ISSN 2526-8910
Cad. Bras. Ter. Ocup., São Carlos, v. 27, n. 1, p. 45-53, 2019
https://doi.org/10.4322/2526-8910.ctoAO1250

Original Article

Evaluation of functionality in children aged 4-6 years presenting congenital toxoplasmosis and retinochoroiditis[1]

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Abstract: Introduction: In Brazil, congenital toxoplasmosis (CT) is the main cause of visual impairment in childhood. It causes retinochoroiditis, which should lead to blindness. Minas Gerais has a prevalence of 1 newborn with congenital toxoplasmosis for every 770 live births. Objective: To evaluate visual functionality and tasks of self-care with TC classified in groups according to a visual acuity. Method: A cross-sectional study with 96 preschoolers with CT. Ophthalmologic examination and assessment of some functionalities were performed: The Functional Vision Evaluation (AVIF-2 at 6 years) and the Pediatric Disability Assessment Inventory (PEDI-Brazilian version). Results: Children were classified into three groups according to visual acuity: moderate / severe visual loss (n=16), low level (n=39) and normal vision (n=41). The chance of difference is not greater than AVIF-2 at 6 years among the three groups (p=0.001), being (p <0.0001) between the groups with moderate/severe visual and normal vision. The domain scores are displayed as the end result (p=0.022). The test PEDI is not able to make a difference between the groups. It is not different between the scores of the tests carried out. Conclusion: Children with CT without moderate / severe visual impairment, compromising visual functionality with greater impairment without visual accompaniment. The AVIF-2 at 6 years test demonstrated the impairment between groups with different visual acuities. The PEDI (self-care) test was not performed with a significant difference in scores between the groups. The AVIF-2 at 6 years test may contribute to the more effective intervention in the visual habilitation of children with CT and low vision.

Keywords: *Congenital Toxoplasmosis, Evaluation, Low Vision, Functionality, Tests.*

Avaliação da funcionalidade em crianças de 4-6 anos apresentando toxoplasmose congênita e retinocoroidite

Resumo: Introdução: No Brasil, a toxoplasmose congênita (TC) é a principal causa de deficiência visual na infância. É causa de retinocoroidite, que pode levar à cegueira. Minas Gerais apresenta prevalência de um neonato com TC para cada 770 nascidos vivos. Objetivo: Avaliar funcionalidade visual e tarefas do autocuidado de crianças com TC classificadas em grupos de acordo com a acuidade visual. Método: Estudo transversal com 96 pré-escolares com TC. Realizado exame oftalmológico e avaliada a funcionalidade por dois instrumentos: O teste Avaliação da Visão Funcional (AVIF-2 a 6 anos) e Inventário de Avaliação Pediátrica de Incapacidade (PEDI-versão

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Received on Oct. 22, 2017; 1st Revision on May 11, 2018; 2nd Revision on Sept. 26, 2018; Accepted on Dec. 13, 2018.

brasileira). Resultados: As crianças foram classificadas em três grupos conforme a acuidade visual: perda visual moderada/grave (n=16), perda leve (n=39) e visão normal (n=41). Houve diferença significativa no escore total do AVIF-2 a 6 anos entre os três grupos (p=0,001), e entre os grupos com perda visual moderada/grave e visão normal (p<0,0001). Os escores do domínio *seguimento visual* apresentaram pior resultado (p=0,022). O teste PEDI não mostrou diferença significativa entre os grupos. Não houve correlação entre os escores dos testes aplicados. Conclusão: Crianças com TC e perda visual moderada/grave apresentaram comprometimento da funcionalidade visual com maior prejuízo no seguimento visual. O teste AVIF-2 a 6 anos demonstrou esse comprometimento entre os grupos com diferentes acuidades visuais. O teste PEDI (autocuidado) não mostrou diferença estatística significativa dos escores entre os grupos. O teste AVIF- 2 a 6 anos pode contribuir para intervenção mais objetiva na habilitação visual de crianças com TC e baixa visão.

Palavras-chave: *Toxoplasmose Congênita, Avaliação, Baixa Visão, Funcionalidade, Testes.*

1 Introduction

Toxoplasma gondii is a parasite found worldwide with high prevalence (estimated one child per 1000 births) in Brazil (DUBEY et al., 2012). It is one of the causes of preventable blindness in children. Retinochoroiditis is the most characteristic ocular manifestation of congenital toxoplasmosis and, when located in the macula, it may impair visual acuity, visual field and lead to poor vision, with great impairment in quality of life (PAULA, 2013; SILVA; FURTADO, 2016).

In partnership with the International Agency for the Prevention of Blindness, WHO (World Health Organization) has created the global Vision 2020 Program to eliminate preventable blindness, including cases of congenital toxoplasmosis. The actions to reach this goal by 2020 are aimed at treating children up to 7 years old, avoiding amblyopia and the psychological, financial and social damages that permeate the life of the child and the family (FURTADO; SILVA, 2016).

The ability to find objects in their visual field and the identification of objects is closely linked to maintaining their posture, displacement in the environment, safety and the participation in different activities. A visual impairment from congenital toxoplasmosis can lead to delays in the functional skills, noticeable by the therapists (SILVA; AIROLDI, 2014).

The impairment of the macula, which is responsible for central vision, can lead can lead to reduced clarity of detail, low visual acuity for far distance, and the difficulty to identify very large or very small objects as observed in some cases (SANTOS; PASSOS; REZENDE, 2007). This problem can hamper tasks such as writing, due to the need for a compensatory position of the head to visualize the whole sentence, or the drawing, placing the paper closer, with an impact on the child's quality of life. Studies relating macular impairment to specifically self-care activities in children are scarce. Tibúrcio (2016) in a cohort of children with congenital toxoplasmosis at birth in Minas Gerais observed that they have low vision in 17.9% (25/140) of them. In this population, a tool was used to evaluate quality of life in general. It was observed that children with low vision had significant repercussions in several dimensions of quality of life when compared to children with mild visual loss and without visual loss.

Evaluating and consequently relating the visual sequel to the function is relevant because of the peculiarity of the impact that each dysfunction in the visual sensory system can have on specific abilities and on the individual's participation. Individuals with the same visual acuity may present differences in the use of functional vision, which is how you use the remaining view to perform tasks (COLENBRANDER, 2005). For example, a child with macular retinochoroiditis may present impairment in the detail vision and that one with congenital cataract may present reduced ability to visualize colors (CAVALCANTE, 1995).

Considering that the lesion of the anatomical structure is associated to the impairment of function and repercussion in the development of the skills necessary for the individual's participation in daily activities, occupational therapy proposes functional evaluations and interventions that allow the individuals to participate in their occupations. Regarding the visual functionality, the American Occupational Therapy Association (AOTA) developed a practical guide to the adults' rehabilitation of low-vision in 1998 and in 2006 a certification for professionals who fulfilled the prerequisites of experience in this area was awarded (SCHEIMAN; SCHEIMAN; WHITTAKER, 2007). In Brazil, some evaluations of the functional vision in children deserve special mention: Bruno (1993) performed the functional assessment of vision; Gagliardo (1997) assessed

the visual behavior of infants (GAGLIARDO; GONÇALVES; LIMA, 2004). In 2010, Rossi and Saliba proposed AVIF-2 at 6 years; and in 2015, Zimmermann et al. (2015) developed the functional vision assessment test. The Evaluation of the visual conduct of infants and AVIF-2 at 6 years are based on the rationale described above. AVIF-2 at 6 years is authored by a physiotherapist and an occupational therapist (ROSSI et al., 2013; BRANDÃO, 2017).

Occupational therapy contributes with the same reasoning and brings several instruments to evaluate the functionality under different conditions. Silva and Martinez (2002) highlighted, for example, the SIPT, (Sensory Integration and Praxis) of Ayres (1989). Beyond them and others, it is important to highlight the Brazilian version of Mancini's Pediatric Assessment of Disability Inventory (PEDI) with its valuable contribution to the functional evaluation of children, used for different health conditions.

This study aims to evaluate the visual and global functionality of a cohort of children with congenital toxoplasmosis and ocular lesion through the application of PEDI and AVIF-2 at 6 years instruments and to compare their results with visual acuity levels.

2 Methodology

2.1 Method

This is an observational, cross-sectional study of children with congenital toxoplasmosis treated at the Hospital das Clínicas, Federal University of Minas Gerais.

This study is part of a research on quality of life evaluation of a cohort of 190 children with congenital toxoplasmosis diagnosed in the neonatal period in Minas Gerais (2006-2007) and treated during their first year of life. This cohort is reassessed annually, or at shorter intervals if necessary (ophthalmological complaints and/or neurological impairment) by multidisciplinary team. At the end of six years of follow-up, this cohort had a routine evaluation at the Hospital das Clínicas of the Federal University of Minas Gerais (HC-UFMG), Brazil, and the individuals were invited to participate in the study.

2.2 Participants

Ninety-six children with congenital toxoplasmosis between 4 and 6 years old were eligible. Children who presented adequate neuropsychomotor development according to the Denver II Developmental Test; children who performed the ophthalmologic exam in the Low Vision Child (BVI) sector; and children who were evaluated with AVIF-2 at 6 years and PEDI test, on the same day were included in the study. Children with glasses prescription for refraction correction should be using them at the evaluation date.

Children who had an abnormal screening result for delayed neuropsychomotor development assessed by the Denver Developmental Test II, children who did not wear prescribed glasses, children whose companions were unsure about the child´s routine, and those not assessed by both tests (AVIF-2 at 6 years and PEDI) on the same day were excluded.

2.3 Data collection instruments

The Pediatric Evaluation of Disability Inventory (PEDI) (MANCINI, 2005) used in this study as an interview was used to evaluate self-care tasks. The PEDI test (Brazilian version) has three parts: 1) Functional skills; 2) Caregiver care; and 3) Modifications, and three scales: self-care, mobility, and social function.

The test called AVIF-2 at 6 years was applied to evaluate the capacity and visual functionality. It is an observational test with seven domains: visual fixation, visual follow-up, functional visual field, hand-eye coordination, location of objects on the surface, displacement in the environment, and color perception.

2.4 Procedures

The study was approved by the Ethics and Research Committee (COEP - UFMG) (CAAE/05040.0.203.000-11). The parents or guardians of the children were invited to participate and expressed their agreement by signing the Informed Consent Form (ICF).

Data collection was held at the Low Vision Children's Department (BVI) and Uveitis Sector of the Hospital São Geraldo - Hospital das Clínicas of UFMG (HC-UFMG), during routine consultation for visual evaluation.

The ophthalmologic examinations were performed in the Uveitis and Low Vision Children's Sections of the Hospital São Geraldo by ophthalmologists specialized in the care of children with ocular pathologies. In Uveitis, indirect ophthalmoscopy was performed to observe the existence or not of retinochoroiditis lesions and to describe its characteristics: location (macular or peripheral), size and inflammatory activity; in the BVI Sector, ectoscopy, strabismus evaluation, refraction measurement, visual acuity measurement, color vision, and contrast sensitivity.

AVIF-2 at 6 years and PEDI tests were applied by the main researcher (occupational therapist) and another researcher of the group (physiotherapist) to evaluate the visual functionality, specifically the functional skills in self-care. A reliability analysis among examiners was performed before starting the research to guarantee greater reliability of the data collection. After previous training in the application of the two tests, the examiners applied each instrument twice separately on the same day in a same group of children (n=11), patients of BVI sector of the Hospital São Geraldo (HC-UFMG) and who did not participated in this study. The results obtained with the two examiners were compared for consistency and agreement.

The tests were then applied by the two examiners. AVIF-2 at 6 years test was applied and scored according to the guidelines of the original study (ROSSI, 2010). The answer shown by the child when performing the requested task was observed and scored according to two categories, qualitative and quantitative. As an example, there is the evaluation of the visual fixation of an object, as a qualitative category: (1) the child does not fix the object; (2) brief fixation; (3) complete or sustained fixation for more than 3 seconds; and as a quantitative category: the sum of the values (in parentheses) associated to the observed answer. Thus, the sum of the scores by domains and the total score was obtained. The PEDI Brazilian version test in this study was applied as an interview with the caregiver and only part 1 of the self-care scale was used, with 73 items that assessed the child's capacity to perform the requested task without help. The orientation of the test author (MANCINI, 2005) was followed for its punctuation: (0) unable to perform the task and (1) able to perform the task. The crude score was transformed into continuous score and used in the analyses of this research.

The study was blinded to the examiners who applied the functionality tests, meaning that at the time of the application of the tests, they were not aware of the result of the ophthalmological examination.

2.5 Data analysis

Intraclass correlation coefficient (ICC) was used to calculate the reliability index among the examiners. When the values were higher than 0.81, there was consistency between the data (MARÔCO, 2011). Descriptive statistical analysis, association between categorical variables using the Asymptotic Pearson Chi-square test, comparisons using Analysis of Variance (ANOVA) between the quantitative variables (scores of the AVIF-2 at 6 years test) and the measures of the visual acuity, classified according to the International Council of Ophthalmology (2002) as moderate/severe visual loss, mild visual loss and normal vision were performed. The Least Significant Difference (LSD) was used for multiple comparison analysis to verify the difference of the results of each group between the two groups (MARÔCO, 2011).

As the results of the PEDI test were not normally distributed, the Kruskal Wallis analysis was used to compare them with the values of visual acuity (classification in groups according to the International Council of Ophthalmology). The Spearman correlation was performed to analyze the correlation between the results (AVIF-2 at 6 years scores at 6 years and PEDI scores) because the variables had no normal distribution. The linear regression evaluated the influence of age, macular lesion, and visual acuity according to the International Council of Ophthalmology (ICO) (INTERNATIONAL..., 2002) on the tests. $P < 0.05$ was considered significant.

3 Results

The reliability analysis among the examiners regarding the results of the PEDI and AVIF-2 at 6 years test scales showed good or near perfect results (ICC> 0.81) for all items except for "food texture" (PEDI test item), which was 0.00.

The study population (96 children with congenital toxoplasmosis and between 4 and 6 years old) was classified and divided into groups according to visual acuity and criteria established by the International Council of Ophthalmology and the World Health Organization. This classification was based on the information (reference values) shown in Table 1. The characteristics of the sample are in Table 2.

Regarding the location of the retinochoroiditis lesion, 56 children had bilateral macular lesion, 27 children had unilateral lesion and 13 children had no lesion.

When comparing the mean total scores of the the AVIF-2 at 6 years test results according to the classification by visual acuity groups, a significant difference was observed between the groups ($p=0.001$), especially in the difference between the groups of normal visual loss and moderate/severe visual loss ($p < 0.0001$) and the groups with mild visual loss and moderate/severe loss ($p=0.003$). When comparing the scores by domains of the test, only the visual domain showed a significant difference ($p=0.022$) between

the groups (Table 3). The difference was observed in the comparison between the groups of normal vision and moderate/severe visual loss (p=0.007) and between the groups of mild visual loss and moderate/severe visual loss (p=0.018). No significant difference was observed in the comparison between the normal vision and mild visual loss groups in the total score and visual follow-up.

Table 1. Visual acuity classification reference values, according to the International Council of Ophthalmology (ICO).

Classification	Visual acuity measurement[1]
Normal or near vision	≥ 0.8
Mild visual loss	< 0.8 a ≥ 0.3 20/60 6/18
Moderate visual loss*	< 0.3 a ≥ 0.1 20/200 6/60
Severe visual loss*	< 0.1 a ≥ 0.05 20/400 3/60
Deep visual loss**	< 0.05 a ≥ 0.02 20/1200 1/60
Near total visual loss**	<0.02 a ≥ LP
Total visual loss**	NLP
	Indeterminate or unspecified

*Low vision; **Blindness; [1]The measure of visual acuity is the result of part of the ophthalmological examination. It is the ability to identify optotypes in a table; NLP = no light perception. Source: International Council of Ophthalmology (2002).

Table 2. Characteristics of the sample and classification of visual acuity in a cohort of children with congenital toxoplasmosis in Minas Gerais.

Variables	Visual acuity (INTERNATIONAL..., 2002)*			Total (n=96)	p-value
	Normal (n=41)	Mild visual loss (n=39)	Moderate+Severe visual loss (n=16)		
Age(years old)					
4	1 (2.4)	1 (2.6)	0 (0.0)	2 (2.1)	0.385[1]
5	33 (80.5)	33 (84.6)	**16 (100.0)**	82 (85.4)	
6	7 (17.1)	5 (12.8)	0 (0.0)	12 (12.5)	
Gender					
Female	21 (51.2)	14 (35.9)	7 (43.8)	42 (43.8)	0.496[2]
Male	20 (48.8)	25 (64.1)	9 (56.2)	54 (56.3)	

*Normal: >0.8 decimal or 20/20 Snellen; Mild visual loss: >0.8 to 0.3 decimal or up to 20/60 Snellen; Moderate+severe visual loss: <0.3 decimal to >= 0.05 or 20/400. [1]Asymptotic Pearson's Chi-square test; [2]Exact Pearson Chi-Square Test.

Table 3. Comparison of the domains means in the 6-year AVIF-2 at 6 years test according to the classification of visual acuity.

Variables	Visual acuity (INTERNATIONAL..., 2002)#			Total	p-value*
	Normal (n=42)	Mild visual loss (n=39)	Moderate+severe visual loss (n=16)		
AVIF – total score Mean ± standard deviation	93.9±3.3	93.2±3.2	89.9±5.4	92.9±3.9	**0.001**
Visual follow-up domain Mean ± standard deviation	23.0±2.2	22.8±2.5	21.0±3.1	22.6±2.6	**0.022**
Field Visual Fixation domain Mean ± standard deviation	17.7±1.0	17.5±1.0	17.2±1.5	17.6±1.1	0.293
Functional visual field domain Mean ± standard deviation	3.5±0.6	3.3±0.8	3.5±0.7	3.5±0.7	0.422
Eye coordination domain Mean ± standard deviation	11.8±0.5	11.9±0.4	11.6±0.9	11.8±0.5	0.199
Displacement in the environment domain Mean ± standard deviation	5.2±1.1	5.0±1.1	4.5±1.4	5.0±1.2	0.149
Perception of colors domain Mean ± standard deviation	8.7±0.8	8.6±0.7	8.1±1.8	8.6±1.0	0.163

*Significant p-value <0,05; #Normal: >0.8 decimal or 20/20 Snellen; Mild visual loss: >0.8 to 0.3 decimal or up to 20/60 Snellen; Moderate+severe visual loss: <0.3 decimal to >= 0.05 or 20/400; Analysis of Variance - ANOVA.

The results of total (median) and PEDI self-care scores did not show significant difference when compared to the visual acuity groups (Kruskal Wallis, p> 0.05).

The results of the Spearman correlation analysis showed a small correlation between the continuous total score of PEDI and AVIF-2 at 6 years (rs=0.198) and for the items, only for the displacement in the environment domain (rs=0.377). In the result of the linear regression performed with the two instruments, AVIF-2 at 6 years was shown to be influenced only by the visual acuity variable (β=-0,150; p=0.006) and IC95% β [-2.56; -0.45] (Table 4). However, the PEDI did not show to be influenced by any of the variables.

4 Discussion

The studied population had a specific disease called congenital toxoplasmosis. It is the main responsible for the infantile visual deficiency in Brazil (FURTADO et al., 2016). Reference services for ocular evaluation of children with congenital toxoplasmosis use in their protocols only indirect ophthalmoscopy for routine evaluation of ocular impairment and associate the presence of macular retinochoroiditis to the risk of visual impairment (SILVA; FURTADO, 2016; LAGO, 2006). In this study, although the population had frequent and macular visual impairment, with 58% (56/96) of bilateral macular lesions, moderate to severe visual loss was observed in a relatively small proportion of cases (16.7%). The variability of macular involvement, with different sizes of retinocoroid scars, should be considered, but this result warns the importance to include visual evaluation routinely, besides indirect ophthalmoscopy, visual acuity assessment and functionality tests performed by the Occupational Therapist and of utmost importance to evaluate the impact of the dysfunction on the occupational performance of the child.

As the objective of this study is to evaluate the functionality, and the most important visual function is visual acuity, the characteristics of the retinochoroiditis lesions were not detailed.

Table 4. Result of the linear regression adjustment of the 6-year AVIF-2 at 6 years test.

Variables	Beta	CI95% Beta	Valor-p*
Age	1.92	-015 ; 3.99	0.069
Macular lesion	-0.67	-1.73;0.40	0.216
Visual acuity	-1.50	-2.56; -0.45	**0.006**

*Significant p-value <0.05; R2 adjusted: 11.9%.

This aspect was already described in other studies (VASCONCELOS-SANTOS et al., 2009; TIBÚRCIO, 2016).

When choosing the tests to evaluate the functionality of children with congenital toxoplasmosis and ocular lesions, the age limitations and specificities of visual impairment assessment were found. Some validated tests available evaluated both visual and global functionality, such as *LV Prasad-Functional Vision Questionnaire* (LVP- FQV) (GOTHWAL; LOVIE-KITCHIN; NUTHETI, 2003), but it was aimed at children older than 8 years old. The Visual Ability Score (VAS) questionnaire (KATSUMI et al., 1998) showed a high correlation with visual acuity, but its format did not allow the examiner to observe and score the use of functional vision during a task. The Visual Assessment Procedure - Capacity, Attention, and Processing (VAP-CAP) (BLANKSBY; LANGFORD, 1993) allowed the child to observe, but it did not score quantitatively. The Functional Vision Evaluation (AVIF-2 at 6 years) (ROSSI, 2010) allowed the observer to score the tasks performed and covered the age range of interest for Visual Habilitation, reason for its application in this study. Another reason for its choice was their specific planning for children with low vision and their ability to discriminate children with low vision from those with normal vision. The instrument (PEDI), also selected for its application in this study, was not designed to evaluate children with low vision, but it was applied in this population in few studies and with small casuistics. Thus, significant results were observed for self-care scale (p <0.001) and mobility (p <0.001) (MANCINI et al., 2010). A study comparing groups of visually impaired children and control groups also showed significant results for self-care (p <0.01) and mobility (p <0.01) (MALTA et al., 2006). Unfortunately, the authors did not correlate the test results with the classification of children into groups according to visual acuity or any other specific test for children with low vision. Several tests available to evaluate the functionality are discussed in the review of the literature by Brandão et al. (2017).

AVIF-2 at 6 years test showed a significant difference in the total test score in the group of children with normal visual acuity compared to those with moderate/severe visual loss, showing that the greater severity of visual loss is associated with greater impairment in use of functional vision (p <0.0001). When analyzing the domain/function with the worst score, it was highlighted the difficulty in visual follow-up, which may be justified by the presence of a scar in the macular region. In the

study population, no impairment was observed in visual fixation and hand-eye coordination, which may be observed in cases with visual impairment due to other pathologies. The increase in the size of the sample studied could contribute to reinforce the findings. Other studies with cohorts of children with different eye diseases and different age groups are necessary for advances in the area of visual habilitation.

The AVIF-2 at 6 years test was able to discriminate the impact of visual impairment in children with congenital toxoplasmosis in this study. In addition to evidencing the impairment in the use of functional vision, it identified the compromised domain (visual follow-up) and showed a direct association with a classification of visual acuity. This results lead to the work of the multidisciplinary team in habilitation and visual rehabilitation, allowing greater objectivity in the intervention program and guidelines to the parents.

PEDI presented no difference in the results (medians) for the groups classified by visual loss, which was already expected since the instrument was neither developed nor validated for visually impaired children. Despite having good results in previous studies with children with low vision, most children present mild visual loss in this case (which may have an impact on self-care) but mainly because seeing the macula was difficult, which is very specific and different from assessing visual loss that reaches another area. The macula vision leads to the compensatory position of head to use the lateral view since the central one is impaired, there can be difficulty in the perception of details as already mentioned and others. Thus, the child may present limitations not in the task, but in stages of the process, which is not contemplated by the questionnaire. PEDI is widely used by rehabilitation professionals who work with children with neuropsychomotor development delays. Although it could be an interesting source of information in the practice of visual habilitation to evaluate self-care, the need for specific adaptations for the area of visual impairment in case of macular lesion was evident.

The weak correlation (demonstrated by the Spearman correlation analysis) between AVIF-2 at 6 years and the PEDI tests indicates that they did not provide complementary information on the population evaluated, regarding macular vision deficit, responsible for perception of details and others. This led the researchers to question whether it is necessary to use both instruments concomitantly to assess the functionality of the child with congenital toxoplasmosis or to use the therapist in a targeted way (steps, details), knowing the limitations and potentialities of the child with congenital toxoplasmosis, verifying how this condition is impacting the performance of self-care activities by the child.

None of the tests showed influence of the lesions on the macular scar scores, regardless of whether the lesions were unilateral or bilateral. Although the scar may interfere with the results of visual acuity and the classification of visual loss (INTERNATIONAL..., 2002), this interference is dependent on other characteristics of the lesions, such as extension, for example. As the information about the existence and location of the retinochoroiditis lesion did not influence the results of the visual functionality evaluations in this study, the sum of the anatomical and functional information about the child's vision to proceed with its treatment is important.

As most of the children studied did not have a very low mean in the total score of the AVIF-2 at 6 years test, the influence of the other variables on this result (confounding bias), especially their age, was investigated. The results of the linear regression showed that there was no influence of the age variable and the location of the retinochoroiditis lesion, and the test result was influenced only by visual acuity ($p=0.006$).

The studied population did not present self-care performance difficulties according to the items measured by the PEDI test and how it should be applied. Silva and Airoldi (2014) applied PEDI in a child with low secondary vision to congenital toxoplasmosis to study the influence of family members in the acquisition of functional skills in self-care, mobility and social function of caregiver care, including part II. The results of the crude and continuous scores showed that there is a difficulty by the parents of visually impaired children in understanding their limitations and potentialities, which interferes in the stimulation to the acquisition of these abilities.

5 Conclusion

Although the study population showed a reduced number of children with moderate/severe visual loss (only one child presented severe loss) compared to those with mild visual loss and normal vision, which could be a limitation of the study, AVIF-2 at 6 years was able to discriminate the groups and it was applicable in the studied population, being able to be used in this specific people and in the age range close to the upper limit of the original test. There

is a need for further studies, with the application of AVIF-2 at 6 years test in children with congenital toxoplasmosis belonging to smaller age groups and also in those with neuropsychomotor development delay, which could modify the results found. In the first case, the test results could contribute to the earlier qualification of this patients, in an optimal time for this intervention, besides consolidating the use of the test.

Regarding the global functionality, adequacy of instruments for this evaluation is needed, specifically in the tasks of self-care, which are very important in the daily life of the child, can complement the information of the evaluation of visual functionality and constitute an area of great interest to perform the occupational therapy.

The authors consider that this study enables to know the specificities of visual impairment in children with congenital toxoplasmosis, a frequent clinical condition and one of the main causes of visual impairment in Brazil. It also shows results of the use of a visual functionality assessment instrument (AVIF-2 at 6 years) that is already available to use it in referral services for the care of visually impaired children. Finally, the importance of the correlation between the information on the structure of the eye, visual functions and the performance of the child in the activities of daily life is shown, for planning a visual intervention program that covers all domains of the International Classification of Functioning and Disability (ICF). This planning broadens and gives objectivity to the work of the occupational therapist in the areas where visual functionality and self-care are more harmful, favoring child development.

Acknowledgements

We thank gratefully to Grace Rego Saliba for contributing during the elaboration and revision of the text with her expertise on children's low vision. We also thank Maria de Fátima Pinto Coelho for her willingness to assist and guide the searches in the databases and references.

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Author's Contributions

Aline de Oliveira Brandão: text design. Galton Carvalho Vasconcelos and Gláucia Manzan Queiroz Andrade: text writing. Jacqueline Domingues Tibúrcio: information for the elaboration of the database. Luciana Drummond de Figueiredo Rossi: text review. All authors approved the final version of the text.

Funding Source

CAPES.

Notes

[1] This article is part of the Master´s Dissertation of Aline de Oliveira Brandão in the Graduate Program in Child and Adolescent Health at the Federal University of Minas Gerais. All ethical procedures were followed. The project was approved by COEP-UFMG nº CAAE 0540.0.203.000.11.