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Clinical and epidemiological features of tuberculosis in children and adolescents

Características clínicas e epidemiológicas da tuberculose em crianças e adolescentes

Características clínicas y epidemiológicas de la tuberculosis en niños y adolescentes

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ABSTRACT

Objective: To analyze the clinical and epidemiological features of tuberculosis in children and adolescents in an infectious diseases reference hospital. **Method:** A documental and retrospective study was carried out with 88 medical files in an infectious diseases reference hospital in the state of Ceará. Data were analyzed by univariate, bivariate and multivariate approaches. **Results**: It was found that, depending on the tuberculosis type, its manifestations may vary. The logistic regression model considered only pulmonary tuberculosis due to a number of observations and included female sex (95% CI: 1.4-16.3), weight loss (95% CI: 1.8-26.3), bacilloscopic screening (95% CI: 1.5-16.6) and sputum collected (95% CI: 1.4-19.4) as possible predictors. **Conclusions**: Children and adolescents present different manifestations of the disease depending on the tuberculosis type that affects them. Knowing the most common features of each condition could enhance early diagnosis and, consequently, result in adequate treatment and care.
Descriptors: Tuberculosis; Child; Adolescents; Epidemiology; Pediatric Nursing.

RESUMO

Objetivo: Analisar as características clínicas e epidemiológicas da tuberculose em crianças e adolescentes de um hospital de referência em doenças infecciosas. **Método:** Foi realizado um estudo documental e retrospectivo com 88 prontuários médicos em um hospital de referência em doenças infecciosas no estado do Ceará. Os dados foram analisados através das abordagens univariada, bivariada e multivariada. **Resultados**: Verificou-se que, dependendo do tipo de tuberculose, suas manifestações podem variar. O modelo de regressão logística considerou apenas a tuberculose pulmonar devido a um número de observações e incluiu sexo feminino (IC 95%: 1,4-16,3), perda de peso (IC 95%: 1,8-26,3) e baciloscopia (IC 95%: 1,5-16,6) com coleta de escarro (IC95%: 1,4-19,4) como possíveis preditores. **Conclusão:** Crianças e adolescentes apresentam diferentes manifestações da doença dependendo do tipo de tuberculose que os afeta. Conhecer as características mais comuns de cada condição pode melhorar o diagnóstico precoce e, consequentemente, levar a tratamentos e cuidados adequados.
Descritores: Tuberculose; Criança; Adolescentes; Epidemiologia; Enfermagem Pediátrica.

RESUMEN

Objetivo: Analizar las características clínicas y epidemiológicas de la tuberculosis en niños y adolescentes en un hospital de referencia de enfermedades infecciosas. **Método:** Se realizó un estudio documental y retrospectivo con 88 archivos médicos en un hospital de referencia de enfermedades infecciosas en el estado de Ceará. Se analizaron los datos por enfoques univariados, bivariados y multivariados. **Resultados:** Se encontró que, dependiendo del tipo de tuberculosis, sus manifestaciones pueden variar. El modelo de regresión logística consideró solo la tuberculosis pulmonar, debido a varias, observaciones e incluyó el género femenino (IC 95%: 1,4-16,3), la pérdida de peso (IC 95%: 1,8-26,3), la revisión baciloscopia (95 % CI: 1,5-16,6) y el esputo recolectado (95% CI: 1,4-19,4) como posibles predictores. **Conclusiones:** Los niños y adolescentes presentan diferentes manifestaciones de la enfermedad en función del tipo de tuberculosis que los afecta. Conocer las características más comunes de cada afección podría mejorar el diagnóstico temprano y, en consecuencia, resultar en un tratamiento y atención adecuados.
Descriptores: Tuberculosis; Niño; Adolescentes; Epidemiología; Enfermería Pediátrica.

INTRODUCTION

Tuberculosis (TB) is a known tropical infectious disease and currently is the number one cause of death among the infectious conditions. In 2016, there was estimated 10.4 million new cases of TB all over the globe, and 6.9% of these cases were represented by people under 15 years old[1]. During the same year in Brazil, an incidence rate of 32.4 new cases of TB per 100 thousand habitants was identified. No data were available regarding manifestation in children or adolescents'[2].

Only recently did the World Health Organization (WHO) begin publishing data from this specific group. Following WHO initiative, many countries started publication on the childhood results from their TB programs; however, information on the subject is still scarce and several questions have not yet been addressed. Challenges such as early and/or proper diagnosis, early treatment and adequate notification difficult the publication of accurate data[3].

It is important to consider that TB in children varies from the adult manifestation of the disease in several ways. Some studies[4-5] presented the differences between both types; for example, in children and adolescents, the history of contact is positive over 50% of the cases, contrasting with adults, which is negative. Although some clinical clues such as chronic cough and fever are present in both cases, children present weight loss or failure to thrive; and in adults, the weight loss is uncommon. Differently from adult TB, in children, hemoptysis is rare.

Even though little is known about the disease, the Brazilian literature still lacks in publications about this subject. One study reported that this difficulty in finding childhood cases occurs due to the many ways in which the disease is perceived, as well as the low number of professionals and few tools available for the task. All these situations can lead to underreporting of the disease[6].

Furthermore, it is possible to identify that, depending on the Brazilian region, incidence of the disease may vary considerably and, as previously stated, this can be due to the unusual form that the disease appears in this particular group[7]. Because of this, it is very difficult to generalize the research results since the scenarios are completely different from each other.

By gathering these pieces of information, it can be seen that TB in children and adolescents is a serious concern, which brings the need for a qualified health team and appropriate care. Among health professionals, nurses are involved in several activities related to care towards people with such condition. Directly observed treatment, home visits and pre- and post-consultations are actions mostly focused on the nursing team[8]. Although much is known about TB and the importance of nurses in the management of this illness, nursing professionals still perceive the disease with stigma and fear, which contributes to distance towards patients[9].

Nevertheless, considering the important role that TB has in the health-illness process of developing countries and its relevance when analyzing the scarce Brazilian publication about the disease in children and adolescents, the importance of conducting researches in this field is evident. Since TB in this age group is becoming more common, it is vital that health professionals, including nurses, know aspects involving TB in the young population. Thus, more knowledge on this area would give a clear vision to them about what features are expected in different TB types, which could enhance identification of the disease in early stages.

OBJECTIVE

To analyze the clinical and epidemiological features of tuberculosis in children and adolescents in an infectious diseases reference hospital.

METHOD

Ethical aspects

This research was submitted to the Brazilian Platform of Research Involving Human Beings and was approved by its Ethics Committee as well as by the hospital in which the research was conducted. Confidentiality was guaranteed to each person whose medical file was used, and only data that were relevant to this study was gathered as established in the 466/12 resolution of the Brazilian National Health Council.

Design, location of the study and study period

This documental and retrospective study used medical files to investigate the characteristics associated with TB in hospitalized children and adolescents. The research was conducted in a tertiary healthcare hospital, located in the municipality of Fortaleza, a reference in treating infectious diseases in the state of Ceará, Northeast Brazil.

Most of its patients are from Fortaleza, but there is also a number of them from countryside cities and even people from other states. It is also an institution for teaching and research purposes. There are different types of services offered in the hospital, such as intensive care, outpatient following, and services directed to specific groups such as children and adolescents. The hospital's pediatric unit admits people from zero to eighteen years with infectious conditions requiring a specific health assistance.

Moreover, this institution also has an area destined to file all records known as Medical and Statistical Archive Service. It was developed to properly allocate the files and use them for further case investigation and outpatient following. It is also used for scientific reasons, under the ethical committee approval, the researchers can access them and retrieve necessary data.

This study was conducted in the Medical and Statistical Archive Service from June to July 2016.

Population and sample

All medical files from people aged zero to eighteen years that were hospitalized to receive treatment for any type of TB from January 2010 to December 2015 available during data collection period were included. No medical file was excluded from data collection.

The decision for this age range was given by the Brazilian Statute of the Child and Adolescent (In Portuguese: *Estatuto da Criança e do Adolescente – ECA*). The document considers a child a person until 11 years and 29 days old, and a person from 12 to 18 years old is considered an adolescent[10].

Study protocol

At this service, it is possible to find books that are annually made, called "Discharge and Deaths Book" (In Portuguese: *Livro de Altas e* Óbitos), containing the first information for each person hospitalized such as name, age, sex, final diagnosis, outcome and medical file number. Only age and final diagnosis were taken into consideration, since only the files from people with TB aged until 18 years were able to participate in the research. Thereafter, the numbers of each medical file were used to find the records and start data collection.

A total of 88 medical files was found that fit the previously cited criteria and were thus used to have their data extracted. In this part of the research, a structured instrument developed by the authors was used to gather information. This instrument covered different features that were hypothesized as being associated with the disease (sociodemographic, clinical, laboratory and outcome).

Analysis of the results and statistics

This paper covers features associated with TB in children and adolescents that included several different aspects. For such, all the clinically important variables passed by statistical analysis with the different TB diagnosis, which were also found in the files.

The variables were analyzed using the application SPSS version 20.0. Univariate, bivariate and multivariate analysis were performed in this study. Firstly, descriptive statistics was used, mostly by using absolute and relative frequencies of the variables. Afterwards, all nominal variables were associated with the different TB diagnosis; for this, the chi-square test was performed (or Fisher's exact test when there were less than five observations in the cells), statistical significance was considered when $P<0.05$. For the multivariate models, performed logistic binary regressions were performed considering the outcomes of TB diagnoses. For this, we considered the results of $P<0.20$ and integrated them into the first models for each diagnosis; however, only those with $P<0.05$ remained in the final model. For bivariate and multivariate approaches, it was also considered a 95% Confidence Interval (95% CI).

RESULTS

During January 2010 to December 2015, eighty-eight children and adolescents were admitted to the institution to treat TB; thus, these number medical files were used for the research. In this research, it was considered two different age ranges (≤10 years old and >10 years old) because, for the Brazilian Health Ministry, from 10 years old, TB is similar to the adult form of the disease[11].

From them, it was possible to see that 56% of the children and adolescents were male, 73% pardo[1], 69% from the countryside, and 84% with more than 10 years old. The most common diagnosis was pulmonary TB (59%), followed by extrapulmonary TB (25%), mixed type TB (13%) and drug-resistant TB (3%).

The description of the features associated with diverse TB types is presented in Tables 1 to 4. In Table 1, it can be seen the features associated with pulmonary TB. Being female, presenting expectoration, weight loss and performing bacilloscopic screening with sputum were associated with the previously cited condition. Highlighting that the female sex had almost three times more odds of pulmonary TB and manifestations such as expectoration and weight loss were almost five times more associated with the pulmonary manifestation of the disease.

Table 1 – Association of children and adolescents' features and pulmonary Tuberculosis registered in the medical files, Fortaleza, Ceara, Brazil, 2018

Features	Pulmonary TB		*p* value	Odds Ratio (95%CI)
	No (%)	Yes (%)		
Sex (*Female*)*	11 (28.2)	28 (71.8)	0.03	2.65 (1.08-6.48)
Age Range *(>10 years old)**	29 (39.2)	45 (60.8)	0.45	1.55 (0.49-4.88)
Skin Color (*Pardo*)*[a]	25 (39.1)	39 (60.9)	0.56	1.32 (0.51-3.40)
Precedence (from *Fortaleza*)*	11 (39.3)	17 (60.7)	0.83	1.10 (0.44-2.75)
Basic Sanitation†	19 (46.3)	22 (53.7)	1.00	‡
Fever*	23 (35.4)	42 (64.6)	0.07	2.37 (0.90-6.25)
Expectoration*	15 (27.3)	40 (72.7)	0.001	4.66 (1.85-11.76)
Weight Loss*	5 (17.9)	23 (82.1)	0.003	4.91(1.65-14.64)
Dyspnoea*	5 (33.3)	10 (66.7)	0.51	1.47 (0.45-4.75)
Lymph Nodes Alteration†	6 (100.0)	0 (00.0)	0.004	‡
HIV†	4 (57.1)	3 (42.9)	0.43	0.49 (0.10-2.33)
Comorbidities*	14 (43.8)	18 (56.2)	0.68	0.83 (0.34-2.00)
Previous TB treatment*	13 (37.1)	22 (62.9)	0.55	1.29 (0.54-3.11)
Bacilloscopic screening*	11 (22.4)	38 (77.6)	**<0.001**	6.16 (2.41-15.74)
Mycobacterium culture*	23 (45.1)	28 (54.9)	0.34	0.65 (0.27-1.57)
Tuberculin skin test*	17 (47.2)	19 (52.8)	0.31	0.64 (0.27-1.52)
Sputum collected*	15 (26.3)	42 (73.7)	**<0.001**	5.88 (2.26-15.30)
Bronchoalveolar liquid collected†	0 (00.0)	4 (100.0)	0.14	‡
Outcome (hospital discharge)*	30 (41.1)	43 (58.9)	0.93	0.95 (0.30-2.96)

Note: chi-square; † Fisher's exact test; ‡ Not possible to calculate due to low values in the matrix; TB - Tuberculosis.*

The next table (Table 2) shows the features associated with extrapulmonary TB. Statistical significance was found for expectoration, weight loss, previous TB treatment, bacilloscopic screening and sputum collected as protective factors, but it is important to note that they are in this situation because they are risk factors to pulmonary TB. Being from Fortaleza and performing the tuberculin skin test are positively associated with extrapulmonary TB. Moreover, it was not possible to calculate both odds ratio and 95% confidence interval to lymph node changes due to the values in the matrix; however, the six patients that presented such a condition were diagnosed with extrapulmonary manifestation. Therefore, such condition was considered as a possible predictor of extrapulmonary TB.

In Table 3, we presented the results of the mixed-type TB, in other words, both pulmonary and extrapulmonary TB. In this case, being *pardo* was considered as protection factor, so people with other skin colors have more odds of this disease. Only HIV had a positive association with it (p=0.004) with high odds to this TB type (around 14 times).

Table 4 presents data of drug-resistant TB in children and adolescents. It was not possible to find statistical significance to resistant forms of TB, but previous TB treatment nearly approached a significant contribution to developing resistance to medication (p=0.06, 95% CI: 0.98-1.21). Although it is not a positive measurement, it should be taken into account for this specific type of TB.

1 Brown-skin color

Table 2 – Association of children and adolescents' features and extrapulmonary Tuberculosis registered in the medical files, Fortaleza, Ceara, Brazil, 2018

Features	Extrapulmonary TB No (%)	Yes (%)	*p* value	Odds Ratio (95%CI)
Sex (*Female*)*	33 (84.6)	6 (15.4)	0.06	0.37 (0.13-1.07)
Age Range (*>10 years old*)*	57 (77.0)	17 (23)	0.31	0.53 (0.15-1.81)
Skin Color (*Pardo*)*	47 (73.4)	17 (26.6)	0.58	1.37 (0.44-4.25)
Precedence (from *Fortaleza*)*	17 (60.7)	11 (39.3)	0.03	2.88 (1.05-7.84)
Basic Sanitation†	30 (73.2)	11 (26.8)	1.00	‡
Fever*	51 (78.5)	14 (21.5)	0.20	0.51 (0.18-1.45)
Expectoration*	49 (89.1)	6 (10.9)	**<0.001**	0.13 (0.04-0.38)
Weight Loss†	25 (89.3)	3 (10.7)	0.03	0.25 (0.06-0.96)
Dyspnoea†	13 (86.7)	2 (13.3)	0.33	0.40 (0.08-1.97)
Lymph Nodes Alteration†	0 (00.0)	6 (100.0)	**<0.001**	‡
HIV†	7 (100.0)	0 (00.0)	0.18	‡
Comorbidities*	24 (75.0)	8 (25.0)	1.00	1.00 (0.36-2.72)
Previous TB treatment†	32 (91.4)	3 (8.6)	0.005	0.16 (0.04-0.62)
Bacilloscopic screening*	42 (85.7)	7 (14.3)	0.009	0.26 (0.09-0.74)
Mycobacterium culture*	35 (68.6)	16 (31.4)	0.10	2.36 (0.82-6.78)
Tuberculin skin test*	22 (61.1)	14 (38.9)	0.01	3.5 (1.27-9.59)
Sputum collected*	50 (87.7)	7 (12.3)	**<0.001**	0.14 (0.05-0.43)
Bronchoalveolar liquid collected†	4 (100.0)	0 (00.0)	0.56	‡
Outcome (*hospital discharge*)†	53 (72.6)	20 (27.4)	0.33	2.45 (0.50-11.85)

*Note: * Chi-square; † Fisher's exact test; ‡ Not possible to calculate due to low values in the matrix; TB - Tuberculosis.*

Table 3 - Association of children and adolescents' features and mixed-type Tuberculosis registered in the medical files, Fortaleza, Ceara, Brazil, 2018

Features	Mixed-type TB No (%)	Yes (%)	*p* value	Odds Ratio (95%CI)
Sex (*Female*)†	35 (89.7)	4 (10.3)	0.74	0.68 (0.18-2.53)
Age Range (*>10 years old*)†	65 (87.8)	9 (12.2)	1.00	0.83 (0.15-4.33)
Skin Color (*Pardo*)*	59 (92.2)	5 (7.8)	0.03	0.25 (0.06-0.93)
Precedence (from *Fortaleza*)†	28 (100.0)	0 (00.0)	0.01	‡
Basic Sanitation†	34 (82.9)	7 (17.1)	1.00	‡
Fever†	57 (87.7)	8 (12.3)	1.00	0.93 (0.22-3.87)
Expectoration†	48 (87.3)	4 (12.7)	1.00	1.05 (0.28-3.92)
Weight Loss†	26 (92.9)	2 (7.1)	0.49	0.43 (0.88-2.16)
Dyspnoea†	12 (80.0)	3 (20.0)	0.39	2.03 (0.47-8.77)
Lymph Nodes Alteration†	6 (100.0)	0 (00.0)	1.00	‡
HIV†	3 (42.9)	4 (57.1)	0.004	14.09 (2.61-76.06)
Comorbidities*	27 (84.4)	5 (15.6)	0.50	1.54 (0.43-5.52)
Previous TB treatment†	28 (80.0)	7 (20.0)	0.10	3.06 (0.82-11.38)
Bacilloscopic screening†	46 (93.9)	3 (6.1)	0.05	0.25 (0.06-1.02)
Mycobacterium culture*	46 (90.2)	5 (9.8)	0.36	0.56 (0.15-2.00)
Tuberculin skin test†	34 (94.4)	2 (5.6)	0.18	0.28 (0.05-1.38)
Sputum collected*	51 (89.5)	6 (10.5)	0.44	0.61 (0.17-2.19)
Bronchoalveolar liquid collected†	4 (100.0)	0 (00.0)	1.00	‡
Outcome (*hospital discharge*)†	64 (87.7)	9 (12.3)	1.00	0.91 (0.17-4.73)

*Note: * chi-square; † Fisher's exact test; ‡ Not possible to calculate due to low values in the matrix; TB - Tuberculosis.*

Due to the number of observations, only pulmonary TB was considered when performing binary logistic regression. After analyzing the variables, female sex, weight loss, bacilloscopic screening and sputum collected presented a *p value* lower than 0.05 and remained in the logistic regression model. All of them had a positive association with the outcome pulmonary TB, evidenced by Exp. B higher than 1. Therefore, these variables are possible predictors of pulmonary TB in children and adolescents. In Table 5, it is possible to identify the final model of logistic regression.

Table 4 - Association of children and adolescents' features and drug-resistant Tuberculosis registered in the medical files, Fortaleza, Ceara, Brazil, 2018

Features*	Drug-Resistant TB No (%)	Yes (%)	*p* value	Odds Ratio (95%CI)
Sex (*Female*)	38 (97.4)	1 (2.6)	1.00	0.61 (0.05-7.08)
Age Range (*>10 years old*)	71 (95.9)	3 (4.1)	1.00	†
Skin Color (*Pardo*)	61 (95.3)	3 (4.7)	0.55	†
Precedence (from *Fortaleza*)	28 (100.0)	0 (00.0)	0.54	†
Basic Sanitation	40 (97.6)	1 (2.4)	1.00	†
Fever	64 (98.5)	1 (1.5)	0.16	0.16 (0.01-1.90)
Expectoration	53 (96.4)	2 (3.6)	1.00	1.20 (0.10-13.85)
Weight Loss	28 (100.0)	0 (00.0)	0.54	†
Dyspnoea	15 (100.0)	0 (00.0)	1.00	†
Lymph Nodes Alteration	6 (100.0)	0 (00.0)	1.00	†
HIV	7 (100.0)	0 (00.0)	1.00	†
Comorbidities	31 (96.9)	1 (3.1)	1.00	0.87 (0.07-10.0)
Previous TB treatment	32 (91.4)	3 (8.6)	0.06	1.09 (0.98-1.21)
Bacilloscopic screening	48 (98.0)	1 (2.0)	0.58	0.38 (0.03-4.41)
Mycobacterium culture	49 (96.1)	2 (3.9)	1.00	1.46 (0.12-16.83)
Tuberculin skin test	35 (97.2)	1 (2.8)	1.00	0.71 (0.06-8.18)
Sputum collected	55 (96.5)	2 (3.5)	1.00	1.09 (0.09-12.53)
Bronchoalveolar liquid collected	4 (100.0)	0 (00.0)	1.00	†
Outcome (*hospital discharge*)	72 (98.6)	1 (1.4)	0.07	0.09 (0.00-1.06)

*Note: * Fisher's exact test; † Not possible to calculate due to low values in the matrix; TB - Tuberculosis.*

Table 5 - Final model of logistic regression for pulmonary Tuberculosis, Fortaleza, Ceara, Brazil, 2018

			Odds Ratio (95%CI)		
	B	P	Exp. (B)	Lower	Upper
Pulmonary TB*					
Constant	-2.73	<0.001			
Sex (*Female*)	1.56	0.013	4.7	1.4	16.3
Weight Loss (*Yes*)	1.93	0.004	6.9	1.8	26.3
Bacilloscopic screening (*Yes*)	1.62	0.008	5.0	1.5	16.6
Sputum collected (*Yes*)	1.67	0.012	5.3	1.4	19.4

Note: p = 0.784 (Hosmer and Lemeshow); R^2 = 0.356 (Cox & Snell); R^2 = 0.480 (Nagelkerke); Model χ^2 = 38.71; TB - Tuberculosis.

DISCUSSION

In this study, different TB types were found, the most common type was pulmonary (59%), followed by extrapulmonary (25%), mixed (13%) and drug resistant (3%) forms. Similarly, different studies reported pulmonary TB as the majority of the infections, followed by the extrapulmonary type, and data on drug-resistant TB are still underestimated[12-13]. Different from this, a study in Uganda showed extrapulmonary TB as the most prevalent form[14]. Moreover, in a study[15] conducted in Spain, it was possible to see

that 18% of the pediatric TB forms are extrapulmonary, which are more common in this group compared with the adult population.

This study found an association of female sex, expectoration, weight loss, bacilloscopic screening and sputum collected with pulmonary TB. Even though fever did not present a statistical association with pulmonary TB, it was one of the most prevalent in the group and may be considered when investigating TB. A study in Taiwan presented that fever and/or cough are indicators of TB. When there is the inclusion of recent weight loss and contact with a smear-positive patient, a more consistent investigation for TB can be performed[16].

In a study conducted in Salvador and Manaus[17] it was possible to identify that when TB is diagnosed in people under 10 years old, the symptoms and the positivity rate in the bacilloscopic screenings are less common; moreover, the transmission does not happen as occurs in adults. Starting from 10 years old, particularly from 15 years old, the TB symptoms are very similar to adult ones, which can contribute to perpetuating the transmission chain.

The evaluation of TB in children occurs after presenting suggestive symptoms (coughing, fever and weight loss, as identified in this paper) or as contact with index cases[18-19]. Moreover, there is also evidence of transmission among school pupils who share activities with an index case on a regular basis[20]. Subsequently, in order to obtain a faster and more precise diagnostic, new models are being developed such as those found in Bayesian approaches or new criteria methods[21-22].

Some studies[4-5,12,23] showed that the percentage of children with extrapulmonary TB is higher than the adult population, whereas adults with TB of extrapulmonary type is over 10%, children and adolescents presented results ranging from 25% to 30% of all TB cases. We found conditions as being from Fortaleza, change in lymph nodes, and tuberculin skin test are somehow associated with extrapulmonary TB.

In Campina Grande[24], it was possible to identify that 14.5% (n=31/214) of the cases of extrapulmonary TB in people from 0-19 years old, and 8.8% of the cases were in people under 15 years old. A study[25] conducted with indigenous and non-indigenous children in Rondônia estimated 22.1% of the children developed extrapulmonary condition (mostly by the group of non-indigenous children from five to nine years old). The most common sites of extrapulmonary infections were pleural (44%) and peripheral lymph nodes (24%).

Contrasting with this study, a Spanish investigation showed HIV as the main risk for extrapulmonary TB, but presented the changes in lymph nodes as the most frequent site as well as a Colombian and Saudi Arabian study. And yet, a meta-analysis reported that even though there is an association between HIV and extrapulmonary TB, it can be weak due to the lack of diagnostic standards[26-29].

Additionally, when comparing both pulmonary and extrapulmonary TB, it was found that being female is a risk factor for pulmonary TB. Studies showed uncertainty on age-related TB as well as this one. Residents of rural areas are more likely to develop extrapulmonary TB. Classical TB symptoms (fever, cough, malaise and weight loss) are commonly found in the pulmonary manifestation of the disease, and the diagnostic rate is higher in the pulmonary group. In contrast, drug-resistant forms are more common in extrapulmonary TB[30-32].

HIV plays a relevant role in TB pathogenesis by increasing the risk of developing TB disease from a latent state. In the case of this study, it was associated with mixed-type TB with an odds ratio around 14-fold. However, several studies have been investigating the importance of the childhood HIV/TB coinfection and its relevance to public health. They showed a TB risk varying from 20 to 30-fold to those infected with HIV and predicted that up to 5% of the children with TB were also HIV positive[33-35].

Developing countries also have an elevated incidence of the disease. For instance, it was estimated a TB incidence of 23 per 100 children living with HIV in South Africa; on the other hand, in developed countries, such as the USA, such estimation only reached 0.61 per 100 children[35]. Mortality of HIV/TB coinfection was estimated at around 31,000 in 2015[36].

In Brazil, the HIV/TB also plays a relevant role in children and adolescents. A time series study identified that, from 2002 to 2012, when considering only TB infection, the incidence rate for the group of 0-9 and 10-19 years old was declining. When analyzing the coinfected cases, however, there was a decline only in the 0-9 years old group, and the 10-19 years old group presented an increasing incidence[37].

Appart from that, drug-resistant TB is a global concern and a challenge to TB management programs. Children and adolescents are part of a group of interest because their compliance with the drug regimen is dependent on external factors such as parental drug administration.

Other factors are linked to drug-resistance, such as treatment abandonment. A study conducted in Recife showed that, from the 55 cases of TB in people from 0 to 19 years old, seven presented treatment abandonment (almost 13% of them)[38]. Another point that can lead to abandonment, and consequently drug-resistance, is the adverse effects that medication brings. In Rio de Janeiro it was possible to find side effects in 22.2% of the people from 0-19 years old[39].

Resistance can be verified when TB treatment shows initial improvement of the condition and, after a period of time, depletes response to such treatment[16]. A study presented large data from WHO Anti-Tuberculosis Global Project and concluded that the number of children with drug-resistant TB is largely unknown and underreported. In Brazil and other Latin-American, African and Asian developing countries, for example, data were not reported[40].

Equally important, contact with TB patients is also a point of interest since its association with TB is evident. Risk increases if the contact has smear-positive sputum, the subject is female and sleeps in the same room as the infant; and, more importantly, if the contact is malnourished[41]. The literature stresses the importance of checking the BCG vaccination (Bacillus Calmette-Guérin) during childcare visits until six months, as well as the importance of knowing the characteristics of childhood TB[42]. These actions reinforce the important roles of health professionals, mostly nurses, in managing TB programs by breaking the disease transmission chain.

Limitations of the study

The main limitation of this study was using secondary data that was poorly registered in some medical records. Variables firstly thought for this study were removed because data could not be completely analyzed due to a high amount of missing values. Moreover, handwriting of some health professionals was difficult to interpret when files had their data recorded in paper. Because of these factors, generalization can be a challenging task.

Contributions to the field of nursing, health or public policy

Regarding the study, it was possible to comprehend that TB in children and adolescents vary in its manifestations. In the clinical practice, nurses can have one more approach when examining the group, by understanding the difference in the findings that each condition brings. It is also important to note that health professionals will be able to think in extrapulmonary manifestations due to the high incidence of these manifestations in the studied population. Therefore, nursing care can be more centered on this specific population.

CONCLUSION

In this study, many features associated with different TB diagnosis in children and adolescents were identified in a tertiary health care institution. Some of the characteristics need to be highlighted due to their difference from the adult manifestation; for example, the female sex in pulmonary TB, lymph nodes alterations and tuberculin skin test in extrapulmonary TB, and the high influence of HIV infection in the manifestations of mixed-type.

Moreover, by knowing the characteristics brought up by this investigation, it is possible to highlight the main points associated with TB in this group, giving a clear view of the problem in order to be further addressed. After understanding the clinical and epidemiological conditions regarding TB in children and adolescents, it can be seen that, even though TB is a well-known disease, it may manifest differently in the younger population. Therefore, health professionals would be able to identify the disease and its type earlier as well as to provide rapid and correct treatment to the population affected by this condition.

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