

Gestational, perinatal and family findings of patients with Patau syndrome

Achados gestacionais, perinatais e familiares de pacientes com síndrome de Patau

Hallazgos gestacionales, perinatales y familiares de pacientes con síndrome de Patau

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ABSTRACT

Objective: To describe gestational, perinatal and family findings of patients with Patau syndrome (PS).

Methods: The study enrolled patients with PS consecutively evaluated during 38 years in a Clinical Genetics Service of a pediatric referral hospital in Southern Brazil. The clinical data and the results of cytogenetic analysis were collected from the medical records. For statistical analysis, the two-tailed Fisher's exact test and the chi-square test with Yates' correction were used, being significant $p < 0.05$.

Results: The sample was composed of 27 patients, 63% were male, with a median age of nine days at the first evaluation. Full trisomy of chromosome 13 was the main cytogenetic finding (74%). Only six patients were submitted to obstetric ultrasound and none had prenatal diagnosis of PS. The patients' demographic characteristics, compared to born alive infants in the same Brazilian state showed a higher frequency of: mothers with 35 years old or more (37.5%); multiparous mothers (92.6%); vaginal delivery (77%); preterm birth (34.6%); birth weight <2500g (33.3%), and Apgar scores ≤ 7 in the 1st (75%) and in the 5th minute (42.9%). About half of them (53%) died during the first month of life.

Conclusions: The understanding of the PS patients' gestational, perinatal and family findings has important implications, especially on the decision about the actions to be taken in relation to the management of these patients.

Key-words: chromosomes, human, pair 13; chromosome aberrations; infant, premature; Apgar score; prenatal diagnosis; prognosis.

RESUMO

Objetivo: Descrever os achados gestacionais, perinatais e familiares de pacientes com síndrome de Patau (SP).

Métodos: Esta pesquisa envolveu pacientes com diagnóstico de SP avaliados consecutivamente durante 38 anos no Serviço de Genética de um hospital pediátrico de referência do sul do país. Os dados clínicos e os resultados da análise citogenética foram coletados dos prontuários médicos. Para a análise estatística, utilizaram-se o teste exato de Fisher bicaudado e o teste do qui-quadrado com correção de Yates ($p < 0,05$).

Resultados: A amostra foi composta por 27 pacientes, 63% do sexo masculino, com mediana de idade na primeira avaliação de nove dias. A trissomia livre do cromossomo 13 foi o principal achado citogenético (74%). Somente seis pacientes apresentavam relato de ultrassom obstétrico e nenhum teve diagnóstico pré-natal de SP. Ao comparar os dados da presente amostra com os dados de nascidos vivos do mesmo estado, observou-se que, para os pacientes com SP, houve maior frequência de mães com idade ≥ 35 anos (37,5%); múltiplas (92,6%); parto vaginal (77%), prematuridade (34,6%), peso ao nascer <2500g (33,3%) e escore de Apgar ≤ 7 no 1º (75%) e 5º minuto (42,9%). Cerca de metade dos pacientes (53%) morreu no primeiro mês de vida.

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Conflito de interesse: nada a declarar

Recebido em: 5/4/2013

Aprovado em: 12/6/2013

Conclusões: O entendimento dos achados gestacionais, perinatais e familiares da SP leva a importantes repercussões, especialmente sobre a decisão quanto às condutas a serem tomadas no manejo desses pacientes.

Palavras-chave: cromossomos humanos par 13; aberrações cromossômicas; prematuro; índice de Apgar; diagnóstico pré-natal; prognóstico.

RESUMEN

Objetivo: Describir los hallazgos gestacionales, perinatales y familiares de pacientes con síndrome de Patau (SP) y compararlos con los de la población de nacidos vivos de la misma provincia, Rio Grande do Sul, presentes en la base de datos del Sistema Único de Salud (DATASUS).

Métodos: Esa investigación implicó a pacientes con diagnóstico de SP evaluados consecutivamente durante 38 años en el Servicio de Genética de un hospital pediátrico de referencia en el sur de Brasil. Los datos clínicos y los resultados del análisis citogenético fueron recogidos de los prontuarios médicos. Para el análisis estadístico, se utilizaron la prueba exacta de Fisher bicaudado y la prueba del chi cuadrado con corrección de Yates ($p < 0,05$).

Resultados: La muestra fue compuesta por 27 pacientes, el 63% del sexo masculino, con mediana de edad en la primera evaluación de nueve días. La trisomía libre del cromosoma 13 fue el principal hallazgo citogenético (74%). Solamente seis pacientes presentaban relato de ultrasonografía obstétrica y ninguno tuvo diagnóstico pre-natal de SP. Al comparar los datos de esa muestra con los datos de nacidos vivos en la misma provincia, se observó que, para los pacientes con SP, hubo mayor frecuencia de madres con edad ≥ 35 años (37,5%); multíparas (92,6%); parto vaginal (77%); prematuridad (34,6%); peso al nacer < 2.500 g (33,3%) y score de Apgar ≤ 7 en el 1° (75%) y 5° minuto (42,9%). Aproximadamente mitad de los pacientes (53%) murió en el primer mes de vida.

Conclusiones: El entendimiento de los hallazgos gestacionales, perinatales y familiares de SP lleva a importantes repercusiones, especialmente sobre la decisión respecto a las conductas a tomar en el manejo de esos pacientes.

Palabras clave: cromosomas humanos par 13; aberraciones cromosómicas; prematuro; índice de Apgar; diagnóstico pre-natal; pronóstico.

Introduction

Trisomy 13, or Patau syndrome (PS), was first described in 1960 by Patau *et al*⁽¹⁾. Since then, there have been numerous reports of the syndrome, as its prevalence is estimated at 1:20.000-29.000 live births^(2,3). Thus, the PS is a relatively frequent and recurrent condition, considered the third most common trisomy of autosomes, only behind Down syndrome (trisomy 21) and Edwards syndrome (trisomy 18). It is characterized by a usually recognizable scenario of multiple congenital anomalies, associated to a poor prognosis. About 67% of fetuses with PS are spontaneously aborted or have intrauterine death; and among those who come alive at birth, 50% end up dying in the 1st week of life and only 9% reach the 1st year^(4,5). In the literature, it is noteworthy the paucity of data regarding pregnancy, birth, and family of patients with PS^(3,6-13), although they are very important for diagnosis, appropriate management, and genetic counseling to family members⁽⁴⁾.

Thus, this study examined the pregnancy, perinatal, and family findings of patients with PS and compared them to the population in general, present especially in the database of the National Health System of Brazil (DATASUS).

Method

Study of a case series, descriptive and retrospective, which involved patients with diagnosis of PS, evaluated consecutively in Clinical Genetics of a referral hospital in southern Brazil. Patients were considered with PS only upon diagnostic proof conducted with karyotype examination.

The period analyzed was from 1975 to 2012. These patients were part of the study sample developed by Petry *et al*⁽¹⁴⁾, who assessed the presence of clinical abnormalities (including congenital heart defects) and prognosis. Clinical data and results of the cytogenetic analysis were collected retrospectively from the medical records of the patients. Data consisted primarily of sex, age of patients at the time of initial evaluation, maternal and paternal ages, prenatal care, maternal disease, threatened abortion (defined as the occurrence of vaginal bleeding before viability), obstetric ultrasound, prenatal diagnosis, type of delivery and form of presentation, gestational age, and body measurements at birth (weight, length, and head circumference), Apgar scores at 1 and 5 minutes, survival (defined as the period from birth to the moment of death), parity, history of prior pregnancy

loss, history of birth of children with PS or other chromosomal aneuploidies, and results of karyotype examination. Patients without these data, i.e., with incomplete medical records, were excluded from the study.

Advanced maternal age was established at ≥ 35 years, and low birth weight when less than 2,500g. The birth weights of the patients were also evaluated according to gestational age, and those below the 10th percentile were considered small, according to the growth curves described by Margotto⁽¹⁵⁾. As for obstetric ultrasound, we considered only those who held at least one exam after the 18th week of gestation. As for Apgar scores, patients were classified into values ≤ 7 (indicative of some degree of anoxia) and > 7 . Regarding parity, mothers of patients were classified as primiparous or multiparous and with number of pregnancies ≥ 4 or not. To obtain survival data from this sample, we carried out a consultation with the Center of Health Information (NIS) of the Health Department of the State of Rio Grande do Sul.

We compared data from the study with those observed in the general population – present in the vital statistics of the state of Rio Grande do Sul and described in the DATASUS database (www.datasus.gov.br/)⁽¹⁶⁾, using an average of the values reported between the years 1994 and 2010, and in studies, especially local, reported in the literature.

The present study was approved by the Research Ethic Committee of Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA), according to opinion n. 929/09. For statistical analysis, we used the PEPI program (version 4.0), using the two-tailed Fisher exact test and the chi-square test with Yates' correction, available at <http://quantpsy.org/>⁽¹⁷⁾, establishing significance at $p < 0.05$.

Results

During the study period, we identified 30 patients with PS among the 10,561 assessed by the Service, comprising 0.3% of the total. Among these, three had incomplete medical records and were excluded. Among the 27 patients who comprised the sample, 63% were male, with ages ranging from 1 to 388 days in the first assessment (median: 9 days; mean=35.5 days). We evaluated 18 patients before the 2000s (67%) and nine (33%) from the 2000s. Among the latter, five, (56%) were analyzed before 2006 and four (44%), later.

Regarding cytogenetics, the full trisomy of chromosome 13 was the main finding ($n=20$; 74%). Among the remaining, 7.5% ($n=2$) had a translocation and 18.5% ($n=5$),

mosaicism. Both cases had translocation between chromosomes 13 and 14 [der(13;14)]. In one case, we also performed the karyotype of the parents, verifying that the mother was a balanced carrier of the same translocation.

Maternal age at birth ranged from 18 to 45 years (mean=30.7 years) and 37.5% were aged ≥ 35 years. In all these cases, the chromosome constitution of patients was full trisomy of chromosome 13. The parents' ages ranged from 20 to 52 years, with a mean equal to the maternal, 30.7 years. Among all patients, 96.3% received prenatal care. Maternal diseases were reported in five cases (15.4%) and consisted of urinary tract infection ($n=2$), preeclampsia ($n=2$), increased blood pressure ($n=1$) and anemia ($n=1$). Threatened abortion was reported in 7.7% of cases. Only six patients (22%) reported at least one obstetric ultrasound after 18 weeks of gestation. However, we highlight the fact that, in four of them (66.7%), the examination was considered normal. In two cases with changed ultrasound, the changes consisted of hydrocephaly ($n=1$) and hydronephrosis ($n=1$). None of the patients underwent procedures such as amniocentesis for fetal karyotyping or had prenatal diagnosis of PS (Table 1).

Regarding the mode of delivery, 23% ($n=6$) were cesarean, due, mainly to breech presentation, ($n=4$). Other reasons included hydrocephaly ($n=1$) and fetal distress ($n=1$). As for the presentation, 20% of cases were breech. Prematurity was observed in 34.6% of patients. Birth weight ranged from 1,875 to 3,830g (mean=2,681g). Low weight ($< 2,500$ g) was verified in 33.3% of cases. Seven patients (25.9%) were small for gestational age. The length at birth ranged from 42 to 52cm (mean=46.3cm) and head circumference ranged from 27 to 34.5cm (mean=30.1cm). As for Apgar scores, indexes ≤ 7 were observed in 75% of cases in the 1st minute and 42.9% in the 5th. We obtained data regarding survival of 17 patients, and of these, nine (53%) died within the 1st month of life. The median survival was 26 days and the earliest death occurred at 4 days, with two patients still living with more than 8 years old.

Regarding maternal parity, the number of pregnancies ranged from one to 11 (mean=3.6), and 37% had number of pregnancies ≥ 4 . Two cases (7.4%) were primiparous. Prior history of abortion was found in 25.9% of cases (all had only one pregnancy loss). There was one case report (5%) of previous birth of a child with Down syndrome from a previous marriage of a parent of children with PS. When the child with PS was born, this father was 32 years (the daughter with Down syndrome was born when her father

Table 1 - Gestational, perinatal and family findings of patients with Patau syndrome (PS) in the present sample and in the literature

	Baty <i>et al</i>⁽¹⁰⁾ 32 USA	Lin <i>et al</i>⁽¹³⁾ 28 Taiwan	Present study 27 Brazil	Population in general Brazil	p-value
General Characteristics					
Sex					
Male (%)	?	53.6	63	51.3*	0.3057
Female (%)	?	46.4	37	48.7*	
Maternal age					
Mean (years)	n=31 31.3	n=28 29	n=24 30.7	26.1**	
≥35 years (%)	?	?	37.5	12.6*	0.0007
Paternal Age					
Mean (years)	n=31 33.7	n=25 35.4	n=21 30.7	NO	
Gestation					
Prenatal	nd	nd	n=27		
Yes (%)	nd	nd	96.3	92.3*	0.6810
Maternal Disease					
Yes (%)	nd	nd	n=26 15.4		
Preeclampsia (%)	nd	?	7.7	2.3***	0.1226
Threatened Abortion					
Yes (%)	nd	nd	n=26 7.7	4.2****	0.3181
Obstetric Ultrasound					
Yes (%)	nd	nd	n=10 60	96.8*****	0.0002
Normal (%)	nd	nd	66.7	NO	
Delivery					
Vaginal (%)	n=32 75	n=28 39	n=26 77	53*	0.0245
Cesarean (%)	25	61	23	47*	
Prematurity (<37 weeks)					
Yes (%)	n=31 19	n=28 43	n=26 34.6	7*	<0.0001
Birth Weight					
Mean (g)	n=31 2676	n=28 2477	n=27 2681	3149.6*****	
<2,500g (%)	35	54	33.3	9.4*	<0.0001
Length at birth					
Mean (cm)	?	n=28 46.6	n=18 46.3	48.2*****	
Head Circumference					
Mean (cm)	?	n=28 31.3	n=17 30.1	34.4*****	
Apgar scores					
1st minute					
≤7 (%)	n=21 ?	n=17 ?	n=12 75	15.6*	<0.0001
5th minute					
≤7 (%)	n=21 ?	n=17 ?	n=14 42.9	3.6*	<0.0001
Parity					
Mean					
≥4 pregnancies	nd	nd	3.6	1.1**	
Primiparous	nd	nd	37	7.3**	<0.0001
Multiparous	nd	nd	92.6	56.2**	0.0001
History of prior miscarriage					
Yes (%)	n=25 23	nd	n=27 25.9	14*****	0.1324
Family					
Recurrence od PS	n=32 -	nd	n=20 -	NA	
Children with other aneuploidies	1	nd	1	NA	

ND: not described; ?: Questioned; NA: not applicable; NO: data not obtained or unknown; *DATASUS⁽¹⁶⁾; **Santos *et al*⁽¹⁸⁾; ***Gaio *et al*⁽²³⁾; ****Stein-Backes e Flores-Soares⁽²⁶⁾; *****Barros *et al*⁽²⁸⁾; *****Cecatti *et al*⁽³¹⁾; *****Mota *et al*⁽²⁹⁾

was 22 years old). There was no recurrence of PS, even in cases involving translocations (Table 1).

In the literature review, we found few studies describing the findings related to pregnancy, perinatal, and family members of patients with PS^(3,6-13). Only two of them were held in Latin America, both also in Brazil, involving the same sample of patients^(11,12). However, they are not in journals indexed in PubMed and SciELO. The main studies may be seen in detail in Table 1.

Discussion

The frequency observed in this study with males and females was similar to that found for Rio Grande do Sul in the database DATASUS⁽¹⁶⁾ ($p=0.31$) (Table 1). This finding is also in line with Taylor⁽⁷⁾. However, Lin *et al* noted a slight predominance of males with PS (53.6%)⁽¹³⁾. On the other hand, Magenis *et al*, Hodes *et al* e Sugayama *et al* observed a little higher frequency of female subjects (52, 57, and 55%, respectively)^(6,8,11). However, these differences were not statistically significant.

The mean maternal age at birth observed in this sample (30.7 years) was within the range reported in other studies involving patients with PS (28.2 to 31.6 years)^(3,7,9,10,13). The average reported for the general population in Brazilian studies is 26.1 years⁽¹⁸⁾. The frequency of mothers aged ≥ 35 years observed in this study (37.5%) was higher than that described in the DATASUS database⁽¹⁶⁾ (12.6%) ($p=0.0007$). In all these cases, the chromosome constitution of patients was full trisomy of chromosome 13, which correlated with maternal age and the phenomenon of non-disjunction of chromosomes, especially during meiosis I⁽¹⁹⁾. Magenis *et al*⁽⁶⁾ e Sugayama *et al*⁽¹¹⁾ found a mean age of 31.7 and of 28.3 years, respectively, for mothers of children with PS with full trisomy of chromosome 13. Furthermore, Magenis *et al*⁽⁶⁾ observed a likely bimodal distribution for maternal age, with the 1st peak occurring around 25 years and the second, around 38 years. Maternal and paternal ages seem inevitably correlated^(6,7), and the mean paternal age at birth in the present study was identical to the maternal (30.7 years). In the literature, the mean described for parents of patients with PS ranged from 29.4 to 35.4 years^(7,9,10,13) (Table 1).

The frequency of prenatal care among patients with PS (96.3%) was similar to that described in the general population (92.3%)⁽¹⁶⁾ ($p=0.68$). They reported maternal diseases in 15.4% of our cases. Despite the association described in the literature between fetuses with PS and preeclampsia⁽²⁰⁻²²⁾,

there was no difference between the frequency noted in cases described here (7.7%) and in pregnant women in general (2.3%)⁽²³⁾ ($p=0.12$) (Table 1). Perhaps this is related to the low frequency (7.4%) of primiparous mothers (a risk factor well associated with preeclampsia) in this study in comparison to pregnant women in general (43.8%)⁽¹⁸⁾ ($p=0.0001$) or the actual sample size. On the other hand, the sample presented here had numerous women with advanced age (greater frequency than that observed in pregnant women in general)⁽¹⁸⁾ ($p=0.0071$) (Table 1), which is also associated with a higher risk of preeclampsia^(23,24). However, none of the mothers of the patients in our study with the description of preeclampsia were primiparous or had advanced age. Interestingly, placental abnormalities are described with great frequency in pregnancies of fetuses with PS and include small placental volume, reduced placental vascularization, a partial molar appearance of the placenta, and placental mesenchymal dysplasia⁽²⁵⁾. These placental abnormalities were not described in this study, especially due to the lack of placental analysis.

The rate of threatened abortion (7.7%) was similar to that of the general population of pregnant women (4.2%)⁽²⁶⁾ ($p=0.32$) (Table 1). In the literature, there are no reports of this variable in other studies with patients with PS. Only 6 patients in this study (22.2%) relied on obstetric ultrasound. Perhaps this relates to the fact that, in Brazil, the ultrasound started to be offered as a routine examination in public health, especially from the 2000s. However, it was noted that, in four cases (66.7%), the examination was considered normal (Table 1). Anyway, none of the patients in this sample were subjected to procedures such as amniocentesis for fetal karyotyping or had prenatal diagnosis of PS, suggesting a possible failure in our system. This finding was also observed by Rosa *et al*⁽²⁷⁾ in patients with trisomy 18 (Edwards syndrome). However, we should also consider that, Brazilian Law does not allow termination of pregnancies of fetuses with PS allowed in Brazil. Therefore, it is believed that this aspect has not influenced our results.

Regarding the mode of delivery, 23% were cesarean. Interestingly, this rate was lower than the general population (47%)⁽¹⁶⁾ ($p=0.0245$). Even so, this frequency was statistically similar to Baty *et al*⁽¹⁰⁾ (25%) ($p=1.0000$) and Sugayama *et al*⁽¹²⁾ (other Brazilian study, with 42%) ($p=0.21$). In addition, Lin *et al*⁽¹³⁾ found higher rates (61%) ($p=0.0067$) (Table 1). Perhaps these findings relate to the low sonographic detection of PS and, hence, of prenatal diagnosis. In the case series described here, the main reason of cesarean

indication was breech presentation (66.7%). In the study by Lin *et al*⁽¹³⁾, such indication occurred only in 6% ($p=0.0078$). Of all births in this sample of patients, it was found breech presentation in 20% of cases, similar index to that described by Baty *et al*⁽¹⁰⁾ (13%) ($p=0.6849$) and Sugayama *et al*⁽¹²⁾ (17%) ($p=1.0000$).

The prematurity rate observed here (34.6%) was higher than the general population (7%)⁽¹⁶⁾ ($p<0.0001$), however, similar to other studies with PS (19 to 63.6%)^(9,10,12,13). The mean birth weight was 2,681g, a value close to the variability described in the literature (2,477 to 2,676g)^(7,10,13) and lower than that of the general population (3,149g)⁽²⁸⁾ (Table 1). Sugayama *et al*⁽¹²⁾ reported mean birth weight of 2,255g for the preterm newborns with PS and of 2,539g for term infants. It was observed low birth weight (<2,500g) in 33.3% of our cases, an index much higher than the rate of the general population (9.4%)⁽¹⁶⁾ ($p<0.0001$). This may have been influenced by the high prematurity rate observed in our sample. Among the 9 patients with birth weight <2,500g, six (66.7%) were small for gestational age. In the literature, the weight ratio among patients with low PS is similar to the present study and ranges from 35 to 54%^(10,13) (Table 1).

The average length at birth of patients analyzed in this study was 46.3cm; in the literature, in individuals with PS, the mean was 46.6cm⁽¹³⁾. In the population in general, Barros *et al*⁽²⁸⁾ found a slightly higher rate of 48.2cm. As for the head circumference, the mean of this study was 30.1cm, which is close to that of Lin *et al*⁽¹³⁾ (Table 1). Sugayama *et al*⁽¹²⁾ found the value of 29.3cm for preterm children with PS and of 32.5cm for those born at term. In Mota *et al*⁽²⁹⁾, the mean head circumference found in the general population was higher, 34.4cm (Table 1), indicating that microcephaly is a common finding in patients with PS, which is consistent with the description held in the literature⁽¹⁰⁾.

Regarding Apgar scores, indexes ≤ 7 were observed in 75% of cases, at 1 minute, and 42.9%, at 5. These frequencies were much higher than those described in the database of DATASUS (15.6 and 3.6%, respectively)⁽¹⁶⁾ ($p<0.0001$ for both Apgar scores) (Table 1). In this study, we considered the Apgar scores ≤ 6 for the 1st and 5th minutes (66.7 and 14.3%, respectively), the frequencies were similar to those described in the literature for patients with PS (in the 1st minute, 53 to 62%; in the 5th, 12 to 33%)^(10,13).

A significant number of patients died within the 1st month of life (53%), which is compatible with the gravity associated with the PS. Further discussion on these aspects can be seen in Petry *et al*⁽¹⁴⁾. The poor prognosis

associated to PS generates intense controversy regarding the management, including the implementation of interventions or not. However, in Brazil, there are no laws regarding cardiopulmonary resuscitation of newborns with PS. According to the Neonatal Resuscitation Program of the Brazilian Society of Pediatrics⁽³⁰⁾, in the case of congenital malformations, it is necessary to have antenatal diagnostic verification and consider the parents' wish and the existing therapeutic advances to decide the conduct to be taken in the delivery room. However, as it can be seen in this study, the prenatal diagnosis of PS in our environment seems to be poor. Another aspect to be considered relates to the survival achieved by some patients with the syndrome. In this sample, for instance, three individuals (18%) exceeded the age of 8. These findings may have important implications on the management of patients.

Regarding parity, the number of pregnancies in this study ranged from 1 to 11. The mean was 3.6 pregnancies, higher than that described in the general population (1.1 pregnancies)⁽¹⁸⁾ (Table 1). In the same study, 37% of mothers were ≥ 4 , in relation to the 7.3% of pregnant women in general⁽¹⁸⁾ ($p<0.0001$). It is believed that this finding is related to the frequency of mothers with advanced age in the sample. The frequency of primiparous mothers in this study, as stated earlier, was also quite low.

Regarding prior history of abortion, it was found that it was positive in 25.9% of cases, an index statistically similar to the population in general (14%)⁽³¹⁾ ($p=0.13$) (Table 1). Taylor⁽⁷⁾ reported that, in their sample, mothers of children with PS had 68 pregnancies, of which five (7.4%) ended in known spontaneous miscarriage, an index lower than that of this study ($p=0.0340$).

There was no recurrence of PS, even in cases involving translocations, which, was consistent with the findings of Baty *et al*⁽¹⁰⁾ (Table 1), showing how rare is the recurrence of PS. Interestingly, the risk observed even in cases of translocation, in which this chromosomal abnormality is identified also in one of the parents, it is lower than 1%, especially due to the wide selection in utero⁽³²⁾. There was only one case described in this study of a previous birth of a child with Down syndrome, from another marriage of one of the parents with PS. In turn, Baty *et al*⁽¹⁰⁾ also found a case with previous birth of a child with trisomy 18 (Edwards syndrome).

Because it refers to a very long period of time (1975–2012), changes in clinical practice in the period probably influenced the results of this investigation. Thus, especially the realization of

ultrasound in prenatal care and the lower frequency of prenatal diagnosis may be a consequence of these differences over time. This sample consisted of patients with PS treated at the Genetics Service of the Hospital and with diagnostic verification conducted by karyotype. There may have been suspected cases that have died before evaluation, due to its severity. Furthermore, this is a retrospective study, with data collection from medical records, subject, therefore, to a possible measurement bias.

Anyhow, the understanding of the findings on pregnancy, perinatal, and family of PS patients can lead to significant repercussions, especially regarding the decisions related to actions to be taken in the clinical management and genetic counseling of these patients and their families. Furthermore, despite the small sample size of this study and the long period of evaluation, the lack of prenatal diagnosis of PS is noteworthy in our location.

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