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Table 1. Frequency by TB Clinical Presentation.

TB presentation	Pulmonary TB n	Ganglionic TB n	Meningeal TB n	Milliary TB n	Skeletal TB n	Other* n	Total n
	51	21	14	7	4	3	100

*Other: Pleural and intestinal tuberculosis

Table 2. Epidemiological Characteristics According to TB Clinical Presentation.

TB presentation	Pulmonary TB n (%)	Ganglionic TB n (%)	Meningeal TB n (%)	Milliary TB n (%)	Skeletal TB n (%)	Other n (%)	Total n
Sex							
Male	27 (53%)	10 (48%)	8 (57%)	5 (71%)	3 (75%)	1 (33%)	54
Female	24 (47%)	11 (52%)	6 (43%)	2 (29%)	1 (25%)	2 (67%)	46
Age in years							
Mean ± SD	10.32 ± 4.14	7.76 ± 4.86	5.1 ± 5.17	9.18 ± 5.3	2.5 ± 1.3	11.67 ± 4.16	7.76 ± 1.49
Age groups							
<1 year	1 (2%)	0 (0%)	4 (29%)	1 (14%)	0 (0%)	0 (0%)	6
1-4 years	6 (12%)	7 (33%)	4 (29%)	1 (14%)	4 (100%)	0 (0%)	22
5-12 years	21 (42%)	10 (48%)	4 (29%)	2 (29%)	0 (0%)	1 (33%)	38
13-18 years	23 (46%)	4 (19%)	2 (14%)	3 (43%)	0 (0%)	2 (67%)	34
Living area							
Urban	38 (75%)	17 (81%)	11 (79%)	6 (86%)	4 (100%)	3 (100%)	79
Rural	13 (25%)	4 (19%)	3 (21%)	1 (14%)	0 (0%)	0 (0%)	21
COMBE (Community Bacillus Exposure)							
Positive	35 (69%)	8 (38%)	6 (43%)	5 (71%)	2 (50%)	1 (33%)	57
Negative	16 (31%)	13 (62%)	8 (57%)	2 (29%)	2 (50%)	2 (67%)	43
BCG vaccination status							
Non-vaccinated	21 (41%)	11 (52%)	9 (64%)	4 (57%)	2 (50%)	2 (66%)	49
Vaccinated	30 (59%)	10 (48%)	5 (36%)	3 (43%)	2 (50%)	1 (33%)	51
Malnutrition (according to weight-for-age classification by Gomez et al.)							
Mild (Grade 1)	11 (21%)	7 (33%)	2 (14%)	1 (14%)	0 (0%)	1 (33%)	22
Moderate (Grade 2)	4 (8%)	2 (10%)	3 (21%)	2 (29%)	0 (0%)	1 (33%)	12
Severe (Grade 3)	5 (10%)	0 (0%)	1 (7%)	2 (29%)	0 (0%)	0 (0%)	8
Outcome (%)							
Cured	29 (57%)	13 (62%)	5 (36%)	1 (14%)	2 (50%)	2 (67%)	52
Ongoing therapy	19 (37%)	8 (38%)	4 (29%)	4 (57%)	1 (25%)	0 (0%)	36
Died	3 (6%)	0 (0%)	5 (36%)	2 (29%)	1 (25%)	1 (33%)	12

Background

- Tuberculosis (TB) is a global health issue and major cause of morbidity and mortality in developing countries. Despite the intense efforts of eradication by the World Health Organization, 1 million children develop the disease annually.
- The objective of this study is to define the epidemiological trends of the different clinical presentations of TB in pediatric population.

Methods

- A retrospective, cross-sectional study, carried out at a pediatric hospital in Mexico between 2012-2021. Pediatric patients diagnosed with TB were included.
- Descriptive statistics were performed in order to summarize the demographic, clinical and paraclinical characteristics of pediatric patients with TB.
- A Chi-squared univariate analysis was performed to evaluate the association between several variables of interest with mortality.

Results

- A total of 100 patients were included in this study.
- Pulmonary TB was the most common presentation (51%), followed by ganglionic (21%), meningeal (14%), and milliary (7%) [Table 1].
- A male predominance was observed (54%). Mean age of presentation was 7.8 years ± 1.5, most lived in urban areas (79%) and had a positive COMBE (57%). Half of the patients had BCG vaccination. Meningeal TB was the most fatal clinical presentation [Table 2].
- Fifty-two patients were successfully cured, 36 patients were receiving antituberculous treatment and fatality rate was of 12%.
- Out of the total sample, fever was the most common sign (65%), followed by cough (56%) and weight loss (37%) [Table 3].
- The most common sign of meningeal TB were generalized seizures (10/14), fever (10/14), and vomiting (7/14). Brain imaging was performed in all patients with meningeal TB: hydrocephalus (71.4%) and basal arachnoiditis (64.3%) were present. Cerebrospinal fluid analysis was also performed: 11 patients had pleocytosis, 10 had hyperproteinorrhachia, and 10 had hypoglycorrhachia [Table 4].
- Clinical TB presentation (p=0.009) and immunodeficiency (p= 0.015) were significantly associated with mortality [Table 5].

Conclusions

- Pediatric TB cases in this referral hospital indicated an equivalent proportion of pulmonary and extrapulmonary TB.
- Most of the patients with milliary and meningeal TB were not vaccinated; however, BCG vaccination was not significantly associated with decreased mortality.
- Patients with extrapulmonary forms of the disease and with immunodeficiency were associated with mortality.

Table 3. Signs and symptoms in children according to their clinical presentation of TB.

	Pulmonary TB n (%)	Ganglionic TB n (%)	Meningeal TB n (%)	Milliary TB n (%)	Skeletal TB n (%)	Other n (%)	Total
	51	21	14	7	4	3	100
Fever	36 (70.6%)	10 (47.6%)	9 (64.3%)	6 (85.7%)	2 (50%)	2 (66.7%)	65
Cough	43 (84.3%)	1 (4.8%)	5 (35.7%)	5 (71.4%)	1 (25%)	1 (33.3%)	56
Weight loss	23(45.1%)	3 (14.3%)	5 (35.7%)	4 (57.1%)	0 (0%)	2 (66.7%)	37
Lymphadenopathy	6 (11.8%)	21(100%)	2 (14.3%)	3 (42.9%)	0 (0%)	2 (66.7%)	34
Hyporexia	17 (33.3%)	4 (19%)	5 (35.7%)	2 (28.6%)	0 (0%)	2 (66.7%)	30
Asthenia	14 (27.5%)	3 (14.3%)	6 (42.9%)	2 (28.6%)	0 (0%)	2 (66.7%)	27
Night sweats	3 (5.9%)	3 (14.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6
Fatigue	3 (5.9%)	0 (0%)	3 (21.4%)	0 (0%)	0 (0%)	0 (0%)	6
Hepatomegaly	1 (2%)	0 (0%)	0 (0%)	3 (42.9%)	0 (0%)	1 (33.3%)	5
Splenomegaly	0 (0%)	0 (0%)	0 (0%)	1 (14.3%)	0 (0%)	0 (0%)	1

Table 4. Clinical, radiological and CSF characteristics in meningeal TB.

Signs and symptoms (n=14)	n (%)
Generalized seizures	10 (71.4%)
Fever	10 (71.4%)
Vomiting	7 (50.0%)
Meningeal signs	6 (42.9%)
Headache	5 (35.7%)
Irritability	5 (35.7%)
Weight loss	5 (35.7%)
Dizziness	4 (28.6%)
Cranial nerve alterations	3 (21.4%)
Other	7 (50.0%)
Brain imaging findings (CT or MRI) (n=14)	
Hydrocephalus	10 (71.4%)
Basal arachnoiditis	9 (64.3%)
Vasculitis	2 (14.3%)
Tuberculoma	2 (14.3%)
Cerebral edema	2 (14.3%)
Parenchymal infarction	1 (7.1%)
Parenchymal hemorrhage	1 (7.1%)
Cerebrospinal fluid characteristics (n=13)	
Frequency	
Pleocytosis (>5 cells/microL)	11 (84.6%)
Hyperproteinorrhachia (>60 mg/dL)	10 (76.9%)
Hypoglycorrhachia (<50 mg/dL)	10 (76.9%)
Cerebrospinal fluid characteristics (n=13)	
Numerical	
Cytology (cells/microL)	120 (30-227)
Proteins (mg/dL)	112 (78-576)
Glucose (<50 mg/dL)	25 (16-47)

Table 5. Clinical outcomes of children with TB according to their epidemiological characteristics

Characteristic	Cured (n=52)	Died (n=12)	p-value	Total (n=64)
Presentation				
Pulmonary TB	29 (56%)	6 (50%)	.009*	35
Ganglionic TB	13 (25%)	0 (0%)		13
Meningeal TB	5 (10%)	4 (33%)		9
Milliary TB	1 (2%)	2 (17%)		3
Skeletal TB	2 (4%)	0 (0%)		2
Other	2 (4%)	0 (0%)	2	
Age (years)				
<1	1 (2%)	2 (17%)	0.174	7
1-4	14 (27%)	2 (17%)		23
5-12	19 (37%)	4 (33%)		37
13-18	18 (35%)	4 (33%)		33
Sex				
Male	28 (54%)	5 (42%)	0.447	54
Female	24 (46%)	7 (58%)		46
Location				
Rural	14 (27%)	2 (17%)	0.460	21
Urban	38 (73%)	10 (83%)		79
BCG status				
Yes	28 (54%)	4 (33%)	0.2	32
No	24 (46%)	8 (66%)		32
Immunodeficiency*				
Yes	4 (8%)	4 (33%)	0.015*	8
No	48 (92%)	8 (67%)		56

* Indicates statistically significant association on mortality (p-value < 0.05)