging to the same region of Gharb (Morocco North West in the town of El Had and Mnasra) and the same socio-economic and environmental conditions. These children are identified at random three schools in the region, nearly getting administrative approvals and the consent of parents or guardians of student's and school officials.

Method

During the hospitalization of patients, complete blood count was performed and the parameters of these blood counts were analyzed.

For the control group, the survey was conducted in the school grounds with the director of support. Children accompanied by their parents or guardians, were examined by the medical school health. Then they underwent pon venous ction to collect 5 ml of blood EDTA tube.

The s blood counts were performed on a self matt type counter (Coulter), t he information collected is the number of white globules, platelets, blood cells red, hematocrit (Haute), hemoglobin (Hb), the globular average volume (MCV), mean corpuscular hemoglobin concentration (MCHC) and mean corpuscular hemoglobin (MCH). The limits are used es are defined in accordance with thresholds set by the WHO / UNICEF / UNU in 1996.

Statistical analyzes were performed by the SPPS software (Version 20). The chi-square test (χ2) a fl é used to detect significant links between certain variables. On the other hand, to study and visualize correlations between variables, we used simple linear regression.

RESULTS

The study population consists of 60 children, 67% were male and mean age of 11 ± 0,27ans, with extremes ranging from 7 to 14 years. The distribution of children pa r age reveals that 57% are aged 10 to 14 years and 43% of 7 to 9 years. For the 65 case-control study, 54% of my sex sculin with a mean age of 11.7± 0.32 years and extremes from 7 at 15.

The results in Table 1, illustrating variations of different haematological values studied.

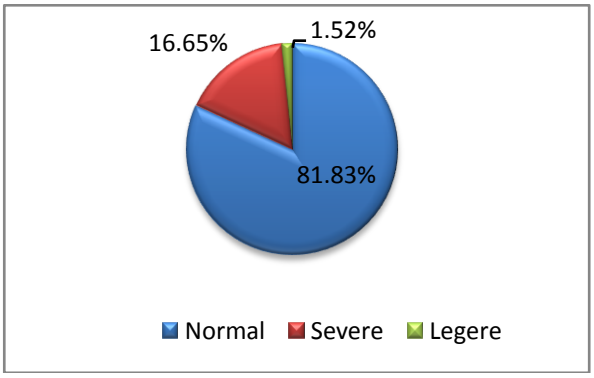
Table 1. Hematologic sickle cell subjects.

Settings	Sickle cell (n = 60)	Controls (n = 65)	Student test
Hemoglobin	6.45 (3.10 to 10.3)	12.6 (11,4-14,5)	P <0.001
Red blood cell	2.63 (1.06 to 4.92)	4.8 (4,04-6,13)	P <0.001
hematocrit	20.9 (10,8-32)	37.9 (31,9-43,5)	P <0.001
white Blood Cell	11.78 (4,5-43,9)	5.9 (3,1-10,4)	P <0.001
VGM	82.75 (51,64-111)	80.04 (64,6-92)	P <0.001
MCH	26.42 (13,4-37)	26.7 (19,2-30,4)	P <0.001
MCHC	31.7 (22,3-38,7)	33.3 (29,8-36)	P <0.001

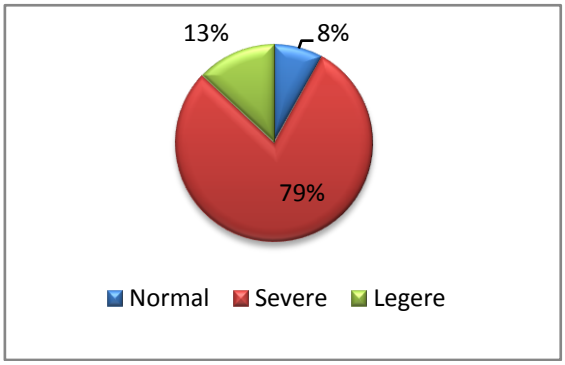
In patients, the an average rate of hemoglobin is of 6,45g / dl with a minimum of 3.1 g / dl and a maximum of 10.3 g / dl, while the type gap is 1, 69 no significant age difference (χ2 = 300.4 ; P> 0.05).However, in controls, this rate was 12.6 g/dL with ends ranging from 11.4 g/dL and 14.5 g/dl (Table 1). l e Hb rate was slightly different among women (Hb 6, 3 g / dl) as compared to subjects of themasculine sex ulin (6.5 g Hb/dL). The difference was not statistically significant (χ2 = 45.37; p> 0.05).

The sickle cell patients, have a hemoglobin value of less than 10.3 g / dL.

The majority has némie is severe in 78% of cases, moderate in 13% and 8% of cases have mild anemia. However, 80% of the control cases had e mild anemia (Figure 1).



Control cases



Sickle cell case

Figure 1. Intensity of anemia among children surveyed.

The types of anemia by MCH and MCV

The distribution of malad're Functi we mean corpuscular volume (MCV) showed that 56.7% of anemias are normocytic dominate with a percentage of 56.7 %, followed 35% 8.3% microcytic and macrocytic (Figure 2). E n function of the mean corpuscular hemoglobin, forms hypochromic anemia constitutes two thirds of thes normochromic (Figure 2 and 3).

In control 50, 7% of microcytic anemia and 48, 3% macrocyta ries first, second, anemias normo chrome is in the order of 91% against 9% hypochromic anemias (Figures 4 and 5).

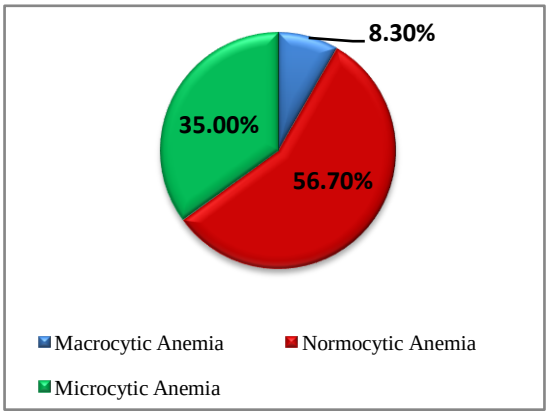


Figure 2. Classification of anemia MCV (SCD).

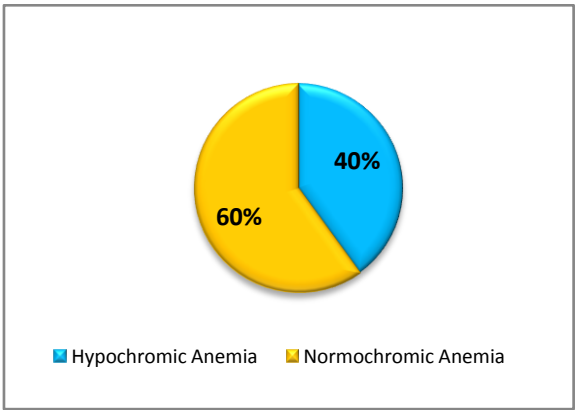


Figure 3. Anemia Classification according to MCH (SCD).

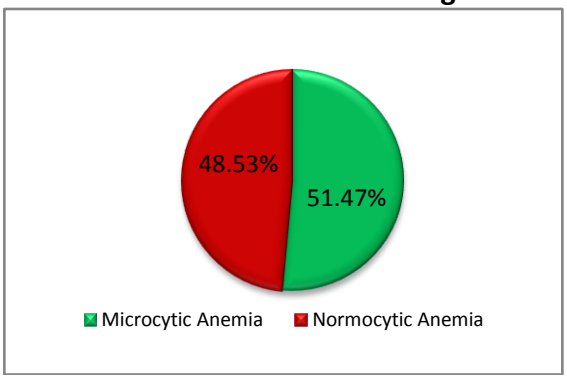


Figure 4. Classification of anemia MCV (Witnesses).

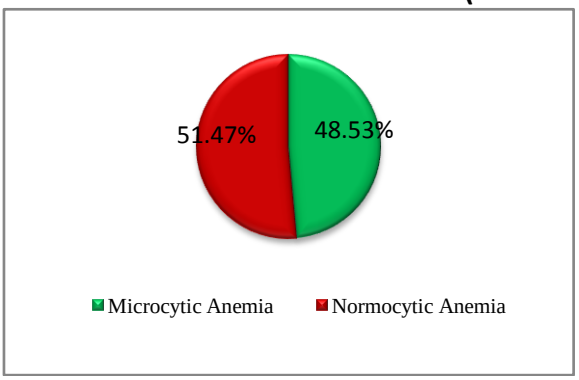


Figure 5. Anemia Classification according to MCH (Witnesses).

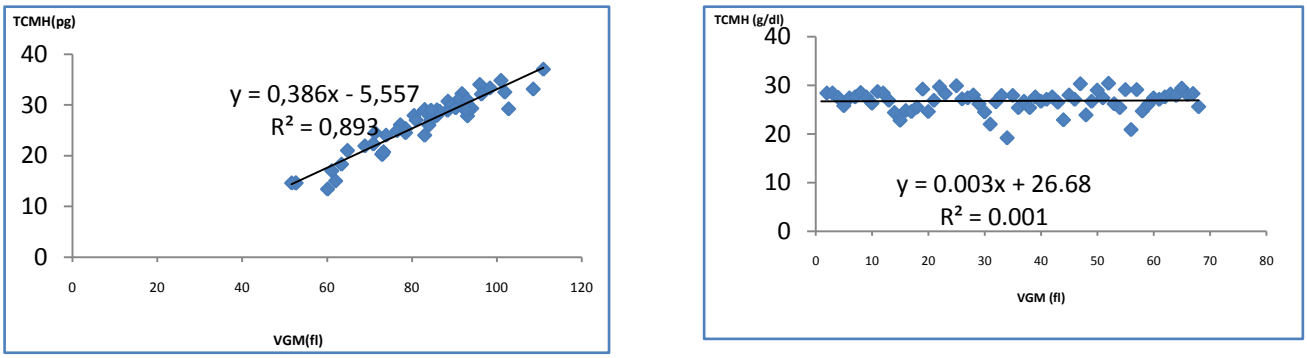


Figure 6. Correlation between the rate of MCV and MCH

The results obtained by simple linear correlation, show that more rate increases more MCV mean corpuscular hemoglobin content is important. This association is demonstrated by a coefficient of determination (R^2 = 89.3%). However, there is no correlation between the MCV and MCH in healthy subjects. So in case the witnesses MCH are a great deficiency screening criterion in iron and anemia. (Figure 6).

The linear combination of MCH and MCV (Table 2) revealed that are anemia normocytic normochromic are the most frequent (42%), followed by normocytic hypo chrome anemia (15%) and anemia microcytic normochromic (13%) compared to controls that have a dominant anemia normocytic 48 % followed by normochromic anemia m icrocytaire normochrome (42 %) and anemia icrocytaire hypochrome a m in 9 % of cases (Table 2).

Table 2. General Classification MCV and MCH.

Anemia (sickle cell)	**%**
normocytic hypochromic	15%
normocytic normochromic	42%
microcytic normochromic	13%
macrocytic normochromic	5%
macrocytic hypochromic	3%
(Witnesses)	**%**
Microcytic hypochromic anemia	9%
Microcytic normochromic anemia	42%
Normocytic normochromic (normal)	48%

DISCUSSION

The blood count is used to analyze the cellular components of blood and give the characteristics to guide the clinician to the various causes of disturbance of these parameters and thus etiological [**Najean, 1991, World Health Organization (WHO) 1972 Sankale Satge et al., 1974**]. C is an important tool for the diagnosis of anemia and finding its cause.

In our study, the observed population is made up of 60 affected children whose average age was 11 ± 0,27ans. The distribution of patients by gender shows that the male is the most affected in 67% of cases; this may be due to chance or the sample size. This result is similar to the work of [**Diagne et al., 200 and Mabiala et al., 2005**], other publications that prédominance fall no gender: This is the case of [**Thuilliez and Vierin, 1997**] and Dreux [**2012**].

These differences are related with the demographics of each country because the transmission of sickle cell anemia is not sex-linked [**Nacoulma et al., 2006 and Tolo et al., 2006**].

Biologically, this part was performed to identify the interest of blood count in the knowledge of typical values of hematological parameters of the affected children of the region and the peculiarities of their own.

It is known as sickle cell anemia present a polymorphic clinical presentation according to individuals and populations concerned. [**Labie and Elion, 1996**] N in study, patients were presented by different clinical appearance namely fevers, infectious fevers, joint pain, joint and abdominal pain, headache, dyspnoea. Comparing our results with

other studies [**Mabiala and Nzingoula 2005**], we allowed to find the same classic signs of sickle cell disease with a difference on the epidemiological profile, socioeconomic and environmental of our patients. Especially the clinical and biological expression of SCD presents significant variations across geographic region (climate, social, diseases, etc. [**Tshilolo et al., 2010**].

The sickle cell blood count subjects tracked abnormalities that can affect different lines to know: Red blood cell abnormalities expressed by a degree of anemia of varying severity from 3.10 to 10.3 with an average of 6.45g/dl.

The mean Hb level varies between 6-7g/dL and corresponds to the values found in other populations of Central Africa as shown in Table 3.

Table 3. Comparison Chart haematological values in African populations.

Country	not	Age way	Hemoglobin (g / dL)	hematocrit (%)	erythrocytes (Tera / L)	VGM (fl)	MCH (pg)	MCHC (%)	Reference
Tanzania	12	10.7	6.42	24.7	2.27	108.8	28.8	26	C. Oner
Kenya	25	10.9	7.85	26	2.54	102.4	30.9	30.2	C. Oner
angola	4	9.3	7.30	20.7	2.7	88.3	30.5	35.3	C. Oner
DRC	42	8.9	6.2	20.7	2.3	89.6	26.8	29.7	Tshilolo L1
CHR Kenitra	60	11	6.45	20.9	2.63	82.75	26.42	31.7	our results

The type of anemia varies according to mean corpuscular hemoglobin (MCH), mean corpuscular volume (MCV). Our results showed that normocytic anemia are the most common (57%), this result is discordant with ' other studies [**Girot** et al., 2004, **Modebe and Ifenu, 1993**, **Barden** et al., 2002 and **Vanderjagt et al., 2000**]. the blood count of about sickle cell dan notr e study shows varying intensity anemia (6.45 ± 3.7 g / dl), normocytic (MCV average 81.75 fl) . The difference was highly significant compared to the control group ($p < 0.001$). This observed difference between these averages in both groups is consistent with Nacoulma studies Tshilolo and Omoti [**Nacoulma** et al., 2006 and **Omoti, 2005**].

Regarding the red blood cells, the averages are statistically lower in the Sickle cell group compared with the reference group ($p < 0.001$). This can be erythropenia gold igine chronic hemolysis known by red blood cells in sickle cell disease. [**Osaghae, 1987**] To add.

The leukocyte average for sickle cell patients is significantly higher than control children ($p < 0.001$). The leukocytosis can be explained by the greater of succession of our patients to infections [**Samira et al., 2015**]. Furthermore SCD is in effect a sym ptomatologie inflammatory disease in which one of the markers is leukocytosis [**Chies and Nardil, 2001**]

CONCLUSION

In Morocco, as all track developing countries, sickle cell anemia is a public health problem because of its frequency and its complications. They are often serious in their major forms that occur in early childhood, their care is fraught with a great social impact on patients and their families.

Variation different settings of blood count often allow an etiological orientation. Wider studies with more numerous series in homogeneous populations ed wish after

this preliminary study for a better understanding of the factors interfering with the clinical and biological expression of SCD.

Biologically, the increasing use of automation should not forget the importance of the study of blood smears that will provide practitioners with haematological profile characteristic of sickle cell children in the region.

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