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Profile of Lymphopenia in Children from Zero to Two Years in Douala-Cameroon: Study of 58 Observations

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Abstract— Background*: Pediatric lymphopenia is an often malignant biological sign that can be associated with a primary immune deficiency exposing children to severe and/or recurrent infections. The objective of this work was to study the profile of lymphopenia in order to assess its importance in children aged from 0 to 2 years and to direct them towards better management.* ***Method****: We conducted a prospective and cross-sectional study at the General Hospital and the Laquintinie Hospital in Douala. It took place from March 18 to July 31, 2019 on children from zero to two years old. A blood count was performed followed by a thin blood smear on a population of 825. The data was entered and analyzed using Epi Infos 7 and Office 2013 software.* ***Results****: The prevalence of lymphopenia was 7.03%, or 58 cases. It was more represented in female children, is 6.46%, and in children aged between 7 and 24 months. In children with lymphopenia, fever was the most represented clinical sign (63.79%), infections of the ORL sphere were the most frequent (51.72%) of which 36.20% were severe and/or repeated. and respiratory disorders were predominant (53.45%). Thrombocytopenia and anemia were the most common blood count abnormalities associated with lymphopenia, at 31.03% each.* ***Conclusion****: This study shows us that pediatric lymphopenia is accompanied by several clinical signs and testifies to the presence of several cases of disease due to bacterial, parasitic, fungal or viral infections. Therefore, it would be important to take into account the probable presence of a primary immunodeficiency and to direct the diagnosis towards the search for the latter in order to improve management.*

Keywords— *Lymphopenia – Douala — Pediatrics - Primary immune deficiency.*

I. INTRODUCTION

Lymphopenia is a biological abnormality defined by a number of lymphocytes lower than physiological values according to age. In pediatrics, it is often a malignant sign, which can be associated with a primary immunodeficiency [1]. Since lymphocytes are the body's specific defense cells, the occurrence of lymphopenia can be the cause of infections with opportunistic germs, multiple, severe and/or recurrent infections and autoimmune symptoms [2]. In order to guide the patient towards better care, the diagnostic approach must be rigorous because there are many causes of lymphopenia, whether acute or chronic [3]. Several studies have been carried out evoking the infectious profile of children with lymphopenia linked to a primary immune deficiency; notably in France in 2016 [4], in Tunisia in 2013 [5], in Morocco in 2017 [6]. The data being missed in our context, we proposed to evaluate the physiopathological variations of lymphopenia in children aged from 0 to 2 years consulting at the General Hospital and the Laquintinie Hospital of Douala.

II. PATIENTS AND METHOD

A prospective and cross-sectional study was conducted with 825 children aged between 0 and 2 years old from March 18 to July 31, 2019, consulting or interned at the General and Laquintinie hospitals in Douala. Patients were sampled according to the standards and qualities of venous blood sampling and respect of asepsis. The volume required was between 1 and 4 ml of blood contained in an Ethylene Di-amine tetra-acetate tube. The analysis of the samples was done with the automatons of the hemogram PENTRA XLR at the General Hospital and PENTRA XL at the Laquintinie Hospital following the same principles, namely: Variation of the impedance, Spectrophotometry, light scattering, Absorbance and resistivity. Subsequently, a blood smear was taken and stained with May Grunwald Giemsa to obtain the relative and absolute values of the cells of the white line. Lymphopenia was interpreted according to the blood count reference values

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in children aged from zero to two years: [0-3[months: ≤ 2 G/l, [3-7[months: ≤ 4 G/l, [7-24] months: ≤ 3 G/l.

Ethical considerations

For this study, we received a research certificate from the Dean of the Faculty of Medicine and Pharmaceutical Sciences of the University of Douala; the administrative authorizations of the Directors of the Hospitals (General and Laquintinie) of Douala and the ethical clearance issued by the institutional ethics committee for human health research of the University of Douala.

Statistical analysis of data

The data obtained during the study were entered using Microsoft Office Excel 2013 software and analyzed by SPSS version 7 software. The comparison of frequencies and the tests of association were carried out using the Chi 2 test. The results were considered significant at $p \leq 0.05$.

III. RESULTS

Out of the 825 children sampled, only 58 were found to have lymphopenia, i.e. a prevalence of 7.03%, mainly girls aged between 7 and 24 months.

Fever (63.79%), break in the height-weight curve (46.55%) and diarrhea (29.31%) were the clinical signs accompanying lymphopenia most cited in this study (Table I).

Table II shows the distribution of children with lymphopenia according to clinical diagnosis. According to this table, infections of the ORL sphere (51.72%), gastroenteritis (15.52%) severe bronchopulmonary infections (8.62%) and. Prematurity (25.86%) were the clinical diagnoses most associated with lymphopenia. It should be noted that, out of the 58 cases of lymphopenia, four deaths were recorded, i.e. 6.90%

TABLE I: Distribution of children with lymphopenia according to clinical signs

Clinical signs accompanying lymphopenia	Number	Percentage(%)
Fever	37	63.79
Convulsion	12	20.69
Skin rash	11	18.96
Break in the height-weight curve	27	46.55
Diarrhea	17	29.31
Total	58	100

TABLE II: Distribution of children with lymphopenia according to clinical diagnosis.

Clinical diagnosis	Effectif (n)	Percentage (%)
Severe and/or repeated ORL infections	21	36.20
Simple ORL infections	9	15.52
Severe gastroenteritis	4	6,90
simple gastroenteritis	5	8.62
Severe bronchopulmonary infection	5	8.62
Early neonatal infection	10	17.24
Infectious meningitis	7	12,07
Sepsis	1	1,72
Premature	15	25.86
Deceased	4	6.90
Total	58	100.00

Table III presents the different cases of infections associated with lymphopenia in children according to age. From this table, we note that the ENT infection was the only one present in children between 0 and 2 months old; and more represented (50%) in children between 7 and 24 month olds. In addition, gastroenteritis was the most common infection in children aged between 3 and 6 months, i.e. 42.86%. The age group most affected by infections was that of [7-24] months, with 32 cases of infection. Respiratory disorders were predominant at 53.45% followed by digestive (37.93%) and neurological (20.70%) disorders.

TABLE III: Infections in children with lymphopenia according to age

Age (month)	Type of infections				
	ORL n(%)	Bronchopulmonary n(%)	Meningitis n(%)	Gastroenteritis n(%)	Total n(%)
[0-3[	11 (100)	0 (0.00)	0 (0.00)	0 (0.00)	11 (100.00)
[3-7[	2 (28.57)	1 (14.29)	1 (14.29)	3 (42.86)	7 (100.00)
[7-24]	16 (50.00)	4 (12.50)	6 (18.75)	6 (18.75)	32 (100.00))

The distribution of the cases of lymphopenia according to the germ revealed that, the lymphopenia could be due to several pathogenic germs thus, out of the 7.03% of lymphopenia, 3.51% were bacterial, 1.1% of infections were parasitic infections, 0.97% were viral infections, 0.12% were fungal infections and 1.33% of the patients were suffering from poly-infection.

TABLE IV: Distribution of children according to blood count abnormalities associated with lymphopenia

Blood count abnormalities	Effectif (n)	Percentage (%)
Anemia	18	31.03
Leukopenia	14	24.14
Neutropenia	8	13.79
Thrombopenia	18	31.03
Neutrophilia	12	20.69
Anemia and thrombocytopenia	5	8.62
Hyperleukocytosis	6	10.34
Total	58	100

Table IV: Distribution of children according to abnormalities of the hemogram associated with lymphopenia. It is observed in this table that thrombocytopenia (31.03%) and anemia (31.03%) were the abnormalities mostly associated with lymphopenia.

IV. DISCUSSION

Lymphopenia in children aged from zero to two years is due either to a primary immune deficiency, to an acquired immune deficiency or to viral infections (HIV, HCV, HBV)[4]. Its prevalence in our study was 7.03%. This prevalence is lower than that obtained by Fournier [4] who found 0.13% lymphopenia in his study. This rising prevalence may be due to the increasingly high presence of viral infections in our country.

Lymphopenia was found more in female children, ie 6.46% of the female population. This would be explained by

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the fact that lymphopenia linked to an immune deficiency is most often caused by genetic abnormalities of the sex chromosome X [7], which is more expressive in the female sex.

The most represented age group was that of [7] months, i.e. 10.00% of the population aged between 7 and 24 months. This could be explained by the fact that the majority of children had a late diagnosis of lymphopenia compared to the fact that lymphopenia linked to a PID could lead to the occurrence of infections in children when the maternal antibodies are progressively disappearing [8]. This result corroborates with that of Benali [9] in his study on "primary immune deficiencies".

We highlighted 63.79% cases of fever, 46.55% cases of break in the height-weight curve and 29.31% cases of Diarrhea; this result demonstrates the involvement of the immune system [10, 11]. These results are similar to those of Fasth [12] in his study on "primary immunodeficiencies" in Sweden.

The most represented infection was that of the ORL sphere (51.72%) of which 36.21% were severe and/or repeated, followed by gastroenteritis (15.52%) of which 6.90% were severe and 8. 62% of severe broncho-pulmonary infections. This could be explained by the fact that a drop in lymphocytes due to an immune deficiency would expose the entry routes of the body to infections [10]. Our results are nevertheless in disagreement with those of Lamia et al. in his study on "deficits. Four deaths were reported, or 6.90%. Bejaoui had found 24.3% of deaths. This difference would be due to the fact that his study was conducted over a long period and the pathologies of patients whose diagnosis of a primary immune deficiency did not early become complicated.

Bacterial infections were the most marked with 50%, followed by parasitic infections, which were found at 25.86%. 18.96% of patients were suffering from poly-infection. This could be explained by the fact that lymphopenia linked to PID could be associated with the presence of poly-infection [13].

Thrombocytopenia and anemia were the most common abnormalities, i.e. 31.03% of cases each, this could be explained by the fact that immune deficiencies are often accompanied by autoimmune thrombocytopenia and infections that can lead to anemia [14]. Our results can be compared to those of Talibi [6] who had found 14% autoimmune reaction if we had had to do more extensive immunological tests. We found 8.62% of children with lymphopenia associated with both thrombocytopenia and anemia. This could be explained by the fact that the latter could have presented a medullary attack leading to a defect in the production of cells of the three blood lines.

V. CONCLUSION

Lymphopenia is represented mostly in children at the age of progressive disappearance of maternal antibodies; it is mostly present during severe bronchopulmonary, ORL infections and severe gastroenteritis. Thrombocytopenia, anemia, and neutrophilic polynucleosis were the predominant blood count abnormalities accompanying lymphopenia. In view of all the above, it would therefore be important to take into account the probable presence of a primary immunodeficiency in the face of such a profile of lymphopenia in children and to direct the diagnosis towards the search for the latter.

Conflict of Interest

Authors declare no conflict of interest.

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