

Clinical and sociodemographic findings in a cohort of 4632 pediatric patients with language, speech and learning disorders

Hallazgos clínicos y sociodemográficos en una cohorte de 4632 pacientes pediátricos con trastornos del lenguaje, del habla y del aprendizaje

Paulina C. Murphy-Ruiz¹, Emilio Arch-Tirado², María Guadalupe Leyva-Cárdenas¹, Ana L. Adame-Calderón¹, María Concepción Villarruel-Rivas¹ and Ana L. Lino-González^{3*}

¹Language Pathology Department, Instituto Nacional de Rehabilitación Luis Guillermo Ibarra Ibarra; ²Neurological Center, Centro Médico ABC Santa Fe; ³Subdirectoriate of Clinical Research, Division of Neurosciences, Department of Clinical Neuroscience, Language, Voice and Hearing Disability Area, Instituto Nacional de Rehabilitación Luis Guillermo Ibarra Ibarra. Mexico City, Mexico

Abstract

Objective: To describe and analyze clinical and sociodemographic aspects of a cohort of patients with language, speech and learning disorder. **Method:** Descriptive retrospective study. Patient records (2011 to 2015) were selected, making up a total of 4632. Averages, standard deviations, percentages and frequencies were calculated; in order to assess whether there was a significant difference between variables, chi squared test and a conditional probability analysis was performed between the variables to obtain a priori and a posteriori probability. **Results:** Disorders of language, speech and learning occurred more frequently in males, 3358 patients (72.5%). The most frequent diagnosis was language development disorder, diagnosed in 2924 patients (63.1%). A higher incidence and prevalence of language delay were found for the male sex ($p < 0.05$). **Conclusions:** Of all the variables studied, only the incidence of delay in language development with respect to the male sex was significant; three out of four patients were male and 1 female.

Keywords: Learning. Speech. Language. Disorder.

Resumen

Objetivo: Describir y analizar aspectos clínicos y sociodemográficos de una cohorte de pacientes con trastornos del lenguaje, del habla y del aprendizaje. **Método:** Estudio retrospectivo descriptivo. Se seleccionaron expedientes de 4632 pacientes (años 2011 a 2015). Se calcularon medias, desviaciones estándar, porcentajes y frecuencias. Con la finalidad de evaluar si existía diferencia significativa entre variables se utilizó la prueba de ji al cuadrado y se realizó un análisis de probabilidad condicional entre las variables para obtener la probabilidad a priori y a posteriori. **Resultados:** Los trastornos del lenguaje, del habla y del aprendizaje se presentaron con mayor frecuencia en el sexo masculino, con 3358 pacientes (72.5%). El diagnóstico más frecuente fue el trastorno del lenguaje, diagnosticado en 2924 pacientes (63.1%). Se encontraron mayores incidencia y prevalencia de retraso del lenguaje en el sexo masculino ($p < 0.05$). **Conclusiones:** De todas las variables estudiadas, solo la incidencia de retraso en el desarrollo del lenguaje con respecto al sexo masculino fue significativa; de cada cuatro pacientes, tres eran de sexo masculino y uno de sexo femenino.

Palabras clave: Aprendizaje. Habla. Lenguaje. Trastorno.

*Correspondence:

Ana L. Lino-González

E-mail: ana_onil@yahoo.com.mx

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Introduction

Language, speech and learning disorders (LSLD) are difficulties that occur regularly in the child population of the entire world^{1,2}, and imply that the child exhibits a correct sequence of developmental milestones, but expressed at a slower rate than expected for his/her chronological age²⁻⁴. The American Speech Language Hearing Association (ASHA) defines language disorder (LD) as impaired comprehension or use of verbal, nonverbal, or graphic symbol systems; the form of language or phonology (sounds of a language and rules that govern their combination), morphology (word structure and construction of the forms of words), and syntax (order and combination of words to form sentences, and relationships between elements within a sentence) may be involved; it may also involve language content or semantics (meaning of words and sentences) and the function of language in the communication process or pragmatics (a system that combines the aforementioned components of language to give rise to a functional and socially appropriate communication)^{3,5-8}. The fact that this deficiency or difficulty in the production of language is not related to low IQ, physical or sensorial disability, neurological problems or mental illnesses stands out^{9,10}. On the other hand, ASHA also considers speech disorder (SD) and defines it as an alteration that affects articulation of speech sounds, speech or voice flow. An articulation disorder is characterized by atypical production of speech sounds; during its production, there are substitutions, omissions, additions or distortions of the sounds of language that may affect intelligibility. On the other hand, a fluency disorder is an interruption in the flow of speech characterized by an atypical rhythm, as well as by repetitions of sounds, syllables, words, and phrases, sometimes together with excessive tension, forced attitude and gestural support. Finally, voice disorders are characterized by abnormal production or absence of vocal quality, tone, volume, resonance or duration, considered abnormal for age and gender⁵.

Both disorders have been associated with biological and environmental factors, with perinatal brain injury, prematurity, low birth weight, amniotic complications, intrauterine infections^{11,12}, low socioeconomic status, poor parental educational level¹³ and family history of language or speech delay or reading problems standing out¹⁴. As for its prevalence, studies carried out in

various parts of the world show that it changes according to the age of the study population, and ranges from 1 to 27.5%^{12,15-21}. On the other hand, the highest rate has been found to occur in the male gender, with a ratio of 1.5 boys per girl^{14,22}.

Learning disorder (LeD) is a condition characterized by difficulty learning academic skills, and it is possible for educational skills to be observed significantly below the levels expected for chronological age, importantly affecting reading, writing, mathematics²³, listening, auditory comprehension, oral expression and reasoning abilities²⁴. Developmental dyslexia is the most common learning disorder (80%)²⁵, and is characterized by a language delay that affects the phonological, semantic and syntactic components of literacy skills, with poor reading comprehension and difficulty in expressive reading, spontaneous writing¹⁴ and spelling²⁶ being observed in these children. A prevalence of 5-15%^{24,27-29}, and even 3-20%, has been reported in the schoolchildren population^{26,30}.

A study carried out in New York found that males are more prone to experience learning difficulties (9:6 ratio)²⁸, and in China, dyslexia diagnosis has been reported to be more common in males (2:1 ratio)³¹. With regard to difficulties for mathematics, in general, the prevalence rate is reported to be 3-7% in the schoolchildren population²³.

The purpose of this article is to describe and analyze clinical and sociodemographic aspects of a cohort of patients with LSLD.

Method

A descriptive, retrospective study was designed, with information extracted from the 2011-2015-period database of the Language Pathology Department (LPD) of a Mexico City-based National Health Institute being analyzed. The database contains information of patients who attended or were referred for presenting with LSLD, as well as sociodemographic and clinical information.

Sample

All patient admissions recorded over a 5-year period, from January 1, 2011 to December 31, 2015, were examined, with all patients aged 1 to 13 years whose hospital admission was related to language, speech and learning difficulties being selected.

Variables

- Sociodemographic variables: gender, age, place of origin, place of residence, patient educational level, maternal age and parental schooling.
- Clinical variables: diagnosis, prenatal control, type of delivery, psychomotor development, language development and hereditary-family history.

Statistical analysis

An initial data descriptive analysis was carried out, with means and standard deviations being calculated for quantitative variables, as well as percentages and frequencies for qualitative variables. In order to assess whether or not there was a significant difference between the study variables and patient gender, the chi-square test was used, and to determine the conditional probability between study variables, a joint probability analysis $P(A \cap B) = P(A) \cdot P(B)$ was performed, which is the basis for obtaining the a priori $P(B \cap A_i)$ and a posteriori $P(A_i \cap B)$ probabilities used in Bayes theorem.

Ethical aspects

The study protocol was approved by the Institutional Committee of Research and Ethics. At hospital admission, all parents or legal guardians of participant patients signed an informed consent document authorizing anonymous use of data.

Results

The number of patients who were admitted to the hospital for presenting with LSLD in the study period was 4,632. There were 3,358 boys (72.5%) and 1,274 girls (27.5%), aged from 1 to 13 years (12-year range), with an average age of 5.32 ± 2 years (mean $\pm$ standard deviation). Regarding the place of origin, 4,593 patients (99.1%) were born in 30 of the 32 states of the country; 35 (0.7%), abroad; and in 4 (0.1%), birthplace was unknown. Mexico City was the most common place of origin, with 3,894 patients (84.1%, 2,820 boys and 1,074 girls), followed by the State of Mexico with 489 (10.8%; 364 boys, 125 girls) and Puebla with 26 (0.6%, 19 boys and 7 girls). As for place of residence, 21 states were referred, out of which the most common were Mexico City with

3,974 patients (85.8%, 2,883 boys and 1,091 girls) and the State of Mexico with 580 (12.5%, 419 boys and 161 girls) (Table 1).

Maternal age ranged from 10 to 50 years (40-year range), with average age being 26.8 ± 6.4 years. As for schooling at the time of admission, 2,269 patients (49%, 1,641 boys and 628 girls) were on preschool and 1,802 (38.9%, 1,311 boys and 491 girls) were attending basic or primary education. As regards paternal schooling, the most common was complete secondary education in 1,017 cases (22%, 744 boys and 273 girls), followed by high school degree in 744 (16.1%, 521 boys and 223 girls). Most common maternal schooling was complete secondary education in 1,123 cases (24.2%; 839 boys and 284 girls), followed by high school degree in 821 (17.7%, 581 boys and 240 girls) (Table 2).

The most common diagnosis was LD, identified in 2,924 patients (63.1%, 2,124 boys and 800 girls), followed by learning disorder (LeD) in 1,646 (35.5%, 1,186 boys and 460 girls) and SD in 62 (1.4%, 48 boys and 14 girls). A more refined analysis of the received diagnoses found that, with regard to LD, the most common were phonological syntactic disorder, present in 1,498 patients (32.3%, 1,098 boys and 400 girls) and phonological processing disorder in 1,402 (30.3%, 1,008 boys and 394 girls); as for SD, the most common was organic dyslalia, observed in 55 patients (1.2%, 42 boys and 13 girls); and regarding LeD, the most frequent diagnosis was mixed dyslexia, which was found in 916 patients (19.8%, 664 boys and 252 girls) (Table 3).

With regard to patient history, 4,510 (97.4%) mothers (of 3273 boys and 1237 girls) referred having undergone prenatal control, while 2,409 (52%) mothers (of 1,741 boys and 668 girls) reported cesarean delivery. As for patient psychomotor development, it was reported to be normal in 3,717 cases (80.2%, 2,719 boys and 998 girls); language development was reported with delay in 3,661 cases (79%, 2,682 boys and 979 girls). When the chi-square test was calculated, a p-value of 0.05 was obtained, which means that there is a higher incidence of language problems in the male gender (which is consistent with reports in the literature, with the fact that this was the only variable that showed a significant difference with regard to patient gender standing out). Regarding hereditary-family history, in 2,220 cases (47.9%, 1,601 boys and 619 girls) a communication disorder (language, speech or learning) was reported (Table 4).

Table 1. Place of origin and residence of patients with language, speech and learning disorders

	Origin		Gender		Residence		Gender	
	n	%	Boy	Girl	n	%	Boy	Girl
Aguascalientes	22	0.5	13	9	2	0	1	1
Baja California	4	0.1	1	3	1	0	0	1
Baja California Sur	6	0.1	2	4	-	-	-	-
Campeche	1	0	0	1	3	0.1	3	0
Coahuila	1	0	1	0	-	-	-	-
Chiapas	5	0.1	4	1	2	0	1	1
Chihuahua	4	0.1	3	1	-	-	-	-
Mexico City	3894	84.1	2820	1074	3974	85.8	2883	1091
Durango	6	0.1	3	3	-	-	-	-
State of Mexico	489	10.6	364	125	580	12.5	419	161
Guanajuato	8	0.2	7	1	-	-	-	-
Guerrero	19	0.4	14	5	13	0.3	8	5
Hidalgo	12	0.3	9	3	8	0.2	6	2
Jalisco	7	0.2	5	2	5	0.1	5	0
Michoacán	10	0.2	7	3	5	0.1	4	1
Morelos	13	0.3	10	3	9	0.2	6	3
Nayarit	1	0	1	0	-	-	-	-
Nuevo León	4	0.1	3	1	-	-	-	-
Oaxaca	8	0.2	6	2	-	-	-	-
Puebla	26	0.6	19	7	5	0.1	4	1
Querétaro	7	0.2	6	1	3	0.1	2	1
Quintana Roo	5	0.1	4	1	2	0	2	0
San Luis Potosí	3	0.1	2	1	1	0	0	1
Sinaloa	3	0.1	3	0	2	0	1	1
Sonora	3	0.1	0	3	1	0	0	1
Tabasco	1	0	1	0	-	-	-	-
Tamaulipas	5	0.1	1	4	-	-	-	-
Tlaxcala	6	0.1	4	2	5	0.1	4	1
Veracruz	17	0.4	12	5	10	0.2	8	2
Zacatecas	3	0.1	3	0	1	0	1	0
Abroad	35	0.8	28	7	-	-	-	-
Unknown	4	0.1	2	2	-	-	-	-

To obtain the joint probability between LSLDs with regard to patient gender, $P(A \cap B) = P(A) \cdot P(B)$ proportions probabilistic intersection was calculated,

where A and B were calculated with the proportion to be analyzed, i.e., total number of male or female patients by total sample, and total number of male or

Table 2. Patient and parental schooling

	n	%	Boys	Girls	χ^2
Patient educational level					
None	502	10.8	359	143	NS
Preschool	2269	49	1641	628	
Incomplete primary education	1802	38.9	1311	491	
Complete primary education	7	0.2	6	1	
Secondary education	6	0.1	3	3	
Special education	4	0.1	3	1	
Nursery school	42	0.9	35	7	
Maternal educational level					
Illiterate	41	0.9	24	17	NS
Able to read and write	35	0.8	21	14	
Incomplete primary education	95	2.1	74	21	
Complete primary education	311	6.7	215	96	
Incomplete secondary education	203	4.4	149	54	
Complete secondary education	1123	24.2	839	284	
Incomplete high school	399	8.6	294	105	
High school degree	821	17.7	581	240	
Technical degree	397	8.6	291	106	
Incomplete college education	208	4.5	139	69	
College degree	502	10.8	372	130	
Postgraduate education	40	0.9	29	11	
Unknown	457	9.9	330	127	
Paternal educational level					
Illiterate	28	0.6	19	9	NS
Able to read and write	29	0.6	18	11	
Incomplete primary education	79	1.7	57	22	
Complete primary education	291	6.3	209	82	
Incomplete secondary education	177	3.8	136	41	
Complete secondary education	1017	22	744	273	
Incomplete high school	307	6.6	243	64	
High school degree	744	16.1	521	223	
Technical degree	206	4.4	144	62	
Incomplete college education	163	3.5	110	53	
College degree	507	10.9	375	132	
Postgraduate education	33	0.7	23	10	
Unknown	1051	22.7	759	292	

NS: non-significant

female patients within each disorder by total patients by gender. Thus, for calculations, the proportion of male patients was $\frac{3358}{4632} = 0.7249$ (72.49%), and the proportion of female patients was $\frac{1274}{4632} = 0.275$ (27.5%); therefore, the joint probability with regard to patient gender and LDs was: (A) male patients divided by total sample and (B) male patients with LD divided by total male patients, i.e., $P(A \cap B) = P\left(\frac{3358}{4632} \cap \frac{2124}{3358}\right) = 0.4584$; i.e., the probability for a patient to be male and to have LD is 45.84%. On the other hand, considering (A) female patients divided by total sample and (B) female patients with LD divided by total female patients, i.e., $P(A \cap B) = P\left(\frac{1274}{4632} \cap \frac{800}{1274}\right) = 0.1726$, this means

that, of the entire sample, the probability for a patient to be female and to have LD is 17.26%. However, with regard to the calculation of a posteriori conditional probability, $P(B \cap A_i)$, considering the LD and patient gender variables, using Bayes theorem, the a posteriori conditional probability for a patient to arrive at the LPD, to be diagnosed with LD and to be male is 0.7264 (72.64%), whereas the a posteriori conditional probability for a patient to arrive at the LPD, to be diagnosed with LD and to be female is 0.2735 (27.35%) (Table 5).

Discussion

This study provides information that allows to know the characteristics of patients diagnosed with LSLD from a cohort of pediatric patients cared for at a National Health Institute in Mexico. Being a specialized referral hospital, the number of patients at pediatric age who were admitted is high (4,632). Analyzing this information in relation to national official figures, we found that, for the year 2014, the National Institute of Statistics and Geography (INEGI – *Instituto Nacional de Estadística y Geografía*) referred that 7.1 million population (6%) had some type of disability, among which learning difficulties (38.8%) and difficulty to speak or communicate (18%) are considered³². As for patient gender, our data agree with those reported by international studies in which belonging to the male gender has been established to be a risk factor^{13,14,22,28,31,33}. On the other hand, when patient age was analyzed, they were aged between 1 and 13 years, which agrees with INEGI's data, which highlight that difficulties to learn, speak or communicate are found with higher frequency and severity in the population younger than 15 years³². Continuing with this subject, it should be noted that the World Health Organization considers that the first three years of life are a critical period, which is characterized by an accelerated development of the nervous system that favors growth and comprehensive development of the child⁴. It has also been suggested that disorders related to language expression may be noticed by parents at between 18 months and 3 years of age; however, it is common to hear that the child is in the process of development or language acquisition and that he/she has sufficient time for properly developing it, which is why many times the issue is not given importance and the child is lately referred to a specialist¹⁴.

Table 3. Diagnosis

	n	%	Boys	Girls	χ^2
Disorders					NS
Language	2924	63.1	2124	800	
Speech	62	1.4	48	14	
Learning	1646	35.5	1186	460	
Specific diagnosis					
Language					NS
Childhood aphasia	4	0.1	2	2	
Verbal dyspraxia	14	0.3	12	2	
Phonological syntactic disorder	1498	32.3	1098	400	
Phonological processing disorder	1402	30.3	1008	394	
Semantic pragmatic disorder	6	0.1	4	2	
Speech					NS
Dysglossia	1	0	1	0	
Organic dyslalia	55	1.2	42	13	
Rhotacism	3	0.1	3	0	
Dysarthria	3	0.1	2	1	
Learning					NS
Dyseidetic dyslexia	289	6.2	211	78	
Dysphonetic dyslexia	440	9.5	310	130	
Mixed dyslexia	916	19.8	664	252	
Dyscalculia	1	0	1	0	

NS: non-significant.

INEGI also reports that, in Mexico, approximately half the population with disabilities (49.6%) is concentrated in seven states, with Mexico City (5.8%) and the State of Mexico (14.6%) standing out³². In our study, both these geographical areas concentrate the largest number of patients, and, in this sense, it is worth considering that the Institute where this study was carried out is located in Mexico City, which is enough reason for most population that attend asking for care to be living in this city or in the State of Mexico, which, by being part of the suburban area, has the means of transport that facilitate arrival of patients not only during the detection of the problem, but also for treatment and specialized medical follow-up.

We found that the youngest mothers were aged 10 years, and the oldest, 50; average age and standard deviation (26.8 ± 6.4 years) were within the most recommended age parameters for exercising motherhood. We considered maternal age, since mothers are usually in charge of looking after and taking care of patients and, in this sense, we should highlight that, in the review that was carried out, advanced maternal age was found to have been associated as a risk factor for the development of communication disorders³³.

Regarding patient schooling, 49% were at first level of basic education or preschool, and 38.9% at second level or primary school. Approximate usual age range for attending preschool according to the National Educational System is from 3 to 5 years³⁴, and we can assume that patients within this age range who attended the Institute did it due to LD or SD suspicion. As regards primary education, children aged from 6 to 12 years³⁴ join at this educational level and, therefore, it is possible for patients with LD or SD late detection to be comprised within this range, with those who had any of these diagnoses and that evolved to LeD or who presented with LeD as such also being added. Some authors stipulate that children with LD have a four- or five-fold higher risk for experiencing reading difficulties and for developing difficulties in social skills, in addition to writing, spelling, mathematics and attention problems, as well as to experience developmental dyslexia and lower levels of school performance^{2,3,6,12,13,35}.

We were interested in knowing the educational level of both parents and found that it is similar; the majority reported having completed secondary education, i.e., they had concluded the third and final stage of basic education. Some authors refer that educational level of both parents affects the development of language and learning of children^{35,36}; others consider that

Table 4. Patient history

	n	%	Boys	Girls	χ^2	p
Prenatal control					NS	
Yes	4510	97.4	3273	1237		
No	101	2.2	73	28		
Unknown	21	0.5	12	9		
Type of delivery					NS	
Eutocic	2049	44.2	1485	564		
Cesarean section	2409	52	1741	668		
Dystocic	74	1.6	58	16		
Accidental out-of-hospital	79	1.7	62	17		
Unknown	21	0.5	12	9		
Psychomotor development		80.2	2719	998	NS	
Normal	3717	19.1	619	265		
With delay	884	0.7	20	11		
Unknown	31					
Language development					5.0161	< 0.05
Normal	934	20.2	650	284		
With delay	3661	79	2682	979		
Unknown	37	0.8	26	11		
Hereditary-family history					NS	
No	1657	35.8	1211	446		
Communication disorder	2220	47.9	1601	619		
Psychiatric disorder	92	2	61	31		
Neurological disorder	142	3.1	105	37		
Congenital disorder	44	0.9	29	15		
Unknown	12	0.3	5	7		
Genetic disorder	106	2.3	77	29		
Communication and neurological disorder	118	2.5	87	31		
Psychiatric and neurological disorders	20	0.4	19	1		
Communication and psychiatric disorders	125	2.7	95	30		
Communication and congenital disorder	85	1.8	61	24		
Communication and genetic disorder	11	0.2	7	4		

NS: non-significant.

maternal educational level is essential, and suggest that illiterate or poorly-educated mothers represent a risk factor for the development of LD and LeD^{31,37-39}, and that those with higher educational levels represent a protective factor³³.

With regard to psychomotor development, 80.2% of the parents in our study referred that patient development had been normal; however, it would be worth for an objective evaluation to be carried out by a psychomotor specialist in order to verify this information, since there are several researchers who have found a relationship between motor disorders and the development of LSLDs^{2,9,40}. Okuda and Pinheiro⁴¹ consider that when the child is able to achieve good motor control, the construction of the basic concepts for intellectual development is facilitated, constituting a direct relationship between cognitive and motor development. Poor motor performance is evident when the

child exhibits clumsiness, impaired balance, delay in developmental milestones (crawling, walking, sitting), or poor performance in activities such as throwing, catching, running, kicking, jumping, cutting out, coloring, and writing, with all these activities being considered aspects that will interfere with academic performance.

As for hereditary-family history, 47.9% of the patients were found to have or have had relatives with LSLDs, which is consistent with observations reported in the literature since, for the disorders under analysis, significant involvement due to genetic predisposition is referred^{12,33,40}. Children with a family history of poorly intelligible speech, dysphemia, delayed language acquisition, and limited vocabulary are four times more likely to experience SD or LD^{13,39}. Furthermore, the prevalence of developmental dyslexia has been shown to be high in the offspring of parents with

Table 5. A priori and a posteriori probability with regard to patient gender and the diagnosed disorder

Disorder	Gender	A priori	P (A∩B)	A posteriori P (A B)
Language	Males (2,124)	0.7245	$P\left(\frac{3358}{4632} \cap \frac{2124}{3358}\right) = 0.4584$	$\frac{0.4584}{0.631} = 0.7264$
	Females (800)	0.2750	$P\left(\frac{1274}{4632} \cap \frac{800}{1274}\right) = 0.1726$	$\frac{0.1726}{0.631} = 0.2735$
	Σ = 2,924		Σ = 0.631	Σ = 0.9999
Learning	Males (1,186)	0.7245	$P\left(\frac{3358}{4632} \cap \frac{1186}{3358}\right) = 0.2559$	$\frac{0.2559}{0.3551} = 0.7206$
	Females (460)	0.2750	$P\left(\frac{1274}{4632} \cap \frac{460}{1274}\right) = 0.0992$	$\frac{0.0992}{0.3551} = 0.2793$
	Σ = 1,646		Σ = 0.3551	Σ = 0.9999
Speech	Males (48)	0.7245	$P\left(\frac{3358}{4632} \cap \frac{48}{3358}\right) = 0.0102$	$\frac{0.0102}{0.0131} = 0.7786$
	Females (14)	0.2750	$P\left(\frac{1274}{4632} \cap \frac{14}{1274}\right) = 0.0029$	$\frac{0.0029}{0.0131} = 0.2213$
	Σ = 62		Σ = 0.0131	Σ = 0.9999

reading difficulties³⁵; moreover, there is evidence that developmental dyslexia is associated with multiple genes^{25,26}.

Considering the results obtained when the joint probability was calculated, the elevated probability for a patient to develop LD stands out, which is 45.8% for the male gender and 17.2% for females, in comparison with patients with LeD or SD. As for LD and LeD a posteriori conditional probability, considering that the proportion is practically the same in both genders, the probability for a patient to arrive at the LPD, to be diagnosed with LD or LeD, and to be male, is 72%, while the probability for a patient to arrive at the LPD, to be diagnosed with LD or LeD, and to be female, is 27%. Interestingly, the results for SD show the same trend for the proportion, and a larger difference is observed between males and females; in this particular case, the probability for a patient to arrive at the LPD, to be diagnosed with SD and to be male is 77%, which is 5% higher than for patients with LD and LeD; and the probability for a patient to arrive at the LPD, to be diagnosed with SD and to be female is 22%, which is 5% lower in comparison with patients with LD and LeD.

One aspect that deserves to be highlighted has to do with the treatment these patients require once the problem has been detected and diagnosis has been established; ideally, this intervention should be early and administered by qualified specialists, but this can be complicated, for example, in those patients who have mild disorders, which makes typing of the problem to be difficult, which in turn leads to late identification and diagnosis. In the case of severe disorders, these can become persistent and continue during adulthood^{2,40,42,43}. In different studies, it has been possible to establish that adults who were diagnosed with LD and SD during childhood, and who were not treated, or received a late intervention, are more likely to be unemployed, have lower income, obtain less qualified jobs or have few possibilities of access to education or training^{3,12, 27,42}.

Another important aspect is related to what is reported about the intervention, medical or therapeutic follow-up, and socio-emotional development of these children, which is referred to as with significant difficulties^{6,44,45}. For example, LeDs have been reported to be associated with high rates of secondary school dropout, poor academic performance, lack of

opportunities to progress within the educational or training system, high levels of distress^{27,42}, social anxiety, manic episodes, bipolar affective disorder and psychotic depression^{2,42}. Adolescents with an unresolved LD exhibit social difficulties^{1,42} and high levels of aggression, which could be explained by the presence of a high degree of frustration and inability to use language skills as a bridge or facilitator in the interaction with others and for effective problem-solving⁴³. It is important to highlight that linguistic ability not only fulfills the communication function, but is also a cognitive and behavioral self-regulation resource, since it facilitates knowledge and understanding of emotions⁴⁴. It has been suggested that early and appropriate intervention during childhood can interrupt the risk for developing socioemotional and behavioral difficulties, often related to the use of harmful substances and non-compliance with social rules⁴³.

Some authors suggest that, in addition to specialized therapeutic treatment by language and speech therapists (speech therapists, speech and language pathologists, phon audiologists, human communication therapists, etc.), it is important for these children to attend regular psychotherapy sessions that help them acquire self-confidence, facilitate their adaptation in school environments and improve their social life quality⁷.

Conclusions

Of all analyzed variables, only the incidence of delayed language development in males was significant: of every four patients, three were males and one was female.

With regard to the attended population that was provided care, the a priori conditional probability for patients to arrive at the LPD, to be diagnosed with any of the three disorders, and for all of them to be males, or all of them to be females, is the same. On the other hand, the a posteriori conditional probability shows an important similarity with regard to the proportion at which all three disorders occur; however, the highest proportion was found in male patients with SD, and the lowest, in females.

LSLDs represent a highly common problem in early childhood. Thanks to different studies, it has been possible to establish that these conditions occur all over the world and that they can also be prolonged and get complicated in adolescence and adulthood, significantly affecting emotional, academic, social and occupational development; therefore, it is essential to

highlight the importance of early detection and therapeutic intervention by specialist physicians and speech therapists or language, speech and learning therapists.

Implementation of programs created to inform and guide parents, other family members, teachers and doctors will allow to solve these problems at early ages and prevent the evolution to more serious conditions.

Conflicts of interest

The authors declare that there are no conflicts of interest.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures that were followed adhered to the ethical standards of the responsible committee for experimentation on human beings and were in agreement with the World Medical Association and the Declaration of Helsinki.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained informed consent from the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

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