Speech-Language Disorders in Congenital Toxoplasmosis: Literature Review

Camila de Castro Corrêa¹*, Silke Anna Theresa Weber¹ and Luciana Paula Maximino²

¹Department of Ophthalmology and Otorhinolaryngology, Botucatu Medical School, State University São Paulo, UNESP, Botucatu, SP, Brazil
²Department of Speech-Language Pathology and Audiology, Bauru School of Dentistry, University of São Paulo, Bauru, SP, Brazil

*Corresponding author: Camila de Castro Corrêa, Department of Ophthalmology and Otorhinolaryngology, Botucatu Medical School, State University São Paulo, UNESP, Distrito de Rubião Júnior, S/N, Zip Code 18618-970- Botucatu-SP, Brazil, Tel: +551-438-116-256, +5514-3880-1524, E-mail: camila.ccorrea@hotmail.com

Abstract

Introduction: Congenital toxoplasmosis causes calcifications in the brain and may alter the routes of cerebral stimuli reception. This implies in the necessity of an investigation of possible language disorders.

Objective: The objective was to analyze what is known about language disorders in congenital toxoplasmosis children in literature.

Methods: A literature review was conducted on the data bases Lilacs, Scielo, PubMed and Scopus by combining the following keywords: “Congenital Toxoplasmosis” and “Speech”, “Toxoplasmosis Congenital” and “Language”.

Results: 28 papers were found, the majority was published in Scopus and PubMed database in the period from 1984 to 2015. After careful reading and application of inclusion criteria, 2 articles remained for analysis in the present study, published in 2010 and 2014.

Conclusion: There are published only a few studies showing the possibility of association of language disorders and congenital toxoplasmosis, with low and moderate level of evidence.

Keywords
Speech, Language and Hearing sciences, Toxoplasmosis, Congenital, Language, Language disorders

Introduction

Congenital toxoplasmosis is defined as the infection acquisition caused by vertical transmission. During pregnancy, the mother is infected with Toxoplasma gondii, which is transmitted intra-uterus to the fetus [1,2]. This infection can cause changes in neurologic development, as visual impairment and other neurological abnormalities [2-4].

The visual impairment in congenital toxoplasmosis is reported, for example, the low scores at the Snellen Test, which is based on the discrimination of fine intersecting lines [5]. However, the evaluation of the ophthalmologic impairment may have some limitations, were described difficulties for interpretation of the results due to specific limitations of the cognitive functions of the child and of the verbal skills [5].

Hearing disorders are also frequently reported in congenital toxoplasmosis, were diagnosed alterations at the peripheral level and also at the central auditory processing [6-9]. It should be noted that congenital toxoplasmosis is a risk factor for hearing loss according to ASHA’s position statement (2007) [10], although it’s important to notice that there’s peer reviewed literature showing absence of auditory problems in this population [1].

Knowing that language is a superior cognitive function and its development depends on the receptive pathways, among them the hearing and visual processes, the possibility of language disorders should be considered and must be investigated [11-14].

The aim of this study was to perform a literature review and analyze the published data on language disor-
2. Articles been published in Portuguese, English or Spanish;
3. Without time limitation;
4. Without limitation as to the type of study.

Were considered as exclusion criteria:
1. Articles discussing other topics of Congenital Toxoplasmosis
2. Not available in full text.

The search was carried out at a VPN system of the University to guarantee the access of more articles in their full format.

Analysis of the articles of the literature search was performed in two steps, at first, articles were selected by their titles and abstracts. When they contemplated the inclusion criteria, they were read in full text. The included articles were analyzed about their objectives, methods, results and conclusions.

Results

28 papers were found by the search strategy (Lilacs 2, Scielo 0, Pubmed 11 and Scopus 15), all published in a time interval from 1984 to 2015. Most of the articles were located in Scopus and Pubmed database (Figure 1).

After application of the inclusion criteria, two articles were included in the present study, published in 2010 and 2014. In Table 1, are listed the details of the literature review, including author, year of publication, filiation of the main author, country, study design, objectives, methods and results.

Discussion

Several studies, discussing visual impairment and hearing disorders associated to congenital toxoplasmosis, already mentioned the possibility of language disorders in congenital toxoplasmosis, to answer if communication disorders are associated with toxoplasmosis.

Methods

A literature review was performed by means of the databases Lilacs, Scielo, Pubmed, and Scopus, combining the following DeCS/MeSH keywords: “Congenital Toxoplasmosis” and “Speech”, “Toxoplasmosis Congenital” and “Language” (Portuguese and English language). These keywords were selected to find articles about the characteristics of language development in children with a history of toxoplasmosis, considering that more researches with focused on hearing issues.

Were considered as inclusion criteria:
1. Studies concerning speech and/or language disorders in congenital toxoplasmosis;

![Figure 1: Distribution of the results obtained in the four databases with keywords “Congenital Toxoplasmosis”, “Speech” and “Language”.

| Author, Year | Filiation of Main Author, Country | Type of Study | Objectives | Methods | Results |
|--------------|----------------------------------|--------------|------------|---------|---------|
| Resende, et al., 2010 [15] | University of Minas Gerais, Brazil | Cross-sectional Study | To describe the auditory and language outcomes of children with early diagnosis and treatment for congenital toxoplasmosis | All children diagnosed with congenital toxoplasmosis at the Minas Gerais State Neonatal Screening Program | 28 children (26.4%) with language disorders. In univariate analysis, visual impairment and/or ocular lesions were not associated with hearing and/or language impairments (p = 0.86 and p = 0.39). The language deficit was associated with hearing disorders as central dysfunction and conductive hearing loss. |
| Corrêa, et al., 2014 [16] | University of São Paulo, Brazil | Case Report | To describe the language evaluation and speech therapy intervention in a boy with history of congenital toxoplasmosis | A child, six-years-old, underwent 45 sessions of speech therapy, phonological, semantic, syntactic and pragmatic language, as well as psycholinguistics abilities were evaluated | It was observed improvement in all aspects evaluated, but the child maintained difficulties in communication, not expected for his age. |
velopment disorders [11-14]. However, was observed that there was no standardization of the use of tests to measure the monitoring of speech-language performance. The use standardized tests for the diagnosis of speech-language disorders allows the careful monitoring of each patient, as well as the sharing of results with the scientific community, aiming at better planning of health promotion actions as well as new proposals for speech-language therapy treatment.

This review of the literature found two studies about the language development in congenital toxoplasmosis children, which were recently published in 2010 and 2014, respectively, one originated in Lilacs and the other in Scopus. Both of them were performed in Brazil, it is a cross-sectional study and the other a case report.

The description of auditory and language outcomes in children with early diagnosis and treatment for congenital toxoplasmosis verified that 26.4% of the enrolled population showed language disorders [15]. This study used a standardized protocol to evaluate the language development, Language Development Assessment (ADL), which allows identifying impairments in language acquisition based on the scales for receptive and expressive language [16]. The authors classified the children with or without language disorders, but they did not describe which aspect of language development was more committed to congenital toxoplasmosis. In contrary to the initial hypothesis of this study, visual impairment and/or ocular lesions were not associated with hearing and/or language impairment, that is hearing and language outcomes occur independently of others sequelae from this infection. However, the small sample size might be a limiting factor for stronger conclusions.

In a case report, they observed that sessions of language intervention by a speech-pathologist provided an improvement in the phonological processes, in the abilities of denominations and of psycholinguistics. The most expressive gains were shown in the auditory-vocal abilities. Thus, speech therapy showed to be an important therapeutic tool to induce improvements in phonological, semantic, syntactic and pragmatic levels, but, despite these results, the child was still in lag considering the neuropsychological development of the chronological age [17].

The results of this research showed the importance to carry out further research on this topic, and that health professionals in attending a patient with a history of toxoplasmosis should consider the possibility of language alterations.

Conclusion

Congenital toxoplasmosis could be associated with communication disorders, specifically with language disorders, however, our search strategy found only a few studies with low and moderate level of evidence. New research should be realized on this subject, clarifying the associations between language and congenital toxoplasmosis, using the diversity of standardized protocols to elucidate the details considering all levels of expressive and receptive language. In this way, it will be possible to trace the profile of language changes expected for individuals with congenital toxoplasmosis.

Financing
None.

Conflict of Interests
None.

References

1. McLeod R, Boyer K, Karrison T, Kasza K, Swisher C, et al (2006) Outcome of treatment for congenital toxoplasmosis, 1981-2004: The National collaborative Chicago-based, congenital toxoplasmosis study. Clin Infect Dis 42: 1383-1394.
2. Reis MM, Tessaro MM, D’Azevedo PA (2006) Toxoplasma-IgM and IgG-avidity in single samples from areas with a high infection rate can determine the risk of mother-to-child transmission. Rev Inst Med Trop Sao Paulo 48: 93-98.
3. Saleh MMS, AL-Shami AH, Qaed AA (2010) Seroprevalence and incidence of Toxoplasma gondii among apparently healthy and visually or hearing disabled children in Taiz City, Yemen. Korean J Parasitol 48: 71-73.
4. Diniz EMA (2006) O diagnóstico da toxoplasmose na gestante e no recém-nascido. Pediatrica 28: 222-225.
5. Roizen N, Kasza K, Karrison T, Mets M, Noble AG, et al. (2006) Impact of visual impairment on measures of cognitive function for children with congenital toxoplasmosis: Implications for compensatory intervention strategies. Pediatrics 118: e379-e390.
6. Azevedo MF, Silva AAM, Guedes APS, Meneguello J, Caneschi S, et al. (2000) Achados audiológicos na toxoplasmose congênita. Acta AWHO 19: 96-101.
7. Brown ED, Chau JK, Atashband S, Westerber BD, Kozak FK (2009) A systematic review of neonatal toxoplasmosis exposure and sensorineural hearing loss. Int J Pediatr Otorhinolaryngol 73: 707-711.
8. Silva DP, Lopez PS, Ribeiro GE, Luna MO, Lyra JC, et al. (2015) The importance of retesting the hearing screening as an indicator of the real early hearing disorder. Braz J Otorhinolaryngol 81: 363-367.
9. Vos B, Senterre C, Lagasse R, SurdiScreen Group, Levêque A (2015) Newborn hearing screening programme in Belgium: A consensus recommendation on risk factors. BMC Pediatr 15: 160.
10. Joint Committee on Infant Hearing, Muse C, Harrison J, Yoshinaga-Itano C, Grimes A, et al. (2013) Supplement to the JCIH 2007 position statement: Principles and guidelines for early intervention after confirmation that a child is deaf or hard of hearing. Pediatrics 131: e1324-e1349.
11. Andersen ES, Dunlea A, Kekelis LS (1993) The impact of input: Language acquisition in the visually impaired. First Language 13: 23-49.
12. Morash VS, McKerracher A (2017) Low reliability of sighted-normed verbal assessment scores when administered to children with visual impairments. Psychol Assess 29: 343-348.
13. Ching TYC, Dillon H, Button L, Seeto M, Van Buynder P, et al. (2017) Age at intervention for permanent hearing loss and 5-year language outcomes. Pediatrics 140.

14. Tokgöz-Yılmaz S, Özcebe E, Türkyılmaz MD, Köse A, Sennaroğlu G, et al. (2013) Evaluation of hearing and speech-language in preschool children: How important, why we should perform? Turk J Pediatr 55: 606-611.

15. Resende LM, Andrade GMQ, Azevedo MF, Perissinoto, Vieira ABC (2010) Congenital toxoplasmosis: Auditory and language outcomes in early diagnosed and treated children. Sci Med 20: 13-19.

16. Menezes MLN (2004) Avaliação do desenvolvimento da linguagem (ADL) 67.

17. Corrêa CC, José MR, Fidêncio CLD, Nicolielo AP, Lopes-Herrera SA, et al. (2014) Intervenção fonoaudiológica em um caso de toxoplasmose congênita. Rev Disturb Comun 26: 287-294.