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ORIGINAL ARTICLE

# Evaluation of pediatricians and neonatologists knowledge about ocular disorders in childhood

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**Keywords:**
Knowledge,
Pediatrics,
Clinical competence,
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Surveys and
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## Abstract

**Objective:** The aim was to evaluate the level of knowledge of pediatricians and neonatologists about eye problems in children, their diagnosis and management, using a standardized questionnaire. **Methods:** A questionnaire with demographic data and questions about ophthalmological knowledge was applied among pediatricians, through the transmission line of the pediatric service of the HC FMRP/USP from January to June 2021. A cross-sectional study was carried out, whose responses were tabulated, and statistical analysis was performed using the Krukal Wallis Test and Fishers Exact Test for comparison between the pre-established groups (pediatric residents, 4 to 9 years, and more than 10 years of practice in pediatrics). Sampling was by convenience. **Results:** The structured questionnaire was sent to 277 pediatricians. Ninety pediatricians answered the questionnaire and 81.11% were female. As for the time of pediatric practice, 42.22% had more than 10 years. From the 17 questions about ophthalmologic knowledge, correct answers ranged from 6 to 14, and the average score was 58.52%. The questions with the highest error rate were about the management of newborns with ocular discharge and congenital tear obstruction and when a premature child should be evaluated by an ophthalmologist. However, no significant differences were found when comparing the correct answers between the groups (p=0.425) **Conclusion:** The results suggest a deficiency in ophthalmologic knowledge among the pediatricians interviewed; therefore, continuing education and collaboration programs between ophthalmology and pediatrics disciplines should be developed and reinforced to deepen knowledge on these topics.

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## INTRODUCTION

Vision is one of the most important senses in a child's normal physical and cognitive development. Gestures and behaviors are mostly learned through visual feedback, which is why children with visual impairments have impaired motor development and communication skills. [1]

According to the World Health Organization (WHO), it is estimated that 1.4 million children are considered blind around the world. Controlling visual impairment in children is extremely important for several reasons, including social, economic and psychological aspects for the child and their family. Furthermore, many causes are preventable or treatable, and some are associated with infant mortality (such as measles, rubella, premature birth, vitamin A deficiency, and meningitis). [2]

In Brazil, according to the International Agency for the Prevention of Blindness, it is estimated that more than 33 thousand children are blind due to preventable or treatable etiologies if detected early. It is estimated that at least 100 thousand children have some visual impairment. According to a survey by the Brazilian Council of Ophthalmology, retinopathy of prematurity, cataracts, toxoplasmosis, congenital glaucoma and hereditary optic neuropathies are the main causes of moderate and severe childhood visual impairment. [3,4] Furthermore, 20% of school-age children have ophthalmological disorders due to uncorrected refractive errors. [5, 6]

Basic knowledge of ophthalmology is necessary for the pediatrician's daily routine, so that when necessary, a quick and accurate referral to an ophthalmologist can be made. Therefore, it is necessary to continually evaluate the quality of pediatrician training in basic knowledge of ophthalmological conditions during childhood.

The present work aims to evaluate the level of knowledge of pediatricians about eye problems in childhood, their diagnosis and management, using a standardized and validated questionnaire.

## METHOD

A cross-sectional survey was carried out involving 277 pediatricians. The sample was obtained through the transmission line of the pediatrics service of the Hospital das Clínicas of the Faculty of Medicine of Ribeirão Preto. A questionnaire was prepared based on a preliminary study of reality (Manica et al.) [7], structured on the Google Form platform and sent by email between January and June 2021.

The questionnaire was applied in two phases. In the first phase, 10 pediatricians participated, providing clarifying elements regarding the relevance of the aspects asked, and doubts regarding the difficulties in understanding the questions asked. In the second phase, a semi-structured questionnaire was administered to 10 pediatricians, constructed based on input from the previous phase. After analyzing these phases, the definitive questionnaire was applied.

The questionnaire thus constructed was subjected to prior testing, by applying a questionnaire to 20 pediatricians, as proof of validity and reliability. Individuals who participated in the previous test were excluded from the study sample.

In the present study, the questionnaire used consisted of an initial part containing questions about demographic characteristics such as age, sex and time working in pediatrics. The second part consisted of 17 tests, covering ophthalmological conditions in childhood, questioning conduct in the first assessment, assessment of visual acuity, conduct in the face of ocular secretion, correct referral to the ophthalmologist, knowledge of congenital cataracts, leukoria and congenital glaucoma (Figure 1 ) .

After collecting the data, statistical analysis was performed using the Kruskal -Wallis Test and Fisher's Exact Test to compare the pre-established groups (residents, 4 to 9 years of exercise and more than 10 years of exercise) and established the significance level of 0.05.

The research project received approval from the HCFMRP/CEP Research Ethics Committee (protocol number: 36538220.7.0000.5440). Consent was obtained from all participants who completed the questionnaire to use the data in this work. Anonymity and data confidentiality were assured to respondents.

## RESULTS

### Demographic characteristics:

The structured questionnaire was sent to 277 pediatricians. Of the 90 pediatricians who answered the questionnaire, 73 (81.11%) were female and 17 (18.88%) were male. Regarding age, 25 (27.77%) reported being between 24 and 29 years old, 20 (22.22%) between 29 and 34 years old, and 45 (50%) said they were over 34 years old. For the length of time working in pediatrics, 26 (28.88%) reported being in Pediatrics medical residency (1 to 3 years), 26 (28.88%) between 4 to 9 years and 38 (42.22%) had more than 10 years of practicing pediatrics.

### Knowledge of ocular disorders in childhood:

Of the 17 questions focused on ophthalmological knowledge, the correct answers ranged from 6 to 14 (total score of 17), the average number of correct answers for the questions was 10 (58.52%).

The questions that had the highest error rate were regarding the management of newborns with ocular secretion and congenital lacrimal obstruction and when a premature child should be evaluated by an ophthalmologist (Graph 1), but no significant differences were found when comparing the level of correct answers. between groups ($p = 0.425$) (Graph 2).

When evaluating the level of correctness of each question between the groups, a significant difference was

**Figure 1.** Questionnaire applied to pediatricians.

1- Age
   a. 18 to 23 years old
   b. 24 to 29 years old
   c. 29 to 34 years old
   d. > 34 years old
2- Sex :
   a. Feminine
   b. Masculine
3- Time working in the specialty of Pediatrics.
   a. Residents (1 to 3 years)
   b. 4 to 6 years
   c. 6 to 9 years
   d. More than 10 years

QUIZ

4- When the parents of a child, without a risk factor, ask the pediatrician “Doctor, when should I take my child for his first eye exam?” You answer:
   a. Until the first year.
   b. After 5 years.
   c. Only when you're at school.
   d. Take it tomorrow.

5- What is your management of newborns when they have eye discharge?
   a. Prescribe eye drops.
   b. Refer to an ophthalmologist.
   c. Harvest culture and observe.
   d. Just observe
6- Which of these eye drops would be your first choice for treating a child (1 month to 10 years) with eye discharge (e.g. bacterial conjunctivitis, tear duct obstruction, etc. )?
   a. Tobrex ( tobramycin ).
   b. Maxitrol (dexamethasone + neomycin sulfate + polymyxin b sulfate + hypromellose ).
   c. Dexafenicol (dexamethasone + chloramphenicol).
   d. Lacrima Plus Eye Drops
7- How would you prescribe the eye drops mentioned above?
   a. A drop of 1/1h.

b. A drop of 2/2 h.
c. A drop of 6/6 h.
d. A drop of 12/12 h.

8- A 6-month-old child with ocular deviation since birth, what would you recommend?
a. Wait for the child to turn one year old and then refer them to an ophthalmologist.
b. Forward for ophthalmological evaluation immediately.
c. Assess the child in 3 months and then refer him for an ophthalmological evaluation.
d. I would explain to parents that strabismus is common in young children.

9- What do you understand by amblyopia?
a. Absence of vision in one or both eyes.
b. Loss of the red reflex leading to the appearance of strabismus.
c. Significant reduction in visual acuity.
d. Loss of ocular parallelism

10- How can a pre-verbal child's vision be assessed?
a. A- Object tracking.
b. B- Light tracking.
c. C- Using the Snellen table .
d. A + B are correct.

11- When there is a family history of eye problems ( e.g. parents with myopia, hyperopia, stigmatism, glaucoma, etc. ) what do you do?
a. It is recommended to take the child for assessment at school age.
b. It is recommended to take the child for evaluation before the age of two.
c. Instruct parents to take their child to the ophthalmologist when they observe that the child is experiencing any difficulties.
d. You don't ask about eye problems in the family.

12- What is the best age to start treatment for a child's low visual acuity?
a. Before the age of two.
b. In diagnosis.
c. From four to five years old
d. After seven years.

13- When should a premature child be referred for ophthalmological evaluation?
a. In the first week of life.
b. Between the fourth and sixth week of life.
c. After hospital discharge.
d. At family discretion.

14- Which of the drugs below do you believe could cause an eye problem if abused (for example: increasing eye pressure)?
a. Chloramphenicol eye drops ®(chloramphenicol).

b. Tobrex eye drops ®( tobramycin ).
c. Dexafenicol eye drops ®(dexamethasone + chloramphenicol).
d. Biamotil eye drops ( ®ciprofloxacin hydrochloride ).

15- What is the ideal age to undergo surgery for congenital cataracts diagnosed in the first month of life?
a. As soon as diagnosed.
b. In the second month of life.
c. In the second year of life.
d. In the first year of life.

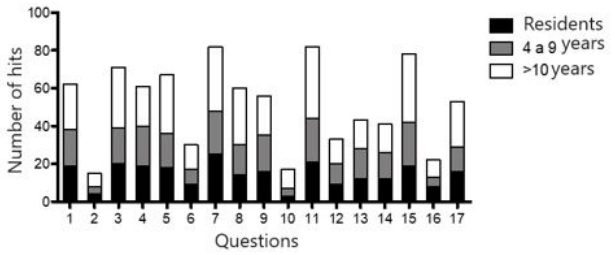
16- Do children operated on for congenital cataracts have as good a visual recovery as adults operated on for senile cataracts?
a. Ever.
b. Rarely.
c. If it is unilateral, recovery is better.
d. Children's visual recovery is often inferior to that of adults.

17- Which of the following pathologies below present with leukoria in children?
a. Retinoblastoma .
b. Retinopathy of prematurity.
c. Exudative diseases of the retina.
d. All above.

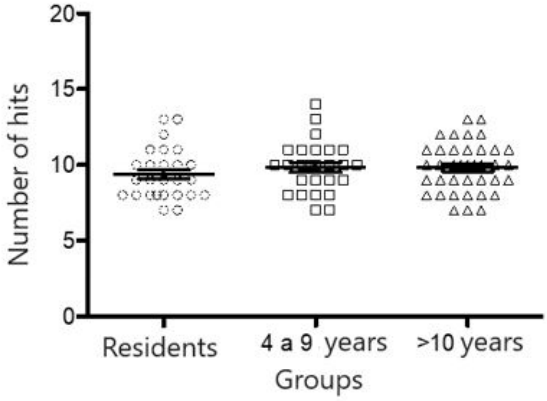
18- Which alternative is evil?
a. Retinoblastoma
b. Retinopathy of prematurity
c. Exudative retinal diseases
d. All above

19- Child with congenital tear obstruction. When do you refer for an ophthalmological evaluation?
a. Once diagnosed.
b. In case of acute dacryocystitis .
c. Up to 6 months of age.
d. Wait until 1 year of age.

20- What ophthalmological signs and symptoms remind you of congenital glaucoma?
a. Corneal edema.
b. Large corneas.
c. Photophobia, tearing and blepharospasm .
d. Epiphora .




**Graph 1:** Number of correct answers among the pre-defined groups for each question




**Graph 2:** Kruskal-Wallis test between number of correct answers and each pre-established group.

found only in the groups between residents and more than 10 years of training when asked which drug when abused could cause eye problems (p=0.025) and when asked which would be a malignant nosological condition (p=0.041) with a higher correct answer rate for both questions in the group with more than 10 years of training.

### First review:

Only 68.88% (n= 62) of pediatricians would refer a child without a risk factor to an ophthalmologist before the first year of life for the first ophthalmological examination. Furthermore, 10% (n= 9) reported not asking about their family history of eye problems.

In premature children, in the first week of life, 81.11% (n=73) of those interviewed were unaware of the need for an ophthalmological evaluation.

Regarding referral to an ophthalmologist, 75.55% (n=68) did not know the best time to refer a child with congenital tear obstruction, and 74.44% (n=67) would refer a child with ocular deviation directly to the ophthalmologist.

### Visual acuity :

In this topic, knowledge was analyzed to estimate the visual acuity of a pre-verbal child, and 8.88% (n=8) of those interviewed did not know how to measure it correctly. It is also important to highlight that 37.77% (n=34) were unaware of the best time to start treatment for low visual acuity. Furthermore, 66.6% (n=60) did not know the definition of amblyopia.

### Eye secretion:

Tobramycin eye drops ®as their first choice , with 67.77% (n=61) prescribing its use every 6 hours. However, when the questioning focused on newborns with eye discharge, 83.33% (n=75) did not know the correct procedure. It is important to highlight that 91.11% (n=82) of pediatricians recognize that excessive use of corticosteroid eye drops can lead to serious eye problems.

### Congenital cataract:

Regarding the initial management of congenital cataracts, 63.33% (n= 57) were unaware of the best time to perform the surgery and 52.22% (n= 47) would not know how to inform their family of the disease's prognosis.

### Leukory :

Among the various causes of leukoria , 54.44% (n= 49) did not know that retinoblastoma , retinopathy of prematurity and exudative retinal disease can cause leukoria . Furthermore, 86.66% (n=78) know that retinoblastoma is malignant.

### Congenital Glaucoma:

Photophobia, tearing and blepharospasm is the classic triad of congenital glaucoma, and 41.11% (n=37) of respondents are unaware of it.

## DISCUSSION

The results suggest a deficiency in basic medical education and medical residency regarding ophthalmology knowledge, since the average number of correct answers was 10 questions, that is, 58.52%. Considering the percentage of pediatricians who did not respond to the questionnaire, this average may be both underestimated and overestimated.

According to the American Academy of Pediatrics, it is essential to make parents and guardians aware that the red reflex test does not replace a complete ophthalmological examination, which must be carried out in the first year of life. [8]

It is necessary that the child's parents and guardians be asked about the history of eye diseases in the family. [9] When questioned, only 68.88% of pediatricians referred a premature child to the ophthalmologist, before the first year of life, for the first ophthalmological examination and 10% (n= 9) reported not asking about a family history of eye problems. As a general recommendation from the Brazilian Society of Pediatric Ophthalmology (SBOP) and the Brazilian Society of Pediatrics (SBP), it is recommended that healthy children undergo at least one complete ophthalmological

examination between 3 and 5 years of age, to be carried out by a Ophthalmologist. Ideally, it can be preceded by an examination at 6 to 12 months of age . [10] In comparison to Ababneh & Co, 77.1% of pediatricians thought that children should be seen at least once before entering kindergarten, while 10.4% thought that they should only be seen if there were any complaints, and 12.5% did not know when children should be screened. [11] Screening by an ophthalmologist is important because many eye diseases can be silent, and children may not be able to complain or communicate well about vision problems.

Retinopathy of prematurity (ROP) is a vasoproliferative disease secondary to inadequate vascularization of the immature retina of premature newborns, which can lead to blindness or serious visual sequelae. 1500 g and/or gestational age below or equal to 32 weeks, and must be performed at most one month of life. Therefore, the examination for retinal evaluation carried out by an experienced ophthalmologist is very important, therefore, all neonatologists and pediatricians who care for these premature newborns must be aware of the severity of the disease's evolution, and 81.11% would not request an evaluation specialized. [12] While in Manica et al., 53% were unaware of the best time for an ophthalmological evaluation in ROP. [7] In the study by Ababneh et al., 75% of participants would refer a baby for ROP screening within 6 weeks of birth or at age 32 weeks, whichever was later. [11]

This study showed that 37.77% of pediatricians were unaware of the best time to start treatment for low visual acuity, regardless of age, while in the study by Manica & Co, 20% were unaware. [7] This is relevant data, because if the intervention is not carried out at the appropriate time, it can result in amblyopia, defined as a considerable reduction in visual acuity in one or both eyes, in the absence of another pathology. Amblyopia can result from numerous causes, including congenital cataracts, refractive errors, strabismus, among others. Knowing the definition of amblyopia and its causes is essential for the correct referral of the child for subsequent diagnosis and treatment. [7] In this study, 66.6% of those interviewed did not know how to define it, while in Manica et al. showed that 70% were unaware of the definition. [7]

Most refractive defects are easily corrected with glasses when diagnosed, however, anisometropia and high ametropia in childhood can lead to amblyopia, resulting in permanent vision loss if not corrected in early childhood. Therefore, visual acuity must be correctly assessed even in a pre-verbal child, with tracking of objects and light, a fact that 8.88% of interviewees were unable to report. [13] In the study by Ababneh & Co, only 62.5% of respondents knew that children can have refractive errors, demonstrating an important result, as it is extremely important to detect refractive errors as early as possible to avoid complications. [11]

Neonatal conjunctivitis is defined as acute mucopurulent conjunctivitis, which presents in the first four weeks of life. The clinical presentation can vary from eyelid edema and conjunctival hyperemia, to chemosis, serous or purulent secretion. Neonatal conjunctivitis has several etiologies, such as bacterial infections (*Chlamydiatrachomatis , N. gonorrhoeae, Haemophilus, Streptococcus pneumonia* etc.), viral infections (adenovirus or *Herpes simplex virus*), or chemical substances (after treatment with silver nitrate prophylaxis). For most non-sexually transmitted bacterial conjunctivitis, treatment includes different topical antibiotics. In cases caused by *C. trachomatis* and *N. gonorrhoeae* , treatment includes topical and systemic antibiotics. [14] The conduct in the presence of ocular secretion in newborns was questioned and 83.33% would not refer them to an ophthalmologist, a number comparatively higher than that observed in the study by Manica et al., in which only 45% did not know. [7]

In children with eye discharge, the first choice was Tobramicina eye drops ®, with a success rate of 78.88%, with 67.77% prescribing it every 6 hours. A common problem is distinguishing viral from bacterial conjunctivitis, but epidemiologically , the most common cause of conjunctivitis in children is bacterial, therefore, the use of antibiotics is necessary. [15]

Regarding topical ocular corticosteroids, 91.11% of pediatricians recognize that their excessive use can lead to eye problems, such as glaucoma, therefore their use should be rationalized and prescribed only when necessary. [15]

Congenital obstruction of the nasal lacrimal duct (OCDLN) occurs in approximately 6% of newborns, due to imperforation of the Hasner valve. It manifests itself as persistent epiphora , from the first days of life. The vast majority of cases of OCDLN can be resolved spontaneously within the first year of life, with massage of the internal angle of the eye against the nasal bone, in the direction of the nasal lacrimal duct (Criegler massage).[16] If not resolved, the approach is probing the nasal lacrimal duct , which is when the ophthalmologist should be referred until 6 months of age, and in the present study 74.44% did not know the best time, compared to Manica et al., 65% did not know the best time. [7.17]

Eye deviation, or strabismus, has several classifications and each one must have a different approach taken by the ophthalmologist. Therefore, in the face of clinical suspicion, the child should be referred immediately at any age, and only 74.44% of those interviewed would refer directly to the ophthalmologist, compared to Manica et al., 15% did not know the appropriate management. [7] In Ababneh & Co, in terms of treatment, 60.4% of pediatricians responded that they would refer children with strabismus to an ophthalmologist, while 31.3% would recommend brain imaging tests, in addition, 58.3% of them They incorrectly responded that they could carry out the treatment on their own. [11, 18]

Congenital cataract is the opacification of the lens present at or shortly after birth. It has several etiologies and can be associated with congenital anomalies, metabolic

diseases, such as diabetes, galactosemia and hypoglycemia, and intrauterine infections such as rubella. [19,20] Screening for diagnosis is carried out using the red reflex test at birth. The treatment is surgical, and the child may become aphakic or have an intraocular lens implanted, carried out no later than the eighth week of life, leading to a better visual prognosis. [19] The best time for treatment and prognosis of this condition must be known to the pediatrician to provide better guidance to family members. Of the total number of respondents, 63.33% were unaware of the best time to undergo surgery, up to 2 months of life, and 52.22% would not know how to inform their family of the disease's prognosis, with a more reserved prognosis for adults undergoing surgery for senile cataracts. [19] While in the study by Manica et al , 36% did not know the initial management of congenital cataracts and 75% did not know how to inform their patients' families about the prognosis of the treatment of this disease. [7, 19]

Of those interviewed, 54.44% did not know that retinoblastoma , retinopathy of prematurity and exudative retinal disease can cause leukocoria . Leukocoria is observed as a white reflex on the red reflex test, and is often the first sign of serious eye diseases, which must be diagnosed and managed early, as most conditions threaten the visual prognosis, and specifically retinoblastoma , which can be fatal. [21]

Furthermore, 86.66% know that retinoblastoma is malignant. [21] In comparison to Manica et al , 63% did not remember that retinoblastoma , retinopathy of prematurity and retinal exudative diseases are causes of leukocoria and 90% knew that retinoblastoma is malignant. [7] In the study by Ababneh & Co, 83.3% of respondents reported that retinoblastoma is a cause of leukocoria. [11]

Congenital glaucoma is a potentially serious disease that can result in blindness if it is not diagnosed early and does not receive adequate treatment. [22] Developmental glaucoma refers to glaucoma associated with developmental anomalies of the eye present at birth. [23]

The clinical suspicion of congenital glaucoma must be based on the presence of the classic triad of tearing, photophobia and blepharospasm, and must be confirmed by evaluating the refractive status, changes present in the cornea and procedures such as tonometry, ophthalmoscopy and gonioscopy. [24] Treatment must be efficient, precise and immediate, to avoid future complications, therefore, an early diagnosis is extremely important for the prognosis. [23] According to the questionnaire, 41.11% of pediatricians interviewed are unaware of the classic triad. While in Manica et al., 52% did not know the classic triad of Congenital Glaucoma. [7]

## CONCLUSION

In this sample, the results suggested a deficiency in basic education and pediatric medical residency in the area of ophthalmology. Continuing education and collaboration programs between ophthalmology and pediatrics disciplines should be developed and reinforced, aiming to deepen knowledge of this topic.

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