



Article/Artigo

Epidemiological, clinical, and operational aspects of leprosy patients assisted at a referral service in the State of Maranhão, Brazil

Aspectos epidemiológicos, clínicos e operacionais de portadores de hanseníase atendidos em um serviço de referência no Estado do Maranhão

Rita da Graça Carvalhal Frazão Corrêa¹, Dorlene Maria Cardoso de Aquino¹, Arlene de Jesus Mendes Caldas¹, Dayse Karen Carneiro Rêgo Amaral¹, Fábio Silva França² and Emygdia Rosa Rêgo Barros Pires-Leal Mesquita¹

ABSTRACT

Introduction: Leprosy is an infectious disease caused by *Mycobacterium leprae*. The aim of this study was to describe the epidemiological, clinical, and operational aspects of leprosy carriers. **Methods:** A cross-sectional study leprosy patients assisted in São Luis, MA, was performed. **Results:** Of the 85 cases analyzed, 51.7% were male participants, and 60% were brown. Concerning the age, 54.8% of women were between 35 and 49 years, and 57.6% of men were between 20 and 34 years. Lepromatous leprosy was found in 42.3% of cases, and the multibacillary form was found in 72.9%. The skin smear was positive in 42.3%. The occurrence of reaction was found in 43.5% of cases, and 83.5% had no Bacillus Calmette-Guérin scar. Leprosy in the family was reported by 44.7% of the patients. Most of the individuals (96.4%) lived in houses made of brick with more than three rooms (72.6%) and two persons per room (65.1%). Concerning the level of education, 41.4% of women and 34.1% of men had more than one to three years of education. The most evaluated age group in the beginning of the treatment was that of 35 to 49 years with a Grade 0 incapability (64.5%), and that in the end was the age group of 20 to 34 (29.9%) with Grade 0, 30.7% Grade 1, and 11.5% Grade 2. **Conclusions:** The frequency of multibacillary forms found in this study and the cases in family members point out delayed diagnoses. Thus, early diagnosis and appropriate treatment are important in decreasing the outcome of disabilities.

Keywords: Leprosy. Clinical profile. Epidemiological profile.

RESUMO

Introdução: A hanseníase é uma doença infecto-contagiosa causada pelo *Mycobacterium leprae*. Este estudo descreve os aspectos epidemiológicos, clínicos e operacionais de portadores de hanseníase. **Métodos:** Estudo transversal, realizado no município de São Luis, MA. **Resultados:** Foram analisados 85 casos, sendo 51,7%, do sexo masculino e cor parda (60%). As mulheres tinham entre 35 a 49 anos de idade (54,8%) e os homens entre 20 a 34 (57,6%). A forma virchowiana foi mais frequente (42,3%), a classe operacional a multibacilar (72,9%) e baciloscopia positiva em 42,3%. Houve ocorrência de reação em 43,5%, e ausência da cicatriz da *Bacillus Calmette-Guérin* (BCG) em 83,5%. Hanseníase na família foi referida por 44,7%. As casas eram de alvenaria (96,4%), tinham mais de 3 cômodos (72,6%), dormindo duas pessoas por cômodo (65,1%). Quanto aos anos de estudo, 41,4% de mulheres e 34% de homens tinham de um a três anos. A faixa etária entre 35 e 49 anos foi a mais avaliada com Grau 0 de incapacidade, no início do tratamento (64,5%) e no final, foi entre 20 e 34 e destes 29,9% tinham Grau 0, 30,7% Grau 1 e 11,5% Grau 2. **Conclusões:** A frequência das formas multibacilares e casos em familiares indicam diagnósticos tardios, reforçando a importância do diagnóstico precoce e tratamento adequado, para a redução do aparecimento de incapacidades.

Palavras-chaves: Hanseníase. Perfil clínico. Perfil epidemiológico.

1. Curso de Enfermagem, Universidade Federal de Maranhão, São Luis, MA. 2. Hospital Universitário, Universidade Federal de Maranhão, São Luis, MA.

Address to: Dra. Rita da Graça Carvalhal Frazão Corrêa. R. Barão de Grajaú, Quadra 45/Casa 05, Jardim Eldorado-Turú, 65066-210 São Luis, MA, Brasil.

Tel: 55 98 3248-0868

e-mail: ritacarvalhal@hotmail.com

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INTRODUCTION

Leprosy is considered a serious public health problem because of the large disabling potential caused by peripheral nerve impairment and because it affects many people in the economically active age group¹.

Although the disease is considered of easy diagnosis and treatment, the situation of leprosy worldwide is alarming. The high prevalence associated with its disabling potential poses a major public health problem². In Brazil, despite the reduction of prevalence observed from 190 to 45.2 patients/100,000 inhabitants from 1985 to 2003, it still requires a resolute surveillance³.

The epidemiology of leprosy in Brazil has shown that, although there is a decrease in prevalence, the detection rate was still not effectively decreased. This scenario is mainly due to the lack of active search for patients, the delayed diagnosis, the precariousness of public services, abandonment of treatment, lack of knowledge, and prejudice about the disease⁴.

Leprosy is a compulsory notification disease throughout the country and of obligatory surveillance. However, it is estimated that only 1 of 3 leprosy patients is reported, which, together with factors such as irregular treatment and abandonment, has contributed to the increase of leprosy problem in public health^{4,5}.

The national leprosy elimination program has the aim of eliminating the disease by 2010 through actions such as reducing the prevalence to less than 1 case/10,000 people, monitoring records of new cases, strengthening epidemiological surveillance, training of health professionals for the disease detection, improvement of cases reporting, and accessibility to specialized services to avoid disability and guarantee rehabilitation^{3,6}.

Leprosy is a chronic infectocontagious disease caused by *Mycobacterium leprae*. It is characterized by a slow progress, high infectivity, and low

pathogenicity. Dermato-neurological signs and symptoms are the primary manifestations, ranging in spectrum between two stable poles (tuberculoid and lepromatous), with intermediate unstable forms. An operational classification, for purposes of treatment, comprises patients in two groups: paucibacillary and multibacillary. According to this classification, the treatment through multidrug therapy established by the World Health Organization (WHO) is defined⁷⁻⁸.

Interhuman transmission is considered to be the main form of getting the disease, and people at higher risk are those who live in the same house as the carrier of the bacillus. The upper airways of patients with contagious forms of the disease, multibacillary (lepromatous and borderline), are the main exit routes of the bacillus. The entry route of the microorganism is the upper respiratory tract, especially the nasal mucosa, through contaminated droplets⁹.

Leprosy affects people of all ages and both sexes. Besides the individual conditions, other factors related to levels of endemicity and the unfavorable socioeconomic conditions, as well as precarious conditions of living and health and high rate of large families, influence the risk of contracting the disease¹⁰.

Brazil is an endemic country that has a detection rate of 20.56 per 100,000 inhabitants. It has the largest number of patients in the Americas and is the second in the absolute number of cases in the world after India. Most leprosy cases are concentrated in the North and Northeast regions, with Santa Catarina and Rio Grande do Sul being the unique states to achieve, in 2005, the target of elimination of leprosy as a public health problem^{5,10}.

Maranhão is one of the states considered to have very high prevalence. It presents an overall detection rate of 67.26 per 100,000 inhabitants and 19.05 per 100,000 individuals aged 15 years or younger. The rate of disability is 5.82 in the above-mentioned state and 6.16 in the City of São Luis; hence, the state has been considered hyperendemic. The high mean leprosy detection rates in Maranhão exceed the mean rates of the northeast region and Brazil¹¹.

The epidemiological characteristics of leprosy represent tools for the diagnosis of health situation and contribute to the prevention and surveillance of the epidemiological chain through planning and evaluating health activities, with the establishment of strategies for disease control as a public health problem. This study aimed to describe the clinical, socioeconomic, and demographic characteristics of leprosy patients assisted at a referral service in São Luis, MA.

METHODS

We performed a descriptive cross-sectional study among leprosy patients assisted at a referral service in São Luis, MA, from May 2008 to November 2009.

The patients were identified by searching in the registration book of new cases and the individual notification form. For data collection, we used a questionnaire as instrument, with information such as demographic, socioeconomic, and clinical aspects, as well as skin smear, therapeutic regimen, operational classification, Bacillus Calmette-Guérin (BCG), degree of disability, family history of leprosy, and degree of kinship.

Data collection was performed either after ambulatory care or in home visits when the patients claimed to be more available to answer the questionnaire. Data collection was made at home after scheduled appointment in the day of consultation.

Vaccination with intradermal (ID) BCG was observed by the presence or absence of scars. For evaluating the grade of disability, we used the parameters adopted by the Ministry of Health.

Clinical evaluation consisted of dermato-neurological examination according to the Ministry of Health's simplified evaluation form of neural functions. It was based on the identification of skin lesions through inspection of the body surface, search for sensitivity, palpation/percussion, and functional evaluation (sensitivity, muscle strength) of nerves.

Statistical analysis was performed using the software STATA 11.0, and the data bank was created with Epi-Info, version 6.4 (CDC-Atlanta-USA). Descriptive analysis was expressed by absolute and percentage frequencies. The odds ratio (OR) was used to assess the association and risk.

Ethical considerations

The research was approved by the Research Ethics Committee of the University Hospital, Federal University of Maranhão (CEP-HUUFMA), with protocol number: n 016/2008.

RESULTS

This study had the participation of 85 patients. Most (51.7%) patients were men. Regarding the skin color, brown accounted for the majority of individuals (60%), followed by black (25.8%) and white (14.2%). Concerning the marital status, most patients were married or living together (57.6%). In reference to the monthly income, 54.1% received 1 to 2 minimum wages. Approximately 52.9% of the patients had public water system, and 47.1% had sewerage system; however, 43.5% were still using septic tanks (**Table 1**).

The most frequent clinical form was the lepromatous form (42.3%), followed by the borderline (30.5%). The multibacillary form was predominant (72.9%). Concerning the skin smear test, 42.3% were positive, 36.4% were negative, and 21.1% did not undergo the test. Among the carriers of leprosy, 43.5% of those referred had a reaction. In relation to the immunization with BCG, 83.5% had no scar. **Table 2** shows that leprosy case in the family was reported by 44.7% of individuals, and most (63.1%) of these leprosy cases were first-degree relatives (father, mother, and brother).

Most (96.4%) of the individuals lived in houses made of bricks with roof tiles, and 56.4% had houses with floor tiles. More than half (72.6%) of the residents had houses with more than three rooms and with two persons (65.1%) in each room (**Table 3**).

Among the leprosy patients, the multibacillary and paucibacillary forms represented 72.9% and 27.1% of the cases, respectively. By correlating the classification and sex, the paucibacillary form was found higher in female participants (52.1%), whereas multibacillary was higher in male participants (53.2%); however, the difference was not statistically significant. In reference to age distribution and sex, the age group of 50 to 64 years had predominance of female subjects with 72.1% of cases, followed by the age group of 35 to 49 years with 54.8% of cases. In the other age groups, male subjects had a higher percentage. Among the leprosy patients with no education, 6.8% were men, and 2.4% were women. **Table 4** shows that concerning the length of education, 41.4% of women and 34.1% of men had more than one to three years¹², and more years of education length was frequent among women (12.2%).

TABLE 1 - Demographical characteristics of leprosy patients. São Luis, State of Maranhão, Brazil, 2009.

Patient characteristics	Number	Percentage
Gender		
male	44	51.7
female	41	48.3
Skin color		
white	12	14.2
black	22	25.8
brown	51	60.0
Marital status		
married/living together	49	57.6
single	29	34.2
divorced	6	7.0
widow (er)	1	1.2
Monthly income		
<1 wage	10	11.8
1 to 2 wages	46	54.1
≥2 wages	29	34.1
Water origen		
public system	45	52.9
artesian well	32	37.7
water well	7	8.2
river	1	1.2
Waste destination		
sewerage system	40	47.1
septic tank	37	43.5
black tank	8	9.4
Garbage destination		
public collection	75	88.2
vacant lots	3	3.5
burning	7	8.3
Total	85	100.0

TABLE 2 - Clinical and operational characteristics of leprosy patients. São Luis, State of Maranhão, Brazil, 2009.

Characteristics	Number	Percentage
Clinical form		
indeterminate	3	3.6
tuberculoid	20	23.5
borderline	26	30.6
lepromatous	36	42.3
Operational classification		
paucibacillary	23	27.1
multibacillary	62	72.9
Skin smear		
positive	36	42.3
negative	31	36.5
not performed	18	21.2
Occurrence of reaction		
yes	37	43.5
no	20	23.6
not informed	28	32.9
Bacillus Calmette-Guérin		
yes	14	16.4
no	71	83.6
History of leprosy in the family		
yes	38	44.7
no	45	52.8
not informed	2	2.5
Kinship degree (n =38)		
first degree	24	63.1
second degree	14	36.9
Total	85	100.0

TABLE 3 - Dwelling conditions of leprosy patients. São Luis, State of Maranhão, Brazil, 2009.

Variables	Number	Percentage
Dwelling type		
brick	82	96.5
wood	1	1.2
not informed	2	2.3
Roof type		
tile	82	96.5
thatch	1	1.2
not informed	2	2.3
Floor type		
clay tile	48	56.4
cement	33	38.8
beaten earth floor	1	1.2
others	3	3.6
Number of rooms		
two	9	10.8
three	15	16.6
> three	61	72.6
People per room		
one	12	13.2
two	55	65.1
three	16	19.2
> three	2	2.5
Total	85	100.0

Concerning the grade of disability at the beginning of treatment in the age group of those mostly affected by leprosy (35 to 49 years), 64.5% had disability of Grade zero, 6.5% of Grade 1, and 3.2% of Grade 2, and 25.8% were not evaluated. Among the 52 patients evaluated

at the end of treatment, the most evaluated age group was that of 20 to 34 years, with 29.9% of patients classified as Grade zero, 30.8% Grade 1, and 11.5% Grade 2 (Table 5).

TABLE 4 - Clinical classification versus sex, age group, and education level in leprosy patients. São Luis, São Luis, State of Maranhão, Brazil, 2009.

Characteristics	Female		Male		OR (95% CI)	p
	n	%	n	%		
Classification × gender						
paucibacillary	12	52.1	11	47.8	0.809 (0.30-2.11)*	>0.05
multibacillary	29	46.7	33	53.2		
Age group (year) × gender						
4 to 9	-	-	1	100.0	-	
10 to 14	1	33.3	2	66.6	-	
15 to 19	2	28.5	5	71.4	-	
20 to 34	11	42.3	15	57.6	-	
35 to 49	17	54.8	14	45.1	-	
50 to 64	8	72.1	3	27.2	-	
65 to 79	2	33.3	4	66.6	-	
Education level × gender (Education length in years)						
none	1	2.4	3	6.8	3.75 (0.21-64.20)	>0.05
1 to 3	17	41.4	15	34.0	1.10 (0.24-4.97)	>0.05
4 to 7	15	36.5	14	31.8	1.16 (0.25-5.35)	>0.05
8 to 11	3	7.3	8	18.1	3.33 (0.45-24.64)	>0.05
≥12	5	12.2	4	9.0	1.0 (reference)	

*OR: odds ratio with confidence interval of 95%; 95% CI: 95% confidence interval.

TABLE 5 - Age group of leprosy patients according to disability grade at the beginning and end of treatment. São Luis, São Luis, State of Maranhão, Brazil, 2009.

Age group (years)	Grade of disability at the beginning (n=63)							Grade of disability at the end (n=52)								
	Grade 0		Grade 1		Grade 2		NR*	Grade 0		Grade 1		Grade 2		NR**		
	n	%	n	%	n	%		n	%	n	%	n	%			
4-9	1	100.0	-	-	-	-	-	-	1	100.0	-	-	-	-	0	-
10-14	2	66.6	-	-	1	33.3	-	-	-	-	-	-	1	33.3	2	66.6
15-19	4	57.1	-	-	-	-	3	42.8	4	57.1	1	14.2	-	-	2	28.5
20-34	11	42.3	6	23.0	2	7.6	7	26.9	7	29.9	8	30.7	4	11.5	8	30.7
35-49	20	64.5	2	6.4	1	3.2	8	25.8	11	36.6	5	16.6	1	3.3	13	43.3
50-64	4	36.3	3	27.2	-	-	4	36.3	3	27.2	1	9.0	1	9.0	6	54.5
65-79	4	66.6	2	33.3	-	-	-	-	-	-	4	66.6	-	-	2	33.3

*No record. **In treatment. of the 85 cases, only 63 were evaluated in the beginning of the treatment. Of the 85 cases, only 52 completed the treatment in this study.

DISCUSSION

Leprosy care has faced difficulties because of the many factors involved in this action. Although the healthcare teams of basic care and family health units have participated in specific training programs, the effects on the early diagnosis and the coefficients of the municipality remain unnoticed. Prevention and control of index cases and contacts seem to be far from their effectuation, which in turn may influence the break of disease transmission chain.

According to our data, the male participants were predominant, similar to another study performed in the Federal District by Lee et al.¹², wherein the male predominance was 54.2%. This indicates that men are the most affected and responsible for transmission of leprosy. However, Figueiredo and Silva¹³ showed an increase of leprosy cases among female participants by studying the leprosy spread in São Luis, MA.

A study conducted by Sobral¹⁴ also showed predominance of women. This increase of infected women may occur because they are more concerned with self-image and seek more health services than men¹⁴.

The predominant color was brown, which is in agreement with the results found by Lima et al.¹⁵ in a study made in Caxias, MA, where the predominant color was brown, followed by black (34.6%). Studying the association between race and leprosy, Santos et al.¹⁶ found no statistically significant data. However, it should be taken into account that in Northeastern Brazil, brown skin, because of strong miscegenation, has predominance over the others.

In this study, a small percentage of individuals had a monthly income of one to two minimum wages, as confirmed in another study by Garcia¹⁷ in the State of São Paulo, where the leprosy patients (80.3%) earned up to two minimum wages. This shows that the lower the financial conditions of patients are, the greater their life impairment is.

The public collection was present in the majority of houses, and although the sewer was used, the use of the septic pit was common. Only 52.9% had water supply by the public net. These results were similar to the ones found by Leite et al.¹⁸ in studies made in Buriticupu with inside-home contacts where only 35.6% used water from public net, and 58.9% directed the waste to the black pit.

Regarding the clinical form, the lepromatous form was predominant, followed by the borderline one. The predominance of multibacillary clinical forms showed the same trend found in studies conducted in Mato Grosso do Sul¹⁹, where multibacillary cases accounted for 67.2% of individuals. The same was found in the City of Belo Horizonte, MG²⁰, where the borderline and lepromatous clinical forms accounted for 98.8% of all the cases. The predominance of multibacillary forms is due to the late diagnosis of the disease, which influences the maintenance of the epidemiological chain, because the multibacillary cases serve as a source of infection that reflects the endemicity of the studied region. Maranhão presents an overall detection of 67.26/100,000 inhabitants and has disability rates ranging from 5.82 in the state to 6.16 in the City of São Luis. Maranhão is, thus, classified as a hyperendemic state¹¹.

According to Fernandes et al.⁸, the skin smear test serves as a support for diagnosis as well as one of the criteria for confirmation of relapse, when compared with the result at the moment of diagnosis and cure. In this study, the skin smear was positive in 41.2% of the patients, although many leprosy patients had not undergone the test.

Despite the fact that BCG vaccination status has become a part of the Ministry of Health recommendations for leprosy control, this study found that 78.8% of individuals were not immunized. The efficacy of BCG vaccine in the immunoprophylaxis and immunotherapy of leprosy has shown to be significant, as demonstrated in studies in Uganda, New Guinea, and Myanmar²¹, where a variation of 20% to 80% was found. Fine²², in many studies, demonstrated the efficacy of ID BCG vaccine as a protective agent against leprosy among household contacts, confirming that the role of ID BCG vaccine in the protection is not primarily related to prevention of infection, but associated with a potentialization of the infected person's immune response as well as the prevention of its progression and protection against multibacillary forms.

The familial distribution of leprosy seems to have a relation between forms of the disease and kinship relationship. Our results showed that those who reported leprosy contacts in the family had relatives of 1st or 2nd degree of kinship. The same kinship relationship was found in Rio de Janeiro, where a percentage of 70.3% was identified²³. According to Guedes et al.²⁴, the literature shows that the proximity of the primary case is a factor that contributes to the risk of becoming sick. Beiguelman²⁵ observed that in families where a parent was lepromatous, the blood relatives were at higher risk of developing the same kind of polar disease. Knowledge about these data may assist in the service management, as one of the most important actions for controlling the disease is the surveillance of contacts.

Leprosy is traditionally associated with poverty; therefore, the more substandard the conditions of the dwelling are, the more widespread the disease is. However, in this study, the majority had their own houses, which were made of brick and tile roof and floor. A study in Buriticupu, MA, showed that most houses were made of brick, and 86.3% of the interviewees lived in their own houses²⁶. This makes us conclude that the profile of leprosy patients is changing, as in this study, the houses were at appropriate conditions.

It is known that the main kind of leprosy transmission is interhuman through direct contact. The bacilli are eliminated mainly through the upper airways of multibacillary patients with viable bacilli, that is, patients who are untreated or have drug-resistant bacteria²⁷. In this study, more than half of the patients lived with two to five people, in houses that had more than three rooms, with up to two people per room. Similar results were found in a survey in São Paulo, where houses had four or more rooms (67%), and almost all families had two people in the same room (92%)²⁸. The number of people per room (more than three) is a risk factor, with five to eight times higher probability of developing leprosy compared with non contacts²⁹. These conditions increase the risk of becoming sick because a large family, particularly at night, provides ideal conditions for infection with *M. Leprae*, as the transmission occurs in an infective form (borderline or lepromatous)²⁷.

The leprosy operational classification revealed a higher incidence of multibacillary cases among male participants. The relation between age group and sex showed that the group of 50 to 64 and 35 to 49 years often were more predominant among female participants. However, in the other age groups, the male participants were predominant. A study conducted by Miranzi et al.³⁰ showed that 31.4% of leprosy patients were 34 to 49 years of age. Another study from the Federal University of Paraíba also showed that the highest frequency was at older ages, between 50 to 64 (27%)³¹. High frequency of infected adults may be due to the disease's long incubation, with average length of two to seven years. Furthermore, this disease manifests on the economically active age group, which, in turn, brings social and economic losses, considering the disabilities and lesions as important factors of the patients' withdrawal from productive working life³⁰.

Regarding education, which is an important condition for the implementation of educational activities, as a strategy for prevention and control of the disease, this study showed that most patients had 1 to 3 years of education, which is more predominant in women. Majority of the men were among those with no education. Similar results were shown by Duarte, et al.³², where the average length of education was four years, with a statistically significant predominance (68%) of patients with elementary education (up to eight years of schooling). Low education level may decrease the understanding of the prevention guidelines of the disease, as well as the suitable treatment and necessary medical care. A higher educational level may explain the spontaneous demand of health services. The lack of knowledge and the stigmatization aspect of leprosy are, still, factors that hinder the acceptance and contribute to the rejection and abandonment of treatment³⁰. However, among those with more than 12 years of education, women were more predominant, which could explain the high frequency of women having paucibacillary forms.

The suitable diagnosis and early treatment, in the phase of indeterminate form, prevent the transmission and therefore break the transmission chain of the disease. Furthermore, data from this study indicate the existence of a large amount of individuals transmitting the disease (borderline and lepromatous), that is, when they had not undergone treatment yet. The presence of multibacillary forms in our study may reflect the delay in the diagnosis of the disease, thus favoring the maintenance of the epidemiological chain, because the multibacillary cases serve as a source of disease infection.

Concerning the grade of disability evaluation at the beginning of treatment, in the age group of 35 to 49 years, which was mostly affected by leprosy, 64.5% manifested Grade zero, and 25.8% were

not evaluated. Patients with early diagnosis have a good chance of preventing the onset or worsening disabilities resulting from current lesions as well as later impairments³³. A study conducted by Rodini et al.³⁴ showed that 20 of 26 patients already had disability of Grades 1 and 2 at the beginning of treatment. The presence of disability is probably associated with late diagnosis.

Of the 52 patients who completed treatment in the study, in the most evaluated age group (20 to 34 years), 30.7% were classified as Grade 1 and 11.5% as Grade 2. The impact of disability for patients in their social and physical function may be related to the monitoring by the health professional³⁵.

Although the degree of disability recommended by the WHO represents one of the instruments used for the evaluation of patients with leprosy, the tactile sensitivity threshold for Grades 0 and 1 can vary greatly during its implementation and, therefore, represents a limitation.

The frequency of multibacillary forms found in this study and the cases of leprosy in family members point out delayed diagnoses. Thus, the early diagnosis and appropriate treatment are important to decrease the disabilities.

Leprosy studies make possible the disease understanding and the epidemiological knowledge of a region, which is important for supporting the prevention and control of the disease as a public health problem. Capacity building of professionals, therefore, represents a relevant strategy to enable the early diagnosis and prevention of disabilities.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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