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Original articles

Voice disorder and teaching work ability

Distúrbio de voz e trabalho docente

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ABSTRACT

Purpose: to analyze the association between voice disorder and work ability in teachers of municipal schools of São Paulo.

Methods: teachers who looked for speech therapy, with voice alteration complaint; and selected teachers with no complaint who were exposed to the work environment and submitted to the auditory voice perception; completing the Ability Index for the job and the Teacher Condition Vocal Production protocols; and visual-perceptual larynx evaluation. Those with changes in perceptual evaluation and vocal folds (167) and the control without changes in evaluations (105) were classified as Case.

Results: the ability to work was from low to moderate among the cases (67.4%) and between good and great (66.6%) in the control teachers (total score). There was statistical association in two dimensions of ICT, pointing out that teachers with voice disorders had nearly three times more likely to lose the ability to work and the loss of capacity, and how worst the loss of capacity, the stronger is the association with the speech disorder.

Conclusion: there is an association between the voice disorder and the dimensions for current work ability compared with the best of lifetime, indicating that subjects who had a voice disorder was at their worst ability to work, and estimated loss for work because of diseases, indicating that the greater the loss of ability to work, the stronger the relationship with the voice disorder, regardless of age.

Keywords: Voice Disorder; Faculty; Work Ability Evaluation; Work; Voice; Speech, Language and Hearing Sciences

RESUMO

Objetivo: analisar a associação entre distúrbio de voz e capacidade para o trabalho em docentes da rede municipal de ensino de São Paulo.

Métodos: professoras que buscaram atendimento fonoaudiológico, com queixa de alteração vocal; e professoras selecionadas sem queixa, expostas ao mesmo ambiente de trabalho, passaram por avaliação perceptivo-auditiva da voz; preenchimento dos protocolos Índice de Capacidade para o trabalho e Condição de Produção Vocal do Professor; e avaliação perceptivo-visual da laringe. Foram classificadas como Caso as que tinham alteração na avaliação perceptivo-auditiva e em pregas vocais (167) e Controle as sem alterações nas avaliações (105).

Resultados: a capacidade para o trabalho esteve entre baixa e moderada entre os casos (67,4%) e entre boa e ótima (66,6%) nas professoras do controle (escore total). Houve associação estatística em duas dimensões do ICT, apontando que as docentes com distúrbio de voz apresentaram quase três vezes mais chance de perder capacidade para o trabalho e que quanto pior a perda da capacidade, mais forte é a associação com o distúrbio de voz.

Conclusão: há associação entre o distúrbio de voz e as dimensões *capacidade atual para o trabalho comparada com a melhor de toda vida*, indicando que os sujeitos que apresentaram distúrbio de voz estavam em sua pior capacidade para trabalhar, e *perda estimada para o trabalho por causa de doenças*, indicando que quanto maior a perda da capacidade para o trabalho, mais forte é a relação com o distúrbio de voz, independente da idade.

Descritores: Distúrbios da Voz; Docentes; Avaliação da Capacidade de Trabalho; Trabalho; Voz; Fonoaudiologia

INTRODUCTION

Teachers belong to the professional category with higher prevalence of vocal disorders and these injures are one of the leading causes of work absence, coming in second only to the psychic disorders[1].

The development of vocal disorder arising from the occupational use of voice has been shown in recent studies, associated with unfavorable conditions of the environmental and the school-work organization[2], which has led to the inability of teachers for the performance of their duties and has caused them to get involved in economic and social burden. An early diagnosis may favor the adoption of measures to protect, prevent and treat voice disorders in teachers, in addition to save time and resources[3].

According to the International Labor Organization (ILO), teachers are the working category that presents the greatest risk of contracting work-related voice diseases and the ILO recommends that these issues related to teachers are treated as privileged object of research in the Worker Health field[4]. In this context, it is important to have a tool available to evaluate the perception of the employee with respect to their feeling while performing their work, in accordance with the requirements, and with their health condition and physical and mental capacities. This is the purpose of the Work Ability Index (WAI), which is a result of researches conducted in Finland, and has been used to diagnose and monitor changes in the work ability in different occupational groups[5]. The WAI contributes to the study to evaluate work ability through its predictive value for disability, health/disease and mortality[6].

The evaluation analyzes the physical and mental demands of the work, as well as the worker's health condition and their physical and mental abilities in order to detect changes in the work ability. This tool can be used as a method to assess the work ability in on-site health tests and to identify workers who need an early assistance, by predicting the risk of work inability in the near future, regardless of age[6].

In Brazil, WAI has been used in different areas for studies in specific populations; while internationally it is used in a greater numbers of researches in the medical field[7].

Despite the relevance in the current context of demographic transition and changes in the business world, issues regarding work ability in Brazil still require further attention. There is need to disseminate knowledge with a number of workers involved with the situation, so that the subject can be incorporated to the reality of the business world[8].

Based on these assumptions, and in order to present the worker's assessment on their own work ability, this study was aimed to analyze the association between voice disorder and work ability in teachers from the public schools in São Paulo, through the Work Ability Index (WAI).

METHODS

This research was conducted from a database of data collected for the study with teachers of child, elementary and middle education of the public education system of São Paulo[9] , and it was approved by the Research Ethics Committee of the Pontifical Catholic University of São Paulo under the number 061/2011. All participants received elucidation and signed the free and informed consent.

This case-control study was conducted with 272 teachers, and the option of including only female participants was due to the fact that women represent a large majority in the population of Brazilian basic education system, according to census data from the National Institute for Educational Studies and Research[10].

The selection of participants included two phases. In the first phase, all teachers who attended the clinic with vocal change complaints from July/2007 to May/2009 were selected. Then, teachers underwent to vocal and laryngoscopic assessments and answered questionnaires. In the second phase, researchers went to the schools where the case teachers worked and randomly selected teachers without vocal complaints who were working and who were subjected to the same procedures from the previous phase. Teachers with organic vocal fold disorders not related to the use of voice and those who were not actively performing classroom functions for medical reasons were excluded from the sample.

Sample collections for voice evaluation were performed by speech-language pathologists, early in the morning, to ensure vocal rest at night. The option of conducting a perceptive-auditory analysis using the GRBASI scale (*Grade, Roughness, Breathiness, Asteny, Strain, Instability*) was given since this is the standard procedure in international vocal assessments and due to its high level of reliability[11]. Considering that most teachers present voice changed, even in low levels, voice was classified as altered when the alteration was moderate (grade 2) or intense (grade 3), and not altered when normal (grade 0) or mild (grade 1). The

collection of data related to the larynx was performed by the otolaryngologist who conducted the video laryngoscopy and who classified participants as altered, when lesions, irritative structural disorders, or chinks in the vocal folds were detected; and not altered, in the absence of any lesions or disorders.

Case definition was based on the results of both vocal and laryngoscopic assessments. The case group comprised teachers that presented changes in both assessments (167 participants); while the control group included participants without changes (105 participants). Teachers who presented changes in only one of the two assessments were excluded from the study in order to obtain groups that were clearly distinct categorized by the illness focused on in this study, even if the disorders have been accepted for treatment.

For this study, the variables related to the completion of two instruments were used: (1) the Conditions of Vocal Production of Teachers (CPV-P) and (2) The Work Ability Index (WAI).

The CPV questionnaire-P, proposed by Ferreira *et al.* (2007)[12], collects socio-demographic, lifestyle, occupational, environmental, and school-work organization data. The answers were given on a Likert scale: never, seldom, sometimes, and always.

The WAI version used was translated and validated by researchers from several Brazilian institutions[13]. It is composed of seven dimensions: current work ability compared to the best in life, work ability in relation to work demands, current number of self-reported diseases or of illnesses diagnosed by a doctor from a list of 51 illnesses, estimated loss of work due to illnesses, work absences due to illnesses; own prognosis concerning work ability; and mental resources to enjoy daily activities, to feel active and aware, and to have hopes for the future. The score is calculated as the sum of points scored for each of the seven dimensions, namely: 7 to 27 corresponds to low ability, 28 to 36 to moderate ability, 37 to 43 to good ability, and 44 to 49 to excellent work ability[6].

This study analyzed variables regarding socio-demographics (age, marital status) and teaching (education, number of schools, time in profession, type of work contract, number of teaching hours per week) characteristics. The dependent variable was the presence of voice disorder (yes=case; no=control), and the independent variable of interest was the WAI general score and its seven dimensions; the independent variable of control was the age. The WAI general score had a Cronbach alpha coefficient of 0.75 showing good reliability for the instrument in this study.

A chi-square association test with Yates correction coefficient was conducted for data analysis to determine the association between the variables of each dimension of WAI and the presence of a voice disorder. Then, the association level between these variables and the voice disorder was determined through the multivariate logistic regression model, with the calculation of the Odds Ratio (OR). The variables with $p<0.200$ were selected for multiple modeling in the univariate analysis and the *stepwiseforwardselection* modeling process was selected. Variables that remained significant ($p<0.050$) were maintained, after adjusting for other variables.

RESULTS

Socio-demographic data show that the majority is married, over 40 years old and has complete higher education. As teachers, they work as full teacher, with more than 31 working hours per week and they have over 16 years of professional activity.

Table 1. Distribution of case and control groups according to socio-demographic characteristics and functional work situation

Socio-demographic characteristics and functional situation		Controls (n = 105)		Cases (n = 167)		p value (χ^2)
		n	%	n	%	
Age range	20-29 years old	15	14.3	21	12.6	0.092
	30-39 years old	38	36.2	50	29.6	
	40-49 years old	33	31.4	77	46.4	
	50-65 years old	19	18.1	19	11.4	
Marital status	single	27	25.8	49	29.3	0.513
	married	62	59.0	100	59.9	
	divorced/widowed	16	15.2	18	10.8	
Education	Incomplete higher education	4	3.8	13	7.8	0.187
	Complete higher education and more	101	96.2	154	92.2	
Time of profession	<10 years	33	31.7	40	24.0	0.244
	11-15 years	23	22.1	29	17.4	
	16-20 years	29	27.9	62	37.1	
	>21 years	19	18.3	36	21.5	
Employment	Full Professor	101	96.2	158	94.6	0.552
	Substitute Teacher	4	3.8	9	5.4	
Classes/ week	<10 hours	14	13.3	29	17.4	0.187
	11-20 hours	16	15.2	22	13.2	
	21-30 hours	32	30.5	31	18.6	
	31-40 hours	24	22.9	48	28.7	
	>41 hours	19	18.1	37	22.2	

Chi-square test and univariate binary logistic regression ($p \leq 0.05$).

Table 2 indicates the analysis of the association between the total score of the WAI and the voice disorder between the case and control groups ($p<0.001$). It is possible to notice that 66.6% of subjects in control group considered their work ability as good or excellent, whereas 67.4% of subjects in the case group considered their work ability either poor or moderate.

The association values of WAI with case and control groups are shown in Table 3. In five dimensions of the instrument the case group presented the highest number of teachers in the tertile indicative of low work ability.

Table 2. Association analysis of the WAI general score with case and control groups

Work Ability Index (WAI)		Controls (n = 105)		Cases (n = 167)		p value (χ^2)
		n	%	n	%	
Ability	Low	6	6.9	26	17.7	**<0.001**
	Moderate	26	26.4	73	49.7	
	Good	45	51.7	41	27.9	
	Great	13	14.9	7	4.8	

Chi-square test ($p \leq 0.05$).

Table 3. Association analysis between the Work Ability Index with case and control groups

	Controls (n = 105)		Cases (n = 167)		p (x^2)
	n	%	n	%	
Current work ability compared to the best in life					
0 – 6	14	13.3	51	30.5	**0.001**
7 – 8	54	51.4	81	48.5	
9 – 10	37	35.2	35	21.0	
Work ability in relation to work demands					
3 – 7.9	35	33.3	79	47.3	**0.050**
8 – 8.9	38	36.2	54	32.3	
9 – 10	32	30.5	34	20.4	
Current number of illnesses diagnosed by a doctor					
No illnesses	32	30.5	31	18.6	0.052
From one to three illnesses	45	42.9	75	44.9	
Four or more illnesses	28	26.7	61	36.5	
Estimated loss of work due to illnesses					
There is no loss / I have no illnesses	32	32.7	23	14.2	**<0.001**
I'm able to perform my work, but it causes me some symptoms / sometimes I need to reduce my work rate or to change my working methods	54	55.1	94	58.0	
I often need to reduce my work rate or to change my working methods / due to my illness I feel able to work only part time / in my opinion, I'm totally unable to work	12	12.2	45	27.8	
Work absences due to illnesses (12 months)					
No day	33	33.0	37	22.7	0.154
Up to nine days	37	37.0	71	43.6	
From ten to twenty-four days	21	21.0	30	18.4	
Twenty-five days or more	9	9.0	25	15.3	
Own prognosis concerning work ability in a couple of years					
Unlikely	4	4.0	7	4.4	**<0.001**
I'm not too sure	21	20.8	74	46.3	
Likely	76	75.2	79	49.4	
Mental resources (0-6 = worst, 10 – 12 = best)					
0 – 6	16	16.0	46	28.0	**0.011**
7 – 9	31	31.0	60	36.6	
10 – 12	53	53.0	58	35.4	

Chi-square association test and univariate logistic regression with Yates correction coefficient. ($p \leq 0.05$).

Table 4 indicates the results of the multivariate logistic regression analysis adjusted for the age variable. The difference between case and control groups stands out in the *current work ability compared with the best of lifetime*, *estimated loss for work due to illnesses, work absences due to illnesses in the last 12 months* and *mental resources* dimensions, always with the worst score for the case group. The dimensions of work absences due to illnesses in the last 12 months and mental resources also differed in the groups, but not remained in the final model.

Table 4. Association analysis between the Work Ability Index with case and control groups

Variable / Category	Univariate Gross OR (p)	Multivariate adjusted OR (p)
Current work ability compared to the best in life		
0 – 6	**3,9 (<0.001)**	**2.6 (0.027)**
7 – 8	1.6 (0.117)	1.5 (0.253)
9 – 10	1.0	1.0
Work ability in relation to work demands		
3 – 7.9	**2.1 (0.018)**	
8 – 8.9	1.3 (0.371)	
9 – 10	1.0	
Current number of illnesses diagnosed by a doctor		
No illnesses	1.0	
From one to three illnesses	1.7 (0.085)	
Four or more illnesses	**2.2 (0.017)**	
Estimated loss of work due to illnesses		
There is no loss / I have no illnesses	1.0	1.0
I'm able to perform my work, but it causes me some symptoms / sometimes I need to reduce my work rate or to change my working methods.	**2.4 (0.006)**	**2.2 (0.022)**
I often need to reduce my work rate or to change my working methods / due to my illness I feel able to work only part time / in my opinion, I'm totally unable to work	**5,2 (<0.001)**	**3.5 (0.008)**
Work absences due to illnesses (12 months)		
No day	1.0	
Up to nine days	1.7 (0.087)	
From ten to twenty-four days	1.2 (0.515)	
Twenty-five days or more	**2.4 (0.047)**	
Own prognosis concerning work ability in a couple of years		
Unlikely	1.0	
I'm not too sure	2.0 (0.229)	
Likely	0.6 (0.421)	
Mental resources		
0 – 6	**2.6 (0.005)**	
7 – 9	1.8 (0.051)	
10 – 12	1.0	
Age range		
20 – 29	1.0	1.0
30 – 39	0.9 (0.877)	0.8 (0.559)
40 – 49	1.7 (0.198)	1.3 (0.487)
50 – 65	0.7 (0.473)	0.6 (0.281)

Chi-square test and multivariate logistic regression, with Odds Ratio calculation (OR) ($p \leq 0.05$); p (HosmerLemeshow test) of final model = 0.484.

The data obtained in the other dimensions of WAI did not show statistically significant difference in relation to both case and control groups. The independent variable age, despite not having statistical significance, was added to the models as an adjustment.

DISCUSSION

As a paired case-control study by school, all participants of the study, with and without voice disorders, were exposed to similar working conditions, which make it possible to specifically evaluate the association of the voice disorder with the work ability[9]. Both groups showed similar distribution in virtually all sociodemographic aspects, as well as regarding lifestyle, occupation, environment and school-work organization.

Low and moderate work ability shows strong statistical association with the group of teachers with voice disorders, regardless of age, indicating an early functional aging resulting in teaching working absence,

since voice is essential to perform the teaching work[14]. An association between age or teaching time and voice disorder was not observed; however, the lack of association between age and time of teaching in studies related to the field might be an indication that the severity of the voice disorder favors the change of profession or early work absence[15].

In the current research, the first dimension of WAI that showed no difference between the case and control groups was *current work ability compared with the best of lifetime* in low or very low categories, which represent 30.5% of the cases and only 13.3% of control cases. Research that assessed the Participation Profile in Vocal Activities conducted with teachers in private school with and without vocal complaints[16] indicated that teachers with vocal complaints feel with lower work ability, although they don't feel limited to perform their works, even with symptoms.

Similarly, with regard to the *ability in relation to work demands*, it can be noted that the case group presented low values in this dimension. A study with academics[17] indicated a greater dissatisfaction related to: workload demanded, degree of safety (stability) in employment and degree to which the institution assimilates its potentialities.

In the *estimated loss for work due to illnesses* dimension, the groups present difference, although most of the participants of both groups point the need to reduce the work rate or to modify the work method. However, the case group indicates an obstacle or restriction to perform their work due to their diseases. This data can be understood by analyzing the results of the *current number of illnesses diagnosed by a doctor* dimension, which indicates that teachers who had no disease represents only 18.6% of the case group and 30.5% in the control group. In the *Work absences due to illnesses* dimension, most of teachers from both case and control groups had temporary absences of up to nine days due to illnesses, 43.6% and 37.0%, respectively.

The worker's poor health condition has been associated with the process of intensification of teaching work, which would make it more prone to this illness[1]. The teacher, who is tired due to the process of intensification of teaching work, has poor health conditions, especially by the hyper demand in an urgency basis, which leads teachers to overstep their own limit[1].

Vocal illness has been pointed as the second cause of work absence of teachers, classified as "respiratory system diseases", coming in second only to the psychic disorders[1]. Although it is not possible to establish a direct relationship between the voice disorder and the work absence, studies have confirmed that teachers more present more work absence due to vocal issues than workers in other occupational categories[18,19]. In practice, such restriction is represented by absences, permits or functional rehabilitation, which is a possibility in public education when teachers show no physical or mental condition to perform their activity[14].

A research that analyzed the search for vocal treatment by teachers indicates that 25.4% of the teachers seek medical care and 34.6% had lost at least one day of work due to voice issues[20]. The voice disorder has an impact on the personal and professional life of teachers, in addition to involve a financial burden due to the need to replace teachers in schools, as well as the high cost of the treatments[20].

On the *own prognosis concerning work ability in a couple of years* dimension, it is possible to note an optimism among the participants, since only 4.0% of the control group and 4.4% of the case group stated that they won't be able to perform their profession in two years. Even with the possibility to point out that they are not too sure whether they will be able or not, most of the participants of the two groups mentioned that it is very likely that they will be able to work. This optimism may be justified by the good work ability of the control group subjects in the time of the research, and the case group, although with less ability to develop the activities, were in the initial phase of speech-language pathology to treat the voice disorder. Among the occupational problems related to speech language pathology it is worth mentioning that the voice disorder is the issue that has better prognosis, and it may be completely reversed, which is not possible with other diseases, such as the noise-induced hearing loss.

In the *mental resources* dimension, the case and control groups present great difference in results in higher scores (53.0% in the control group, and 35.4% in the case group) and in the lowest scores (16.0% in the control group, and 28.0% in the case group), which are data that suggest a high work ability in teachers without voice disorder and low work ability in teachers with voice disorder. The results corroborate the statement that the psychic-related health problems are the most frequent in teachers and are also associated to stress at work[21].

The school-work organization has had significant repercussions in the mental aspects of the teacher,

a worker who works with knowledge and training people. In addition to these tasks related to teaching, gradually, teachers have became responsible for school management and planning, in an inadequate infrastructure, with the lack of interest on the part of students and their families, in addition to the lack of appreciation for professionals and the low wages, increasing the vulnerability of these professionals to stress[22]. The teacher's role requires mental demands, which should lead to a greater recognition and professional prestige, autonomy, participation in decision making and, mainly, higher wages[23].

In the multivariate analysis, only two dimensions have remained in the final model: *current work ability compared with the best of lifetime* and *estimated loss for work due to illnesses.* The first of them presented a 2.6 ($p<0.027$) odds ratio in the univariate analysis for the score between 0 and 6 (i.e., the lowest). This means that anyone who presents a voice disorder has nearly three times more chance of losing their work ability. The variable age was maintained in the final model as an adjustment, which means that the loss of the work ability happens regardless of this variable.

It is possible to understand that this dimension of the WAI has been associated to voice disorder, once teachers who present voice disorder are at their worst condition for performing their work. The voice disorder impacts in the performance and effectiveness of the teaching work, generates physical problems, with some level of pain and restriction in professional activity[24].

With respect to the latter dimension, it is possible to notice that the worst *estimated loss for work due to illnesses*, the stronger is the association with the voice disorder. The values calculated in odds ratio indicate that the subjects with voice disorder have two times more chances of having to reduce their work rate by presenting symptoms ($OR=2.2$, $p=0.022$) and three and a half times more chances of presenting limitations at work or to present work inability ($OR=3.5$, $p=0.008$).

In a research[25] also conducted with teachers from the public school system of São Paulo through focal groups from the improvement or worsening records of the WAI score, applied with a two-year interval, the authors concluded that the teachers who had worse WAI scores were more ill, not just with respect to voice, while the group comprised of teachers who improved presented greater strength to face the problems related to the work. It is worth emphasizing that different aspects that might undertake the vocal care process were mentioned in the focal group, such as the pressure of managers and of other teachers to avoid work absences to search for treatment of voice problems or of other health problems.

Therefore, it stands out that the work ability is not necessarily related only to the presence or absence of voice disorder, even though the presence of changes in the vocal quality contributes significantly to teachers lose their work ability.

CONCLUSION

It is possible to conclude that there is an association between the voice disorder and the dimensions for *current work ability compared with the best of lifetime*, indicating that subjects who had a voice disorder was at their worst ability to work, and *estimated loss for work due to illnesses*, indicating that the greater the loss of ability to work, the stronger the relationship with the voice disorder, regardless of age.

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