



Audiological characteristics and communication skills of people with aphasia

Características audiológicas e habilidades de comunicação de pessoas com afasia

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*Débora Schuelter**

*Priscila Leal Nunes Muller**

*Raquel Schillo**

*Denise Terçariol**

*Débora Frizzo Pagnossim**

Abstract

Introduction: Aphasia is a language alteration caused by damage to the central nervous system, which reduces the quality of communication, as in hearing alterations. Hearing and communication should be monitored together. Objective: to characterize the audiological findings and communication skills of people with aphasia who attended the extension Project “Assistance in the construction of a support network for aphasic subjects of Itajaí and Region”. Methods: A quantitative study with 16 people actively participating in the Project in 2016, submitted to communication and tonal audiometry evaluation scales, logoaudiometry, and measurements of acoustic immittance. Results: 81.25% were male; 50% were aged between 50 and 60 years; 87.5% had a history of stroke with damage predominantly to the left brain hemisphere (43.75%) and presence of hypertension (31.25%). Among the individuals, 56.25% had preserved understanding and 50% had partial difficulty expressing themselves; 50% complained of understanding difficulties when in noisy places; 37.5% presented total or partial obstruction of the ear

* Universidade do Vale do Itajaí – UNIVALI, Itajaí, SC, Brazil.

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PLNM; data collection and manuscript writing;

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DT; final revision;

DFP; data collection and manuscript writing.

Correspondence address: Débora Schuelter - deboraschuelter@hotmail.com

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canal. There was prevalence of sensorineural hearing loss limited to high frequencies (LE – 81.25% and RE – 68.75%), with 90.52% symmetrical with type A tympanometric curve (LE – 62.5% and RE – 56.25%). Speech intelligibility was normal in 50% of individuals evaluated. Conclusion: The prevalence of people with aphasia and hearing loss demonstrates the relevance of regular audiological follow-up for this population, as hearing loss can have a detrimental effect on the communication process, which is already adversely affected by the aphasia.

Keywords: Aphasia. Communication. Hearing loss.

Resumo

Introdução: a afasia é uma alteração de linguagem ocasionada por lesões no sistema nervoso central que reduz a qualidade da comunicação, como também ocorre nas perdas auditivas, motivo pelo qual a audição e a comunicação devem ser monitoradas constantemente. **Objetivo:** caracterizar os achados audiológicos e as habilidades de comunicação de pessoas com afasia que frequentam o projeto de extensão “Assessoria na construção de uma rede de apoio para sujeitos afásicos de Itajaí e Região”. **Métodos:** pesquisa quantitativa com 16 pessoas ativas no projeto em 2016 submetidas a duas escalas de avaliação da comunicação e audiometria tonal, logaudiometria e medidas de imitância acústica. **Resultados:** 81,25% são do sexo masculino; 50% pertencem à faixa etária de 50 a 60 anos; 87,5% têm histórico de acidente vascular encefálico (AVE) com lesão predominante no hemisfério esquerdo (43,75%) e presença de hipertensão arterial sistêmica (31,25%). Das pessoas avaliadas, 56,25% têm compreensão preservada e 50% têm dificuldade parcial na expressão; 50% queixam-se de dificuldade de compreensão no ruído; 37,5% apresentaram obstrução total ou parcial do meato acústico externo. Houve predomínio de perda auditiva neurosensorial limitada a frequências altas (OE – 81,25% e OD – 68,75%), sendo 90,52% simétricas com curva timpanométrica do tipo A (OE – 62,5% e OD – 56,25%). A inteligibilidade de fala foi normal em 50% dos avaliados. **Conclusão:** o predomínio de pessoas com afasia e perda auditiva demonstra a relevância do acompanhamento audiológico periódico para esta população, uma vez que perdas auditivas podem interferir negativamente no processo de comunicação, já defasado pela afasia.

Palavras-chave: Afasia; Comunicação; Perda auditiva.

Resumen

Introducción: la afasia es una alteración de lenguaje ocasionada por lesiones en el sistema nervioso central que reducen la calidad de la comunicación, como también ocurre en las pérdidas auditivas, motivo por el cual deben ser monitorizadas constantemente. **Objetivo:** caracterizar los hallazgos audiológicos y las habilidades de comunicación de personas con afasia que asisten al proyecto de extensión “Asesoría en la construcción de una red de apoyo para sujetos afásicos de XXXX y región”. **Métodos:** investigación cuantitativa con 16 personas activas en el proyecto en 2016, sometidas a dos escalas de valoración de la comunicación y audiometría tonal, logaudiometría y medidas de imitancia acústica. **Resultados:** el 81,25% de los individuos son del sexo masculino; el 50% pertenece a una franja etaria de 50 a 60 años; el 87,5% tiene histórico de accidente vascular encefálico (AVE) con lesión predominante en el hemisferio izquierdo (43,75%) y presencia de hipertensión arterial sistémica (31,25%). De las personas evaluadas, el 56,25% tiene comprensión preservada y el 50% tiene dificultad parcial en la expresión; el 50% se queja de dificultad de comprensión en el ruido; el 37,5% presentaban obstrucción total o parcial del meato acústico externo. Hubo un predominio de la PA neurosensorial limitada a frecuencias altas (OE – 81,25% y OD – 68,75%), de las cuales un 90,52% eran simétricas con curva timpanométrica de tipo A (OE – 62,5% y OD – 56,25%). La inteligibilidad del habla fue normal en el 50%. **Conclusión:** el predominio de personas con afasia y PA demuestra la relevancia del acompañamiento audiológico periódico para esta población, considerando que las PA pueden interferir negativamente en el proceso de comunicación, ya defasado por la afasia.

Palabras clave: Afasia; Comunicación; Pérdida auditiva.

Introduction

Aphasia is a language disintegration that contributes to reduce the quality of communication¹, since the language disorder often prevents or limits the individual in expressing the feelings, thoughts and wishes².

The classification of aphasias is related to concepts on the brain and language, and studies are based on structural dichotomies, in which the tongue is considered an autonomous system, separated from its effective use³. It occurs due to the damaged area and its morphofunctional aspects, and Broca and Wernicke⁴ are the main types of aphasia.

In cases of aphasia, in addition to the language deficit, there may be alterations in hearing processing, either primary or secondary, that negatively influence the social inclusion of individuals with aphasia².

Hearing is considered a fundamental aspect for the language ability, and deepening the knowledge on its relationships with language is relevant for the rehabilitation of individuals with communication disorders, especially those with aphasia².

Zeigelboim *et al.*⁵ highlighted the importance of audiological evaluation to contribute to procedures that must be performed in the therapeutic follow-up of individuals with aphasia.

Audiological evaluation of individuals with aphasia is fundamental, since hearing is extremely important for language development and effective communication⁶.

However, the literature on the hearing abilities of individuals with aphasia is still scarce, especially in the national literature, evidencing the need of studies on the hearing abilities of individuals with aphasia, to raise the awareness of health professionals on the importance to evaluate these abilities to enhance the language evaluation and rehabilitation⁷.

Individuals with hearing disorder, as well as with aphasia, often suffer prejudice and are considered to have cognitive handicap⁵. There is scarce literature associating aphasia and hearing disorders, warranting further studies to search for epidemiological data on the hearing ability of individuals with aphasia, to guide the rehabilitation of these individuals⁸.

Thus, more studies and investigations related to the therapeutic process of individuals with apha-

sia and concomitant hearing loss are necessary, since the lack of knowledge on this issue limits these individuals, who then may not exploit their brain plasticity and create readaptations⁹.

The present study was proposed from a university extension project, entitled “Advisory Board for Construction of a Supporting Network for Aphasic Individuals from Itajaí and Region”, which aims to provide activities to stimulate the communicability, exchange experiences, cooperation, and interaction between individuals with aphasia. In this project, during a conversation activity (time for dialogues and language), one individual mentioned hearing difficulties, which raised the hypothesis of possible hearing losses combined to the communication disorders caused by aphasia, thus further worsening the communication process.

Therefore, this study characterized the audiological findings and communication abilities of individuals with aphasia attending the project “Advisory Board for Construction of a Supporting Network for Aphasic Individuals from Itajaí and Region”.

Method

This cross-sectional observational quantitative study was conducted at the Outpatient Hearing Service (SASA) in collaboration with the project “Advisory Board for Construction of a Supporting Network for Aphasic Individuals from Itajaí and Region”. The project was approved by the Institutional Review Board of Universidade do Vale do Itajaí under protocol n. 1.358.626 on December 9th 2015.

The study target population were individuals with aphasia attending the extension project “Advisory Board for Construction of a Supporting Network for Aphasic Individuals from Itajaí and Region”.

Data collection was performed on a SASA and comprised speech-hearing anamnesis; application of questionnaire to evaluate the communication, developed by the investigators (Appendix A – individuals with aphasia; and B – caregivers); visual examination of the external ear; tonal audiometry, logaudiometry and survey of acoustic immittance.

The audiological results (type, degree and pattern of hearing loss, type of tympanometric curve and presence/absence of acoustic reflexes) were analyzed as described in the handout for procedures

in tone threshold audiometry, logaudiometry and acoustic immittance measurements¹⁰.

The degree of aphasia of individuals was determined according to the records of the extension project “Advisory Board for Construction of a Supporting Network for Aphasic Individuals from Itajaí and Region”.

To facilitate the communication with individuals with aphasia, the investigators designed a questionnaire to verify to which extent the issues mentioned affect the life of individuals with aphasia. This questionnaire employed a numerical scale to facilitate the understanding of individuals with aphasia, in which zero indicated “totally without problems”, and ten “totally problematic”. The questionnaires for evaluation of communication contained questions related to the communication skills after the neurological injury and were applied both to individuals with aphasia and their caregivers. The questionnaires were illustrated for people with aphasia and involved topics such as “Do you have problems to understand what people are saying to you?”, “How much do you think other people understand of what you say?”, “Do you think you have hearing difficulty?” and “If you think you have hearing difficulty, how much do you think your hearing impairs your communication?”. Caregivers who actively participated in the extension project and accompanied the person with aphasia during

the survey responded the following questions: “What do you think he/she understands when other people talk to him/her?”, “In your opinion, what do people understand of what he/she talks? “,” Do you think he/she has hearing difficulty?” and, “If he/she has hearing difficulty, does it impair the communication? “.

After completion of data collection, the results were typed in an Excel spreadsheet - 2010 version and submitted to descriptive statistical analysis comprising absolute and relative frequency calculations and measures of central tendency and dispersion. The results were presented in tables. The Friedmann non-parametric statistical test was applied at the 5% level to determine the significance of changes in hearing thresholds between frequencies of 250 and 8,000 Hz, per ear tested.

At study completion, the participants were informed by presentation of results during an extension project meeting, in which there was participation of both individuals with aphasia and their project caregivers. For SASA, information was provided by a meeting with the team, previously scheduled with the service chief.

Results

Table 1 presents the division of individuals analyzed according to age and gender.

Table 1. Distribution of individuals analyzed according to gender and age range

Age range	Gender					
	Female		Male		TOTAL	
	N	%	N	%	N	%
42 -- 50	0	0	1	6.25	1	6.25
50 -- 60	1	6.25	7	43.75	8	50.00
60 -- 70	1	6.25	2	12.5	3	18.75
70 -- 74	1	6.25	3	18.75	4	25.00
TOTAL	3	18.75	13	81.25	16	100

Most individuals in the sample were males (81.25%) in the age range 50 to 60 years (50%) (Table 1).

Concerning the causes of aphasia, 14 (87.5%) individuals exhibited history of stroke; 1 (6.25%) had concomitant stroke and cranial trauma, and 1 (6.25%) had only cranial trauma.

The site of lesion was the left hemisphere in 7 (43.75%) individuals and the right in 3 (18.75%). The lesion site was not informed in the records of six (37.5%) cases.

Concerning the distribution of individuals analyzed according to the time elapsed between the event causing the aphasia and inclusion in the extension project “Advisory Board for Construction

of a Supporting Network for Aphasic Individuals from Itajaí and Region”, 9 (56.25%) entered the project immediately or up to one year after the event, 3 (18.75%) entered after one to five years, 1 (6.25%) after six to ten years, and 1 (6.25%) more

than ten years after the event. This information was not available in two (12.5%) records.

Table 2 presents the distribution of individuals according to factors associated with the occurrence of AVE.

Table 2. Distribution of individuals analyzed according to factors associated to the occurrence of stroke

Associated factors	Yes		No	
	N	%	N	%
Hypertension	5	31.25	11	68.75
Alcoholism	4	25	12	75
Smoking	3	18.75	13	81.25
Hypercholesterolemia and triglycerides	2	12.5	14	87.5
Cardiac disease	1	6.25	15	93.75
Stress	1	6.25	15	93.75
Diabetes mellitus	1	6.25	15	93.75
No causal factors	1	6.25	15	93.75
Not informed	3	18.75	13	81.25

The most frequent factors associated with the occurrence of stroke were hypertension (31,25%), alcoholism (25%) and smoking (18.75%) (Table 2).

Table 3 displays the language characteristics of individuals with aphasia.

Table 3. Language characteristics of individuals with aphasia

Language characteristics	Yes		No		Not informed	
	N	%	N	%	N	%
Fluent aphasia	7	43.75	5	31.25	4	25
Presence of spontaneous language	8	50	3	18.75	5	31.25
Preserved language understanding	9	56.25	3	18.75	4	25
No orality, possible apraxia of speech	1	6.25	12	75	3	18.75

The language characteristics of individuals with aphasia revealed that 9 (56.25%) individuals presented preserved language understanding; 8 (50%) had presence of spontaneous language, and 7 (43.75%) were characterized as fluent aphasia, not affecting the understanding, which would allow a more fluent speech¹¹. Only one individual (6.25%) did not present orality.

Table 4 displays the results obtained in questionnaires applied to individuals with aphasia and their caregivers concerning their perceptions about communication and hearing.

Table 4 evidences that 8 (50%) individuals reported partial difficulty of expression, which was also reported by 4 (66.66%) among the six caretakers who responded to the questionnaire.

Table 5 displays the hearing complaints reported by individuals with aphasia.

Table 4. Language and hearing difficulties reported by individuals with aphasia and their caregivers

Difficulty	People with aphasia			Caregiver			
	Yes	Partial	No	Yes	Partial	No	No caregiver
Difficult understanding	3	3	10	5	1	0	10
Difficult expression	1	8	7	1	3	2	10
Hearing difficulty	4	3	9	1	1	4	10
Interference from hearing difficulty on communication	0	1	15	0	1	5	10

Table 5. Hearing complaints reported by individuals with aphasia

Hearing complaint	YES		NO	
	N	%	N	%
Difficult understanding in noisy places	8	50	8	50
Tinnitus	6	37.5	10	62.5
Discomfort with intense sounds	3	18.75	13	81.25
External or middle ear alterations	3	18.75	13	81.25
Difficulty in telephone calls	1	6.25	15	93.75
Sporadic hearing difficulty	1	6.25	15	93.75
No hearing complaint	5	31.25	11	68.75

The most frequent hearing complaint was speech understanding in noisy places (50%), followed by tinnitus (37.5%). Five (31.25%) individuals did not report any type of hearing difficulty (Table 5).

Concerning the presence of tinnitus, 3 (18.75%) reported it as a wheeze and 2 (12.5%) described it as the sound of a waterfall. One case (6.25%) had both types of tinnitus, and 1 (6.25%) reported tinnitus on the same side as hemiplegia. None of the individuals analyzed was able to inform whether tinnitus was present before the clinical event causing the aphasia, thus it was not possible to establish a correlation between this symptom and aphasia.

The results of visual inspection of the external ear, by ear, revealed 8 (50%) right ears and 10 (62.5%) left ears without obstruction, compared to 5 (31.25%) right ears and 6 (37.5%) left ears with total or partial obstruction. Three (18.75%) right ears exhibited alterations in the tympanic membrane. Even those with external ear canal obstruction upon evaluation were submitted to audiometry, and were later referred to evaluation by an ear, nose and throat doctor, recording the conditions of the external ear on the audiometry form, as foreseen on the orientation guide for basic audiological evaluation¹². It should be highlighted that external ear canal obstruction interferes with the results of

audiometry; however, since the study objective was to verify whether the hearing condition of individuals with aphasia may interfere with their communication process, the disorders caused by an external ear canal obstruction should be considered.

Table 6 presents the results obtained in audiological evaluation concerning the type and degree of hearing loss, and Table 7 exhibits the results of comparison between the type of hearing loss and the audiometry pattern,

Regarding the type and degree of hearing loss, there was predominance of sensorineural loss, affecting 13 (81.25%) left ears (LE) and 11 (68.75%) right ears (RE). Among these, when the degree of hearing loss was calculated, most presented normal findings (8 - 50% RE and 10 - 62.5% LE) (Table 6). The predominant pattern of hearing loss was descending (8 - 50% RE and 10 - 62.5% LE), followed by sensorineural hearing loss with irregular pattern (31.25% RE and LE) (Table 7).

Concerning the laterality of hearing loss, 13 (81.25%) were bilateral and 3 (18.75%) were unilateral.

With regard to the best ear, 3 (18.75%) had symmetrical hearing (same mean hearing thresholds at 500, 1,000 and 2,000 Hz on both ears), 8 (50%) had best ear on the left side and 5 (31.25%) on the right side.

Table 6. Type and degree of hearing loss, by ear, observed in individuals with aphasia

Type	Degree							
	Mild		Moderate		Normal		TOTAL	
	RE	LE	RE	LE	RE	LE	RE	LE
Sensorineural	3	3	-	-	8	10	11	13
Conductive	-	-	1	-	-	-	1	-
Mixed	1	-	-	-	-	-	1	-
Hearing loss at 6,000 and/or 8,000 Hz	-	-	-	-	2	1	2	1
No hearing loss	-	-	-	-	1	2	1	2
TOTAL	4	3	1	1	11	13	16	16

*(Silman; Silverman, 1997)

Table 7. Type and pattern of hearing loss, by ear, observed in individuals with aphasia

Type	Pattern							
	Flat		Descending		Notch 4,000 Hz		Irregular	
	RE	LE	RE	LE	RE	LE	RE	LE
Sensorineural	-	1	5	7	1	-	5	5
Conductive	-	-	-	1	-	-	1	-
Mixed	-	-	-	-	-	-	1	-
Hearing loss at 6,000 and/or 8,000 Hz	-	-	1	-	-	-	-	-
No hearing loss	2	2	-	-	-	-	-	-
TOTAL	2	3	6	8	1	0	7	5

Figures 1 and 2 present the results of hearing thresholds by frequency and ear tested (Figure 1 – right ear; Figure 2 – left ear), in relation to the means and standard deviations.

Figure 1 evidences gradual increase of hearing thresholds with the increase in frequency on the right side, with significant differences ($p < 0.001$) comparing the 250-2,000 Hz group to the frequency of 8,000 Hz. The other frequencies exhibited intermediate results.

As presented in Figure 2, there were significant differences ($p < 0.001$) between frequencies, which were more pronounced than those observed on the right side. On the left ear, the groups 250-2,000 Hz and 3,000-8,000 Hz exhibited significant difference.

In both ears, comparison of the thresholds of the groups 250-2,000 Hz and 3,000-8,000 Hz revealed significant differences, with median values of 20 dB (250 Hz) compared to 35 dB (8,000 Hz) on the right side, and 15 dB (250 Hz) and 40 dB (8,000 Hz) on the left side (Figures 1 and 2).

Regarding the mean and standard deviation of hearing thresholds per frequency and tested ears, hearing loss was greater at higher frequencies, at

3,000 Hz to 8,000 Hz, ranging from 30 dB to 50 dB on the right side and 30 dB to 45 dB on the left side (Figures 1 and 2).

The results achieved in acoustic immittance evidenced greater occurrence of tympanometric curve type A both on the right (9 – 56.25%) and left sides (10 – 62.5%). The acoustic reflexes were partially present in 8 (50%) individuals and totally present in 3 (18.75%). This evaluation was not performed in 7 (43.75%) right ears and 5 (31.25%) left ears, due to the conditions of the external ear or tympanic membrane upon examination.

Regarding the speech recognition index, 8 (50%) individuals had normal intelligibility (90 to 100%); 6 (37.5%) exhibited slight difficulty (75 to 90%), and 2 (12.5%) had moderate difficulty in speech recognition (60 to 75%)⁶. It should be highlighted that, in this procedure, 3 (18.75%) individuals reported that they could hear the words in some moments yet were unable to repeat them, being that 1 (6.25%) made gestures to represent the spoken word (individual without orality) and other (6.25%) did perseveration. The test was conducted using a list of words, as indicated in the literature^{10,12}. Even though the investigators

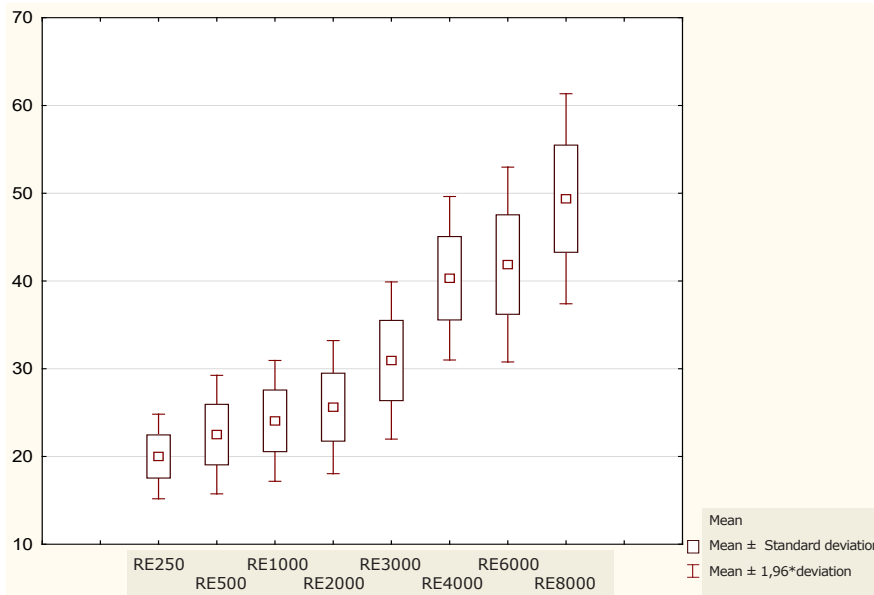


Figure 1. Means and variations of hearing thresholds between frequencies of 250 to 8,000 hz on the right side

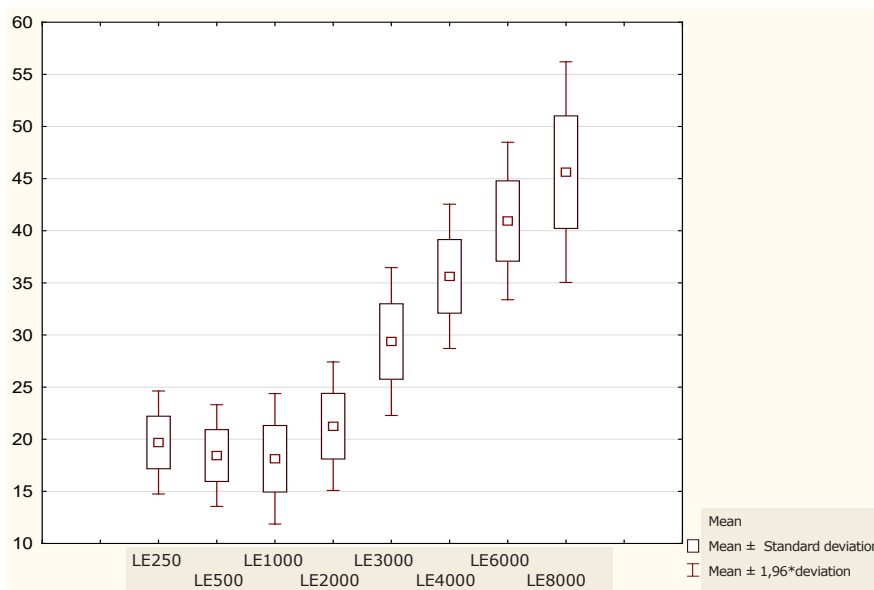


Figure 2. Means and variations of hearing thresholds between frequencies of 250 to 8,000 hz on the left side

were aware of the importance to respect the communication difficulties of individuals analyzed, as well as their chronological age and cognitive ability, no changes were necessary to this procedure, such as utilization of figures, for any individual analyzed.

Chart 1 presents the characterization of type of present language with the type and pattern of hearing loss.

Chart 1 reveals that, regardless of the type and pattern of hearing loss, the most common language pattern was preserved understanding.

Chart 1. Relationship between type of present language and type and pattern of hearing loss

Type of present language	Type and pattern of hearing loss				
	Sensorineural		Conductive	Mixed	No loss
	Descending	Irregular	Descending	Irregular	Flat
Fluent aphasia	2 (12.5%)	4 (25%)			
Preserved understanding	2 (12.5%)	4 (25%)	1 (6.25%)	1 (6.25%)	1 (6.25%)
Spontaneous speech	3 (18.75%)	4 (25%)			1 (6.25%)
Not informed	2 (12.5%)				1 (6.25%)

Discussion

In the present study, most individuals were males in the age range 50 to 60 years, in agreement with the findings of Mazzola *et al.*⁷, who investigated 43 individuals affected by stroke, among which 72.09% were males with predominant age range of 50 to 59 years. Concerning the cause of aphasia, there was greater occurrence of stroke (87.5%), which is associated with geographic factors, ethnicity, diagnosis of the case and definition of the event. Usually, males present higher age-adjusted prevalence than females, with predominance of ischemic stroke, and the main risk factors are hypertension, cardiac disorders and *Diabetes mellitus*¹⁵.

Concerning the lesion site, there was predominance on the left hemisphere (43.75%), and aphasia is manifested by expressive and/or receptive language loss or deficiency, caused by a brain damage usually located on the brain hemisphere¹⁴. In most individuals analyzed, the cause of stroke was hypertension (31.25%), followed by alcoholism and smoking, respecting scientifically demonstrated data about the causes of stroke^{5,4}.

Concerning the rehabilitation process of individuals with aphasia after its causative event, 56.25% of individuals initiated the process immediately or up to one year after the event causing the aphasia, participating in the project “Advisory Board for Construction of a Supporting Network for Aphasic Individuals from Itajaí and Region”, since the social interactions favor the development of self-concept, and groups play a facilitative and collaborative role in the integrity and coherence of personality of individuals, allowing to look at other individuals’ difficulties and finding new possibilities of interaction, integration and restart¹⁶.

Concerning the language characteristics of individuals with aphasia, there was greater oc-

currence of preserved language understanding (56.25%), corroborating that the speech production and language processes encompass different activities of the cerebral cortex, thus different types of alterations in the central nervous system may cause different types of language or speech disorders¹⁷.

The greatest implication of aphasia was the partial or total difficulty of expression, in agreement with the literature¹⁸, which describes that individuals with aphasia may present diverse difficulties in language production and/or understanding, since a single brain lesion may simultaneously impair several functions and consequently lead to relevant social damages.

The investigation of language may aid the establishment of therapeutic planning, increasing the efficacy of speech therapy. This investigation has been used to promote the language recovery in aphasic individuals with primarily expressive deficits¹⁴.

Individuals whose language is affected by a pathology will participate in a social group stigmatized as “he/she who speaks wrongly”¹⁸. Other factor that may interfere with the language understanding process in individuals with aphasia is hearing loss, yet this difficulty is not perceptible in usual tests of language evaluation, requiring the accomplishment of a series of audiological examinations⁷.

The most frequent hearing complaints in this study were difficulty of speech understanding in noisy places (50%) and tinnitus (37.5%). Airoidi *et al.*¹⁷ cited that the difficulty to understand the speech in noise places was present in 51% of elderly individuals; Tenório *et al.*⁸ highlights that 68.57% of elderly individuals present tinnitus.

No studies were found in the literature relating hearing complaints and aphasia. The hearing complaints reported in the literature are only related

with the advanced age range. Since most individuals in the present study are aged less than 60 years, future studies on individuals without aphasia in the same age range as the present study are warranted to determine whether this complaint may be related to aphasia.

The auditory evaluations revealed predominance of bilateral sensorineural hearing loss with bilateral descending pattern, even in ears with external ear canal obstruction. Concerning the accomplishment of audiological examinations in individuals with total or partial obstruction of the external ear canal, a study conducted in Setúbal, Portugal⁶, showed that 18.2% of individuals analyzed had total or near total occlusion of the external ear canal, which could influence the audiological findings. In the present study, only two ears with obstruction may have had interference from this on the audiological results, being one with mixed hearing loss and other with conductive hearing loss.

Chora et al.⁶ reported that the condition of occluded external ear canals constitutes an important and entirely treatable public health problem.

Analyzing the data obtained, among the 32 ears evaluated, only three did not present hearing loss, being one right and two left ears. No individual in the sample exhibited normal bilateral hearing, which was also observed by Onoue et al.²³, who described that most individuals with aphasia present hearing loss.

None of the individuals participating in the study had audiological evaluation before the event causing aphasia, thus it is not possible to state whether hearing loss occurred after it or not. However, it should be mentioned that most participants reported not noticing worsening of hearing over the years, and the predominant age group was below 60 years, which would not justify the presence of presbycusis^{16,19}. Therefore, the present results showed predominance of bilateral descending sensorineural hearing loss that, combined with aphasia, may negatively interfere with the communication process, corroborating other findings in the literature^{6,5}.

Analysis of the audiometry of individuals analyzed revealed that the hearing thresholds decrease with the increase in frequency tested, being worse at the region from 3,000 to 8,000 Hz in both ears, which was also observed in the literature⁵.

Descending hearing loss interferes with people's communication, especially in noisy¹⁹ or reverberating environments and in adverse situations for communication, e.g. several people speaking simultaneously, speaker turned back to the individual with hearing loss, speaker with articulatory inaccuracies or regional accent different from the listener. The greater the hearing loss at high frequencies, the greater will be the damage to communication.

To improve communication, it is suggested to always speak close and in front of the individual, if possible, as well as to reduce background noise and improve the site acoustics, such as meeting rooms. It is useful to articulate the words correctly, yet without exaggeration, emphasizing those with greater meaning in the context. In meetings, it is necessary to respect each individual's turn to speak, avoiding overlapping voices and, if possible, using a sound amplification system with microphones and speakers. The utilization of hearing aids should be individually analyzed, and many may benefit from them.

The results of acoustic immittance showed higher occurrence of type A tympanometric curve bilaterally (62.5% LE and 56.25% RE), with partial presence of acoustic reflexes due to the increase in hearing thresholds at high frequencies (4,000 Hz), which agrees with the most frequent type of hearing loss, namely sensorineural.

Regarding speech intelligibility, 50% of individuals presented normal intelligibility (90 to 100%) and no individual had great difficulty in the evaluation²². Comparison of the type and pattern of hearing loss with the present language pattern revealed that, regardless of the type and pattern of hearing loss, most individuals presented preserved understanding, and it was not possible to establish a correlation between the audiological and language findings for individuals with aphasia. The present findings evidence the need for future studies involving speech tests in adverse situations, such as speech recognition in noisy places, with groups of individuals with and without aphasia, to establish to which extent aphasia interferes with the speech tests used in audiology.

Franco²⁴ mentions that there are different types of alterations caused by aphasia, such as difficulty in naming and repetition; severe loss of word articulation and speech organization, and changes in understanding. Individuals with aphasia usually do

not assume the role of speaker in dialogues, using mimics or gestures to communicate in some cases.

Conclusion

Most individuals in this study presented hearing loss, evidencing the need of regular audiological follow-up, since the hearing loss may present progressive evolution and thus negatively interfere with the communication process, due to the aphasia.

It is known that hearing loss has multicausal factors; in this study, it was not possible to establish whether hearing loss occurred before or after the etiologic event of aphasia.

Since the present sample was limited to participants of the extension project “Advisory Board for Construction of a Supporting Network for Aphasic Individuals from Itajaí and Region”, the number of individuals was small, highlighting the importance of further studies correlating aphasia and hearing loss, including comparative studies between individuals with and without aphasia, as well as speech analysis in adverse situations.

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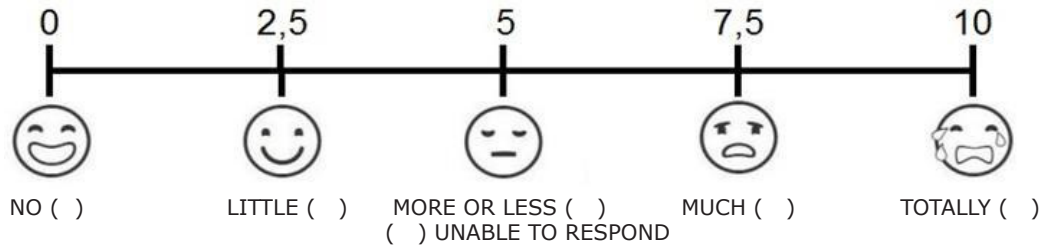


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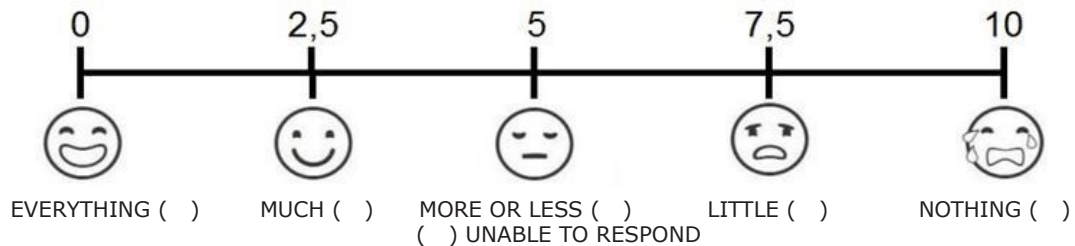
Appendix A – Questionnaire for assessment of communication in individuals with aphasia.

QUESTIONNAIRE FOR ASSESSMENT OF COMMUNICATION – INDIVIDUALS WITH APHASIA

1- DO YOU HAVE PROBLEMS TO UNDERSTAND WHAT PEOPLE SAY TO YOU?

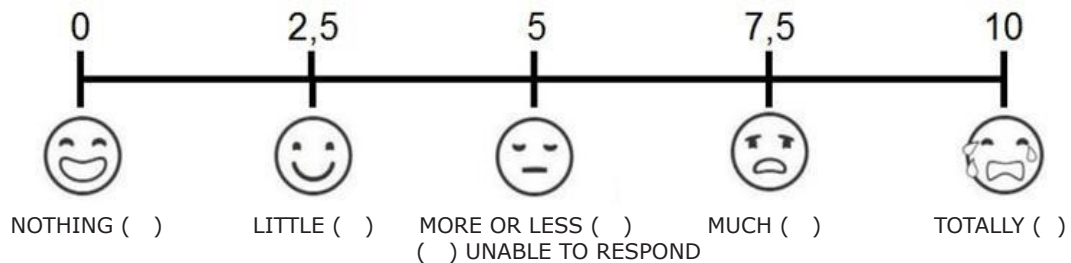


2- IN YOUR OPINION, HOW MUCH DO PEOPLE UNDERSTAND OF WHAT YOU SAY?



3- DO YOU THINK YOU HAVE HEARING DIFFICULTIES? () YES () NO

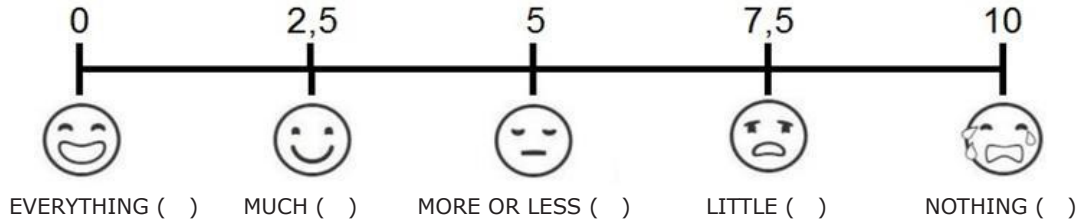
4 – IF YOU THINK YOU HAVE HEARING DIFFICULTIES, IN YOUR OPINION, HOW MUCH DOES YOUR HEARING IMPAIR YOUR COMMUNICATION?



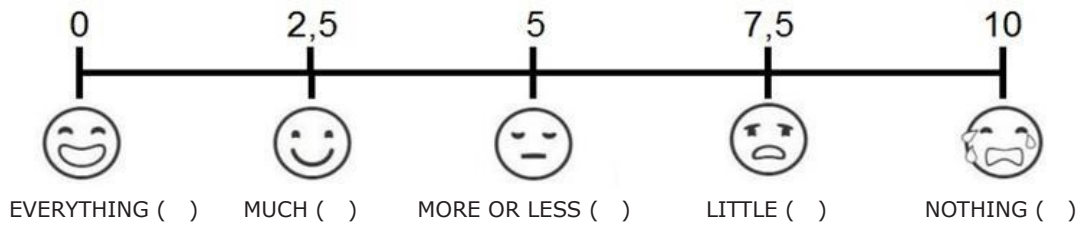
Appendix B - Questionnaire for assessment of communication for caregivers.

QUESTIONNAIRE FOR ASSESSMENT OF COMMUNICATION – CAREGIVERS

1- IN YOUR OPINION, HOW MUCH DOES HE/SHE UNDERSTAND WHEN OTHER PEOPLE TALK WITH HIM/HER?



2- IN YOUR OPINION, HOW MUCH DO PEOPLE UNDERSTAND OF WHAT HE/SHE TALKS?



3- DO YOU THINK HE/SHE HAS HEARING DIFFICULTIES? () YES () NO

4 - SE ELE(A) TEM DIFICULDADES PARA OUVIR, O QUANTO A AUDIÇÃO DELE(A) PREJUDICA A COMUNICAÇÃO DELE (A)?

