

Child Tuberculosis: Epidemiological-Clinical Appearance in the Paediatric Ward, Mahajanga University Hospital

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Abstract

Introduction: Tuberculosis is an infectious disease due to the tuberculosis complex. Childhood tuberculosis is responsible for significant morbidity and mortality especially in these serious forms such as meningitis and military. Our aim is to describe the epidemiological and clinical profile of tuberculosis in children.

Methods: This is a retrospective, descriptive study of hospitalized children with tuberculosis infection, starting from 1 January 2011 to 31 December 2015, in the Pediatric Department at the University Hospital of Mahajanga.

Results: We included 226 cases of tuberculosis, with a prevalence of 3.9%. The sex ratio was 1.3. Seventy-one point four (71.4%) lived in urban areas, 54.4% were with notion of tuberculosis, 14.6% were not vaccinated with BCG, 34.3% were malnourished. The diagnostic delay was 2.6 months with a range of 1 week to 2 years. Pulmonary tuberculosis was 30.9% (TPM + 12.8%), lymph node tuberculosis: 38.1%, peritoneal tuberculosis: 4.4%, pleural tuberculosis: 6.6%, bone tuberculosis: 2.7%, meningeal tuberculosis: 10.6% and military tuberculosis: 6.6%. The lethality rate was 7.1%. Children with low socioeconomic status, malnourished, not vaccinated with BCG or with sputum smear-positive, mostly contracted severe forms of tuberculosis.

Conclusion: The improvement of living conditions, early detection and reinforcement of BCG vaccination campaigns are needed for this alarming situation.

Keywords: *Child; Tuberculosis; Military; Meningitis; BCG*

Introduction

Tuberculosis (TB) affects children in 15 to 20% of cases [1,2]. It kills 3105 children each year. Severe forms are represented by military and meningitis. The progression of TB infection varies according to the age of the child [4]. In infants under one year of age, the risk of developing lung disease is estimated at 30 - 40% and that of disseminated, meningeal or military forms is 10 - 20% [5]. The aim of this work is to describe the epidemiological-clinical aspects of childhood TB in the Pediatrics Department of the Mahajanga University Hospital Centre.

Methodology

This is a cross-sectional, descriptive retrospective study, based on the medical records of children hospitalized in the Pediatrics department at the Mahajanga University Hospital Center. The study spanned a 5 -year period from January 2011 to December 2015. Children

diagnosed with TB, with biological confirmation or a clinical score of TB ≥ 7 were included. We excluded those whose medical records were not complete. The parameters studied were socio-demographic and economic parameters (age, place of birth, gender, occupation of parents, number of siblings, type of house, number of rooms, number of people living in the house, socio-economic situation, low if the monthly income of parents were lower than 100 €, moderate if 100 - 200 €, and high if > 200 €), clinical parameters (TB control, BCG vaccination, nutritional status), diagnostic parameters (diagnosis time, diagnosis, clinical score, intra-dermo-response to tuberculin), paraclinical parameters (sputum smears for TB, Accelerated or Not Erythrocyte Sedimentation Rate, C-Reactiv Protein > 6mg or lower), therapeutic parameters (new or relapsed case) and evolutionary. The severity criteria were the miliary form found on the chest x-ray, and the meningitis TB evoked in the presence of a febrile neurological syndrome associated with or not a lumbar puncture result revealing a hyper lymphocytosis, hypoglycorrhachia.

The data was entered on Excel 2010 and analyzed on the EPI-Info version 7 software. The Chi2 test was used for percentage comparison. A value of 0.05 was considered significant. The anonymity and rules of good clinical practice were respected. The collection of data in these files was done only at the hospital.

Results

A total of 226 cases of tuberculosis were identified out of 5,799 children hospitalized, resulting in a hospital prevalence of 3.9%. The median age was 5.9 years with a minimum of 5 weeks and a maximum of 15 years. Our population consisted of 128 boys and 98 girls, giving a sex ratio of 1.3. Fathers worked in the informal sector in 80% of cases. The 58.4% of mothers worked in the informal sector. The average number of siblings was 3.4 with a minimum of one sibling, and a maximum of 13. The average number of people living in a house was 5.6 with a minimum of 2 and a maximum of 17. A concept of contaminator was evoked in 123 children, 60% of whom were contaminating people were from the family. Vaccine coverage for BCG was 85.4%. A quarter of children (24.3%) were malnourished. The average diagnosis time was 2.6 months, with extremes of one week to 2 years. The clinical score was used to retain diagnosis in 56.4% (n = 127) of cases, with a positive result in 68.5% and negative in 31.5%. The tuberculin skin test was performed in 85 children, it came back positive in 80% of cases (n = 68). Severe forms of TB, represented by the form of the military and the meningeal locations, constituted the 17.3% of patients. Pulmonary TB was 31% and the lymph node form was 38% and the remains were 13.7%. The distribution of patients by location of TB is described in table 1. The 19% (n = 43) of the patients were positive bacilloscopic. The erythrocyte sedimentation rate (ESR) were accelerated in 90% of cases and 77% of the C-Reactive Protein (CRP) were positive (> 6mg). We noted eight relapsed cases (3.5%). The fatality rate was 7.1% (n = 16). A significant relationship was found between the severe or non-severe form of TB and the presence or not of a contaminator. Age did not affect the occurrence of a severe form (p > 0.05). The presence of a contaminating person favored the development of a severe form of TB (p < 0.05). Vaccination coverage reduced the risk of a severe form (p < 0.05). A normal nutritional state decreased progression to a severe form (p < 0.05). Severe forms of TB were associated with a positive of the acid-fast bacilli (AFB) smear result (p < 0.05). Those risk factors are detailed in the table 2.

Diagnostics selected	Our series 2015-2016	Tunisia [6] 2008	Morocco [9] 2008	Congo [19] 2003
TPM+/TPM-	30,9	47,3	17	-
Ganglionic	38,1	26,4	30	1,9
Osteoarticular	2,7	14,7	6,6	6,7
Peritoneal	4,4	5,9	14,3	-
Intestinal	-	2,9	9,7	18,3
Meningeal	10,6	5,9	15	0,5
Miliary	6,6	-	-	2,5

Table 1: Comparative table of tuberculosis Location Frequency in the Literature (Percentage).

	Not severe form N (%)	Severe form N (%)	Total N (%)	p
Age (years-old)				
- < 3	51(22,6)	14 (6,2)	65 (28,8)	> 0,05
- ≥ 3	136 (60,2)	25 (11,1)	161 (71,2)	
Gender				
- Male	108 (47,7)	19 (8,4)	127 (56,1)	> 0,05
- Female	79 (34,9)	20 (9)	99 (43,9)	
Socio-economic situation				
- Low	101 (44,7)	32 (14,2)	133 (58,9)	< 0,05
- Moderate	75 (33,2)	6 (2,6)	81 (35,8)	
- high	11 (4,9)	1 (0,4)	12 (5,3)	
Contaminating agent				
- Present	95 (42)	28 (12,4)	123 (54,4)	< 0,05
- Absent	92 (40,7)	11 (4,9)	101 (45,6)	
BCG vaccination				
- Present	166 (73,5)	27 (11,9)	193 (85,4)	< 0,05
- Absent	21 (9,3)	12 (5,3)	33 (14,6)	
Nutritional status				
- Normal	150 (66,4)	21 (9,3)	171 (75,7)	< 0,05
- Moderate	15 (6,6)	7 (3,1)	22 (9,7)	
- Severe	22 (9,7)	11 (4,9)	33 (14,6)	

Table 2: Risk factors for progression to a severe form of child tuberculosis.

Discussion

Analysis of the 226 cases of TB hospitalized in the Mahajanga Hospital Pediatrics Department provided an analysis of the epidemiological and evolutionary profile of child TB.

In this study, the prevalence of hospitalized child TB was 3.9%. It is less important in North Africa and European countries, with a prevalence of 0.4% at the Medi Choker University Hospital in Sfax, Tunisia [6] and 0.8% in Europa. According to the WHO, in 2014, the annual global burden of TB among children was 10-20% of the global burden of TB [7]. The median age of our patients was 5.9 years. It was 9 years old in Cameroon (2013) and in Morocco in 2015 [8, 9]. A clear predilection for male injury is observed (sex ratio: 1.3), as in Tizi-Ouzou (sex ratio: 1.4) [10]. In Morocco in 2015, there was a female predominance [9].

In this study, 80% of fathers worked in the informal sector. TB affects all social classes, especially the poorest, which has also been found in the literature [10]. In Africa, a contaminating person is often found. It was mentioned in 54.4% of our cases, in 62.3% of cases in Congo, 41% in Morocco, and 64% in Algiers [1,9,11]. The contaminator is usually represented by an adult, family member, as in the 60% of our cases, and 62.3% at the University Hospital of Congo [1]. Vaccination coverage was high in our series (85.4%), compared to 60.7%

in Congo, 73.1% in Morocco in 2008, and 90% in 2015 [1,9,12]. The 24.3% of our patients were malnourished, 75.4% in Congo and 22% in Morocco [1.12]. This significant discrepancy could be explained by the difference in HIV-positive rates, which were not assessed in our study [13-14]. Diagnosis of child TB remains a challenge. A clinical score is established by WHO for several low-resource countries such as Madagascar. The sensitivity of the score is 85%, its specificity 67.2%, its positive predictive value of 80.9% and negative value of 73.2% according to Keith EDWARD [15]. The score was calculated in 127 children, with a positive result in 68.5% and negative in 31.5%. The search for BK in sputum or gastric tube, when positive, is an element of certainty. It was in the order of 19% in our series, 17% for Gahouma [16]. Regarding the diagnoses selected, we made a comparison of the different forms of tuberculosis found in our series with those encountered in a Tunisian, Moroccan and French series (Table I). The fatality rate by TB was 7.1% in our series, 5.2% in Tunisia and 10% in Cameroon [6,8]. Severe forms mainly affect children under the age of 3 years-old [17]. In our series, the age of the child had no influence on the appearance of a severe form. Undernutrition, the concept of contaminator, and lack of vaccination coverage were at risk of contracting serious TB. These comments were verified in other studies [1,18]. Strengthening the system for systematic monitoring of children, even at the community level, in order to detect malnutrition early would promote early management. Strengthening immunization campaigns at the community level with improved access to vaccines would be needed to increase immunization coverage.

Conclusion

Child TB remains a concern in a TB-endemic country such as Madagascar. It is a source of morbi-mortality in children especially in its severe form (miliary and tuberculosis meningitis). In our series, undernutrition, the notion of contamination, the lack of vaccination coverage, and the existence of AFB in sputum favored the occurrence of these severe forms. Some preventive measures are needed, such as improving living conditions by combating poverty, educating the population to prevent the transmission of BK, screening and treatment of BK-positive patients, source mass contamination of children and BCG vaccination at birth.

A new larger study would allow us to establish an optimal diagnostic approach to detect and treat contaminants early.

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