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Analysis of voice-related quality of life in children

Análise da qualidade de vida relacionada à voz na população infantil

Keywords

Speech-language Therapy
Dysphonia
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Descritores

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ABSTRACT

Purpose: To analyze the voice-related quality of life of children with dysphonia and without voice disorders in a population sample of Belo Horizonte, Minas Gerais state, Brazil. **Methods:** Study participants were 420 children, 98 with dysphonia and 322 without voice disorders, aged six to 10 years, enrolled in public and private elementary schools. The random sample was divided into two groups: dysphonic children (study group - SG) and children without vocal disorders (control group - CG). Assessment of the children's voices was performed by four voice-expert speech-language pathologists with more than 10 years of experience in this field, using the auditory-perceptual parameter of overall severity of dysphonia graded in four points. The results were analyzed based on the evaluation of children's voices conducted by the speech-language pathologist that presented the highest intra-rater agreement, using the *Kappa* statistical method. The Pediatric Voice-related Quality-of-Life (PVRQoL) survey was answered by the children's parents/legal guardians. Descriptive statistical analysis of the data was conducted using the Student's *t*-Test. **Results:** Of the 420 children evaluated, 98 were dysphonic (SG) and 322 presented no voice alteration (CG). Analysis of the three PVRQoL scores (total, physical, and social-emotional) showed no difference between the groups tested (SG and CG). No difference was observed in PVRQoL values regarding the degree of vocal deviation. **Conclusion:** Dysphonia does not have a negative impact on the voice-related quality of life of children considering the response of secondary informants.

RESUMO

Objetivo: analisar o impacto na qualidade de vida relacionado à voz de crianças disfônicas e sem alteração vocal, com uma amostra populacional da grande Belo Horizonte – Minas Gerais. **Método:** participaram do estudo 420 indivíduos na faixa etária de seis a 10 anos de idade, cursando o ensino fundamental nas escolas públicas e privadas da cidade. A amostragem foi aleatória, e as crianças, divididas em dois grupos: disfônicas (GD) e sem alteração vocal (G0). A avaliação das vozes das crianças foi realizada por quatro fonoaudiólogas especialistas em voz e com experiência de mais de 10 anos nesta análise, utilizando o parâmetro perceptivo-auditivo de grau geral de disfonia, graduado em quatro pontos. Foi considerada, para a análise dos resultados, a avaliação das vozes das crianças realizada pela fonoaudióloga que apresentou maior concordância intra-avaliador, analisada pela estatística *Kappa*. O protocolo Qualidade de Vida em Voz Pediátrico (QVV-P) foi respondido pelos responsáveis das crianças. Para análise inferencial, foi realizada a análise descritiva dos dados e utilizado o Teste-T de Student. **Resultados:** das crianças avaliadas, 98 eram disfônicas (GD) e 322 não tinham alteração vocal (G0). A análise dos três Escores do QVV-P não apresentou diferença para os grupos testados (GD e G0). Também não foi observada diferença nos valores do QVV-P, considerando-se o grau de desvio vocal. **Conclusão:** crianças disfônicas não apresentam impacto negativo na qualidade de vida relacionada à voz, considerando-se a resposta do informante secundário.

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INTRODUCTION

Pediatric dysphonia is characterized as any difficulty that hinders or prevents children from producing their natural voice. Vocal changes during childhood negatively interfere with the social, affective, and emotional development of children⁽¹⁾. The vocal problem on the life of children may be underestimated, considering that they do not present more comprehensive symptoms involving other systems⁽²⁾. This may lead to delays in the demand for intervention, which in turn will result in chronic voice disorder with potential to limit the school life and the social and future professional opportunities of these children⁽²⁾. Therefore, early diagnosis and treatment of pediatric vocal disorders are extremely important so that they do not interfere with social activities and, consequently, with adulthood⁽³⁾.

Prevalence of pediatric dysphonia in schools varies from 6 to 23.4%, reaching its peak in children aged five to 10 years⁽⁴⁾. When untreated, it can influence the development of adequate communicative capacity in adult life.

There are few instruments available to assess the impact of dysphonia on quality of life in the pediatric speech-language therapy clinical practice. The specific scientific literature describes three parental assessment tools related to the voice, namely: Pediatric Voice Outcome Survey (PVOS), Pediatric Voice Handicap Index (PVHI), and Pediatric Voice-related Quality-of-Life (PVRQoL) protocol⁽⁵⁾.

The use of voice assessment tools applied to parents of children and adolescents is important because they have the ability to understand the context of the problem and, from this perception, seek specialized assistance for their children⁽⁶⁾. Furthermore, it has been observed that data obtained in this type of evaluation contribute to verify the damage caused by vocal disorders in the various social contexts of the individual, also allowing more individualized treatment⁽⁷⁾.

The Pediatric Voice-related Quality-of-Life (PVRQoL) survey was validated for Brazilian Portuguese (*Qualidade de Vida em Voz Pediátrica – QVV-P*)⁽⁸⁾. This questionnaire is applicable to parents/guardians of children and adolescents from two to 18 years old and was developed to evaluate the impact of voice on quality of life, as well as the outcome of treatments for vocal disorders. The protocol is composed of ten self-explanatory questions whose scores are calculated by standard formula and can be easily and objectively interpreted: the lower the total score, the poorer the individual's quality of life, and the domain that shows the lowest score is the main responsible for the depreciation of the voice-related quality of life. Therefore, the *QVV-P* is a practical, brief instrument, of easy use, calculation and interpretation, which complies with the requirements for clinical application⁽⁸⁾.

A study that investigated the impact of dysphonia on the voice-related quality of life of children shows that vocal disorders and the presence of voice-related complaints affect the quality of life of this population, with greater losses to individuals aged six years and older⁽⁸⁾. The research also reports that vocal complaints interfere with the vocal quality of children and

adolescents, and that the older they are, the worse their quality of life regarding voice-related aspects⁽⁸⁾. There are few studies in the literature analyzing the voice-related quality of life in the pediatric population, and none of them used a population-based sample of epidemiological character.

The objective of the present study was to analyze the voice-related quality of life of children with dysphonia and without voice disorders in a population sample of Belo Horizonte, Minas Gerais state, Brazil.

METHODS

This epidemiological, observational study of cross-sectional design was approved by the Research Ethics Committee of the aforementioned Institution under process number 22174813.1.0000.5149.

The study sample included 420 children, aged six to 10 years, enrolled in public and private elementary schools of Belo Horizonte, Minas Gerais state, Brazil, from 2013 to 2015. The choice of this age range is justified by the fact that there are no significant differences between the larynx of boys and girls in this age period⁽⁹⁾.

The municipality of Belo Horizonte is composed of nine districts (*Barreiro, Centro-Sul, Leste, Nordeste, Noroeste, Norte, Oeste, Pampulha, and Venda Nova*). The city has 680 public and private schools, and 534 of them hold students aged six to 10 years in their elementary courses. According to data from the Secretary of Education of Minas Gerais State, there were 131,987 students enrolled in the elementary schools of Belo Horizonte in 2012.

Sample size calculation was defined by means of stratified random sampling according to district and schools, using 95% confidence level, 3% margin of error, and 11% prevalence for the variable of interest⁽¹⁰⁾. Based on this information, sample size was calculated using the EpiInfo-StatCalc 6.0 software, reaching a sample of 420 children. All nine districts participated in the study and the number of children selected within each district was proportional to that of the population with respect to type of school (public or private) and age.

Two schools, one public and one private, were drawn within each district. When the number of observations collected did not meet the necessary minimum, another school of the same type was drawn to continue the selection until reaching the number needed to complete it. Thus 19 schools were visited: nine private and 10 public. In each school, the children were drawn according to sample size calculation (Table 1).

One hundred twenty-two individuals who did not agree to participate in the recordings were excluded from the study. Children with unanswered or incomplete questionnaires, those whose parents/guardians did not sign the Informed Consent Form, and those with signs of stuffy and/or runny nose, cough, or the flu on the day of the recording were also excluded from the study sample. In these cases, the children were replaced, by lot, by others from the same school and age group, keeping the total sample size.

Table 1. Number of students selected from public and private elementary schools according to district in Belo Horizonte, Minas Gerais state, Brazil

District	Sample Size		Total
	Private Elementary School	Public Elementary School	
Barreiro	10	47	57
Centro-Sul	26	23	49
Leste	13	34	47
Nordeste	12	37	49
Noroeste	13	38	51
Norte	8	32	40
Oeste	13	28	41
Pampulha	17	32	49
Venda Nova	5	32	37
Total	117	303	420

The present study was conducted in two phases. In the first phase, the schools were drawn and invited to participate in the research. Next, a visit was made to each school to explain the conditions of the research and request authorization for its realization. After permission from the schools, the following material was sent to the children's parents/guardians: 1. An explanatory letter on the research with the telephone numbers of the researchers to clarify any possible doubts; 2. An invitation to participate in the study and an Informed Consent Form (ICF) to be signed by the parents/guardians; 3. The Pediatric Voice-related Quality-of-Life (PVRQoL) protocol validated to Brazilian Portuguese (*QVV-P*)⁽⁸⁾. The questionnaire presents ten self-explanatory questions whose scores are calculated in three domains: total, physical, and social-emotional⁽⁸⁾. Parents who agreed to participate in the study responded to the material and returned it to the school principal within one week.

In the second phase, the children who agreed to participate in the research had their voices recorded. Prior to the recording, the researcher verified whether the child presented signs of stuffy and/or runny nose, cough, or the flu, and whether the parent/guardian had reported any illness in the questionnaire at that time. The children with the previously mentioned symptoms had their voices recorded 20 days later, when they had already recovered. The vocal recordings were collected in a silent room provided by the school using an omnidirectional, cardioid microphone (Sennheiser E815) positioned 10 cm away from the child's mouth, directly connected to a portable personal computer (Toshiba Satellite 1800/1850) and sound card (Soundblaster P), using the Sonic Foundry Soundforge 6.0 software. The voices were recorded individually in the room and the children were instructed to perform an automatic speech (counting from one to 10).

Evaluation of the children's voices was performed by four speech-language therapists with expertise in voice and more than 10 years of experience in this analysis, using the auditory-perceptual overall severity of dysphonia (*G*)⁽¹⁰⁾, graded on a four-point Likert scale: 0 = absent; 1 = mild; 2 = moderate; and 3 = severe. During the evaluations, all the examiners considered the peculiarities of the infantile voice, such as presence of discrete instability and

breathiness during the emissions⁽¹¹⁾. When performing the auditory-perceptual analysis, the speech-language therapists listened to a stimulus identified as anchor (vocal quality without change, selected by the researchers by consensus) to each group of 10 voices. The vocal samples were listened to using a bilateral stereo headphone (Nipponic).

To calculate the intra-rater agreement, 10% of the sample of the voices was duplicated at random. The following values of intra-rater concordance were found: 0.37, 0.49, 0.58, and 0.75. The assessment of the speech-language pathologist that presented the highest intra-rater agreement (75%), according to the Kappa statistics, was considered for analysis of the results, and presence of dysphonia was determined by the presence of vocal disorder ranging from one (mild) to three (severe).

Of all study participants, 223 (53.1%) were female and 197 (46.9%) were male, with mean age of 8.35 years. The sample was divided into two groups: children with dysphonia (SG) and children without vocal disorders (CG). Of the 420 participating children, 98 (23.3%) were dysphonic and 322 (76.7%) presented no vocal disorder. In the study group (SG), there were 42 males (42.8%) and 56 females (57.2%) with mean age of 8.28 years, whereas the control group comprised 179 girls (55.6%) and 143 boys (44.4%) with mean age of 8.37 years. No statistically significant difference was found between the groups regarding gender ($p=0.55$) and age ($p=1.00$).

Descriptive analysis was conducted to analyze the data statistically. The Student's *t*-test was used to compare the mean total, physical, and social-emotional scores for the *QVV-P* of dysphonic and non-dysphonic children, as well as the mean age between the SG and CG. The Chi-square test was used to analyze the measure of association between the gender variable of both groups. All statistical analyses were performed using the SPSS Statistic Base 22.0 (IBM - USA).

RESULTS

Of the 98 dysphonic children that composed the study sample, 62.3% ($n=61$) presented mild, 37.7% ($n=37$) had moderate, and none presented severe grade of severity.

Analysis of the three scores (total, physical, and social-emotional) of the validated version of the PVRQoL to Brazilian Portuguese (*QVV-P*) showed no difference between the tested groups (SG and CG) (Table 2).

As for the analysis of the *QVV-P* three scores between the groups Control - without voice disorders (CG), Study 1 - with mild dysphonia (SG1), and Study 2 - with moderate dysphonia (SG2), no difference was observed between the groups (Table 3).

DISCUSSION

Research on the voice of pediatric population has used different methodological criteria to determine the presence/absence of dysphonia. Some studies have considered the results of auditory-perceptual assessment⁽¹¹⁻¹⁴⁾, some have considered parents' complaints about their children's voices^(8,11); whereas others have used the laryngeal evaluation^(4,15).

Table 2. Total, physical, and social-emotional average scores of the Pediatric Voice-related Quality-of-Life survey validated to Brazilian Portuguese (QVV-P) of participants with dysphonia (SG) and without voice disorders (CG)

Variable	Group	n	Minimum	Maximum	Mean	Standard Deviation	p value
Total	CG	322	10	100	95.17	10.81	0.626
	SG	98	55	100	95.31	8.67	
Physical	CG	322	29	100	92.89	9.67	0.666
	SG	98	41.6	100	94.28	14.26	
Social-emotional	CG	322	25	100	97.63	9.49	0.444
	CG	98	62	100	97.87	7.08	

Student's t-Test

Table 3. Comparison between the total, physical, and social-emotional average scores of the Pediatric Voice-related Quality-of-Life survey validated to Brazilian Portuguese (QVV-P) between the groups Control - without voice disorders (CG), Study 1 - with mild dysphonia (SG1), and Study 2 - with moderate dysphonia (SG2)

Variable	Group	n	Minimum	Maximum	Mean	Standard Deviation	p value
Total	CG	322	10	100	95.17	10.81	CGxSG1-0.20
	SG1	61	65	100	96.02	7.83	CGxSG2-0.44
	SG2	37	55	100	94.12	9.91	SG1xSG2-0.58
Physical	CG	322	29	100	92.89	9.67	CGxSG1-0.65
	SG1	61	66.6	100	95.19	8.45	CGxSG2-0.81
	SG2	37	41.6	100	92.77	11.36	SG1xSG2-0.18
Social-emotional	CG	322	25	100	97.63	9.49	CGxSG1-0.69
	SG1	61	62.5	100	98.25	6.67	CGxSG2-0.66
	SG2	37	62.5	100	97.23	7.76	SG1xSG2-0.18

Student's t-Test.

Caption: CGxSG1 - Comparison between CG and SG1; CGxSG2 - Comparison between CG and SG2; SG1xSG2 - Comparison between SG1 and SG2

Considering the multidimensional nature of the voice function, the Committee on Phoniatrics of the European Laryngological Society suggests that vocal assessment include different approaches, such as auditory-perception, videostroboscopy, acoustics, aerodynamics, and subjective rating by the patient⁽¹⁶⁾. However, epidemiological, population-based studies depend on the evaluation of a large number of individuals, and a multidimensional evaluation of the voice in studies with this type of design is not methodologically feasible.

Some studies show that the prevalence of pediatric dysphonia, evaluated by auditory-perceptual analysis, varies from 6 to 37.14%⁽¹¹⁻¹⁴⁾. These data corroborate the results obtained in this research, which showed prevalence of childhood dysphonia of 23.3%. Conceivably, the auditory-perceptual assessment was an adequate evaluation tool to define the presence/absence of dysphonia in the pediatric population herein investigated.

The results show that dysphonia does not have a negative impact on quality of life, regardless of whether the grade of vocal deviation is mild or moderate. Parents of children and adolescents can measure the impact of voice disorder on their children's quality of life using the PVRQoL survey⁽⁶⁾ - a valid instrument composed of ten questions divided into two domains: physical and socio-emotional that can sensitively identify the impact of vocal alteration⁽⁵⁾. Research has reported that children without voice disorders present PVRQoL scores close to 100⁽¹⁷⁾ - not showing negative impact on quality of life, whereas children with laryngeal alterations present reduced scores for all domains

compared with those of children without laryngeal and vocal alterations, demonstrating that vocal deviation interferes with quality of life⁽¹⁷⁾. Such data differ from those of the present study, which did not reveal negative impact on the voice-related quality of life in children with vocal disorders. It is worth noting that most studies that analyzed pediatric voice-related quality of life were conducted with a convenience sample^(6,8), and not with a population-based, probabilistic sample as in the present study. When research is conducted with non-probabilistic samples, such as those of convenience, there is the possibility of sample bias, and the results may not satisfactorily represent the whole population studied. Probabilistic samples have the advantage of presenting more general results and greater external validity⁽¹⁸⁾.

Another aspect to be considered is that the *QVV-P* is a proxy questionnaire answered by a secondary informant. The *QVV-P* presents ten questions in which parents/guardians should inform the conditions of their children's voice in the past two weeks, considering both problem severity and its frequency of occurrence⁽⁸⁾.

Secondary informants are used in epidemiological studies when the population studied, for any reason, is unable to report the requested data⁽¹⁹⁾. It is worth noting that data generated in interviews with secondary informants are always an approximation of the information provided by the primary informant, as implicit in the notion of substitution, proxy, or secondary information⁽²⁰⁾. In the present study, due to the young age of the participating children, the parents/guardians were responsible for answering

the *QVV-P* questionnaire. Because the data were obtained from secondary informants, this might also have been a factor that influenced the results found in this work.

Pediatric vocal deviations are often not noticed by parents/guardians and the children themselves because they are usually confused with symptoms of infections of the upper airways or with regular quality of voice⁽²¹⁾. In addition, a study shows that parents lack information that allows them to identify vocal disorders in their children and, consequently, these are often not perceived⁽²²⁾. Voice disorders in children are not always valued by parents in infancy because they become accustomed to the vocal characteristics of their children. Although parents of dysphonic children can identify abusive vocal behaviors, they have difficulty perceiving vocal changes in their children⁽²³⁾.

The results of this study can also be explained by the fact that, quite often, parents and educators are more attentive in identifying problems in children's speech and language at the expense of voice alterations. If they can understand the speech of the child, they are not concerned about voice quality, deviations in loudness or others, unless the vocal alteration is very severe⁽²³⁾.

The awareness of parents about the vocal aspects expected for childhood make them important allies in the early identification of bad vocal habits in children and in the search for solutions to voice deviations⁽²⁾.

A pilot study that analyzed the voice-related quality of life applying the PVRQoL survey answered by the children themselves and their parents shows that children present important information on their own voice-related quality of life, and that parents tend not to value the negative impacts of voice on the quality of life of their children, when the results of the physical domain are analyzed⁽²⁴⁾.

Another study that investigated the concordance between parents' and children's responses regarding health-related quality of life found moderate-to-low agreement for children with better health conditions. When children present poorer health conditions, as in chronic illness cases, the parents' perspectives on their child's quality of life may add valuable information and, in these cases, agreement between parents' and children's responses is higher⁽²⁵⁾. This information is consistent with the findings of a systematic review of the literature⁽²⁶⁾ which examined whether parents can assess the health-related quality of life of their children, and verified better response agreement between parents and chronically ill children compared with that between parents and healthy children; no effect was found for the age or gender variables.

The Pediatric Voice-related Quality-of-Life (PVRQoL) protocol⁽⁸⁾ was chosen to conduct this study because it presents self-explanatory questions and it was validated to Brazilian Portuguese (*QVV-P*). The literature⁽²⁷⁾ emphasizes that the use of validated questionnaires - therefore previously tested instruments - are important in epidemiological research because they allow comparative studies and quality of results⁽²⁶⁾.

Studies conducted with population-based samples investigating the impact of dysphonia on pediatric voice-related quality of life, using protocols answered by the children themselves, are

important to analyze the real impact of this disorder on the life of children with vocal alterations.

CONCLUSION

Dysphonia does not have a negative impact on the voice-related quality of life of children considering the response of secondary informants.

REFERENCES

1. Reynolds V, Buckland A, Bailey J, Lipscombe J, Nathan E, Vijayasekaran S, et al. Objective assessment of pediatric voice disorders with the acoustic voice quality index. *J Voice*. 2012;26(5):672.e1-7. PMID:22632794. <http://dx.doi.org/10.1016/j.jvoice.2012.02.002>.
2. Connor NP, Cohen SB, Theis SM, Thibeault SL, Heatley DG, Bless DM. Attitudes of children with dysphonia. *J Voice*. 2008;22(2):197-209. PMID:17512168. <http://dx.doi.org/10.1016/j.jvoice.2006.09.005>.
3. Ribeiro VV, Leite APD, Alencar BLF, Bail DI, Bagarollo MF. Avaliação vocal de crianças disfônicas pré e pós intervenção fonoaudiológica em grupo: estudo de caso. *Rev CEFAC*. 2013;15(2):485-94. <http://dx.doi.org/10.1590/S1516-18462012005000056>.
4. Melo ECM, Mattioli FM, Brasil OCO, Behlau M, Pitaluga ACA, Melo DM. Disfonia infantil: aspectos epidemiológicos. *Rev Bras Otorrinolaringol*. 2001;67(6):804-7. <http://dx.doi.org/10.1590/S0034-72992001000600008>.
5. Verduyck I, Remacle M, Jamart J, Benderitter C, Morsomme D. Voice related complaints in the pediatric population. *J Voice*. 2011;25(3):373-80. PMID:20359863. <http://dx.doi.org/10.1016/j.jvoice.2009.11.008>.
6. Boseley ME, Cunningham MJ, Volk MS, Hartnick CJ. Validation of the pediatric voice-related quality-of-life survey. *Arch Otolaryngol Head Neck Surg*. 2006;132(7):717-20. PMID:16847178. <http://dx.doi.org/10.1001/archotol.132.7.717>.
7. Gasparini G, Behlau M. Quality of life: validation of the Brazilian Version of the Voice-Related Quality of Life (V-RQOL) Measure. *J Voice*. 2009;23(1):76-81. PMID:17628396. <http://dx.doi.org/10.1016/j.jvoice.2007.04.005>.
8. Ribeiro LL, Paula KM, Behlau M. Qualidade de vida em Voz na População Pediátrica: validação da versão brasileira do Protocolo Qualidade de Vida em Voz Pediátrico. *CoDAS*. 2014;26(1):87-95. PMID:24714864.
9. Behlau M, Madazzio G, Feijó D, Azevedo R, Gielow I, Rehder MI. *Voz: o livro do especialista*. Rio de Janeiro: Revinter; 2005. vol. 2, p. 53-528.
10. Hirano M. *Clinical examination of voice*. New York: Springer Verlag; 1981. p. 81-4.
11. Tavares ELM, Brasolotto A, Santana MF, Padovan CA, Martins RHG. Epidemiological study of dysphonia in 4-12 year-old children. *Braz J Otorhinolaryngol*. 2011;77(6):736-46. PMID:22183280. <http://dx.doi.org/10.1590/S1808-86942011000600010>.
12. Oliveira RC, Teixeira LC, Gama ACC, Medeiros AM. Análise perceptivo-auditiva, acústica e autopercepção vocal em crianças. *J Soc Bras Fonoaudiol*. 2011;23(2):158-63. PMID:21829932.
13. Carding PA, Roulstone S, Northstone K. The prevalence of childhood dysphonia: a cross-sectional study. *J Voice*. 2006;20(4):623-30. PMID:16360302. <http://dx.doi.org/10.1016/j.jvoice.2005.07.004>.

14. Simões M, Rosa AH, Soares JC, Ribeiro LR, Imamura VM, Bitar ML. Alteração vocal em crianças que frequentam creche. *Pro Fono*. 2002;14(3):343-50.
15. Mortensen M, Schaberg M, Woo P. Diagnostic Contributions of Videolaryngostroboscopy in the Pediatric Population. *Arch Otolaryngol Head Neck Surg*. 2010;136(1):75-9. PMID:20083783. <http://dx.doi.org/10.1001/archoto.2009.209>.
16. Dejonckere PH, Bradley P, Clemente P, Cornut G, Crevier-Buchmanet L, Friedrich G, et al. A basic protocol for functional assessment of voice pathology, especially for investigating the efficacy of (phonosurgical) treatments and evaluating new assessment techniques. Guideline elaborated by the Committee on Phoniatrics of the European Laryngological Society (ELS). *Eur Arch Otorhinolaryngol*. 2001;258(2):77-82. PMID:11307610. <http://dx.doi.org/10.1007/s004050000299>.
17. Merati AL, Keppel KL, Braun NM, Blumin JH, Kerschner JE. Pediatric Voice-Related Quality of Life: findings in healthy children and in common laryngeal disorders. *Ann Otol Rhinol Laryngol*. 2008;117(4):259-62. PMID:18478834. <http://dx.doi.org/10.1177/000348940811700404>.
18. Miot H. Sample size in clinical and experimental trials. *J Vasc Bras*. 2011;10(4)
19. Shields M. Proxy reporting in the National Population Health Survey. *Health Rep*. 2000;12(1):21-39. PMID:11565112.
20. Jardim R, Barreto SR, Giatti L. Confiabilidade das informações obtidas de informante secundário em inquéritos de saúde. *Cad Saude Publica*. 2010;26(8):1537-48. PMID:21229213. <http://dx.doi.org/10.1590/S0102-311X2010000800008>.
21. Teixeira MZM, Trezza EMC, Behlau M. Opinião dos pais sobre a voz de seus filhos de 5 a 12 anos. *Rev Paul Pediatr*. 2003;21(2):68-75.
22. Wilson DK. Voice problem of children. 2nd ed. Baltimore: Waverly Press; 1979. 238 p.
23. Paixão CLB, Siqueira LTD, Coelho AC, Brasolotto AG, Silverio KCA. Há concordância entre pais e filhos quanto a seus comportamentos vocais? *Distúrbios Comun*. 2015;27(4):750-9.
24. Cohen W, Wynne DMG. Parent and child responses to the Pediatric Voice-Related Quality-of-Life Questionnaire. *J Voice*. 2015;29(3):299-303. PMID:25619466. <http://dx.doi.org/10.1016/j.jvoice.2014.08.004>.
25. Rajmil L, López AR, Aguilà SL, Alonso J. Parent-child agreement on Health-Related Quality of Life (HRQOL): a longitudinal study. *Health Qual Life Outcomes*. 2013;11(101):312-22. PMID:23786901.
26. Christine E, Rachel M. Can parents rate their child's health-related quality of life? Results of a systematic review. *Qual Life Res*. 2001;10(4):347-57. PMID:11763247. <http://dx.doi.org/10.1023/A:1012253723272>.
27. Waldman EA, Novaes MD, Albuquerque MFM, Latorre MRDO, Ribeiro MCSA, Vasconcellos M, et al. Inquéritos populacionais: aspectos metodológicos, operacionais e éticos. *Rev Bras Epidemiol*. 2008;11(1):168-79. <http://dx.doi.org/10.1590/S1415-790X2008000500018>.

Author contributions

BOS was responsible for the data analysis and writing of the manuscript; ACCG and AALF supervised the project design and writing of the manuscript; RBN was responsible for the data collection, project design, and writing of the manuscript.