

## Blood Disorders among Children in the Pediatrics Department of Tlemcen's Hospital (West Algeria): An Epidemiological Study

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### Abstract

The purpose of this study is to evaluate the haematological explorations and blood disorders in the general pediatric department of the specialized health establishment mother and child) of Tlemcen. The sample size is 418, and data were collected using a questionnaire. The hemogram (complete blood count) was the most hematological exam realized (for 99% of patients).

This study revealed a high prevalence of anemia especially in children of preschool age, and among these anemia, the hypochromic microcytic anemia is the most represented with a rate of 28%, it is mainly related to iron deficiency (found in 43% of patients), iron deficiency with or without anemia. The study also revealed the low prevalence of childhood leukemia.

The prescription and the realization of complementary examinations to the hemogram should better clarify the anomalies and hematologic diseases.

**Keywords:** Hematological explorations; Anemia; Iron deficiency; Leukemia; Pediatrics

### Introduction

Hematologic issues are explored through a dedicated hematology consultation, and consultation of Internal Medicine in hematology orientation, and specific assessments called "explorations Blood", which are often represented by the CBC and other tests such as blood smear, bone marrow aspiration, bone marrow biopsy, the hemostasis, iron status...etc. [1].

Today the child is commonly affected by hematological diseases including anemia and leukemia in child is very frequently about several. Anemia and iron deficiency are real public health problem worldwide, especially in developing countries, as well as leukemias often found in children in recent years, where instead of doctor or pharmacist biologist, primary care remains important, particularly with regard to the diagnosis, monitoring during treatment, and follow-up after remission [2].

To contribute to a better understanding of these problems, this work proposes to take stock: A study of 418 cases diagnosed in the pediatric ward, and UMCP EHS (Mother and Child) of Tlemcen, from 1 November 2013 to 31 March 2014.

### Subject and Methods

The current study aimed to evaluate the haematological exams and to estimate the prevalence of anemia, iron deficiency, leukaemia and other blood diseases in the paediatrics department of Tlemcen's hospital. The study was conducted during the period November 2013-March 2014 and the sample consisted of 418 hospitalized children in the age group (1 month-15 years).

Blood samples were collected from each hospitalized child and a questionnaire was completed at the time of blood collection, including basic socio-demographic, biological, and reproductive data (age, sex, address, reason for hospitalization, antecedents) then we noted all blood tests done followed by its interpretations (See appendices).

A haemoglobin value of less than 11.0 g/dL was considered to be anemia. The degrees of anemia studied were mild anemia (9.0-10.9 g/dL), moderate anemia (7.0-8.9 g/dL), and severe anemia (less than 7.0 g/dL). A serum iron less than 0.6 mg/ml with a TIBC less than 1 mg/l and microcytosis was synonymous with iron deficiency. An invasion by the blast accompanied by a leukocytosis was considered as leukemia.

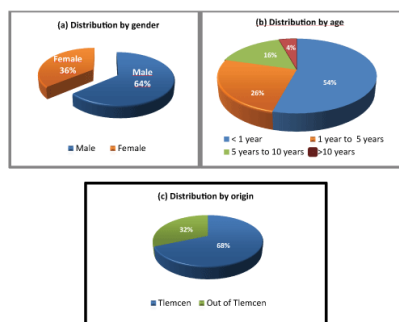
### Results

From 1st November 2013 to 31st March 2014, there were 418 hospitalized children, who have undergone at least one blood test.

The male gender was the most represented with 64%. The sex ratio was 1.76 in favour of males (Figure 1a).

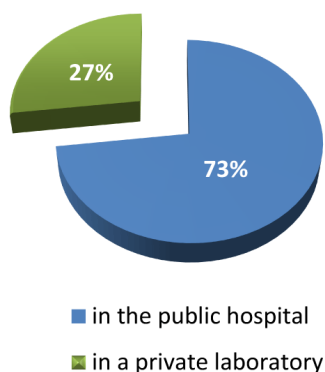
Infants less than 12 months were the most represented with 54% (more than half). The category least represented was that of 10 to 15 years with 4% (Figure 1b).

70% of inpatients were from Tlemcen, while 30% were from outside Tlemcen which is a high rate, they were much more from Naama, Oran, Ain temouchent and Bechar (Figure 1c).



**Figure 1:** Distribution of the whole sample (n=418) according to sex (a), age (b) and origin (c).

The majority of hematological examinations were performed at the public hospital laboratory (73%), while 27% were carried out in a private laboratory (Figure 2).



**Figure 2:** Place of the blood exams realization.

The blood count was the most practiced test. Almost all of the children taken in the study got it done (99%). The test of hemostasis and blood grouping, were made respectively in 15 and 13%, while other tests such as iron status, blood smears or bone marrow have been little practiced (Table 1).

Hematological exam	Frequency	% according to patients
Blood count	415	99.28
Test of haemostasis	63	15.07
Blood grouping	56	13.39
Sedimentation rate	11	2.63
Iron status	7	1.67
Blood smear	5	1.19
Bone marrow	4	0.95

**Table 1:** Distribution of realized blood exams.

There were a lot of below normal values, especially for Hb, Hct and also for the MCV. While for above normal values was much more to the WBC (Figure 3a).

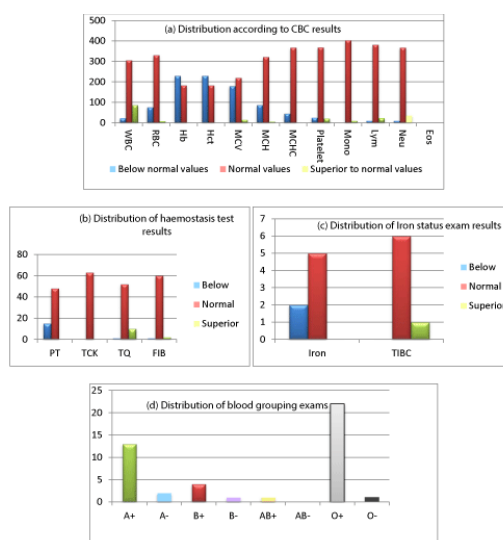
In the leukocyte count, most blood counts gave generalized results for granulocytes, and not with details (Neu, Eos, Bas).

Most of the results were normal except 15 below normal values for the TP (Figure 3b).

For the little iron status test made, there were just 2 below normal values for the determination of serum iron and one value higher than normal for the determination of TIBC (Figure 3c).

The group O<sup>+</sup> was the most frequent, followed by A<sup>+</sup> and B<sup>+</sup>, while there were few groups like AB<sup>+</sup>, A<sup>-</sup>, B<sup>-</sup> and O<sup>-</sup>.

There was no case of AB<sup>-</sup> patients who received a blood grouping (Figure 3d).



**Figure 3:** Distribution of blood examinations results: CBC (a), Haemostasis (b), iron status (c), blood grouping (d).

Among the four hundred and eighteen (418) examinations, one hundred and two (102) were without abnormalities (24%), the rest (76%) there was much more cases of anemia (55%) followed by iron deficiency who were diagnosed in 43% of patients. For the rest there were some abnormalities including leukocytosis white line which was found in 17% of patients and very few cases of leukemia or aplastic anemia (1%) (Table 2).

Interpretation	Frequency	% according to patients
Anemia	232	55.5
Iron Deficiency	180	43.06
Nothing	102	24.4
Leukocytosis	72	17.22
Poly neutrophil	25	5.98
Thrombocytosis	21	5.02

Leukopenia	21	5.02
Thrombopenia	21	5.02
Lymphocytosis	21	5.02
Lymphopenia	11	2.39
Monocytosis	10	2.15
Bicytopenia	10	2.15
Neutropenia	7	1.43
Eosinophilia	5	1.05
Leukemia	3	0.87
Pancytopenia	2	0.47
Polycythemia	2	0.47
Monocytopenia	1	0.23
Basocytosis	1	0.23
Hémolysis	1	0.23

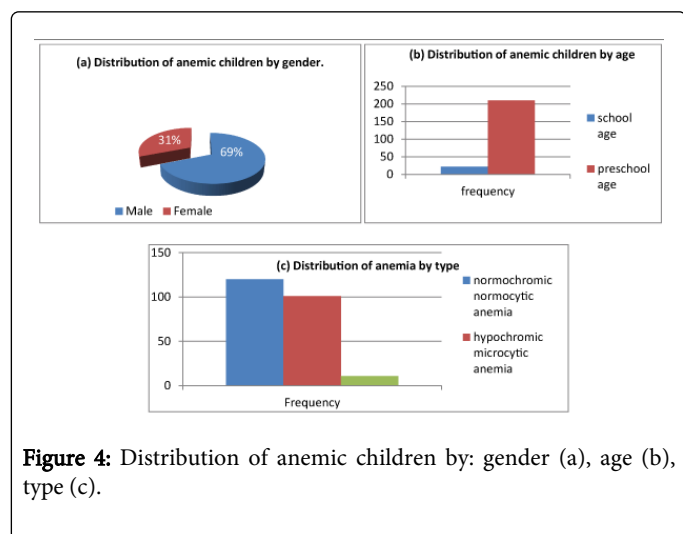
**Table 2:** Distribution of the blood abnormalities.

There was a high rate of anemia (232 cases) which means that 55.5% of patients were anemic, of which 28.70% had hypochromic microcytic anemia, 24.16% had normochromic normocytic anemia and 11 % had macrocytic anemia (Figure 4c).

The male gender was most affected by anemia with almost 69% (Figure 4a).

Children with preschool age (1 month-5 years) were the most affected by anemia (90.11%) of all the anemic children.

Children with school age (5 years - 15 years) were the least affected by anemia (9.48%) of anemic children (Figure 4b).

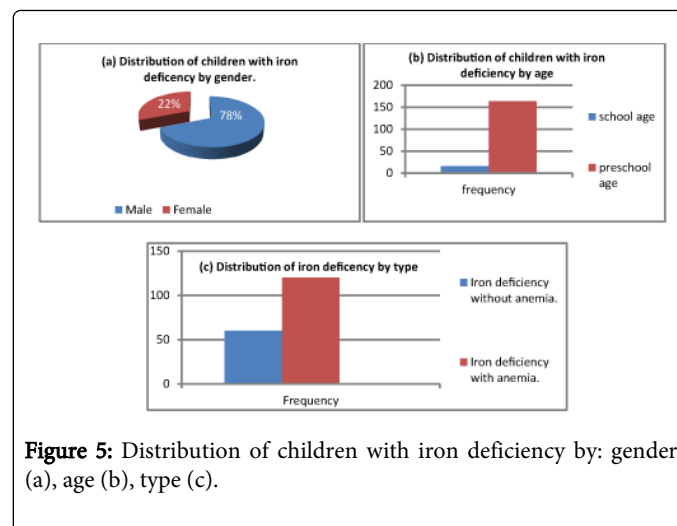


**Figure 4:** Distribution of anemic children by: gender (a), age (b), type (c).

There were one hundred eighty (180) cases of iron deficiency among the four hundred and eighteen (418) sick children included in the study, a rate of (43.06%), including one hundred and twenty (120) with anemia, and (60) without anemia (Figure 5c).

The male gender was most affected by iron deficiency (78.33%). The sex ratio was 3.61 in favour of males (Figure 5a).

Children with preschool age (1 month - 5 years) were the most affected by iron deficiency (91.11%), while children with school age (5 years - 15 years) were the least affected by iron deficiency (8.89) (Figure 5b).



**Figure 5:** Distribution of children with iron deficiency by: gender (a), age (b), type (c).

There were very few cases of leukemia (3 out of 418 patients), and all three (3) was ALL (Table 3).

	Frequency	%
Leukemia	03	0.87

**Table 3:** Leukemia cases recorded during the study.

## Discussion

55.5% patients had anemia, which is higher than the average found by Massen in his study about anemia among children in Tlemcen (Algeria) in 2006 [3], which has found 46% as prevalence of anemia. The average I've found is as high as the rates found in the WHO study on anemia among children in the world in 2005 [4], in which the rate was 42.5% in Algeria. These differences are explained by the fact that in our study there was hospitalized where it is usual to find anemia with a rate higher than in children apparently saints which were taken in the other studies (Table 4).

	Ghaffour	Massen	WHO
Anemia %	55.5	46	42.5

**Table 4:** Comparison of anemia rate with other similar studies.

The prevalence of microcytic hypochromic anemia was 28.7%, this rate is close to the rate found by MRABH [5] in his study entitled "Etiological approach anemia in children" realized in Rabat (Morocco) in 2003, he found 31% of microcytic anemia, and is lower than the rate found in the study of LAHRACH [6] entitled "sever anemia in children" realized in Fes (Morocco) in 2008, in which he found a 40% rate of microcytic anemia (Table 5).

	Ghaffour	Lahrach	Mrabah
<b>Microcytic anemia %</b>	28,7	40	31

**Table 5:** Comparaison of microcytic anemia rate with other similar studies.

The microcytic anemia is generally related to iron deficiency, which the rate was 43.06% (iron deficiency with or without anemia), this rate was higher than the estimated prevalence of iron deficiency in North Africa found in the study of the WHO which was of the order of 39%, [7] and the study conducted by Massen in 2006 [8] in children of preschool age 12 months to 59 months where he has found a rate of 39.5% (Table 6).

Male gender is possibly most likely to be affected by iron deficiency anaemia due to no menstruations.

Preschool children are most likely affected by iron deficiency possibly because diet more milk than later on.

	Ghaffour	Massen	WHO
<b>Iron deficiency %</b>	43	39.5	39

**Table 6:** Comparaison of the iron deficiency rate with other similar studies.

For normocytic anemias there was a 24% rate which is logic in a study in Pediatrics, most of these cases had nutritional causes other than iron deficiency (lack of vitamin A, vitamin C, and acid folic).

Regarding macrocytic anemia, there were 11 cases (2.63%), whose origin could not be detected, but theoretically it was thought to folic acid deficiency or vitamin B12.

For hyperleucocytosis, most of them were recorded in children who have a body vigilante synonymous infection.

Regarding leukemia, the prevalence was very low (0.87%).

Given the high prevalence of iron deficiency (in case of a low ferritin) we recommended routinely supplement this kind of sick to iron therapy as syrups or drops and ensure that improving the diet should be rich in iron (red meat, fish such as sardines some vegetables such as beans and lentils), combined treatment with vitamin C enhances iron absorption by the intestine. We also advise patients to take other supplements to treat all other anemias that are overall food cause.

We also recommended continuing the investigation of iron deficiency at larger scales (regional and national) for the age group (1 year to 15 years) where this kind of studies remains insufficient in Algeria.

## Conclusion

This practice study involved 418 children aged 1 month to 15 years with different diseases of varying severity that imposed hospitalization, and had at least one blood examination. The main results of this study, we found:

1. That infants less than one year accounted for most hospitalized age group.
2. The CBC was the most prescribed and directed examination, but in some cases it was not enough to properly diagnose hematological abnormalities, especially with the prevalence of anemia is high among children, so there were difficult to clarify the etiologies including iron deficiency.
3. We have found that the rate of anemia was 55.5%, the rate of iron deficiency was 43.06 and the iron deficiency anemia rate was 28%, which represents a real public health problem.

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