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# Quality of life in adult cochlear implant users

## Qualidade de vida em adultos usuários de implante coclear

### ABSTRACT

**Objective:** To evaluate the quality of life (QOL) of adult cochlear implant users (CI) and compare it with the QOL of adults with normal hearing; and study the influence of the variables socioeconomic status, education, age at assessment, auditory sensory deprivation time, device usage time and performance in auditory speech perception tests in the QOL of adult cochlear implant users. **Design:** The QOL was assessed using the World Health Organization Quality of Life (WHOQOL-BREF) generic assessment questionnaire. **Study sample:** Seventy adult CI users formed the experimental group (EG) and 50 adults with normal hearing formed the control group (CG). **Results:** The EG scores were close to the maximum score in satisfactory quality of life for all domains of the WHOQOL-BREF and there were similar results between the EG and CG. The variables age at assessment, duration of auditory sensory deprivation, duration of CI use and performance in auditory speech perception did not influence the results of the QOL of adult cochlear implant users. **Conclusion:** Evaluating the QOL should be a concern of interdisciplinary teams in CI for an intervention with humanized care.

### RESUMO

**Objetivo:** Avaliar a qualidade de vida (QV) de adultos usuários de implante coclear (IC), comparando-a com a QV de adultos com audição normal, além de estudar a influência, na QV dos adultos usuários de IC, destas variáveis: nível socioeconômico, escolaridade, idade na avaliação, tempo de privação sensorial auditiva, tempo de uso do dispositivo e desempenho nos testes de percepção auditiva da fala. **Desenho:** A QV foi avaliada segundo o questionário genérico de avaliação *World Health Organization Quality of Life* (WHOQOL-BREF). **Amostra do estudo:** Setenta adultos usuários de IC formaram o grupo experimental (GE) e 50 adultos com audição normal fizeram parte do grupo controle (GC). **Resultados:** O GE apresentou escores muito próximos à pontuação máxima que representa QV satisfatória para todos os domínios do questionário WHOQOL-BREF e houve resultados semelhantes entre os GE e GC. Na avaliação, as variáveis idade, tempo de privação sensorial auditiva, tempo de uso do IC e desempenho em percepção auditiva da fala não influenciaram os resultados de QV de adultos usuários de IC. **Conclusão:** Avaliar a QV deve ser uma preocupação das equipes interdisciplinares em IC para uma intervenção com um cuidado humanizado.

Study carried out at Centro de Pesquisas Audiológicas/Seção de Implante Coclear do Hospital de Reabilitação de Anomalias Craniofaciais da Universidade de São Paulo – USP - Bauru (SP), Brazil.

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## INTRODUCTION

Hearing loss in adulthood is a major difficulty in communication and may cause social isolation, depression and negative feelings that can seriously affect personality<sup>(1,2)</sup>. This framework worsens the hearing loss in a severe and profound degree, which impact on communication is more intense and negative, possibly affecting personal relationships and even lifestyle<sup>(2)</sup>.

The benefits of CI regarding auditory speech perception and the implanted person communication have been widely presented<sup>(3,4)</sup>. Thus, the focus of research in cochlear implants was naturally directed to other areas of research such as evaluating the impact of this device in people's lives, considering the self-esteem, daily activities and social functions, which account for the quality of life<sup>(5)</sup>.

The contribution of studies of this nature is reflected along the CI in interdisciplinary teams, in order to present the results of this intervention on the quality of life of this device users measured methodologically. These data assist and/or confirm the decisions on the indication of CI, especially in elderly people<sup>(6,7)</sup>.

Assessing the QOL is a complex task due to subjectivity. The Quality of Life Group of the Division of Mental Health of the World Health Organization (WHO) defined quality of life as "the individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns<sup>(8)</sup>". Thus, many questionnaires assessing health related quality of life are being developed, including generic instruments such as the Medical Outcomes Study Short-Form 36 (SF-36), and Sickness Impact Profile (SIP), and also specific instruments such as the Cochlear Implant Questionnaire (NCIQ) developed and validated for CI users<sup>(9)</sup>. The application of a questionnaire aims to perform intra and interpersonal comparisons, standardize different views and define the best therapeutic approaches<sup>(10)</sup>.

The search for an instrument that evaluates the quality of life in a broad perspective led the WHO to develop a multicenter project with a scale within a transcultural perspective to measure the quality of life in adults. First, a questionnaire with 100 questions known as WHOQOL-100<sup>(11)</sup> was developed; followed by a shortened version, the WHOQOL-BREF<sup>(12)</sup> due to the need for shorter instruments demanding less time to be filled but with satisfactory psychometric characteristics.

The psychometric properties of the WHOQOL-BREF were assessed in adults from 23 countries and the analyses indicated the instrument presents excellent psychometric properties<sup>(13)</sup>. The WHOQOL-BREF is one of the most appropriate instruments to assess quality of life as it considers the subjectivity and the multidimensionality in people's lives<sup>(14)</sup>.

Research shows that the cochlear implant (CI) has been an effective clinical resource to improve these individuals quality of life (QOL)<sup>(5,6)</sup>, in a study that assess a long-term QOL of 32 cochlear implant users with the instrument SF-36 before surgery, a year and 10 years after the CI<sup>(15)</sup>. These authors found statistically significant difference from preoperative to a year of use in three domains of the instrument (Vitality, Social Functioning, and Mental Health), from a year to 10 years in two domains (Physical aspects and Vitality) and from preoperative

to 10 years of use in one domain (Pain). Once the possibility of a functional hearing brought by the IC to individuals with severe to profound hearing loss is proven, the question becomes how much the QOL of these individuals can get closer or equal to the QOL of a person with normal hearing.

This study aimed to evaluate the quality of life (QOL) of adult cochlear implant users (CI) and compare it with the QOL of adults with normal hearing and study the influence of the variables: socioeconomic status, education, age at assessment, auditory sensory deprivation time, device usage time and performance in auditory speech perception tests in the QOL of adult cochlear implant users.

## METHOD

This study was approved by the Ethics Committee under number 270/2011.

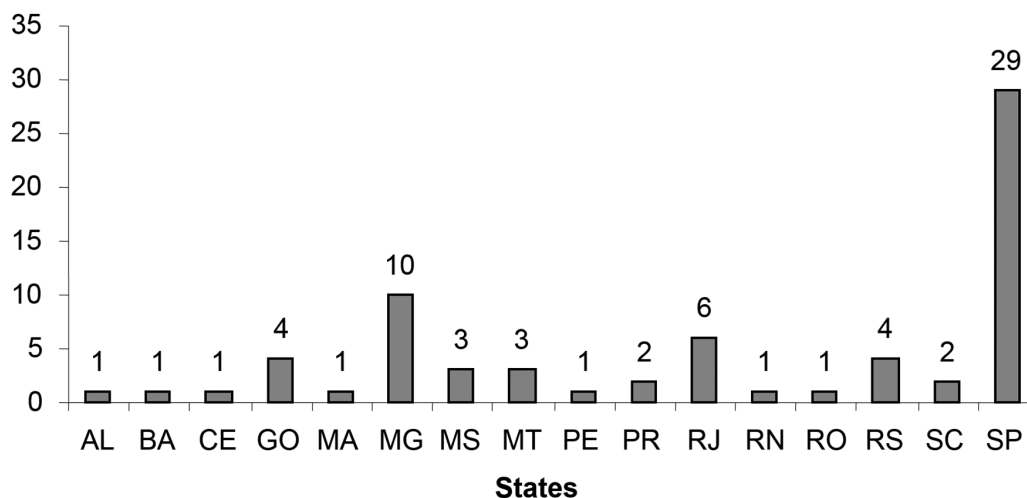
The experimental group (EG) consisted of 70 adults (39 men and 31 women) from several Brazilian states (Figure 1) with post-lingual hearing loss who underwent cochlear implant surgery in adulthood, mean age of 47 years (minimum 23 years and maximum of 75 years were evaluated).

Chart 1 shows gender, marital status, level of education, socioeconomic status, type of electrode insertion and performance in tests of speech perception, studied as variables. The control group (CG) consisted of 50 adults (11 men and 39 women) living within the state of São Paulo with normal hearing according to the classification proposed by the WHO<sup>(16)</sup>, mean age 43 years (age minimum 21 years and maximum 70 years). Chart1 presents the educational and socioeconomic levels of the CG. Table 1 presents the results of the EG regarding the mean time of hearing sensory deprivation, mean duration of CI use and mean age at surgery, also studied as variables.

The present study used the questionnaire for assessing the quality of life WHOQOL-BREF. This questionnaire is an abbreviated version of the WHOQOL-100 that was developed by the WHO, validated in Brazil<sup>(12)</sup>. The WHOQOL-BREF consists of 26 questions covering four domains (Physical, Psychological, Social Relationships and Environment), and the maximum score for each domain is 20.

Two questions were included in this questionnaire, first, "How is your health?" And "Is there any health problem that requires the search for health service and/or treatment?", obtained from the questionnaire suggested by the patient's identification suggested by the WHOQOL group of Brazil's Department of Psychiatry and Legal Medicine, Federal University of Rio Grande do Sul (UFRGS) available on the site [www.ufrgs.br/psiq/whoqol82.html](http://www.ufrgs.br/psiq/whoqol82.html). Participants responded to questionnaires on paper and pen format, without the help of the researcher.

The socioeconomic status (SES) was obtained through a questionnaire answered by the participants of the research and the classifications followed the guidelines by Graciano et al.<sup>(17)</sup>. These authors used the following data and scores to classify the SES: monthly family income, number of resident family members, the education of the family members and housing. After the analysis, the scores were summed and the SES was defined in Inferior Low (IL), Superior Low (SL), Inferior Middle



**Caption:** AL – Alagoas; BA – Bahia; CE – Ceará; GO – Goiás; MA – Maranhão; MG – Minas Gerais; MS – Mato Grosso do Sul; MT – Mato Grosso; PE – Pernambuco; PR – Paraná; RJ – Rio de Janeiro; RN – Rio Grande do Norte; RO – Rondônia; RS – Rio Grande do Sul; SC – Santa Catarina; SP – São Paulo

**Figure 1.** Distribution of subjects in the experimental group according to the Brazilian states of residence

**Chart 1.** Distribution of subjects of CG and CE according to gender, marital status, education and socioeconomic level; and distribution of the subjects in the experimental group in the type of insertion of electrodes and in speech perception test

Variable	Categories	CG	CE
		n = 50	n = 70
Gender	Male	11	39
	Female	39	31
Marital Status	Single	16	15
	Married	26	35
	Separate	-	6
	Divorced	1	4
	Living as married	5	9
	Widower	2	1
Education	College degree	15	14
	College degree incomplete	5	2
	High school	15	35
	High school incomplete	2	2
	Junior High	2	6
	Junior High incomplete	1	6
	Elementary	6	4
Socioeconomic Level	Elementary incomplete	4	1
	Low inferior	4	3
	Low superior	29	50
	Average inferior	16	15
Type of electrode insertion	Average	1	2
	Total	-	64
	Partial	-	6
Performance in speech perception test	Open set	-	61
	Closet set	-	9

**Table 1.** Distribution of the EG according to the time of hearing sensory deprivation, duration of cochlear implant use and age at surgery

Distribution of the EG (n=70)			
	Time of hearing sensory deprivation (months)	Duration of CI use (months)	Age at surgery (years)
Average	133.52	100.71	38.92
Median	120	123	38
Minimum	7	6	18
Maximum	468	256	64

**Table 2.** Mean, standard deviation, and coefficient variation, minimum and maximum scores for each domain of the WHOQOL-BREF questionnaire for the EG (n = 70)

DOMAIN	AVERAGE	STANDART DEVIATION	COEFFICIENT OF VARIATION	MINIMUM SCORES	MAXIMUM SCORES
(1) Physical	15.38	2.99	19.43	5.71	20.00
(2) Psychological	15.55	2.61	16.77	5.33	19.33
(3) Social Relations	14.76	3.53	23.94	4.00	20.00
(4) environment	14.05	2.31	16.47	9.00	18.50
(5) Self-Assessment of QOL	16.51	2.76	16.71	8.00	20.00
TOTAL	15.03	2.24	14.88	7.23	18.92

**Table 3.** Mean, standard deviation, and coefficient variation, minimum and maximum scores for each domain of the WHOQOL-BREF for the CG (n = 50)

DOMAIN	AVERAGE	STANDART DEVIATION	COEFFICIENT OF VARIATION	MINIMUM SCORES	MAXIMUM SCORES
(1) Physical	15.73	2.35	14.92	10.86	19.43
(2) Psychological	15.41	2.01	13.01	9.33	18.67
(3) Social Relations	15.89	3.13	19.68	8.00	20.00
(4) environment	15.07	1.83	12.12	11.00	18.00
(5) Self-Assessment of QOL	15.92	2.62	16.44	10.00	20.00
TOTAL	15.49	1.76	11.39	11.54	18.31

(IM), Middle (M), Superior Middle (SM), High (H). For the education, we considered each participant's highest level of school education.

The assessment of speech perception was performed in the EG in an open or closed set. The tests performed on the open set were: List of monosyllables<sup>(18)</sup>, List of nonsense syllables *Consonant Confusion Study - Confuse Program* (Cochlear implant Nucleus System software, version 6.90) and List of sentences<sup>(19)</sup>. The test conducted in a closed set was the Procedure for assessment of speech perception for profound hearing impaired adults<sup>1</sup>.

All statistical procedures were performed using Statistica version 5.1 (StatSoft Inc., Tulsa, USA), with the statistical T-test and Pearson correlation test. In all cases, the significance level was equal to 5%. The calculation of scores and descriptive statistics of the WHOQOL-BREF was performed using the tool developed by Pedrosa et al.<sup>(20)</sup> from the Microsoft Excel software.

The t-test was used in the statistical analysis to compare the variables insertion of electrodes, performance on tests of speech perception in the EG, associated diseases in the EG and CG with the scores in the domains of the WHOQOL-BREF questionnaire and to compare the QOL scores in the different domains of the WHOQOL-BREF questionnaire among the EG and the CG.

The Pearson Correlation Coefficient was applied to verify the correlation of the variables age in the assessment of the experimental and control groups, time of auditory sensory deprivation and time of cochlear implant with the scores of quality of life in the different domains of the questionnaire WHOQOL-BREF.

The Pearson Correlation Coefficient was also applied to verify the correlation of the socioeconomic status and the education with the scores of quality of life in the different domains of the questionnaire WHOQOL-BREF for both experimental and control groups.

## RESULTS

The average time to complete the WHOQOL-BREF questionnaire was 10 minutes (ranging from 3 minutes to 26 minutes) for the EG and 7 minutes (ranging from 3 minutes to 15 minutes) for the CG.

Tables 2 and 3 show the descriptive statistical analysis of the scores found for the domains 1 (Physical), domain 2 (psychological), domain 3 (Social Relations), domain 4 (environment) and domain 5 (Self- Assessment of Quality of Life) of the EG and CG.

Table 4 shows the mean QOL scores for each domain of the EG and CG, and the application of the t-test showed no statistically significant difference between the groups, except for domain 4 (Middle Environment).

Of the individuals from the EG, three (4.28%) rated their health as poor, eight (11.43%) as neither good nor bad, 34 (48.57%) as good and 25 (35.72%) as very good. Of the total, 35 (50%) claimed to have some sort of disease that needs constant treatment. Of the subjects of the CG, five (10%) rated their health as neither good nor bad, 27 (54%) as good and 18 (36%) as very good. Of the total, 20 (40%) claimed to have some sort of disease that needs constant treatment. Both the EG and CG observed that the QOL scores of the WHOQOL-BREF were lower than those who reported not having some sort of disease for Domains 1 (Physical), 5 (Self -Assessment of Quality of Life) and general ratings, statistically significant differences were found.

<sup>1</sup> Apostilled material adapted by the Audiological Research Center (CPA) of the Hospital de Reabilitação de Anomalias Craniofaciais (HRAC), Universidade de São Paulo (USP). Unpublished material.

No statistically significant correlation was found when comparing the mean scores of the QOL of the subjects of the EG with the performance of speech perception, age at assessment, duration of auditory sensory deprivation and duration of CI use.

Table 5 shows the statistical analysis data of the correlation between the socioeconomic status and education variables with the scores in the domains of the WHOQOL-BREF in the EG. We noticed that the correlation between the socioeconomic status variable for the domain 4 (environment) and correlation between education level and domain 4 (Middle Environment) and general ratings. There was no correlation in the other areas. In the CG there was no correlation between the education level and socioeconomic status with any of the domains of the WHOQOL-BREF.

**DISCUSSION**

Like any protocol or procedure, the use of questionnaires for evaluation requires time to be applied. With prospects of including the assessment of the QOL questionnaire in public service routines in CI, we initially examined the time spent by the study subjects to respond to a quality of life questionnaire used in this study (in the EG, an average of 10 minutes and in the CG, an average of 7 minutes). This finding demonstrates that the questionnaire does not demand too much time to be answered, and may be feasible in outpatient clinic routines without requiring the individual to remain for extra time in their care. This will enable the professional to include other measures of interest along with the QOL<sup>(21)</sup>.

According to the results presented in Table 4, it has been pondered that individuals of the EG showed satisfactory QOL by the proximity of the expected total score compared to scores of individuals in the CG. The instrument does not admit a total score of quality of life, considering the premise that quality of life is a multidimensional construct, so each domain is scored independently, and the maximum score for each domain is 20. These results are similar to those found in the literature regarding improvement in the QOL using the CI<sup>(15,22)</sup>.

**Table 4.** Mean values for each domain evaluated for the EG (n = 70) and CG (n = 50) and p values for the results of the WHOQOL-BREF

	EG	CG	p
Domain 1	15.33	15.73	0.437
Domain 2	15.52	15.41	0.801
Domain 3	14.70	15.89	0.060
Domain 4	14.04	15.07	0.010*
Domain 5	16.54	15.92	0.216
General	15.00	15.49	0.202

Caption: \*p<0,05 – statistically significant. test t.

A recent study evaluating the QOL in post-lingual adults and elderly users of cochlear implant through the SF-36 and “Questionnaire for Self-Assessment of CI Benefit” questionnaires observed a significant increase in QOL subdomains and total score<sup>(23)</sup>.

The comparison of the quality of life results with the EG and CG pointed out similar results between groups, with a significant difference only for the domain 4 (environment). Domain 4 consists of the facets of physical security, home environment, financial resources, health care, access to information, recreation and leisure, physical environment and transportation. The T-test showed that the issues that influenced the experimental group to obtain the scores of quality of life were lower than the control group in questions 8, 12 and 13, relating to physical security, the financial resources and access to information, respectively.

It is possible that one of the factors influencing the significant result of the environment is related to the place of residence of the participating subjects. All subjects in the control group resided in the state of São Paulo, while 70 participants of the EG for a total of 29, resided in the state of São Paulo (Figure 1). People who live in the state of São Paulo may have better health and environmental conditions<sup>(24)</sup>.

Another factor considered was the socioeconomic level. In question number 12 – “Do you have enough money to meet your needs?” – there was a quantitative discrepancy between subjects in the control group and the experimental group. Twenty seven subjects in the experimental group (38.57%) had “no money” or “have very little money” to meet their needs. However, in the control group a total of four (5.71%) had “no money” or “have very little money” to meet their needs, being a significantly smaller group. All those subjects with low scores for question number 12 belong to low socioeconomic status, which implies a greater responsibility in the administration of the budget, prioritizing basic needs for food and housing<sup>(25)</sup>. This is compounded when considering that studies show that working people with hearing disabilities, especially of a severe and profound degree, have trouble getting a job in the labor market or for maintaining the employment<sup>(26)</sup>.

Thus, additional research is needed to contribute to the knowledge of the living conditions and health of Brazilian adult CI users. In order to assess patients living conditions is essential to evaluate the QOL, considered the best measurement of the individual general state.

The improvement in QOL of people in general, with CI or with normal hearing also seems to be subject to the presence of other diseases. For both the EG and CG, it was found that individuals with any disease that needed treatment achieved lower QOL scores in the WHOQOL-BREF for Domains 1 (Physical), 5 (Self-Assessment of Quality of Life) and General

**Table 5.** Correlation of varying socioeconomic status and education with the domains of the WHOQOL-BREF and the EG of the r and p values

		Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	General
Status socioeconomic	r	0.1111	0.1408	0.0435	0.3622*	0.0305	0.2046
	p	p=0.360	p=0.245	p=0.721	p=0.002*	p=0.802	p=0.089
Education	r	0.1638	0.2312	0.0417	0.3927*	0.119	0.2659*
	p	p=0.175	p=0.053	p=0.732	p=0.001*	p=0.326	p=0.026*

Caption: \*statistically significant correlation. Pearson Correlation Coefficient.

Score and this result was statistically significant. Quality of life expression is linked to health, and that perceptions and social conditions are induced by disease, treatments, and political and economic organization of the health care system<sup>(27)</sup>. Psychosocial characteristics of individuals affect their perceptions of hearing loss regarding quality of life<sup>(28)</sup>.

As for the QOL study of the EG scores with the variables of age at assessment, duration of auditory sensory deprivation and duration of CI use, no statistically significant results were found. These results were also observed in other studies<sup>(29)</sup>. A different study showed no statistically significant correlation between QOL and age in the evaluation and surgery, but hearing sensorial deprivation time influenced the QOL scores of the participants, this study, the only one found with this result<sup>(22)</sup>. Regarding the analysis of the variable performance on tests of speech perception, a study found no relationship of this variable with the results of the QOL of the NICQ questionnaire<sup>(9)</sup>.

Positive correlations were found between the socioeconomic status variable for the domain 4 (environment) and between education for the domain 4 (environment) and the general ratings, i.e., higher socioeconomic status and education were higher in the QOL scores. Another study found similar results to this research in relation to socioeconomic level<sup>(27)</sup>.

With regard to education, authors from a different study reported that by studying the correlation of education variable with the QOL scores in implanted adults, no statistically significant results were found, compared with the results of the present study which showed a positive correlation between education level and domain 4 (environment) and general ratings<sup>(30)</sup>. Education need to be considered as an important factor for the QOL, and better quality education has the ability to magnify the view of the person about himself and the conditions around them. Thus, it may be appropriate that the EG subjects with a higher level of education have different conditions to evaluate the environmental aspects of quality of life compared to subjects with less schooling.

In conclusion, the results evaluation should be part of the care received by a CI user and family. The evaluation of the results in CI programs is essential for the ethical commitment to the patient, the technical responsibility of the teams to evaluate their programs and their own performance, the proper use of public funds and the commitment to disseminate the results as quality indicators is important in the establishment and management of the hearing focused on public health policy.

In this context, the QOL faces among the aspects evaluated such as the results in CI. The concern in assessing the QOL is seen as a concern for interdisciplinary teams to provide the intervention not only with expertise that spans the AD and CI, but also marked by the physical, social, emotional, environmental parameters, among others, featuring intervention as a humanized care, and incorporating the point of view of the user, and it was with this proposal that this research was conducted.

The results of the present study allowed to conclude that the comparison of results of quality of life in the experimental group and the control group showed similar results between groups, and the statistical analysis showed no statistically significant difference between the groups, except for the domain 4 (Middle

Environment). Furthermore, we concluded that the variables of age at assessment, time of hearing sensory deprivation, time of cochlear implantation and performance in auditory speech perception did not influence the results of the quality of life of adult cochlear implant users.

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## REFERENCES

1. Fischer ME, Cruickshanks K, Klein B, Klein R, Schubert C, Wiley TL. Multiple sensory impairment and quality of life. *Ophthalmic Epidemiol*. 2009;16(6):346-53. <http://dx.doi.org/10.3109/09286580903312236>. PMID:19995199.
2. Chia EM, Wang JJ, Rochtchina E, Cumming RR, Newall P, Mitchell P. Hearing impairment and health-related quality of life: The Blue Mountains Hearing Study. *Ear Hear*. 2007;28(2):187-95. <http://dx.doi.org/10.1097/AUD.0b013e31803126b6>. PMID:17496670.
3. Budenz CL, Cosetti MK, Coelho DH, Birenbaum B, Babb J, Waltzman SB, et al. The effects of cochlear implantation on speech perception in older adults. *J Am Geriatr Soc*. 2011;59(3):446-53. <http://dx.doi.org/10.1111/j.1532-5415.2010.03310.x>. PMID:21361884.
4. Yang WS, Moon IS, Kim HN, Lee WS, Lee SE, Choi JY. Delayed cochlear implantation in adults with prelingual severe-to-profound hearing loss. *Otol Neurotol*. 2011;32(2):223-8. <http://dx.doi.org/10.1097/MAO.0b013e3182040db7>. PMID:21150681.
5. Chung J, Chueng K, Shipp D, Friesen L, Chen JM, Nedzelski JM, et al. Unilateral multi-channel cochlear implantation results in significant improvement in quality of life. *Otol Neurotol*. 2012;33(4):566-71. <http://dx.doi.org/10.1097/MAO.0b013e3182536dc2>. PMID:22569148.
6. Kosztyla-Hojna B, Moskal D. The impact of cochlear implant (CI) on the process of phonation and quality of life of patients with pre-and postlingual deafness. *Pol Merkur Lekarski*. 2012;33(194):70-9. PMID:23009003.
7. Sanches-Cuadrado I, Lassaletta L, Perez-Mora RM, Zernotti M, Di Gregorio MF, Boccio C, et al. Is there an age limit for cochlear implantation? *Ann Otol Rhinol Laryngol*. 2013;122(4):222-8. <http://dx.doi.org/10.1177/000348941312200402>. PMID:23697318.
8. The WHOQOL Group. The development of the World Health Organization quality of life assessment instrument (the WHOQOL). In: Orley J, Kuyken W, editors. *Quality of Life Assessment: International Perspectives: Proceedings of the Joint-Meeting Organized by the World Health Organization and the Fondation IPSEN in Paris, July 2-3, 1993*. Berlin: Springer Berlin Heidelberg; 1994. p. 41-57.
9. Hinderink JB, Krabbe PF, Van Den Broek P. Development and application of a health-related quality-of-life instrument for adults with cochlear implants: The Nijmegen Cochlear Implant Questionnaire. *Otolaryngol Head Neck Surg*. 2000;123(6):756-65. <http://dx.doi.org/10.1067/mhn.2000.108203>. PMID:11112975.
10. Landeiro GMB, Pedrozo CCR, Gomes MJ, Oliveira ERA. Revisão sistemática dos estudos sobre qualidade de vida indexados na base de dados Scielo. *Cien Saude Colet*. 2011;16(10):4257-66. <http://dx.doi.org/10.1590/S1413-81232011001100031>.
11. Fleck MPA, Leal OF, Louzada S, Xavier M, Chachamovich E, Vieira G, et al. Desenvolvimento da versão em português do instrumento de avaliação de qualidade de vida da OMS (WHOQOL-100). *Rev Bras Psiq*. 1999;21(1):19-28. <http://dx.doi.org/10.1590/S1516-44461999000100006>.
12. Fleck MP, Louzada S, Xavier M, Chachamovich E, Vieira G, Santos L, et al. Aplicação da versão em português do instrumento abreviado de avaliação de qualidade de vida WHOQOL-bref. *Rev Saude Publica*. 2000;34(2):178-83. <http://dx.doi.org/10.1590/S0034-8910200000200012>. PMID:10881154.
13. Skevington SM, Lotfy M, O'Connell KA, and the WHOQOL Group. The World Health Organization's WHOQOL-BREF quality of life assessment:

- psychometric properties and results of the international field trial. A report from the WHOQOL-Group. *Qual Life Res.* 2004;13(2):299-310. <http://dx.doi.org/10.1023/B:QURE.0000018486.91360.00>. PMID:15085902.
14. Seidl EMF, Zannon CML. Qualidade de vida e saúde: aspectos conceituais e metodológicos. *Cad Saude Publica.* 2004;20(2):580-8. <http://dx.doi.org/10.1590/S0102-311X2004000200027>. PMID:15073639.
  15. Arnoldner C, Lin VY, Honeder C, Shipp D, Nedzelski J, Chen J. Ten-year health-related quality of life in cochlear implant recipients: prospective SF-36 data with SF-6D conversion. *Laryngoscope.* 2014;124(1):278-82. <http://dx.doi.org/10.1002/lary.24387>. PMID:24122948.
  16. World Health Organization. Prevention of blindness and deafness: Facts about deafness [Internet]. 2016 [citado em 2011 Dez 05]. Disponível em: [http://www.who.int/pbd/deafness/hearing\\_impairment\\_grades/en/](http://www.who.int/pbd/deafness/hearing_impairment_grades/en/)
  17. Graciano MIG, Lehfeld NAS, Neves A Fo. Critérios de avaliação para a condição sócio-econômica: elementos para a atualização. *Sev Social & Realid.* 1999;8(1):109-28.
  18. Lacerda AP, editor. *Audiologia clínica.* Rio de Janeiro: Guanabara Koogan; 1976.
  19. Valente SLO. *Elaboração de listas de sentenças construídas na língua portuguesa [dissertação].* São Paulo (SP): Pontifícia Universidade Católica; 1998.
  20. Pedroso B, Pilatti LA, Gutierrez GL, Picinin CT. Cálculo dos escores e estatística descritiva do WHOQOL-bref através do Microsoft Excel. *Rev Bras Qualidade Vida [Internet].* 2010 [citado em 2012 Abr 16];2(1):31-6. Disponível em: <http://www.brunopedroso.com.br/whoqol-bref.html>
  21. Chachamovich E, Fleck MPA. Desenvolvimento do WHOQOL-100. In: Fleck MPA, editor. *A avaliação de qualidade de vida: guia para profissionais da saúde.* Porto Alegre: Artmed; 2008. p. 60-73.
  22. Talarico TR. *Qualidade de vida de pacientes deficientes auditivos adultos pré e pós-linguais usuários de implante coclear [dissertação].* São Paulo (SP): Faculdade de Ciências Médicas da Santa Casa de São Paulo; 2013.
  23. Di Nardo W, Anzirno R, Giannantonio S, Schinaia LS, Paludetti G. The effects of cochlear implantation on quality of life in the elderly. *Eur Arch Otorhinolaryngol.* 2014;271(1):65-73. <http://dx.doi.org/10.1007/s00405-013-2396-1>. PMID:23411946.
  24. Cesar CLM, Carandina L, Alves MCGP, Barros MBA, Goldbaum M. *Saúde e condição de vida em São Paulo: inquérito multicêntrico de saúde no Estado de São Paulo, ISA/SP.* São Paulo: Faculdade de Saúde Pública, Universidade de São Paulo; 2005.
  25. Santos LRS, Graciano MIG, Valentim RCAAP. Trabalho e qualidade de vida de pessoas com fissura labiopalatina inseridas no mercado profissional em Bauru. *Serv Soc Real.* 2007;16(2):83-121.
  26. Francelin MAS, Motti TFG, Morita I. As implicações sociais da deficiência auditiva adquirida em adultos. *Saúde Soc.* 2010;19(1):180-92.
  27. Hawthorne G, Hogan A, Giles E, Stewart M, Kethel L, White K, et al. Evaluating the health-related quality of life effects of cochlear implants: a prospective study of an adult cochlear implant program. *Int J Audiol.* 2004;43(4):183-92. <http://dx.doi.org/10.1080/14992020400050026>. PMID:15250122.
  28. Preminger JE, Meeks S. The influence of mood on the perception of hearing-loss related quality of life in people with hearing loss and their significant other. *Int J Audiol.* 2010;49(4):263-71. <http://dx.doi.org/10.3109/14992020903311396>. PMID:20233140.
  29. Mo B, Lindbaek M, Harris S. Cochlear implants and quality of life: a prospective study. *Ear Hear.* 2005;26(2):186-94. <http://dx.doi.org/10.1097/00003446-200504000-00006>. PMID:15809544.
  30. Cohen SM, Labadie RF, Dietrich MS, Haynes DS. Quality of life in hearing-impaired adults: The role of cochlear implants and hearing aids. *Otolaryngol Head Neck Surg.* 2004;131(4):413-22. <http://dx.doi.org/10.1016/j.otohns.2004.03.026>. PMID:15467610.

#### Author contributions

*TCSA participated in the project drafting, data collection, data analysis and wording of article; ALMM participated in the project drafting, data analysis, wording of article and guidelines in all study stages; AOC participated in the data analysis and has performed guidance about the direction of the discussion/completion of the study; LTN participated in the review/wording of the project and article; KFA participated in the review/wording of the project and article.*

#### LIST OF ABBREVIATIONS

Pure Tone Audiometry Threshold (PTA), Control Group (CG), Experimental Group (EG), Cochlear Implant (CI), Quality of Life (QOL), World Health Organization Quality of Life (WHOQOL-BREF).