

BRAZILIAN DOCTORS IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY CERTIFICATED IN THE PERIOD 2009-2013: PROFILE OF TRAINING

Fonoaudiólogos brasileiros titulados doutores no período de 2009 a 2013: perfil da formação

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ABSTRACT

Purpose: to analyze the formation of Brazilian speech-language pathologists (SLP) PhDs in the period 2009-2013. **Methods:** data collection was done through consultation with the Lattes Platform from the National Council for Scientific and Technological Development (CNPq) with the descriptors "Language and Hearing Sciences and "PhDs" and considered as inclusion criteria to be speech-language pathologist and have earned a PhD degree in the determined period. The data were categorized according to the variables: gender, year of submission of the thesis, School, insertion of program by area of expertise of the CNPq and theme developed in the thesis according to the areas set out in the Language and Hearing Sciences and recognized by the Brazilian Society Speech, Language and Hearing Sciences. Data were analyzed descriptively and statistically. We applied the test of association using the chi-square for trend analysis to second-order polynomial regression was applied and it was taken a significance level of 5%. **Results:** the reporting period totaled 271 PhDs degrees and the largest number of theses was achieved by women (266- 98.2%), in 2012 (72- 26.6%), in public universities (216- 79.7%), located in the Southeast region (188 -69.4%), belonging to the Health Sciences Programs (174- 64.2%), and written on language-related topics (95- 35.1%). **Conclusions:** the survey, coupled with previous research, showing a total of 775 doctors with similar profile to the previously researches but differing in the SLP insertion in graduate programs not only linked to the health areas, reflecting the expansion of the various performance of this professional fields.

KEYWORDS: Speech, Language and Hearing Sciences; Scientific Publication Indicators; Teaching; Research

■ INTRODUCTION

Doctors (Ph.D. holders) have a strategic role in the process of producing and transmitting knowledge and technology, in spite of representing a relatively small portion of the overall population. A recent record recognizes the gradual increase in

the number of Doctors accredited by universities in several countries members of the Organization for Economic Co-operation and Development (OECD), where there was a 38% increase in doctors considering that a total of 154.000 doctors accredited in the year 2000 and 213.000 in 2009¹. In Brazil, there is also an increase in the number of Doctors and of Graduate Studies Programs, since in the year 2002 there were 32 Ph.D. programs and 891 programs offering Masters' Degrees and Ph.D.s, with a total of 37.728 Doctoral students and, in 2012 there were 53 Ph.D. programs and 1.664 programs offering Masters' Degrees and Ph.D.s, with a total of 79.478 Doctoral students².

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Conflict of interest: non-existent

This increase in the number of Doctors reflects in greater number and better quality of Brazilian studies, resulting from factors such as the creation and expansion of Masters' Degree and Ph.D. programs, especially after the second half of the 20th Century^{3,4}. This aspect has also been especially registered in the field of Speech-Language Pathology and Audiology that has an ever increasing number of scientific productions, certainly due to greater recognition of the field and to the increase in the number of Speech-Language Pathologists and Audiologists who are part of Graduate Studies Programs, for both Master's and Ph.D. degrees⁵.

Scientific production analysis has been valued in surveys conducted in recent years⁶⁻¹⁵. Knowing the educational profile of the professionals in the field, their scientific production and their ability to educate future researchers help to build a picture of their current identity, and also to plan future scenarios. A consolidated profession in the field of Health sciences may succeed in preparing its members to attend the population's therapeutic needs, as well as to predict future clinical and prevention demands¹¹. This fact has also been observed in other fields such as Education⁹, Nursing¹⁰, Physical Therapy^{6,11}, Nutrition^{12,13} and Physical Education^{14,15}.

A current survey on the Doctors of a specific field may turn into an important indicator to analyze the growth and maturity of the field and consequently to predict the scientific production potential to be recognized by funding agencies¹⁶. This fact will result in the improvement of professional practices in all work field possibilities¹⁷.

The increase and the quality of scientific production has put Brazil in a highlight spot in the international scenery, and Graduate Studies Programs have contributed in the education of professors and researchers who are committed to academic and social development⁴. Continued studies have been increasingly necessary since experience and knowledge gained from university benches are far from enough in ensuring that professionals achieve a good placement in the work market¹⁸.

The proposal presented in this study is an update of previously conducted surveys. A first survey was completed in 1998, aiming to know the Speech-Language Pathologists and Audiologists and field of the Graduate studies program where the Thesis was presented, analyzed the period between 1976 and the beginning of 1998¹⁹. Results found 91 Theses presented during this period, with a significant increase (83.5% increase) in the 1990's. Afterwards²⁰ the period between the beginning of 1998 and the end of 2003 was analyzed and the findings showed that there were 203 Theses

presented by Speech-Language Pathologists and Audiologists with a Ph.D. This survey was updated in 2010²⁰ comprising the period between 1976 (the year the first thesis was presented) up to the end of 2008 and found a total of 504 presented Theses. On the three precious surveys most of the Theses were presented by female Speech-Language Pathologists and Audiologists in the areas of Hearing/Balance and oral Language and its disorders.

Knowledge about the path of scientific production of a certain field is imperative in order to improve research quality, to achieve scientific progress and, mainly, to diagnose the impact of this production in the social environment where it is created. The search for explanations about the paths taken by research enables the evidencing of advances, indicating gaps and, at the same time, drive attention to new investigation alternatives²¹. In the present moment, the update proposed here is also a tribute in recognition to the work developed by Dr. Ieda Chaves Pacheco Russo, a partner in the first surveys conducted. The purpose of this study was to analyze the education of Brazilian Speech-Language Pathologists and Audiologists who earned their Ph.D. degrees between the years of 2009 and 2013, according to sex, year of Thesis presentation, type of Education institution, insertion of the Program where the Thesis was developed and Thesis theme.

■ METHODS

Data survey was conducted through search on the 25th and 30th of October, 2013, on the *Lattes* platform on the National Counsel of Technological and Scientific Development (CNPq) website, using the following descriptors: "Speech Language and Hearing Science" and "Doctors". At this moment, the curriculums for 2177 researchers were found. When reading the curriculums, there were other professional who performed activities related to the field of Speech-Language Pathology and Audiology who were a part of this listing. Thus, each curriculum was accessed and the inclusion criteria was being a Speech-Language Pathologist and Audiologist and having obtained a Ph.D. degree between years 2009 and 2013. Since search was finalized in the month of October, titles were considered up to this moment.

Then, the data, in addition to name and Thesis title, were categorized according to the variables: sex, year of thesis presentation, educational institution (Federal, State, Private and International); insertion of the Graduate Studies Program where the thesis was developed according to the field of knowledge established by the National Counsel of

Technological and Scientific Development (CNPq) which are: Health Sciences; Human Sciences; Applied Social Sciences; Biological Sciences; Linguistics; Arts and Literature; Engineering; Exact and Earth Sciences; Agricultural Sciences and Education); and theme developed in the thesis, according to the established fields in Speech-Language Pathology and Audiology, as recognized by the Brazilian Society of Speech-Language Pathology and Audiology (Language, Hearing and Balance, Orofacial Functions and Mobility, Voice, Collective Health, Dysphagia and Educational Speech-Language Pathology and Audiology).

The descriptive analysis of the data considered the absolute and relative frequency of the variables and in order to compare the fields within Speech-Language Pathology and Audiology and year of publication the chi-square test was used. In order to analyze the tendency of the Doctoral theses quadratic regression analysis was used, in second order polynomial function, $y = a + bx + cx^2$ - in order to observe change throughout time, considering values of $p < 0.05$ as significant. The number of theses was considered a dependent variable (y) and the year an independent variable (x). Year standardization was conducted by subtracting the first analyzed year.

Statistical significance was determined by a descriptive value assumed at 5%. The analyses were conducted using the SPSS software version 17.0 for Windows, and graphs were completed using Excel software, 2007 version.

■ RESULTS

In the analyzed five-year period (2009 to 2013) 271 Doctoral theses were presented. Of these, a greater number was presented by women (266-98.2%), in the year 2012 (72- 26.6%), in public universities (216-79.7%), of the Southeast region (188-69.4%), inserted in the field of Health Sciences (174-64.2%), developing different themes concerning Language (95-35.1%) (Table 1).

A few of the data stood out: about the university where the thesis was developed, the Federal University of São Paulo (UNIFESP) was responsible for 10% of the Doctoral degrees and, among the private institutions the Pontifical Catholic Universities (PUCs) were responsible for 11.4%; when analyzing geographical regions, the state of São Paulo alone, situated in the Southeast region was responsible for conceding 57.6% of Ph.D. degrees; there are Speech-Language Pathologists and Audiologists who attained their titles in programs that used to be specific for the Medical field, such as General Surgery, Clinical Surgery, Gastroenterology Sciences, among others.

When analyzing the presented theses according to the fields of Speech-Language Pathology and Audiology that are recognized by the Federal Council of Speech-Language Pathology and Audiology and by the Brazilian Society of Speech-Language Pathology and Audiology, it was observed that the field of Language prevails in comparison to the other fields (35.1%), followed by Audiology (23.6%). As expected, fields that have emerged more recently (Collective Health, Dysphagia and Educational Speech-Language Pathology and Audiology, respectively) registered a small percentage of titled Doctors. On the item named "others" there were Theses concerning anatomy and physiology, genetics, neurosciences and the placement of the Speech-Language Pathologist and Audiologist in the Work field. There was no statistically significant differences between the fields for a same analyzed year ($p = 0.372$) (Tables 2 and 3). The category "Others" was created in order to group Theses that were related to themes that were not contemplated before, such as anatomy and physiology, education of Speech-Language Pathologists and Audiologists and placement of Speech-Language Pathologists and Audiologists in the work field.

In order to evaluate whether there were statistically significant changes in the increase of Doctoral Theses productions, Polynomial Regression models were used. In the general analysis of theses (Figure 1), there were no verified changes throughout the analyzed years ($R^2 = 0.29$; $p = 0.715$). However, the field of Language has a growth tendency until the year 2012 with a decrease in 2013 ($R^2 = 0.99$; $p = 0.006$) (Table 3). All other areas did not have statistically significant changes in the number of theses throughout the years ($p > 0.05$) (Figure 1).

■ DISCUSSION

This study has shown a gradual increase in the number of presented theses during the years, a characteristic that has been observed since the first survey was conducted¹⁹ that reported 91 theses presented between 1976 and 1998, with an increase of 83.5% from the 1990's onward. The following survey²⁰ counted 203 theses presented by Ph.D. Speech-Language Pathologists and Audiologists between 1976 and 2003, and when the period between 1976 and 2008 was considered¹⁶ there was a total of 504 presented theses. When added to the number found in the present study (271), a total of 775 Speech-Language Pathologists with a Ph.D. title may be considered until the present moment.

This study found a greater number of female Speech-Language Pathologists and Audiologists, which was also reported in the previous surveys, a

Table 1 – Number and percent distribution of Speech-Language Pathologists and Audiologists, according to year of thesis presentation, place (type of university and geographical region) and field (of knowledge according to the National Council for Scientific and Technological Development and specialty field according to the Federal Council of Speech-Language Pathology and Audiology and Brazilian Society of Speech-Language Pathology and Audiology)

Variable	Category	n	(%)
Year of Thesis	2009	48	(17.6)
	2010	55	(20.3)
	2011	50	(18.5)
	2012	72	(26.6)
	2013	46	(17.0)
University	Federal	110	(40.6)
	State	106	(39.1)
	Private	50	(18.5)
	International	5	(1.8)
Region	Southeast	188	(69.4)
	Northeast	43	(15.9)
	South	29	(10.7)
	Mid-west	5	(1.8)
	Other Countries	5	(1.8)
	North	1	(0.4)
Fields of knowledge	Health Sciences	174	(64.2)
	Linguística, Languages and Arts	64	(23.6)
	Human Sciences	27	(10.0)
	Engineering	3	(1.1)
	Biological Sciences	2	(0.7)
	Applied Social Sciences	1	(0.4)
Field in SLP/ Audiology	Language	95	(35.1)
	Audiology	64	(23.6)
	Voice	36	(13.3)
	Orofacial Motricity	28	(10.3)
	Other	13	(4.8)
	Educational SLP/Audiology	12	(4.4)
	Dysphagia	12	(4.4)
	Collective Health	11	(4.1)
	Total	271	(100.0)

Key: SLP - Speech-Language Pathology

fact that reflects the formation of this field that has been traditionally constituted, since its beginnings, mainly by women. This fact is also seen in other occupations. The number of women enrolling in human and biological sciences at the main Brazilian College Entrance System (University Foundation of Admittance Exams – FUVEST) is significantly greater than men and, especially for the field of Speech-Language Pathology and Audiology, there were 91.51% of female applications²². Data from the CNPq from the year 2013 also show a gradual increase in the number of female researchers, who today represent half of Brazilian researchers, while in 1995, they were 39% of the total number

of researchers²³. Specifically in the field of Speech-Language Pathology and Audiology, most of the theses presented during the analyzed period regards Language (35.51%), a finding that is different from those in the first surveys^{20,23}, where Hearing and Balance accounted for most of the theses (37-40.6% and 82-40.3%, respectively), but that confirms the fact announced by the third survey¹⁶, that reported a close record between the fields of Language (34.52%) and Hearing and Balance (32.34%).

Scientific production in other countries also shows prevalence of the rehabilitation model and in it, the field of Language has greater number of scientific productions²⁴.

Table 2 – Analysis of chi-square association between the variables year of thesis presentation and field in Speech-Language Pathology and Audiology

Field SLP/Audiology	year									
	2009		2010		2011		2012		2013	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Language	16	(16.8)	22	(23.2)	24	(25.3)	20	(21.1)	13	(13.7)
Audiology	12	(18.8)	10	(15.6)	11	(17.2)	20	(31.2)	11	(17.2)
Voice	10	(27.8)	5	(13.9)	2	(5.6)	13	(36.1)	6	(16.7)
Orofacial Mot	5	(17.9)	7	(25.0)	3	(10.7)	8	(28.6)	5	(17.9)
CH	2	(18.2)	1	(9.1)	3	(27.3)	3	(27.3)	2	(18.2)
Educ SLP	3	(25.0)	2	(16.7)	1	(8.3)	4	(33.3)	2	(16.7)
Dysphagia	0	(0.0)	3	(25.0)	3	(25.0)	1	(8.3)	5	(41.7)
Others	0	(0.0)	5	(38.5)	3	(23.1)	3	(23.1)	2	(15.4)
Total	48	(17.7)	55	(20.3)	50	(18.5)	72	(26.6)	46	(17.0)

p=0.372 Polynomial Regression

Analysis of quadratic regression – second order polynomial function, considering values of p<0.05 significant

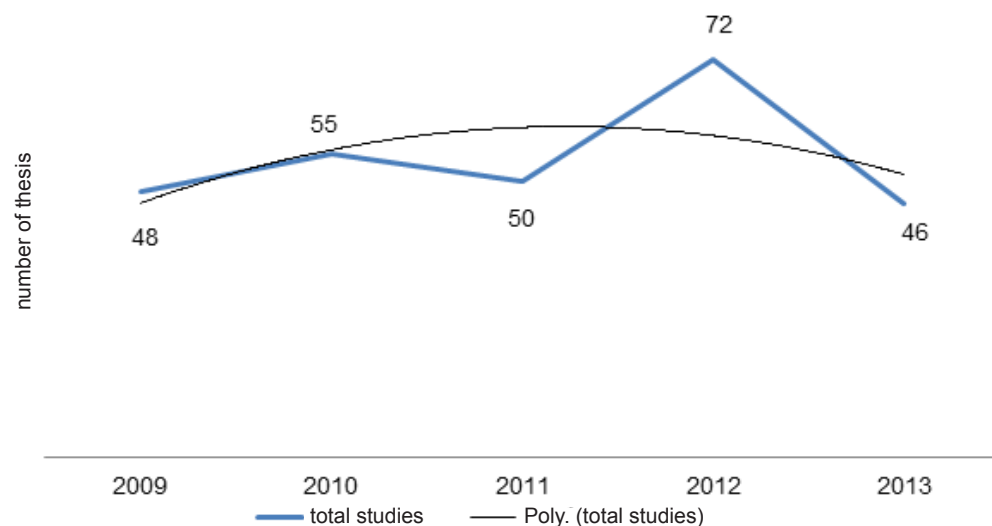
Key: SLP = Speech-Language Pathology, Orofacial Mot – Orofacial Motricity, CH- Collective Health, Educ SLP- Educational Speech-Language Pathology and Audiology

Table 3 – Models of polynomial regression, according to field for years between 2009 and 2013

Variable	n	period	Equation	R ²	p
General	271	2009 a 2013	$y = + 46,029 + 12,443x - 2.786x^2$	0,29	0,715
Field					
Language	95		$y = + 16,029 + 8,343x - 2,286x^2$	0,99	0,006
Audiology	64		$y = + 10,343 + 2,514x - 0,429x^2$	0,13	0,866
Voic	36		$y = + 8,629 - 2,857x + 0,714x^2$	0,10	0,905
OM	28		$y = + 5,257 + 0,386x - 0,071x^2$	0,01	0,989
CH	11		$y = + 1,514 + 0,771x - 0,143x^2$	0,24	0,755
Educ SLP	12		$y = + 2,686 - 0,571x + 0,143x^2$	0,10	0,945
Dysphagia	12		$y = + 3,400 - 2,600x + 1,000x^2$	0,60	0,632
Others	13		$y = + 4.850 - 1.650x + 0.250x^2$	0,91	0,308

SLP – Speech-Language Pathology, OM- Orofacial Motricity, CH- Collective Health, Educ SLP- Educational Speech-Language Pathology and Audiology

Quadratic regression analysis – second order polynomial function, considering values of p<0.05 significant.

**Figure 1 – Tendency Analysis using polynomial regression model**

As expected, the more recent fields (Collective Health, Dysphagia and Educational Speech-Language Pathology and Audiology) have lower percentage of titled professional when compared to the others. However, it is evident that these areas begin to stand out, such as Collective Health, for example, that accounted for 2.98 of the theses presented in the past survey¹⁶ and, in the present research is responsible for 4.1% of the presented theses.

It should be noted that the growth regarding the field of Orofacial Motricity and Functions that was announced in some studies¹⁶ was not confirmed in the present survey.

The creation of new specialty fields reflects different professional placements, in fields where specific knowledge should be obtained in order to perform. The curriculum needs to coincide with the population's new and growing needs²⁵. In addition to Speech-Language Pathology and Audiology, the field of Physical Therapy has also registered changes when analyzing its scientific production. Although there were no new specialty fields, the field of orthopedics, the first, still prevails in comparison to all others⁶.

In this study, regarding the education of these Doctors, there was a preference for choosing federal institutions, especially the Federal University of São Paulo (UNIFESP), a finding that coincides with those in the first surveys^{19,20}, and that differs from those of the third survey¹⁶ that shows a greater search for State universities, particularly the State University of São Paulo (USP). According to the Government Office for Education and Culture (MEC)²⁶ there was a significant increase in the number of Federal Universities and also in the number of grants conceded by funding agencies, a fact that enables a greater number of interested individuals to conduct their Graduate studies in these institutions. In 2008 there were around 40 thousand scholarship holders in the country. As an example, the Coordination for the Improvement of Higher Education Personnel (CAPES) conceded 72.071 Graduate studies grants in 2011 and more than 127 thousand grants of all kinds in 2012, while the CNPq, in the same period, increased the offer of all types of grants from 63 thousand to about 81 thousand in the same period²⁷.

There was an increase in the number of Graduate Studies programs in Speech-Language Pathology and Audiology²⁸, as in the beginning of the field there were only two, one of which was responsible for a greater number of Masters' Degrees (PUC-SP) and another one of Ph.D. degrees (UNIFESP-EPM). In addition to this fact being responsible for the greater number of Doctors in the field, other two may also be noted: other Programs that were formerly specific for certain fields such as Medicine, for example,

have been accepting the enrollment of Speech-Language Pathologists and Audiologists, fact that may be confirmed among those who have received their titles from Programs such as General Bases of Surgery, Surgical Clinic, and Gastroenterology Sciences. Finally, a finding that also accounts for the increase in Doctors is the growing number of new undergraduate schools of Speech-Language Pathology and Audiology in federal universities, mainly in the Northeast region, and these institutions prioritize Ph.D. titles in the composition of their faculty. Teaching is a practice that demands specific education in addition to knowledge of specific content; this is a fact that encourages those who are involved in teaching to search for constant updating, such as found in a Ph.D.²⁹.

It may be said that there is still a movement in search of higher titles, registered in Brazil in different fields. In the year 2000, there were 304,795 Brazilians who were enrolled in Graduate Studies Programs in order to obtain a Masters' or Ph.D. Degree, corresponding to only 0.18% of the total population of Brazil²⁸. In updating this data, it may be seen that Brazilian population is over 190 million citizens and there are currently 594 Graduate Studies Programs in the field of Health, where 132 offer only Masters' Degrees, 17 only Ph.D. degrees, 105 professional Masters' and 340 that offer Masters' Degrees and Ph.D. Degrees. At CAPES, Speech-Language Pathology and Audiology is inserted in Area 21 that also involves programs in the fields of Physical Education, Physical Therapy and Occupational Therapy. While the field of Physical Education has 31 Programs (14 Masters', 1 professional Masters' and 16 Masters'/Ph.D.), Physical Therapy and Occupational Therapy have 12 programs (6 Masters' and 6 Masters'/Ph.D.), Speech-Language Pathology and Audiology has 11 Graduate Studies Programs (9 academic Masters', 2 Professional Masters' and 7 Ph.D. programs). In comparing this finding with that of the precious three-year period, it may be said that the field has had a 71% increase in Graduate Studies Program between the years of 2010-2012^{30,31}.

When analyzing the data regarding the different Brazilian regions, there was more search for education of Ph.D. Speech-Language Pathologists and Audiologists in the Southeast region, mainly in the state of São Paulo. This is due to the fact that the Southeast is the most highly populated region in Brazil and thus concentrates the greatest number of Speech-Language Pathologists and Audiologists. Of all Brazilian Speech-Language Pathologists and Audiologists, 30.9% are located in São Paulo. On the opposite end, the north region was chosen by only one Ph.D. Speech-Language Pathologist and Audiologist (0.4%)³².

Among the programs selected by Speech-Language Pathologists and Audiologists to obtain their Ph.D., the Linguistics program stands out, followed by Human Communication Disorders and Rehabilitation Science. This data is different from previous studies where the Communication Disorders Program accounted for the greatest number of presented theses^{16,23}. Certainly, the fact of a greater search for Linguistics Programs explains the greater number of theses in the field of Language.

Knowing the Education profile of the field has proven necessary in order for better knowledge about the field, a fact that has also proven true in other fields. Among these are Education⁹, Physical Therapy^{6,11}, Nutrition^{12,13}, Physical Education^{14,15} and Nursing¹⁰. Especially in the latter, an increase in the number of Graduate Studies Program has also been found. The analysis of the scientific production on stuttering³³, cerebral palsy³⁴ Speech-Language Pathology and Audiology and Education³⁵, written Language³⁶, general Speech-Language Pathology and Audiology³⁷, evidences the continuing growth of publication throughout the years. The interest in surveying the education of professional, scientific productions and advances are also observed in other fields such as in collective health³⁸, nursing³⁹, nutrition^{12,13}, physical education^{14,15}. These data confirm the privileged place of Brazilian scientific production. Brazil holds the 13th place in global

scientific production, according to the ISI-Thomson Reuters-Web of Science (WS) data-base, and the health sciences occupied the 3rd global position in 2008, according to the WS base, surpassed only by the USA and England⁴⁰.

A study conducted about the profile of the Physical Therapy Researcher regarding aspects of his education, field of work, scientific production and education of new researchers, as well as funding and grants in the country according to the CNPq area concluded that the field itself, as well as research funding agencies need to recognize the high academic efforts of these researchers. With recognition and support, these efforts may be encouraged and reverted in benefit of the development of knowledge in the field, professional strengthening and improvement of the health and quality of life of the population¹¹.

■ CONCLUSIONS

The survey showed 271 Speech-Language Pathologists and Audiologists with Ph.D. Degrees in the analyzed periods (which added to the data of previous studies yield a total of 775), with greater number of titled women who seek mainly federal institutions in the Southeast region, in Health field programs in order to develop themes related to Language.

RESUMO

Objetivo: analisar a formação de fonoaudiólogos brasileiros titulados doutores no período de 2009 a 2013. **Métodos:** o levantamento dos dados foi realizado por meio de consulta à Plataforma *Lattes* do Conselho Nacional de Desenvolvimento Científico e Tecnológico a partir dos termos “Fonoaudiologia” e “doutores”, e considerado como critério de inclusão ser fonoaudiólogo e ter-se titulado doutor no período determinado. Os dados foram categorizados segundo as variáveis: sexo, ano de defesa da tese, instituição de ensino, inserção do programa em que a tese foi desenvolvida, segundo área de conhecimento do Conselho Nacional de Desenvolvimento Científico e Tecnológico e temática desenvolvida na tese, de acordo com as áreas estabelecidas na Fonoaudiologia e reconhecidas pela Sociedade Brasileira de Fonoaudiologia. Os dados foram analisados de forma descritiva e estatística. Aplicou-se o teste de associação pelo qui-quadrado e para a análise de tendência foi aplicada a regressão polinomial de segunda ordem. Assumiu-se um nível descritivo de 5%. **Resultados:** o período avaliado totalizou 271 doutorados defendidos. Desses, maior número de teses foi realizada por mulheres (266-98,2%), no ano de 2012 (72-26,6%), em universidades públicas (216-79,7%), situadas na região Sudeste (188-69,4%), em programas pertencentes à área de Ciências da Saúde (174-64,2%) e de temática relacionada à linguagem (95-35,1%). **Conclusões:** o levantamento, somado a pesquisas anteriores, evidencia um total de 775 doutores, com perfil semelhante ao levantado anteriormente, mas diferindo quanto à inserção de fonoaudiólogos em programas de pós-graduação não relacionados apenas à área de saúde, refletindo a ampliação dos diversos campos de atuação desse profissional.

DESCRIPTORIOS: Fonoaudiologia; Indicadores de Produção Científica; Ensino; Pesquisa

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