

Original Research Article

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3 **CLINICAL PROFILE AND FACTORS ASSOCIATED TO POOR OUTCOME IN** 4 **CHILDHOOD TUBERCULOUS MENINGITIS IN A DEVELOPING COUNTRY**

5 **ABSTRACT**

6 **Aims:** To describe the epidemiologic, and clinic profile and the outcomes of childhood TBM
7 in the 3 university hospitals of Democratic Republic of Congo (DRC).

8 **Study design:** It was a retrospective study.

9 **Place and duration of study:** The University Hospitals of DRC (University Hospital of
10 Kinshasa, Kisangani and Lubumbashi), from January 2005 to December 2014.

11 **Methodology:** Were reviewed the medical records of children aged less than 15 years
12 hospitalized for TBM as defined by clinic and paraclinic parameters. Of 5997 patients
13 admitted for TBM, 42 (0.7%) were children aged less than 15 years, but only 31 cases met
14 the selection criteria.

15 **Results:** The mean of age was 4.3 years (3 months-14 years). The main symptoms were fever
16 (80.6 %), weight loss (41.9%) and alteration in consciousness (70.9%). The main physical
17 symptoms was the neck stiffness and signs of meningeal irritation (61.2%) and cranial nerve
18 palsy (32.2%). One (3.2%) patient was classified as stage I, 12 (38.7%) as stage II, and 18
19 (58.5%) as stage III. Three cases were coinfectd with HIV (38.7%). It was 95.6% cases of
20 pleiocytosis, 58.1% of lymphocytic pleocytosis, 35.4% of neutrophilic pleocytosis, 91.6% of
21 proteins increase, 91.6% of low glucose and 16.6% of low chlorure. Eleven (35.5%) patients
22 were cured, 11 (35.5%) had sequelae and 9 (29.0%) died. The bivariate analysis an
23 association between the time before consultation ($P=.004$), the waiting period before
24 diagnosis after hospitalization ($P=.003$), the TB contact ($P=.046$), the nutritional status

($P=.001$) and the loss of weight ($P=.012$) and a poor outcome. In the logistic regression, only the nutritional status ($P=.001$) was the factor predicting the poor outcome.

Conclusion: TBM poses diagnostic and prognostic challenge in DRC. Cases should be promptly reported and notified to the national report, and the diagnosis must be done early to improve his prognostic.

Key words: Tuberculosis, meningitis, children, Democratic Republic of Congo

Abbreviations:

CNS: Central Nervous System

CSF: Cerebrospinal fluid

CUK: University Hospital of Kinshasa

CUKIS: University Hospital of Kisangani

CULU: University Hospital of Lubumbashi

DRC: Democratic Republic of Congo

EPTB: Extra pulmonary Tuberculosis

MRC: British Medical Research Council

NTP: National Program against Tuberculosis

PTB: Pulmonary Tuberculosis

TB: Tuberculosis

TBM: Tuberculous meningitis

INTRODUCTION

The transmission of Tuberculosis (TB) has been going on around the world for several centuries [1] and still remains a major public health problem in the developing countries, including the Democratic Republic of Congo (DRC) which ranks 7th of the 22 countries carrying the biggest burden of TB in the world [2].

50 TB of central nervous system (CNS) is one of the terrible forms of the disease because it
51 constitutes the 3rd big form of extra pulmonary TB (EPTB) [3].

52 Tuberculous meningitis (TBM) is a severe form of the cerebral nervous system (CNS) TB,
53 reported with a high morbidity and mortality [4, 5]. It occurs after a haematogenic
54 dissemination of bacilli in the space under arachnoid. It can be a complication of a primary
55 TB infection, or a reactivation of a latent TB, or it can be a result of an exogenous reinfection
56 [6-9].

57 TB is one of the 3 big killer diseases in the world [10, 11] and TBM take a huge toll in terms
58 of mortality [5, 12]. Then, it is necessary to underscore the importance of epidemiological
59 surveillance and case management. TBM constitutes an epidemiological index of the TB
60 infection, it is thus a sure reflect of the epidemiological situation of TB infection [13]. Yet, in
61 the developing countries, TBM is under diagnosed, its burden is underestimated and
62 frequently unknown.

63 In DRC, one of the big strengths of the fight against TB is the development of the reporting
64 system. Yet these tools do not report all the specific forms of the EPTB to the central level.
65 This situation explains the lack of data about the childhood TBM at the National Program
66 against TB (NTP) and the insufficiency of information about the impact and outcomes of this
67 pathology in our area [14].

68 That justifies the opportunity to lead this study which has for objective the epidemiological
69 and clinical review of the TBM cases in children in the 3 university hospitals in DRC, and the
70 determination of its outcomes profile, that can help to assess the factors associated to poor
71 outcome.

72

73 **MATERIAL AND METHODS**

74 The present study is a case-series of cases diagnosed between January 2005 and December
75 2014 in the 3 university hospitals in DRC namely the university hospital of Kinshasa (CUK),
76 located in the southwest of the country, the capital of the country, the University hospital of
77 Kisangani (CUKIS), located in the North of the country in the oriental district, and the
78 university hospital of Lubumbashi (CULU), located in the southeast part of the country
79 [Figure 1). University hospitals are the 3rd line of reference in the health care pyramid system.

80 Data was extracted from hospitals files and TB registers for all TB cases admitted during the
81 period of study. Children from 0 to 15 years old hospitalized for TBM were included in the
82 study. Children was categorized into 3 groups (the first group included children aged 0 to 4
83 years-old, the second group children aged 5 to 10 years-old, the third group children aged 11
84 to 15 years-old. Anamnestic data (age, sex, TB contact, Bacillus Calmette Guérin (BCG)
85 vaccination, perinatal asphyxia or epilepsy, TB in the past or previous anti TB treatment, time
86 spent elsewhere before turning to the university hospital and number of days spent in the
87 university hospital before diagnosis) were collected. If the patient consulted the university
88 hospital within 2 weeks after the occurrence of the first sign, this was classified as a “soon
89 consultation” and as “late consultation” otherwise.

90 The physical examination consisted the recording of anthropometric parameters, the general
91 and neurological examination, and assessment of the clinical stage of the disease. The body
92 mass index Z-score was calculated according to the WHO program Anthro and anthro plus
93 software 2011 version 3.2.2 [15]. According to WHO definitions, we considered the absence
94 of malnutrition when the z-score was situated between -2 and 2 SD; a moderate malnutrition
95 when the z-score was between 2 and 3 SD; and a severe malnutrition when the z-score was
96 less than -3 SD. Children were further grouped in 2 categories non-malnourished and
97 malnourished. Children were clinically classified in 3 stages according to the «British

98 Medical Research Council» (MRC) [16]. Stage I includes symptoms and non-specific signs
99 without loss of consciousness, such as apathy, irritability, headache, faintness, fever,
100 anorexia, nausea and vomiting. The stage II consists of altered consciousness without coma
101 or delirious, associated with a minor focal signs, with or without meningeal signs, isolated
102 cranial nerves palsy, and abnormal involuntary movements. Stage III includes the stupor or
103 coma, with severe focal neurological deficit and convulsions, associated or not to abnormal
104 movements or attitude.

105 The paraclinic results were listed (Mantoux test, erythrocyte sedimentation rate (ESR), ziehl
106 exam, Lowenstein culture, chest X-ray, ultrasound transfontanellar, cranial CT scan). The
107 Mantoux skin test was considered as positive from 10 mm.

108 None of the children had Magnetic Resonance Imaging (MRI) exam since not available in the
109 country.

110 Children with acute bacterial meningitis, cerebral malaria, bacterial sepsis, epilepsy,
111 metabolic disease, intra-cranial haemorrhage, history of perinatal asphyxia, children for whom
112 the medical record was incomplete or lost, and those who were not followed up to their final
113 outcome, were excluded from the study. The outcome was defined as follows: 1) the cured
114 patients, 2) patients with sequelae and 3) patients deceased. Were considered as having a
115 good outcome all the children who were cured, and the poor outcome where the child was
116 dead or had sequelae.

117 TBM diagnosis was based on suggestive clinical elements of TBM, associated to a laboratory
118 or radiological features showing an evidence of TB infection (concomitant chest X-ray
119 suggestive of TB infection or concomitant positive result for ziehl test on gastric or sputum,
120 Lowenstein culture, or Xpert-MTB, or positive analysis of the cerebrospinal fluid (CSF), or

121 suggestive cranial Computed Tomographic (CT) scan and/or in a good response to anti TB
122 treatment.

123 The treatment outcome was grouped in 3 groups, patients cured, patients with sequelae, and
124 patients dead. All the children with TBM received anti TB treatment according to old
125 national guidelines, made of 2 months of Rifampicine (R), Isoniazide (H), Streptomycin (S)
126 and Pyrazinamide (Z), followed by 4 months of R and H [15]. At present, NTP plans a
127 treatment of 12 months made of 2 months of RHEZ and 10 months of RH [17]. Besides this
128 treatment, most of the patients (20/23 is 86.9 %) had received steroids. The laboratory
129 follow-up of CSF was not performed for all the patients, because most of patients were not
130 able to pay for it.

131 The Chi-square of Pearson was used to compare different factors associated with poor
132 outcome. Logistic regression was used to identify the determinant of the poor outcome.

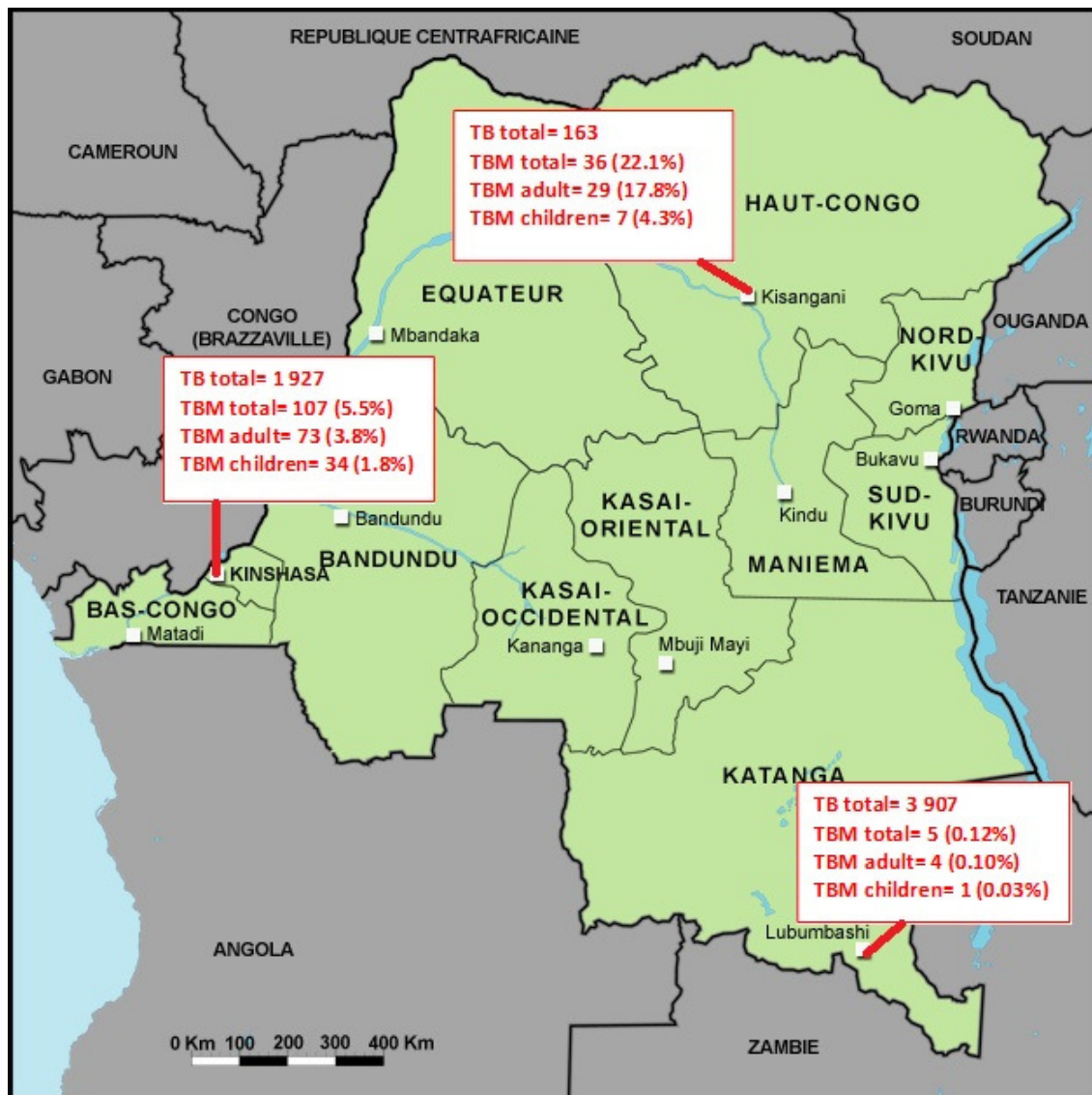
133 The study respect the standards defined by the Declaration of Helsinki. The patients records
134 were anonymized and de-identified before analysis, the Kinshasa School of Public Health's
135 Ethics committee approved this study.

136 **RESULTS**

137 On a total of 5 997 patients admitted for TB in the 3 university hospitals of the country during
138 the period of study, 148 (2.4%) had TBM, among whom 42 (39.2%) were children under 15
139 years-old, that represents 0.7% of all TB cases [Figure 1]. Among them, only 31 children
140 were included because of the lack of some data in the medical file. The distribution of cases
141 by hospital reported 23 (74.2%) from CUK, 7 (22.6%) from CUKIS and 1 (3.2%) from
142 CULU.

143

144 **Figure 1:** Distribution of TB cases in the 3 university hospitals of DRC



145

146 **Legend:** TB: tuberculosis, TBM: tuberculous meningitis, TBM adult: number of TBM cases in adults, TBM children:

147 number of TBM cases in children

148 **Source of the map :**

149 http://www.google.fr/imgres?imgurl=http://www1.rfi.fr/actu/fr/images/079/carte_rdc_provinces2006.jpg&imgrefurl=http://www1.rfi.fr/actu/fr/articles/079/article_45035.asp&h=628&w=627&tbnid=QTywI2BoLpG-5M:&zoom=1&tbnh=91&tbnw=91&usq=_u_zpXBADEQ609x_Fs6FPQP-S04=&docid=sd1Ks9vrBmMn5M&hl=fr&sa=X&ei=CTrHVNSXE8SrUdCsg4gE&ved=0CCUQ9QEwAQ

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The median age was 2.5 years. The average age was 4.8 years (extremes: 3 months-15 years), 16 female and 15 male, sex ratio boy/girl at 0.93. The TB contact was found in 9 (29.0%) cases, and 16 (51.6%) children received BCG.

As regards the symptoms at admission, fever was reported in 25 cases (80.6%), weight loss in 13 cases (41.9%), altered consciousness in 22 cases (70.9%), convulsions in 15 cases (48.3%), vomiting in 4 cases (12.9%), headache in 6 cases (19.3%), altered behavior and photophobia in 1 case each (3.2%) [Table I].

Table I. Symptoms of TBM cases in children in admission

Symptoms	Frequency (%)
Fever	25 (80.6%)
Loss of weight	13 (41.9%)
Altered consciousness	22 (70.9%)
Convulsions	15 (48.3%)
Vomiting	4 (12.9%)
Headache	6 (19.3%)
Altered behaviour	1 (3.2%)
Photophobia	1 (3.2%)
170	

The physical signs in admission were nuchal rigidity in 19 cases (61.2%), coma in 22 cases (70.9%), adenopathia in 9 cases (29.0%), focal deficit signs in 13 cases (41.9%), cranial nerves palsy in 10 cases (32.2%) among which 4 cases (12.9%) had palpebral ptosis,

174 hypertonia of members in 6 cases (19.3%) and blindness in 4 cases (12.9%). Concerning the
175 clinical stages, 1 (3.2%) was at stage I, 12 (38.7%) at stage II, and 18 (58.0%) at stage III
176 [Table II].

177 **Table II.** Clinical signs of TBM cases in admission

Signs	Frequency (%)
Nuchal rigidity	19 (61.2%)
Coma	22 (70.9%)
Lymph nodes	9 (29.0%)
Deficit signs	13 (41.9%)
Cranial nerve palsy	10 (39.2%)
- Palpebral ptosis	4 (12.9%)
- Mydriasis	1 (3.2%)
- Facial deficit	4 (12.9%)
Hypertonia	6 (19.3%)
Myoclonies	2 (6.4%)
Blindness	4 (12.9%)
« British Medical Research »	
Stades	
- Stage I	1 (3.2%)
- Stage II	12 (38.7%)

- Stage III	18 (58.0%)
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178

179 Concerning laboratory exams, the average ESR was 82mm after one hour (mm/H1). Mantoux
180 test was realized for 11 cases (35.5%), 5 (45.4%) were positive. The Ziehl test were
181 performed in 23 (74.1%) cases, among them 7 (30.4 %) were positive (two Ziehl test was
182 realized on the CSF). The lumbar puncture was realized in all the cases. The aspect of CSF
183 was clear in 20 (64.5%) cases, shady in 7 (22.6%) cases, and yellow in 4 (12.9%) cases. The
184 cytological analysis of CSF gave an average of 143 elements by microliter. In 18 (58.1%), it
185 was a lymphocytic pleocytosis, in 11 (35.4%) it was a neutrophilic pleocytosis, and in 2
186 (6.4%) cases, the CSF numeration was normal. The biochemistry analysis of CSF was
187 realized for 24 (77.4%) cases, it showed 22 (91.6%) cases of increased protein, 22 (91.6%)
188 cases of decreased glucose, and 4 (16.6%) cases of decreased chlorure. The Lowenstein
189 culture of CSF was realized in 3 cases, and only one was positive. The Human
190 immunodeficiency virus (HIV) test was perform in 12 patients (38.7%) among whom 5 cases
191 (41.6%) were positive. Thirteen (41.9%) children did a chest X-ray, among them 6 (46.1%)
192 had a lung impairment, of which 4 (30.7%) had pneumonic infiltrates and 2 (15.3%) had
193 miliary. Three children had realized an ultrasound transfontanellar, they had hydrocephalus,
194 among which 2 quadriventricular and 1 triventricular. Cranial CT scan was perform in 12
195 (38.7%) patients, 5 (41.6%) had tuberculoma, 5 (41.6%) had sub-arachnoid nodes and 2
196 (16.6%) didn't show impairment [Table III].

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198

199 **Tableau III.** Paraclinical signs in children with TBM

Paraclinical signs	Frequency (%)
CSF aspect (n=31)	
- Clear	20 (64.5%)
- Shady	7 (22.6%)
- Yellow	4 (12.9%)
Cytologic aspect (n=31)	
- Lymphocytic pleocytosis	18 (58.1%)
- Neutrophilic pleocytosis	11 (35.4%)
- Normal	2 (6.4 %)
Biochemistry exam (n=24)	
- Increased proteines	22 (91.6%)
- Decreased glucose	22 (91.6%)
- Decreased Chlorure	4 (16.6%)
Ziehl test on CSF (n=3)	
- Positive result	1 (33.3%)
Cranial CT Scan (n=12)	
- Tuberculoma	5 (41.6%)
- Sub-arachnoid nodes	5 (41.6%)
- No impairment	2 (16.6%)

As regards the outcome, 11 (35.5%) patients were cured, 11 (35.5%) had sequelae and 9 (29.0%) had died. According to our definition of cases, the poor outcomes concerned 20 (64.5%) cases.

The bivariate analysis was performed to identify factors associated to poor outcome. The time before consultation ($P=.004$), the waiting period before diagnosis after hospitalization ($P=.003$), the TB contact ($P=.046$), the nutritional status ($P=.001$) and the loss of weight ($P=.012$), were associated with a poor outcome [Table IV].

Table IV. Factors associated to the TBM outcome

Factors	Good outcome (n=11)	Poor outcome (n=20)	<i>P</i> value
Time before consultation			.004
- ≤ 15 days	6 (54.5%)	1 (5.0%)	
- > 15 days	5 (45.5%)	19 (95.0%)	
Waiting period before diagnosis			.003
- ≤ 7 days	7 (63.6%)	2 (10.0%)	
- > 7 days	4 (36.4%)	18 (90.0%)	
Age			.730
- 0-4 years-old	8 (25.8%)	13 (41.9%)	
- 5-10 years-old	2 (6.5%)	3 (9.7%)	
- 11-15 years-old	1 (3.2%)	4 (12.4%)	
Sex			.553
- Female	6 (54.5%)	10 (50.0%)	
- Male	5 (45.5%)	10 (50.0%)	
TB Contact			.046
- Absence			

- Presence	10 (90.9%)	11 (55.0%)	
BCG vaccination	1 (9.1%)	9 (45.0%)	
- Received			.192
- Non received	1 (9.1%)	6 (30.0%)	
Nutritional status	10 (90.9%)	14 (70.0%)	
- No malnutrition			.001
- Malnutrition	0 (0.0%)	8 (40.0%)	
Fever	11 (100.0%)	12 (38.7%)	
- Absence			.354
- presence	3 (27.3%)	3 (15.0%)	
Loss of weight	8 (72.7%)	17 (85.0%)	
- No			.052
- yes	9 (81.8%)	9 (45.0%)	
Vomiting	2 (18.2%)	11 (55.0%)	
- No			.447
- Yes	9 (81.8%)	18 (90.0%)	
Convulsions	2 (18.2%)	2 (10.0%)	
- Absence			.447
- Presence	5 (45.5%)	11 (55.0%)	
Headache	6 (54.5%)	9 (45.0%)	
- Absence			.646
- Presence	9 (81.8%)	16 (80.0%)	
Coma	2 (18.2%)	4 (20.0%)	
- Absence			.394
- Presence	4 (36.4%)	5 (25.0%)	
Meningeal signs	7 (63.6%)	15 (75.0%)	

- No sign			.169
- Presence of signs	6 (54.5%)	6 (30.0%)	
Deficit signs	5 (45.5%)	14 (70.0%)	
- Absence			.468
- Presence	7 (63.6%)	11 (55.0%)	
Cranial nerve palsy	4 (36.4%)	9 (45.0%)	
- Absence			.490
- Presence	8 (72.7%)	13 (65.0%)	
Hypertonia	3 (27.3%)	7 (35.0%)	
- Absence			.284
- Presence	10 (90.9%)	15 (75.0%)	
	1 (9.1%)	5 (25.0%)	

208

209 In the logistic regression, only the nutritional status ($P=.001$) was the factor predicting the
 210 poor outcome. The odd ratio was 0.44.

211 **DISCUSSION**

212 TBM is a severe form of TB because it has many complications. In the present study its
 213 prevalence was estimated at 2.4% among adults and children TB patients, and at 0.7% among
 214 children with TB aged less than 15 years.

215 TBM prevalence is not always reported worldwide because of lack of data. In the United
 216 States of America (USA) accounted for 5% of cases of extra pulmonary TB in 1997 [18]. In
 217 2000 in France, one of the countries with low TB burden, the incidence of TBM was 1.6
 218 cases per million populations, while it represented 1.5% of all TB reported cases [19]. A
 219 study in Niger that analyzed the CSF liquid of suspected meningitis patients, found a TBM

220 prevalence of 0.4%, while it was estimated at 1.9% in all cases of a confirmed diagnosis of
221 bacterial meningitis [20].

222 Central nervous system meningitis is a serious entity, but less investigated in our settings.

223 Although our study was conducted in referral health facilities with well trained personnel and
224 well equipped, less attention is paid to this disease in regard of the abundant reports in the
225 literature [21]. This could be explained by the absence of health insurance system in the
226 country where patient cannot afford to defray the costs of laboratory exams except for sputum
227 smear, GeneXpert and Lowenstein which are free of charges. Moreover, in a country where
228 TB prevalence is significantly higher, the national case reporting system is weak since it does
229 not provide for the reporting of extra pulmonary TB clinical forms, especially the TBM [15].

230 This weakness does not encourage service providers to look for this clinical form. Lower
231 reporting could be also the consequence of poor knowledge of the management neurologic
232 disorders. Compared to Kinshasa, the low detection of cases in hospitals in the DRC
233 provinces could be the consequence of poor equipment in remote areas around the country.

234 In our study, the mean age was 4.3 years, which is similar to the one reported by others
235 authors [22, 23, 24] pertaining to the fact that TBM is often a complication of primary TB
236 infection in young children. The concept of contagion is an important element in the patient
237 medical history. Contagion was found in 39.1% of patients, similar to others reports where
238 the rate ranged from 29 to 56% [23-25]. WHO in its recommendations underscores the
239 investigation for contagion whenever TB is suspected [26].

240 BCG vaccination reduces the occurrence of this serious form of the disease [27]. And despite
241 the fact that the DRC has mandated this vaccine to all children at birth, in this series we
242 found that 7 (30.5%) of children never received it.

243

244 Regarding the physical symptoms and signs at admission, in our series, fever (91.3%), neck
245 stiffness, coma and seizures (43.5% each) were frequent. These results are similar to those
246 found by other authors, including Farinha NJ et al [23] in London, Pagliano P et al [28] and
247 FS Faella Italy [25] as if to say that the clinical picture of TBM is the same elsewhere in
248 developed as well in underdeveloped countries. The cranial nerves were affected in almost
249 35% of cases in this study; according Moghtaderi A et al, the cranial nerve affection is a
250 predictor of TBM compared with bacterial meningitis [30]. Therefore, in resource-limited
251 countries like DRC, clinical examination with suggestive signs must suspect the TBM and
252 should compel to initiate additional diagnostic tests such as CSF cyto-biochemistry tests and
253 search of BK to do not to miss the diagnosis.

254 Regarding clinical stages according to the MRC, most of our patients (95.6%) were
255 hospitalized at advanced stages of the disease. Others have made the same observation
256 (Yaramis in Turkey [22] and Van Well GT et al in South Africa [31]). The ideal would be to
257 receive children at the initial stage, as was the case in the study of Pagliano et al [28] in Italy,
258 because the prognosis is better when treatment is initiated early [32].

259 One in two patients (50%) in this series had a positive Mantoux test. Some studies have
260 found a similar percentage [23] while others have reported a very different percentage, well
261 above [24] or lower [22]. Given its high diagnostic value in immunocompetent patients, the
262 Mantoux test will be included for the diagnosis of TB in children at health centers according
263 to new guidelines for TB management in DRC [17].

264 Lumbar puncture was performed in all patients because it is a key step in the diagnostic
265 process of the TBM. His analysis showed a pleiocytosis (96%) with lymphocytic
266 predominance (57%), a hyperprotidorrachy (70%), and fewer cases of hypochlorurorachy
267 (16%); which is similar to findings reported in the literature [25, 29]. Hypochlorurorachy,
268 suggestive of a TBM, was rare. Ziehl positivity was reported in 8.7 % of cases, less than 13%

reported respectively by Yaramis et al [22] and Faella FS et al [25]. X-ray, cranial CT scan and transfontellar echography were performed only in about a quarter of patients, while these exams are crucial for the diagnosis. It is therefore important to equip and make accessible these diagnostic tools, at least in referral hospitals, because in the absence of microbiology, a suggestive CSF profile associated with the history of contagion or the positivity of the Mantoux test, the good response to TB treatment and pathological brain imaging could evoke the diagnosis of TBM [29].

In terms of evolution, over a third of patients died (35%). This fatality rate was higher than the one reported by others [23-25, 31, 33]. This means that the management of the TBM is still a challenge in our country. The sequelae rates was estimated at 35% in this study similar to the one found by Saitoh in the USA [33]. However this rates varies from 19 to 55% according to the literature [23-25, 28, 31]. This rate is unpredictable and depends on the degree of the neuro-brain damage [34]. Still, 30% of our patients were cured, as in the study of Frontera in Spain [24]. This rate is higher than that found in South Africa [31] probably because their sample size was much higher than ours, and the follow-up period was longer. However, studies realized in Europe [23, 25, 29] and USA [33] found a cured patients proportion ranging between 40 and 68%, probably explained by the precocity of cases management. In this study, some factors was associated with poor outcome (time before consultation, the waiting period before diagnosis after hospitalization, the TB contact, the nutritional status and the loss of weight). The nutritional status remain the only one predictor of poor outcome in the logistic regression analysis. The small number of cases didn't permit to realize more analysis that can explain the differences between this study and others. In 2006 in Italy, Faella at al reported that poor outcome was associated with MRC stage III ($P=.001$), hydrocephalus ($P=.001$), and the duration of non-specific symptoms ($P=.034$).

CONCLUSION

In conclusion, the incidence of TBM is underestimated in the DRC, and most patients present with advanced stages of the disease. Its clinical and paraclinical presentation are similar to that described in the literature. The time lost before diagnosis, the TB contact and the nutritional status was associated with a poor outcome. And the nutritional status was a predictor of poor outcome. It's clearly appear that nutritional support must be integrated in the care of children with TB. There is a necessity to make a good description of the clinical signs that can help to diagnose early the TBM. The NTP must integrate the report of different forms of EPTB that can give the real burden of the disease. It is necessary to include the description of the clinical forms in the national reporting system. However, further studies including larger sample sizes are warranted.

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