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ORIGINAL ARTICLE

Clinical and epidemiological scope of retinopathy of prematurity in Pinar del Río

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ABSTRACT

Introduction: Currently, the Cuban university has distinguished itself by its leading role in the transformation of society, facing the various challenges imposed by the development of science, technology, and scientific research. It is a challenge to be able to discern between the enormous amount of existing information and the high-quality information that is available in the various media to which they have access.
Aim: Design a system of teaching tasks to develop the ability to manage relevant scientific information based on the professional mode of action in first-year students of the Bachelor of Nursing degree at the University of Medical Sciences of Pinar del Río.
Methods:method The dialectical materialist approach served as the articulator of the other methods employed. Among the empirical methods used were: surveys, expert interviews, and documentary analysis. The theoretical methods included: historical-logical, modeling, and systemic-structural approaches.
Results:a system is proposedTeaching tasks for the development of the skill of managing relevant scientific informationfrom a systemic, contextualized and interdisciplinary approach based on the development of the professional mode of action.
Conclusions:A system of teaching tasks is proposed from a systemic, contextualized and interdisciplinary approach, which constitutes an auxiliary means to design new tasks and apply them according to the achievement of the general objectives of the training process of the doctor, taking into account the specific characteristics of the students and a didactic way for the training and development of the ability to manage relevant scientific information.

Keywords: Information Management; Aptitude; Education, Nursing, Baccalaureate.

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INTRODUCTION

Retinopathy of prematurity (ROP) is an eye disease related to abnormal vasculogenesis that leads to bilateral, usually symmetrical, ischemic-proliferative lesions of the retina. In its later stages, this causes neovascularization, vasoproliferation in the vitreous humor, tractional retinal detachment, and scarring. The result can be vision loss in one or both eyes, varying in severity and progressing to total blindness. It is one of the three most common causes of severe vision loss in children and is becoming the most common cause in developing countries.It is the leading cause of preventable childhood blindness and its incidence varies from country to country, closely related to perinatal care.[1,2]

First described in 1942 by Theodore Lasater Terry as retrolental fibroplasia, it was characterized by a whitish mass behind the lens in blind children whose only known condition was prematurity. Epidemics of cases with these characteristics were reported during those years. It is now called retinopathy of prematurity, a term that better reflects the different phases the retina of premature infants goes through when affected, uniting ophthalmologists and neonatologists in the search for a solution to this problem, which is linked to extreme prematurity.[3]

According to recent data, it is estimated that 15 million premature infants are born worldwide each year, meaning before 37 weeks of gestation. Prematurity is the leading cause of neonatal mortality globally and the second leading cause of infant deaths, accounting for 1,1 million deaths annually. This accounts for 80 % of deaths within the first month of life, and 98 % of these neonatal deaths occur in developing countries. Prematurity is thus established as a growing health problem.[4]

The main risk factors for retinopathy of prematurity are directly related to immaturity: lower birth weight and reduced gestational age increase the likelihood of the disease. Other contributing factors include repeated transfusions, hypoxia, acidosis, impaired ventilation, sepsis, vitamin deficiency, use of certain medications (indomethacin, steroids, erythropoietin, dexamethasone), severe apnea, intraventricular hemorrhage, respiratory distress, surfactant use, infections, hyperglycemia, as well as male sex and white skin.[5]

The standard treatment for retinopathy of prematurity (ROP) consists of transpupillary laser retinal ablation, with cryotherapy used in specific cases. If pro-angiogenic stimulation persists, intravitreal anti-angiogenic agents are required. Although progress has been made in its management, limitations remain due to the lack of health standards and policies in many countries. In Cuba, the "Prevention of Blindness due to ROP" project, promoted by the Ministry of Public Health and the Christian Blind Mission, implemented training in 11 provinces to strengthen early detection, diagnosis, and treatment, contributing to reducing a preventable cause of childhood visual impairment.[6,7]

In recent times, the province of Pinar del Río has seen a rise in the incidence of retinopathy of prematurity (ROP) due to increased risk factors such as prematurity and low birth weight. This motivates the study to describe the extent of ROP in Pinar del Río province during the period from May 2022 to May 2024.

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METHODS

An observational, descriptive, longitudinal prospective study was conducted in Pinar del Rio during the period from May 2016 to May 2018. The universe was 190 live newborns and the sample of 48 live newborns who presented some degree of ROP, anticipating compliance with the selection criteria:

Inclusion criteria
- Live newborn of less than 35 weeks gestational age
- Live newborn with a birth weight less than 1700 g

Exclusion criteria
- Live newborn in critical condition that did not allow him to be examined due to life-threatening conditions.
- Live newborn whose parents or guardians did not give their consent to include them in the study.

The documentary review allowed us to obtain the information that gave rise to the variables analyzed: gestational age, sex, birth weight, oxygen use, classification of retinopathy of prematurity, need for treatment.

The 2005 international classification of retinopathy of prematurity was used. This classification has allowed the disease to be approached according to four key elements: area of retina involved, clinical stage of the disease, disease plus, and extent of the disease.[3] Considering the area of retina involved, there are zones 1, 2, and 3, which correspond to the progression of retinal vascularization from the optic nerve toward the periphery. Taking into account the clinical stage of the disease, five stages are described:
Stage 1: There is a demarcation line between the vascular and avascular retina. At this stage, the growth of retinal vessels has stopped, and there are abnormal bifurcations of the terminal retinal vessels.
- Stage 2: The demarcation line between the vascular and avascular zones of the retina increases in volume. Clinically, it presents as a whitish ring called a "ridge." The retinal vessels that appear to dilate and bifurcate before reaching the ridge are called brush vessels.
- Stage 3: This stage is characterized by the presence of extraretinal fibrovascular proliferative tissue, which projects from the posterior edge of the ridge into the vitreous. Initially, small neovascular buds are observed, giving rise to blood vessels. This stage is classified as mild, moderate, or severe, depending on the extent of extraretinal fibrovascular tissue infiltrating the vitreous.
- Stage 4: This corresponds to partial retinal detachment. Depending on whether or not the macula is involved, it is subdivided into stage 4A and 4B.
- Stage 5: Corresponds to a total retinal detachment.

This classification includes new concepts such as:
Aggressive posterior retinopathy: occurs in Zone 1 and 2, not a ridge but an anastomosis with rapidly evolving flat proliferation (sometimes with a demarcating vessel).

The need for treatment was assessed taking into account the criteria established in the national ROP program; in cases that received treatment, the type of treatment was specified.

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All live newborns underwent a fundus examination under full mydriasis using the indirect binocular ophthalmoscopy (IBO) method, with prior knowledge and approval from their parents (informed consent). 28-diopter spherical loupes were used; mydriasis was achieved by instilling 2,5 % phenylephrine, a procedure performed by a neonatal nurse.

The first examination was performed on infants born before 30 weeks of gestation, at week 31, and on infants born after 30 weeks of gestation at week 35. Follow-up was conducted according to the stage or severity of retinopathy of prematurity (ROP): stages 0 to 1: every two weeks; stage 2: every week; and aggressive posterior ROP: every 72 hours. After discharge, patients continued to be followed up in outpatient clinics once or twice a year for life, with consultations from ophthalmology and low vision specialists to rule out sequelae. Patient medical records were used as the source of information.

The information processing was performed using the SPSS statistical package, version 15.0. The results are presented in tables with absolute numbers and percentages.

Ethical aspects

During the information gathering process, there were no violations of bioethics, either regarding the dignity and integrity of the patients studied or their families, in compliance with the fundamental ethical principles of autonomy, beneficence, non-maleficence, and justice. Informed oral and written consent was obtained from the parents or primary guardians willing to participate. The information obtained was used solely for research purposes.

RESULTS

Analyzing the clinical and epidemiological scope of retinopathy of prematurity in Pinar del Rio according to gestational age, it was found that 39,6 % of patients diagnosed with retinopathy of prematurity were between 32,1 and 35 weeks and 62,5 % were male.

Table 1. Distribution of patients according to the clinical and epidemiological scope of retinopathy of prematurity, taking into account gestational age and sex.

Gestational age (in weeks)	Male		Female		Total	
	No.	%	No.	%	No.	%
<30	6	12,5	1	2,08	7	14,6
30-32	10	20,8	7	14,6	17	35,4
32.1-35	13	27,1	6	12,5	19	39,6
>35	1	2,08	4	8,3	5	10,4
Total	30	62,5	18	37,5	48	100

Among the described risk factors for retinopathy of prematurity (Table 2), extreme prematurity (low gestational age at birth) and extremely low birth weight are identified as determining factors in the development of the disease. 66,7 % of premature newborns who developed retinopathy of prematurity had a birth weight between 1000 and 1700 grams and 39,6 % had a gestational age between 32,1 and 35 weeks of gestation.

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Table 2. List of patients according to birth weight.

Weight (grams)	No.	%
<1000	2	4,2
1000-1700	32	66,6
1701-2000	9	18,8
>2000	5	10,4
Total	48	100

Considering the use of oxygen therapy as a risk factor triggering ROP, it was found in Table 3 that 62,5 % of live newborns needed oxygen at birth and 33,3 % received it for more than 72 hours.

Table 3. Estimation of patients according to whether or not they received oxygen therapy.

Oxygen therapy	No.	%
They received it for 72 hours	14	29,2
They received it for more than 72 hours	16	33,3
They did not receive oxygen therapy	18	37,5

Table 4 shows the analogy between the ROP stage and the affected area; 93,7 % of patients presented with stage I and 52,1 % were located in zone 3.

Table 4. Analogy between the ROP stage and the affected area.

Stadium	Zone 1		Zone 2		Zone 3		Total	
	No.	%	No.	%	No.	%	No.	%
Yo	2	4,2	18	37,5	25	52,1	45	93,7
II	1	2,1	1	2,1	0	0	2	4,2
Aggressive posterior ROP	1	2,1	0	0	0	0	1	2,1
Total	4	8,4	19	39,6	25	52,1	48	100

93,7 % of patients did not require treatment variants and progressed to spontaneous healing, and 4,2 % of patients required laser therapy with a favorable outcome.

DISCUSSION

This study offers an updated epidemiological and clinical overview of retinopathy of prematurity (ROP) in a cohort from Pinar del Río, Cuba. The results shed light on the disease profile in this region and reinforce findings reported in the international and national literature.[8,9,10] The distribution of patients according to gestational age revealed that the highest percentage (39,6 %) was concentrated in the 32,1 to 35 week group, followed by the 30-32 week group (35,4 %). This finding is consistent with that reported by Rivera-Rueda et al.,[4] who identified that prematurity, even in non-extreme ranges, constitutes a primary risk factor.

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However, this contrasts with studies that emphasize greater severity in premature infants of lower gestational age (<30 weeks).[4,12,13] The data from the present investigation suggest that in our population, ROP is significantly affecting "late" or moderately gestational age premature infants, which underscores the importance of not relaxing screening criteria and extending surveillance to this group. The predominance of males (62,5 %) coincides with that observed by Valencia Rodríguez et al.,[10] in a Cuban reference center, who also reported a higher frequency in males.

Regarding birth weight, 66,7 % of neonates with ROP weighed between 1000 and 1700 grams. This result is fundamental, as it aligns perfectly with the evidence establishing low birth weight as one of the main risk factors for developing ROP.[4,12] Although extreme prematurity (<1000 g) only represented 4,2 % in our series, its inherent high risk justifies the utmost attention, as noted by Bancalari andSchade,[13] in his recommendations for detection and treatment.

One of the most relevant findings of our work is the strong association with oxygen therapy. 62,5 % of patients received it, and of these, more than half (33,3 % of the total) required it for more than 72 hours. This data is crucial and is consistent with the pathophysiology of ROP, where supplemental oxygen administration is a well-known trigger of the disease.[2,5]

Mena Nanniget al.,[5] have even explored the use of high-flow nasal cannulas as a possible risk factor, highlighting the complex interaction between respiratory support and the development of complications such as ROP. The results of the present investigation reinforce the need for strict oxygen management protocols in neonatal units to minimize this iatrogenic risk.

When analyzing disease severity, a predominantly mild profile is observed. 93,7 % of cases were classified as Stage I, and more than half (52,1%) were located in Zone 3, patterns typically associated with a better prognosis and a high rate of spontaneous regression. This picture of less aggressive ROP differs from that reported by Fariñas Falcón et al.,[6] and Casanueva et al,[3] who documented atypical presentations and later aggressive forms. The low incidence of later aggressive ROP (2,1 % in our study) could reflect differences in the at-risk population, the effectiveness of screening programs, or neonatal management practices in our region.

The evolution and need for treatment directly reflect the low severity of the cases. 93,7 % of patients progressed to spontaneous healing without requiring intervention, an encouraging result that coincides with the natural history of early-stage ROP.[9,13] Only 4,2 % required laser therapy, and 2,1 % (a single case of aggressive posterior ROP) required the combination of laser and intravitreal bevacizumab. The use of anti-angiogenics such as bevacizumab has proven to be an effective alternative for severe forms of ROP, especially in the posterior region, as documented in pioneering studies by Bancalari et al.,[14] and supported by the Cuban recommendations of Morilla Guzmánet al.[9] The successful management of this complex case demonstrates the importance of having a diverse therapeutic arsenal and early diagnosis.

The effectiveness of the screening program in Villa Clara, described by Fariñas Falcón et al.,[11] seems to be reflected in our results, where the vast majority of cases were detected at early and manageable stages. This underscores the positive impact of such programs on public health, an aspect economically supported by del Busto Wilhelm et al.,[8] who demonstrated that the cost of screening and timely treatment is far lower than the management of severe visual disability caused by untreated ROP.

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Finally, it is important to consider the long-term consequences. Although not analyzed in this study, Casanueva Cabeza et al.,[7] reported an association between ROP and the development of myopia, indicating that patients who overcome the acute phase of ROP should be kept under ophthalmological follow-up during childhood to detect and treat these refractive complications.

One limitation of this study is its descriptive nature and the sample size, coming from a single region, which may limit the generalizability of the results to other populations with different demographic characteristics and clinical practices.

CONCLUSIONS

The findings of this study describe retinopathy of prematurity in Pinar del Río as a disease that primarily affects newborns with moderate gestational age and low birth weight, closely linked to prolonged oxygen therapy. Most cases presented as mild forms with a tendency toward spontaneous regression, reflecting the effectiveness of current screening programs. The limited need for interventional treatment is a positive aspect, although the subsequent appearance of aggressive forms underscores the importance of maintaining constant monitoring and having advanced therapeutic alternatives available. It is recommended to continue rigorous screening, optimize oxygen management in neonatology, and ensure long-term follow-up to identify potential long-term sequelae.

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