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Epidemiologic profile of preterm infants with retinopathy of prematurity in the Dr. Homero de Miranda Gomes Regional Hospital in São José

Perfil epidemiológico dos recém-nascidos prematuros com retinopatia da prematuridade no Hospital Regional de São José Dr. Homero de Miranda Gomes

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ABSTRACT

Objectives: *To evaluate the prevalence of retinopathy of prematurity (ROP) in premature newborns (gestational age < 37 weeks) and / or birth weight £ 1,500g and those with risk factors, born at the Dr. Homero de Miranda Gomes Regional Hospital in São José (HRSJ) between January 2007 and January 2011.* ***Methods:*** *Cross-sectional, retrospective, observational and analytical study. Data were obtained from medical records at the HRSJ.* ***Results:*** *The presence of 37.81% of retinopathy in newborns was observed, with stage 1 being the most prevalent. No statistical difference was found between the sexes (p = 0.993). The presence of ROP was higher in the group with PN < 1,000 grams (83.33%), evaluated over 6sixweeks of age and with gestational ages less than 32 weeks (49.48%). Risk factors with statistical significance were: oxygen therapy, mechanical ventilation, patent ductus arteriosus, perinatal asphyxia, respiratory distress syndrome, blood transfusions, intraventricular hemorrhage, sepsis, neonatal infection and hyaline membrane disease.* ***Conclusion:*** *It is concluded that: the gender factor and multiple pregnancy were not statistically significant. The newborns with lower birth weight and gestational age have an increased risk for developing ROP. Regarding oxygentherapy, the prevalence is higher in the exposed and proportional to the period of oxygen.*

Keywords: *Retinopathy of prematurity/epidemiology; Risk factors; Prevalence; Oxygen therapy*

RESUMO

Objetivo: Avaliar a prevalência da retinopatia da prematuridade (ROP) em recém-nascidos (RN) prematuros (Idade Gestacional (IG) < 37 semanas) e/ou peso ao nascimento (PN) £ 1500g e os que possuem fatores de risco, nascidos no HRSJ entre janeiro de 2007 e janeiro de 2011. **Método:** Estudo transversal, retrospectivo, analítico e observacional. Os dados foram obtidos a partir de prontuários no Hospital Regional de São José Dr. Homero de Miranda Gomes. **Resultados:** Observou-se a presença de retinopatia em 37,81% dos RNs, sendo o estágio 1 o mais prevalente. Verificou-se que não houve diferença estatística entre os sexos (p=0,993). A presença da ROP foi maior no grupo com PN < 1000 gramas (83,33%), avaliados com mais de 6 semanas de vida e com IG menor que 32 semanas (49,48%). Os fatores de risco com significado estatístico foram: oxigenioterapia, ventilação mecânica, persistência do canal arterial, asfixia perinatal, síndrome do desconforto respiratório, transfusão sanguínea, hemorragia intraventricular, sepsis, infecção neonatal e doença da membrana hialina. **Conclusão:** Conclui-se que o fator sexo e gestação múltipla não tiveram significância estatística. Os RNs com menor PN e IG tem um maior risco de desenvolver ROP. Em relação à oxigenioterapia, a prevalência nos expostos é maior e proporcional ao tempo de utilização de oxigênio.

Descritores: Retinopatia da prematuridade/epidemiologia; Fatores de risco; Prevalência; Oxigenioterapia

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The study was conducted at Hospital Regional de São José Dr. Homero de Miranda Gomes (HRSJ), located in the municipality of São José (Santa Catarina), Brazil.

The authors declare no conflicts of interests.

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Introduction

Retinopathy of Prematurity (ROP) is one of the leading causes of preventable childhood blindness, being responsible for 50 thousand blind children worldwide[1]. It affects preterm newborns (gestational age < 37 weeks), and its severity offers an inversely proportional relation to the gestational age (GA) and birth weight[2,4].

It is defined as a vasoproliferative disease, and is developed from immature retinal vasculature[5]. Tracing newborns (NBs) in risk allows the identification of severe forms of the disease, and early treatment reduces the risk of vision loss.

As described earlier, the immature retina favors the formation of neovascular tissue, which can develop into fibrovascular proliferation toward the vitreous, forming membranes and retinal traction. Said traction can result in retinal detachment and development of low visual acuity of varying degree[6,7]. Thus, it is extremely important in the implementation of a screening of ROP in NBs and early treatment to reduce the long-term consequences of the disease[8].

The main risk factors for the development of retinopathy are prematurity and low birth weight. However, there are other risk factors such as Apgar score lower than 7, fluctuation in oxygen levels in the first weeks of life, use of oxygen therapy, the need for mechanical ventilation, blood transfusion, patent ductus arteriosus, respiratory distress syndrome, child being small for gestational age (SGA), intraventricular hemorrhage, perinatal asphyxia, multiple pregnancy, sepsis and meningitis[2,9,11].

The ICROP defined the disease according to its severity (staging 1 to 5), location (zones I to III), length in hours (from 1 to 12 hours), with or without Plus disease (arteriolar dilatation and venous tortuosity) whose presence would be an indicator of disease activity[12].

This study was proposed to assess the prevalence and staging of ROP and the associated factors in preterm NBs (IG < 37 weeks) and/or birth weight £ 1500g and those who have risk factors, assesses in the HRSJ from January 2007 to January 2011.

Methods

Cross-sectional and retrospective study. Approved by the Research Ethics Committee (REC) of Hospital Regional de São José Dr. Homero de Miranda Gomes (HRSJ) under record No. 47/10. Due to the specificity of the research (data from medical records) it was not possible to obtain the Informed Consent Form from each patient, but an Agreement on Use of Data was signed.

The study was conducted at HRSJ, which is a State reference in the treatment of ROP. A census was carried out in the period from January 2007 to January 2011 with a total of 399 records, and the records assessed were from living preterm newborns and/or with birth weight £ 1500g, and of those with risk factors and which have been assessed by an ophthalmologist. The study included NBs from other institutions which were assessed after looking for the service, according to the inclusion criteria. The sample included all preterm and/or low-birth-weight NBs, and those with risk factors (mechanical ventilation, patent ductus arteriosus, perinatal asphyxia, respiratory distress syndrome, blood transfusion, multiple pregnancy, intraventricular hemorrhage, sepsis, neonatal infection, hyaline membrane disease), born in the period selected and which have been assessed by an ophthalmologist. The study excluded all NBs (preterm and/or with low birth weight and risk factors) who were not included in the period selected, those in which the medical records were incomplete, not allowing the entire assessment of data and preterm newborns who died before the first eye examination.

The routine ophthalmologic assessment performed by the HRSJ comprises the external inspection of the eyeballs and fundoscopy under pupil dilatation (with eyedrops of midriacil 0.5% and phenylephrine 2.5% associated 60 minutes before the procedure), under indirect binocular ophthalmoscopy with magnifying lens of 28 diopters and blefarostate. Droplets of anesthetic eyedrops were used prior to the exam. So the retinal mapping and retinopathy staging were performed (according to the International Classification of Retinopathy of Prematurity).

For the classification of ROP the eye with the largest stadium was considered according to the protocol already used in the service.

The sample was tabulated directly in the program SPSS version 18. The data is described in the form of relative and absolute frequency. Categorical variables were compared by the Fisher exact test and the Chi-square test, with a significance level $p < 0.05$. The prevalence ratios of retinopathy and their respective confidence intervals (IC95%) were calculated.

Results

For statistical analysis, a total of 320 NBs remained. The study excluded 79 NBs, those whose medical records were incomplete.

The sample studied showed the presence of retinopathy in 37.81% (121) (Table 1).

The NBs studied showed the prevalence of the ROP of 37.84% males and 37.79% females, with no statistical difference (p=0.993).

The results show that the prevalence of ROP was higher in the group with birth weight < 1000 grams, where 83.33% had some stage of retinopathy. On the other hand, among patients with > 2500 grams, only 26.66% presented ROP (Table 2).

Regarding the GA, it can be seen that the smaller the GA, the greater the risk of developing ROP (Table 3).

Table 1

Prevalence of retinopathy of prematurity

Staging	n°(%)
Without ROP	199(62.19)
With ROP	121(37.81)
Stage 1	57(17.81)
Stage 2	32(10.0)
Stage 3	16(5.00)
Stage 4[a]	7(2.19)
Stage 4B	0(0)
Stage 5	9(2.81)
Total	**320(100)**

Table 2

Prevalence of retinopathy of prematurity in relation to birth weight in grams

Retinopathy	p < 1000 n°(%)	1000 ≤ p < 1500 n°(%)	1500 ≤ p < 2500 n°(%)	p ≥ 2500 n°(%)	Total	*P* value
With ROP	45(83.33)	53(37.06)	19(17.59)	4(26.66)	121	<0.001
WithoutROP	9(16.67)	90(62.94)	89(82.41)	11(73.34)	199	
Total 54(100)	**143(100)**	**108(100)**	**15(100)**		320	

P value for the Chi-square test

Table 3

Prevalence of retinopathy of prematurity in relation to the gestational age

Retinopathy	IG < 32 weeks n°(%)	IG 32 – 37 weeks n°(%)	IG >37 weeks n°(%)	Total	*P* value
With ROP	96(79.4)	24(19.83)	1(0.83)	121	<0.001
Without ROP	98(49.25)	91(45.73)	10(5.02)	199	

P value for the Chi-square test

Table 4

Risk factors among newborns in relation to retinopathy of prematurity

Factors	With ROP(%)	Witout ROP(%)	n°	Total	*P* value
Oxygen therapy					
Yes	120(41.3)	170(58.6)	290	320	0.005
No	1(8)	29(2)	30		
Mechanical ventilation					
Yes	60(64.5)	33(35.4)	93	320	<0.001
No	61(2)	166(8)	227		
Patent ductus arteriosus					
Yes	5(83.3)	1(16.6)	6	320	<0.001
No	116(3)	198(7)	314		
Perinatal asphyxia					
Yes	43(84.3)	8(15.6)	51	320	<0.001
No	78(1)	191(9)	269		
Respiratory distress syndrome					
Yes	249(77.4)	7(22.5)	31	320	<0.001
No	97(2)	192(8)	289		
Blood transfusion					
Yes	13(86,6)	2(13.1)	15	320	<0.001
No	108(7)	197(3)	305		
Multiple pregnancy					
Yes	21(42.8)	28(57.1)	49	320	0.699
No	100(6)	171(4)	271		
Intraventricular hemorrhage					
Yes	8(66.6)	4(33.3)	12	320	<0.001
No	113(7)	195(3)	308		
Sepsis					
Yes	15(78.9)	4(21.0)	19	320	<0.001
No	106(5)	195(5)	301		
Neonatal infection					
Yes	10(52.6)	9(47.3)	19	320	<0.001
No	111(3)	190(7)	301		
Hyaline membrane disease					
Yes	16(80.0)	4(20,0)	20	320	<0.001
No	105(0)	195(0)	300		

P value for the Chi-square test

Table 4 shows the other risk factors studied in NBs with and without ROP, which showed statistically significant differences ($p < 0.001$), except the multiple pregnancy factor, which was not statistically significant. A higher prevalence of ROP is noted in NBs who have the risk factors described. For example, 80% of NBs who have hyaline membrane disease and 84.31% of NBs who have perinatal asphyxia developed ROP.

As for the aspects related to oxygen therapy, the prevalence ratio (PR) of ROP was 2.65, i.e. the prevalence of NBs who have used the oxygen therapy was 2.65 times higher than the prevalence of NBs who did not use it (Table 5).

In relation to the time of oxygen therapy, it was noted that the shorter the time of use of oxygen, the lower the chance of developing retinopathy (Table 6).

Table 5

Oxygen therapy in relation to retinopathy of prematurity

	Oxygen therapy		Total	*P* value	PR / IC 95%
	Yes	No			
With retinopathy	**120**	**1**	**121**		
% total 0_2	41.38	3.33	37.81		
% total	37.50	0.31	37.81		
Without Retinopathy	**170**	**29**	**199**	<0.001	2.65 (2.61-2.68)
% total 0_2	58.62	96.67	62.19		
% total	53.13	9.06	62.19		
TOTALS	**290**	**30**	**320**		

Fisher's test.

Table 6

Retinopathy of Prematurity in relation to the time of use of oxygen

Time	Retinopathy		Total	*P* value
	Yes	No		
< 1 day	**0**	**8**	**8**	<0.001
% of the total time O_2	0.00	100.00	100.00	
% Total	0.00	4.06	4.06	
1 a < 7 days	**13**	**52**	**65**	
% of the total time O_2	20.00	80.00	100.00	
% Total	6.60	26.40	33.00	
7 – 20 days	**23**	**31**	**54**	
% of the total time O_2	42.59	57.41	100.00	
% Total	11.68	15.74	27.42	
> 20 days	**51**	**19**	**70**	
% of the total time O_2	72.86	27.14	100.00	
% Total	25.89	9.64	35.53	
TOTAL	**87**	**110**	**197**	
% do total tempo O_2	44.16	55.84	100.00	
% Total	44.16	55.84	100.00	

P value for the Chi-square test

Discussion

Sight is one of the most important senses in the normal physical and cognitive development of a child[2]. The motor development and communication skills are impaired in children with visual impairment because gestures and social behaviors are learned by the sense of sight[2,13,14]. This way, blindness and/or low vision, besides affecting the physical, mental, economic and cultural conditions, may change the whole dynamic of the family and affect society as a whole[15]. The present work aims at determining the prevalence of ROP and its risk factors in the HRSJ, thus enabling the detection of possible severe cases and the prevention of the disease through a better understanding of this pathology.

This study showed the prevalence of ROP in 37.81% of NBs assessed. It is important to point out that the prevalence

found was higher than the one reported in the literature (between 20 and 27.73%)[7,8,10]. One possible explanation for this high prevalence is that the HRSJ is a State reference to ROP, thus having many patients referred for treatment as well as a good screening of NBs. As in the HRSJ, we can also mention the high incidence of ROP (32%) at Hospital Regional ASA Sul, in Distrito Federal, which is the reference center in the Brazilian Midwest[15]. Recent data published in the city of Joinville(SC)[8] and in the city of São Paulo[16] showed an overall prevalence of ROP of 20 and 29.90%, respectively. In another study in Rio de Janeiro, Portes et al. described a prevalence of ROP of 27.81% at Hospital Federal de Bonsucesso[17].

This study showed that the majority of NBs was diagnosed in stage 1 disease (17.81%), and only 9 NBs were diagnosed in stage 5 (2.81%), in which there is total retinal detachment; a similar result is found in the literature[7,10,17].

Only 1 patient was recorded with staging ROP 2, born with more than 37 weeks of gestational age, and stage 4B of ROP was not found in any NB. The same happened in the study carried put in Joinville[8].

In the present research, the factor gender showed no association ($p = 0.993$) to the disease in question, as well as in the studies in Joinville[8] and São Paulo[16]. There was a prevalence of ROP of 37.79% in females, and of 37.84% in males, with no statistical difference.

Regarding the birth weight, we observed a prevalence of retinopathy in 83.33% of NBs with less than 1000 grams (extreme low weight). Graziano et al.[16] similarly found in their study a high prevalence of ROP (78.5%) among NBs with birth weight lower than 1000 grams, and Fortes Filho et al.[18] found a prevalence of 45.59%. In another paper, the authors drew attention to the high prevalence of the disease (78.5%) in the group of children born with less than 1000 grams [18]. It was observed that NBs with very low weight (1000 g £ $p < 1500$ g) had a prevalence of ROP of 37.06%, and among those with low birth weight (1500 g £ $p < 2500$ g) a prevalence of 17.59%.

The same was found in relation to birth weight: the lower the gestational age the higher the risk of developing ROP, in this study having a ROP prevalence of 79.34% of NBs with less than 32 weeks of gestational age. Literature data confirm the data found, as they show that the occurrence of ROP is primarily linked to low gestational age and birth weight[6,7,16,18,19].

From the analysis of the results we can see the combination of risk factors (oxygen therapy, mechanical ventilation, patent ductus arteriosus, perinatal asphyxia, respiratory distress syndrome, blood transfusion, intraventricular hemorrhage, sepsis, neonatal infection and hyaline membrane disease) included in this study with the presence of ROP, showing statistical significance to the study, which confirms the literature data[2,7,8,10]. On the other hand, no association between multiple pregnancy and sex was observed, suggesting that these variables may not be risk factors for the development of ROP.

Regarding oxygen therapy, the data presented here shows that the prevalence ratio (PR) of ROP was 2.65 times higher when compared to NBs who did not use it. From these results it is possible to suggest that the prevalence in the exposed patients is greater compared to the non-exposed ones. Another relevant observation is that the shorter the period of use of oxygen, the less chance of developing retinopathy. Other studies report oxygen therapy as an important risk factor for the development of retinopathy[7,8,16].

With the advance of neonatal intensive care units, increasing technological advancement in the area, there was an increase in NBs survival increasingly preterm and underweight, and hence the prevalence of ROP is becoming higher, thereby stimulating researches to allow pathophysiological knowledge, since this is not yet fully elucidated. Thus, it reinforces the need for research in this area, because blindness has achieved a significant number of children, representing a serious public health problem.

Conclusion

The clinical and epidemiological profile of the Preterm NBs in the HRSJ can be defined. There was a significant prevalence of ROP in preterm NBs, and among staging the stage 1 of ROP presented a higher prevalence. The factors gender and multiple pregnancy do not seem to be associated to the development of ROP. And the risk factors oxygen therapy, mechanical ventilation, patent ductus arteriosus, perinatal asphyxia, respiratory distress syndrome, blood transfusion, intraventricular hemorrhage, sepsis, neonatal infection and hyaline membrane disease seem to be associated regarding the development of ROP.

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ERRATA

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The original article “Epidemiologic profile of preterm infants with retinopathy of prematurity in the Dr. Homero Miranda Gomes Regional Hospital in San Jose,” published in the March / April 2016 Journal of Ophthalmology (Rev Bras Ophthalmol 2016;75 (2): 109-14), underwent correction in the names of the authors.
The names of the authors are correct, “Mara Barreto Theiss , Astor Grumann Junior , Marise Regina Wiethorn Rodrigues”.