



Research Paper

Investigating the Relationship Between Medical History and General Health Status of Bank Workers With Voice Handicap Index and Vocal Fatigue Index



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Article info:

Received: 10 Sep 2022

Accepted: 25 Oct 2022

Available Online: 26 Dec 2022

Funding

This article is extracted from the MA. thesis of first author at Department of Speech and Language Pathology, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran.

Conflict of interest

The authors declared no conflict of interest.

ABSTRACT

Background and Objectives: The present study examined the relationship between the total score of the voice handicap index (VHI) and the total score and scores of the three factors of the vocal fatigue index (VFI) with the medical history of Melli bank workers working in Tehran and Kurdistan provinces.

Methods: The research is a descriptive-analytical cross-sectional study that was conducted on 444 clerks of Melli Bank branches in Iran (76% male and 24% female with a mean age of 42.3). A demographic questionnaire, the medical history checklist, and the Persian version of VHI and VFI were used to collect data.

Results: The voice handicap index had a significant relationship with a history of neurological (P=0.030) and head and neck (P=0.048) disorders, speech and language disorders (P=0.001), and reflux (P=0.041). Regarding vocal fatigue index, the total score had a significant relationship with head and neck (P=0.006) and speech and language disorders (P<0.001); the first factor with diseases of the head and neck (P=0.018), pharynx and larynx (P=0.005) and speech and language disorders (P=0.001), the second factor with neurological (P=0.020), head and neck (P=0.006), and speech and language disorders (P<0.001), and allergies (P=0.032), and finally, the third factor with neurological (0.044), pharynx and larynx (P=0.031), speech and language disorders (P=0.044), and reflux (P=0.021).

Conclusion: Regardless of the respiratory system, suffering from diseases of the speech and language system can have a significant effect on the scores of the VHI and VFI indices. Meanwhile, the history of speech and language problems and head and neck disorders affect the total score of most factors of the VFI.

Keywords: Voice disorders, Voice fatigue, Occupational groups, Occupational diseases



Cite this article as Mahmoud Zadeh MS, Torabinezhad F, Saffarian A, Abolghasemi J. Investigating the Relationship Between Medical History and General Health Status of Bank Workers With Voice Handicap Index and Vocal Fatigue Index. *Function and Disability Journal*. 2022; 5:E69. <http://dx.doi.org/10.32598/fdj.5.69>

doi <http://dx.doi.org/10.32598/fdj.5.69>

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↑ *What is “already known” in this topic:*

The voice handicap index and vocal fatigue index are one of the most used instruments in the voice disorders studies. These instruments are widely used to study efficacy of voice therapy protocols in various occupational groups. While correlation between the VHI/VFI with some medical conditions are reported in previous studies, there is no comprehensive study of mentioned relationships in the employees.

→ *What this article adds:*

Current finding revealed significant correlation between VHI/VFI mean scores with the history of speech-productions-related systems such as neurological and head and neck diseases in the bank workers. So, these medical conditions maybe are among the risk factors of voice disorders in the bank workers and should be considered in the future studies in this group when the VHI/VFI questionnaire are used.

Introduction

Voice handicap index (VHI) and vocal fatigue index (VFI) are one of the most widely used tools for measuring voice problems. The VHI was developed by Jacobson et al. [1] in order to evaluate the level of disability caused by voice problems and its impact on the daily life of patients. This index, which was translated into Persian in 2013 [2], contains 30 questions that are answered on a 5-point scale (never to always). The VFI was also presented in 2015 as the first instrument for measuring vocal fatigue [3]. This index, which was also validated in Persian [4], has three factors. The first factor is tiredness and avoidance of voice use (11 questions), the second factor is physical discomfort with voice use (5 questions), and the final factor is the improvement of symptoms or lack thereof with rest (3 questions). Like VHI, the scoring of the questions is on a 5-point scale.

The relationship between VHI and VFI scores with the health status of people in general and especially the diseases and medical conditions affecting the speech and language system has rarely been investigated. The average VHI score in people with allergic laryngitis was reported to be higher than those without allergic laryngitis [5]. Elam et al. [6] confirmed the significant relationship between reflux and VHI mean scores. They reported average scores of 16.2 and 6.6 in people with and without reflux, respectively. In another study [7], the researchers announced that the average score of the VHI in people with laryngopharyngeal reflux (LPR) was significantly high. Also, a higher average score of VHI was reported in people with asthma and respiratory problems than in the control group [8]. The relationship between VFI scores and head and neck surgery, laryngeal surgery [9],

and neurological diseases, such as Parkinson's [10] has been reported. Cantor-Cutiva et al. [11] showed a significant relationship between reflux and seasonal allergies and the average scores of three parts of VFI. They reported that kindergarten teachers who had reflux and seasonal allergies reported higher mean scores of the VFI factors than their colleagues who did not have these problems. Examining the relationship between respiratory adequacy and VFI factors showed a significant relationship in women [12].

Bank employees are at the core of the fundamental pillars of any society, which includes financial and economic exchanges. The professional health of bank employees has been investigated from different aspects. Studies have shown that musculoskeletal disorders are highly prevalent in this group. For example, more than 30% of them have pain in the neck area [13]. Also, 8.7% of them suffer from chronic fatigue [14]. The working environment of this group is usually noisy and crowded. According to studies, the average ambient noise in the banks is 70 to 90 decibels [15]. Noise pollution, constant vocal load, and environmental and psycho-emotional factors are the most important reasons causing voice problems, including vocal fatigue [16–18].

There are no data regarding the relationship between the medical history of employees (in its general form and self-report) and VHI and VFI scores until now. Also, the relationship between the overall score of the VFI and the medical background of the people has not yet been investigated. In this study, the relationship between the average scores of VHI and VFI and the medical history of bank clerks was investigated. Accordingly, three questions of the study were as follows: 1. What is the most important medical condition faced by bank workers? 2. Is there a relationship between medical conditions and

the mean score of VHI? and 3. Is there a relationship between medical conditions and the mean score of VFI?

Materials and Methods

Participants

The participants in this research were 444 bank clerks of Melli Bank branches in Tehran and Kurdistan, of whom 75.9% were men and 24.1% were women. About 97% of these bank clerks were 30 years old or more, and 72.3% of them had a university education (bachelor's degree or higher). Also, 86% of them were married and more than 90% of them had at least one child. In addition, 63.3% of these bank clerks had a work experience of 15 years or more.

Assessment tools

In this research, we used the demographic information questionnaire, the medical history checklist, VHI, and VFI. Demographic information consisted of age, gender, level of education, marital status, the number of children, and work experience. The checklist of the medical history of neurological, head and neck, pharynx and larynx, respiratory, and other diseases in the past and present of the bank clerks along with speech and language disorders and the three medical conditions of allergy, reflux, and asthma, was also completed. Also, the Persian version of VHI and VFI validated by Moradi et al. at [Jundishapur University of Ahvaz](#), were presented.

Data gathering procedure

In total, there are about 460 Melli Bank branches in Tehran and Kurdistan provinces and all contributed to this study. We visited 210 branches of the banks and presented the mentioned questionnaires to them, of which 157 (about 75%) cooperated with us. The online and identical versions of the questionnaires, which were designed on the Google and Porsline platforms, were provided to the rest of the branches. At the end of data collection, we received 517 questionnaires, of which 444 were subjected to statistical analysis.

Data analysis

The descriptive section was analyzed using descriptive statistics methods. Checking the normality of the quantitative data of VHI and VFI was done and confirmed using their skewness and kurtosis. Therefore, we used the independent t-test to analyze the data. It should be noted that the significance level was considered 0.05 and

we used the latest version of SPSS software, version 26 to analyze the data

Results

The results of the medical history checklist of bank clerks are shown in [Table 1](#). Most diseases and medical conditions reported by bank clerks were allergies, reflux, and head and neck diseases, respectively. However, other diseases and conditions, which were not addressed in the recent study, accounted for the largest share ([Table 1](#)).

The relationship between the bank clerk's medical history checklist and the cutoff point of VHI (score 14.5) [19] was considered as an index for classifying people into groups with and without voice problems. Among these, only having neurological diseases had a significant relationship with the cutoff point of VHI ($P=0.013$). However, the relationship between the history of respiratory system diseases ($P=0.056$), allergy ($P=0.054$), asthma ($P=0.056$), and reflux ($P=0.055$) with the cutoff point of VHI was very close to the significant level.

The relationship between the average score of VHI and VFI with the medical history of bank clerks is shown in [Table 2](#). The obtained results showed that only respiratory diseases, asthma, and other diseases had no significant relationship with any of the total and/or subsection average scores of the indices.

At this study, Total score of VFI was calculated as addition of first and second factors of VFI with reversed score of third factor of index.

People who had speech and language problems had a significantly higher mean score in all sections than people without a history of speech and language problems. People with a history of head and neck disorders reported a higher mean score than their peers without a history of head and neck disorders in all sections, except for the third factor of VFI. People with a history of neurological disorders in the VHI and the second and third parts of the VFI, people with pharynx and larynx diseases in the first and third factors of the VFI, bank clerks with allergies in the second factor, and bank clerks with reflux in the VHI and third factor of the VFI significantly were found with higher mean scores.

Discussion

In the present study, the relationship between VHI and VFI scores with the medical history of bank workers was investigated. Results showed that bank clerks mostly suf-

Table 1. Medical history of bank clerks

Variables		No. (%)
Neurological disorders	Yes	19(4.3)
	No	425(95.7)
Head and neck disorders	Yes	43(9.7)
	No	401(90.3)
Pharynx and larynx diseases	Yes	4(0.9)
	No	440(99.1)
Respiratory system diseases	Yes	10 (2.3)
	No	434(97.7)
Speech and language disorders	Yes	4(0.9)
	No	440(99.1)
Allergy	Yes	58(13.1)
	No	386(86.9)
Asthma	Yes	10(2.3)
	No	434(97.7)
Reflux	Yes	44(9.9)
	No	400(90.1)
Other diseases	Yes	61(13.7)
	No	383(86.3)

fer from allergies, reflux, and head and neck disorders. While speech and language disorders and pharynx and larynx diseases were the less common diseases with less than 1%.

The relationship between the cutoff point of the VHI, as a screening tool for people with and without voice problems, was analyzed. Data showed that a history of neurological disorders, a slight tolerance, respiratory system diseases, allergies, reflux, and asthma had a relationship with voice problems in bank clerks. A review study by Byeon [20] in 2019 showed that suffering from respiratory system infections, head and neck disorders, and reflux are among the most important risk factors for teachers suffering from voice disorders. In another study, respiratory system problems, allergies, job dissatisfaction, and constant stress were introduced as risk factors for voice problems [21]. The relationship between various diseases of the neurological system and voice characteristics has been clearly shown previously [22, 23].

The present study showed that the mean score of VHI in bank clerks with neurological, head and neck, speech and language problems, and reflux was higher than colleagues who had no history of these diseases and problems. Hurtado-Ruzza et al. [8] showed that the mean score of VHI in people with respiratory problems and asthma was 11.80 and 7.19, respectively, while this rate was 3.72 in the control group. The difference between the two groups was significant. In the current study, the mean score of VHI in people with and without a history of respiratory problems, as well as bank clerks with and without asthma had no significant difference. However, the mean score of VHI in people with respiratory problems and asthma was reported as 18.20 and 22.70, respectively, which is clearly higher than the numbers reported in the previous study. Elam et al. [6] reported a significant relationship between reflux and VHI mean score. They announced the mean score of VHI in people with and without reflux as 16.2 and 6.6, respectively. This relationship can be seen in the present study. The

Table 2. The relationship between medical history and the main indicators of voice disability and voice fatigue in bank workers

Indices Diseases	VHI		VFI-F1		VFI-F2		VFI-F3		VFI-Total	
	Mean±SE	P	Mean±SE	P	Mean±SE	P	Mean±SE	P	Mean±SE	P
Neurological disorders	Yes	25.78±5.894	11.00±2.598	0.064	5.78±1.458	0.020*	4.73±0.990	0.044*	22.63±3.067	0.079
	No	11.83±0.680	5.83±0.356	0.064	2.06±0.158		3.01±0.175		16.88±0.394	
Head and neck disorders	Yes	18.44±3.203	9.30±1.422	0.018*	4.32±0.787	0.006**	3.88±0.594	0.113	21.37±1.573	0.006**
	No	11.79±0.700	5.70±0.366	0.018*	1.99±0.161		3.00±0.180		16.67±0.406	
Pharynx and larynx diseases	Yes	22.00±6.311	16.75±5.662	0.005**	6.50±3.304	0.283	7.00±1.224	0.031*	28.25±8.730	0.289
	No	12.34±0.712	5.95±0.358	0.005**	2.18±0.165		3.05±0.173		17.02±0.396	
Respiratory system diseases	Yes	18.20±3.297	8.70±2.970	0.267	3.30±0.955	0.329	4.50±1.327	0.217	20.30±3.218	0.232
	No	12.30±0.718	5.99±0.363	0.267	2.19±0.169		2.05±0.174		17.05±0.404	
Speech and language disorders	Yes	37.00±9.823	19.00±2.738	0.001**	9.25±2.495	<0.001**	6.75±1.493	0.044*	33.50±3.796	<0.001**
	No	12.21±0.702	5.93±0.359	0.001**	2.15±0.164		3.05±0.173		16.98±0.397	
Allergy	Yes	15.79±2.120	7.25±1.145	0.197	3.32±0.555	0.032*	3.41±0.458	0.467	19.05±1.317	0.064
	No	11.93±0.784	5.87±0.378	0.197	2.05±0.172		3.03±0.187		6.84±0.417	
Asthma	Yes	22.70±6.998	14.30±4.439	0.090	4.10±1.215	0.089	5.20±1.562	0.064	25.20±4.511	0.101
	No	12.19±0.704	5.86±0.351	0.090	2.17±0.168		3.03±0.173		16.94±0.395	
Reflux	Yes	18.27±2.998	7.88±1.020	0.041*	3.09±0.604	0.085	4.47±0.624	0.021*	18.20±1.388	0.377
	No	11.79±0.708	5.85±0.378	0.041*	2.12±0.173		2.93±0.178		17.01±0.419	
Other diseases	Yes	13.22±2.084	6.55±0.990	0.065	2.42±0.43	0.628	0.62±0.484	0.219	17.57±1.070	0.641
	No	12.30±0.752	5.97±0.388	0.065	2.19±0.181		3.00±0.185		17.06±0.434	

VHI: Voice Handicap Index; VFI-F1: First factor of Vocal Fatigue Index; VFI-F2: Second Factor of Vocal Fatigue Index; VFI-F3: Third Factor of Vocal Fatigue Index; VFI-total: Total Score of Vocal Fatigue Index; SE: Standard Error of Mean; *P<0.05; **P<0.001.

mean score of VHI in bank employees with and without reflux was 18.27 and 11.79, respectively. These numbers are higher than the previous research, especially in the group of people with a history of reflux.

The mean scores on three factor and total score of VFI were analyzed. The total mean score of VFI in people suffering from head and neck disorders and speech and language disorders was significantly higher than in people without mentioned problems. The first factor had a significant relationship with head and neck disorders, pharynx and larynx diseases, and speech and language disorders, the second factor with neurological and head and neck disorders, speech and language disorders, and allergies, and finally the third factor with neurological disorders and pharynx and larynx, speech and language disorders, and reflux. Cantor-Cutiva et al. [11] investigated the relationship between reflux and seasonal allergies of kindergarten teachers with the mean scores of VFI factors and confirmed a significant relationship. They reported that teachers with reflux and seasonal allergies had higher mean scores on the three index factors than their colleagues without reflux and seasonal allergies. Brazilian researchers [24] examined the VFI score in teachers with voice problems who visited the clinic and compared it with teachers with voice problems who did not visit the clinic. They reported that teachers who attended the clinic had significantly higher VFI mean scores. Hunter et al. [12] investigated the relationship between respiratory adequacy and VFI score. They stated that among women, there is a significant relationship between the mean respiratory volume (by spirometer) and the mean score of VFI, while this relationship is not significant in men.

Conclusion

The present study investigated the relationship between VHI and VFI mean scores with the medical history of bank workers. This study showed that almost all mean scores of VHI and VFI had a significant relationship with speech and language problems and head and neck disorders. However, the mentioned indices had no significant relationship with the history of respiratory system diseases, asthma, and other diseases. The history of suffering from other diseases and medical conditions examined in this study (neurological, pharynx and larynx, allergies, and reflux) had a significant relationship with at least one of the mean scores of indices. Therefore, in the studies using these indicators as a measurement tool, attention should be paid to the medical history of the participants.

Ethical Considerations

Compliance with ethical guidelines

The ethics committee of the [Iran University of Medical Sciences](#) approved this study (Code: IR.IUMS.REC.1400225). All participants in this study signed an informed consent form.

Funding

This article is extracted from the master's thesis of Mohammad Sedigh Mahmood Zadeh, Department of Speech and Language Pathology, School of Rehabilitation Sciences, [Iran University of Medical Sciences](#).

Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

Acknowledgments

The researchers thank the bank employees of Melli Bank in Tehran and Kurdistan provinces who participated in this study.

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مقاله پژوهشی

بررسی ارتباط میان تاریخچه پزشکی و وضعیت سلامت عمومی کارمندان بانک با شاخص‌های معلولیت صوتی و خستگی صوتی

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چکیده

تاریخ دریافت: ۱۹ شهریور ۱۴۰۱

تاریخ پذیرش: ۰۳ آبان ۱۴۰۱

تاریخ انتشار: ۰۵ دی ۱۴۰۱

مقدمه: مطالعه حاضر ارتباط میان نمره کل شاخص خستگی صوتی (VHI) و نمرات فاکتورهای سه‌گانه و نمره کل شاخص خستگی صوتی (VFI) را با سابقه پزشکی کارمندان بانک بررسی کرد.

مواد و روش‌ها: این مطالعه مقطعی، از نوع توصیفی تحلیلی بود که بر روی ۴۴۴ نفر از کارمندان شعب بانک ملی ایران (۷۶ درصد مرد و ۲۴ درصد زن با میانگین سنی ۴۲/۳ سال) در استان‌های تهران و کردستان انجام گرفت. جهت گردآوری داده‌ها از پرسش‌نامه جمعیت‌شناختی، چک‌لیست سابقه پزشکی، و نسخه فارسی شاخص‌های VHI و VFI استفاده شد.

یافته‌ها: شاخص VHI با سابقه ابتلا به بیماری‌های نورولوژیک ($P=0/030$) و سر و گردن ($P=0/048$)، اختلالات گفتار و زبان ($P=0/001$) و ریفلکس ($P=0/041$) ارتباط معنی‌دار داشت. در ارتباط با شاخص VFI، نمره کل با بیماری‌های سر و گردن ($P=0/006$) و اختلالات گفتار و زبان ($P<0/001$)؛ فاکتور اول با بیماری‌های سر و گردن ($P=0/018$) و حلق و حنجره ($P=0/005$) و اختلالات گفتار و زبان ($P=0/001$)؛ فاکتور دوم با بیماری‌های نورولوژیک ($P=0/020$) و سر و گردن ($P=0/006$)، اختلالات گفتار و زبان ($P<0/001$) و آلرژی ($P=0/033$) و در نهایت فاکتور سوم با بیماری‌های نورولوژیک ($P=0/044$) و حلق و حنجره ($P=0/031$)، اختلالات گفتار و زبان ($P=0/044$)، و ریفلکس ($P=0/021$) ارتباط معنی‌دار داشتند.

نتیجه‌گیری: سابقه ابتلا به بیماری‌های اندام‌های مرتبط با سیستم گفتار و زبان، به‌جز بیماری‌های سیستم تنفسی می‌تواند بر نمره شاخص‌های VHI و VFI تاثیر معنی‌دار داشته باشد. در این میان سابقه مشکلات گفتار و زبان و بیماری‌های سر و گردن بر بیشتر نمرات کل شاخص‌ها و فاکتورهای سه‌گانه شاخص VFI تاثیر می‌گذارد.

کلیدواژه‌ها:

اختلالات صوتی، شاخص معلولیت صوتی، شاخص خستگی صوتی، تاریخچه پزشکی

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Cite this article as Mahmoud Zadeh MS, Torabinezhad F, Saffarian A, Abolghasemi J. Investigating the Relationship Between Medical History and General Health Status of Bank Workers With Voice Handicap Index and Vocal Fatigue Index. Function and Disability Journal. 2022; 5:E69. <http://dx.doi.org/10.32598/fdj.5.69>

<http://dx.doi.org/10.32598/fdj.5.69>

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تلفن: ۰۵۱ ۲۲۲۲۸۰ (۲۱) ۹۸+

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