

Influence of visual symptoms in school performance of adolescents

Influência dos sintomas visuais no desempenho escolar de adolescentes

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ABSTRACT

Purpose: To investigate if there was an association between visual symptoms and academic performance. A secondary objective was to estimate the prevalence of visual symptoms among students in a public school. **Methods:** A cross-sectional and quantitative study was made with 100 students, attending the sixth or seventh grades in a public school participated in this study. The evaluation of visual symptoms was done through the Visual Efficiency Inventory (IEV), translated and validated version of the College of Optometrists in Vision Development Quality of Life (COVD-QOL) questionnaire. The academic performance was evaluated through the application of a test containing 10 questions, equally divided between the disciplines of portuguese and mathematics. The results were analyzed by means of descriptive statistics, Spearman's coefficient and the Student's t-test for $p < 0.05$. **Results:** Of the 100 students, 52% were male. The prevalence of visual symptoms founded was 72%, with the highest scores in the IEV obtained by the girls. It was not observed a significant relationship between visual symptoms and academic performance. **Conclusion:** A high prevalence of visual symptoms was observed among students, but there was no significant relationship between visual symptoms and academic performance.

Keywords: Symptom assessment; Academic performance; Surveys and questionnaires; Student health; Vision disorders

RESUMO

Objetivo: Avaliar a relação entre sintomas visuais e rendimento escolar, identificando, também, a prevalência de sintomas visuais em escolares matriculados em uma escola pública. **Métodos:** Estudo quantitativo e transversal, no qual foram avaliados 100 estudantes matriculados no sexto ou sétimo ano do ensino fundamental II da EEEFM Jarbas Passarinho. A avaliação de sintomas visuais se deu por meio do Inventário de Eficiência Visual (IEV), versão traduzida e validada do questionário College of Optometrists in Vision Development Quality of Life (COVD-QOL). O rendimento escolar foi avaliado por meio da aplicação de uma prova contendo 10 questões, divididas igualmente entre as disciplinas de português e matemática. Utilizou-se o coeficiente de correlação de postos de Spearman para analisar a relação entre desempenho acadêmico e sintomas visuais, e o teste t-student para avaliar diferenças entre as variáveis. **Resultados:** Dos 100 participantes, 52% eram do sexo masculino. A prevalência de sintomas visuais encontrada foi de 72%, com as maiores pontuações no IEV obtidas pelas meninas. Não houve relação significativa entre os sintomas visuais e o desempenho escolar. **Conclusão:** O presente estudo encontrou uma prevalência de sintomas visuais elevada entre os estudantes participantes da pesquisa, porém, não houve uma relação estatisticamente significativa entre os sintomas visuais e o desempenho escolar.

Descritores: Avaliação de sintomas; Desempenho acadêmico; Inquéritos e questionários; Saúde do estudante; Transtornos da visão

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INTRODUCTION

Sight is one of the most important sources of communication between the brain and the external environment, so that in childhood visual deficits can be detrimental to development and learning.⁽¹⁾ Said deficits, especially when undiagnosed and followed, may be responsible for alterations in quality and performance in several areas of a person's life.⁽¹⁻³⁾

Therefore, instruments for an early identification of those individuals who are more likely to present some visual alteration are required, and the College of Optometrists in Vision Development Quality of Life (COVD-QOL) questionnaire will be emphasized in this paper.

COVD-QOL comprises 30 questions related to visual symptoms and its influence on several aspects of personal and social development.⁽⁴⁾ The questionnaire in its reduced version comprising 19 questions is also indicated as an instrument of analysis of visual symptoms due to its greater practicality and levels of reliability similar to the questionnaire in its full version.⁽⁴⁻⁷⁾

Despite its simplicity and efficiency as an instrument for screening visual deficits, COVD-QOL is an instrument built in English. Thus, in view of the need for questionnaires with these characteristics in the Portuguese language, the translation and cross-cultural adaptation of the COVD-QOL was carried out and validated, and it became known as the Visual Efficiency Inventory (IEV).⁽⁸⁾

The present study aimed to use the IEV to analyze the prevalence of visual symptoms and their relation with school performance in a public school in the city of Belém, aiming at the early identification of students with possible ocular diseases.

METHODS

This is a cross-sectional, quantitative study in which data was collected with the application of the questionnaire. All participants of the present survey were studied according to the principles of the Declaration of Helsinki and the Nuremberg Code, subject to the Research Involving Human Subjects Regulations (Res. CNS 466/12) of the National Health Council, after submitting the draft to the Center for Research and Extension of Medicine and the Ethics Committee of Universidade do Estado do Pará, and after consent of the participants and their legal guardians with the Free and Informed Assent Term (TALE) and Free and Informed Consent Term (TCLE), respectively.

The research comprised students enrolled regularly in the morning or afternoon period between the sixth and seventh grade at Escola Estadual Jarbas Passarinho located in the district of Marco, in the city of Belém, Pará. It included students of both genders aged 10 to 17 years with or without prior visual problems, and who were regularly attending classes.

Data related to visual symptoms were collected using the IEV. The questionnaire was applied in a short version, using as references the questions selected in the short version of COVD-QOL. In responding to the IEV the participant indicated in each question the frequency with which they presented the symptoms in a scale of Likert, where zero represented "never", one "rarely", two "sometimes", three "frequently", and four "always". These responses were summed to generate a score. According to what was pre-established by the questionnaire used, participants were considered as having significant visual symptoms when they obtained scores equal to or greater than 20.

Those students who for some reason refused to participate in the survey were excluded, as those who could not answer the questionnaires by themselves, and those who did not submit the TALE and/or TCLE signed, or who were not present at the time of application of the questionnaires.

For the analysis of the academic performance there was the application of a test with ten objective questions scoring a point each, being divided equally between the school subjects of Portuguese and mathematics. The questions were previously selected by the researchers with the help of the institution's pedagogical team, and the Brazil Test (in its version used by the Ministry of Education in 2015) was used as a source for the selection of questions.

The test and the questionnaire were carried out in the classroom in the presence of the researchers in a period of 50 minutes per class. All students were able to fill the study in this period.

The data collected was stored as a spreadsheet in the programs Microsoft Excel 2016 and Microsoft Word 2016. Data analysis was performed using the softwares Graphpad Prism 5 and Microsoft Excel 2016.

We evaluated the relation between the scores obtained in the IEV and the test applied by a non-parametric method using the Spearman's rank correlation coefficient. Differences between the variables were analyzed using the Student's t-test. The significance level adopted was $p=5\%$.

RESULTS

We invited 120 students to participate in the study, of which 20 were included in the exclusion criteria, thus obtaining a participation of 100 students (83.33%). Of the participants, 49 were in the 6th grade, and 51 in the 7th grade. Regarding the distribution by gender, in the 6th grade there were 24 girls and 25 boys, and in the 7th grade there were 24 girls and 27 boys. The average age among those who attended the 6th and 7th grades was respectively 11.6 and 12.9 (Figure 1).

The prevalence of visual symptoms found among participants, according to the criteria of the questionnaire used, was 72%. There was no statistically significant difference between genders regarding school performance ($p=0.53$). However, the average score on the questionnaire of visual symptoms among girls was higher than that found among boys ($p=0.0004$) (Table 1).

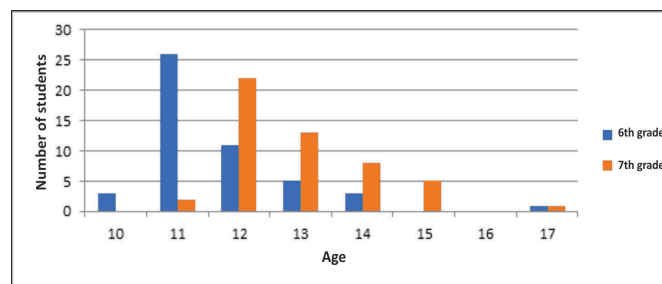


Figure 1: Distribution of students participating in the survey according to the grade and age.

There was no significant relation between the scores obtained in the IEV and the academic performance ($r = -0.10$ and $p = 0.29$) (Figure 2)

Table 1
Average school performance and scores obtained in the Visual Efficiency Inventory according to gender and grade

Gender	Grade (Year)	Mathematics (Average)	Portuguese (Average)	Score
Female	6 ^o	2.51	3.12	31.00
Male	6 ^o	2.54	3.16	24.70
Female	7 ^o	2.08	2.91	35.50
Male	7 ^o	2.92	2.77	24.74

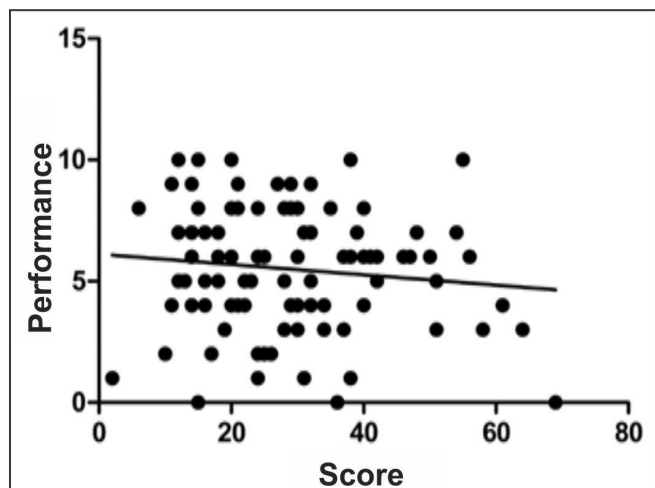


Figure 2: Distribution of grades obtained by students regarding the score obtained in the Visual Efficiency Inventory.

DISCUSSION

The present study observed a weak relation between the visual symptoms detected by the IEV and school performance. These findings corroborate the studies carried out in Curitiba and Amazonas in which 242 and 1,050 children were evaluated, respectively.⁽⁹⁻¹⁰⁾ However, there are studies showing a significant relation between the academic performance and visual deficits. Among these studies, we can emphasize those carried out in the cities of Pouso Alegre (MG), Juiz de Fora (MG), and in the Ophthalmology service of Projeto Saúde é Cidadania/Ação Comunitária in the Northeast of Rio Grande do Sul.^(1,11-12) The studies concluded that low visual acuity was related to lower grades and higher rate of school failure in a statistically significant way.

It is worth mentioning that the method used to evaluate visual acuity can vary in each study, being the Snellen table the most used one.⁽¹³⁾ The present study used the visual symptoms as a reference, which represent consequences of low visual acuity. Thus, it is possible that there are significant divergences between the results found in the present survey and those found in the current literature, which can be taken into account in order to more reliably adapt a practical and easy-to-apply method such as the IEV to the Brazilian context.

Besides, the prevalence of visual symptoms was shown to be up to ten times greater than the prevalence of visual deficits found in Brazilian studies. The prevalence of 72% found among the students studied contrasted significantly with the prevalence

found in other Brazilian cities, such as: Juiz de Fora (MG) 34.8%, Londrina (PR) 17.1%, Pelotas (RS) 15.1%, Sorocaba (SP) 13.1%, Manaus (AM) 7%, Passo Fundo (RS) 10.9%, Pouso Alegre (MG) 11.4%, Vitória (ES) 6%, Curitiba (PR) 7.03%, Campo Grande (MG) 14.2%, Belo Horizonte (MG) 10.3%, and Herval d'Oeste (SC) 9.43%.^(1,9,12,14-22)

Facing this divergence, the authors considered two possible scenarios. The first one admits that the prevalence of 72% found reliably represents the context studied. Therefore, it is suggested that other studies are carried out with this population to confirm said result, as well as to identify the local factors influencing the visual acuity of this population, since the prevalence found is above all previous studies.

The second possible scenario admits that the method used overestimated the visual symptoms of the study population. Among the possible biases, the authors emphasize four alternatives indicated as “frequently” in almost all questionnaires filled, even when the other alternatives were marked as “never”. These alternatives are: “clumsy(a), stumbles in things”; “mismanage the time”; “loses things”; “forgetful/weak memory”. Therefore, it is suggested that further studies are carried out taking into account this possible bias, thus finding results that represent reality more accurately.

The prevalence of visual symptoms was shown to be more present in females in both groups in a statistically significant way. These data corroborates the results found in previous studies, emphasizing the higher incidence of visual impairment in females.^(10,15,20,23)

Finally, it should be emphasized that the discussion about the degree of influence between visual deficits and school performance is old.⁽²⁾ Of course, there are several factors to influence learning. However, even if low visual acuity is not the main factor in some cases, it certainly contributes to hinder the learning process when associated with other determinants. Thus, it is the ophthalmologist’s main role to provide the child with conditions to learn to their maximum level, through the early identification of cases of low visual acuity.⁽²⁻³⁾

CONCLUSION

The present study found a high prevalence of visual symptoms among the students participating in the research. However, there was no statistically significant relation between visual symptoms and school performance. Therefore, it is suggested that similar studies be performed later, taking into account the data obtained in the present study as well as the difficulties and possible biases reported by the authors.

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