

# Occupational diseases among call center operators needing vocal rehabilitation

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**KEYWORDS:** Call center operators; call center employees; occupational disease; vocal cord nodules; employment status

## ABSTRACT

**Background:** Work related diseases (WRDs) and occupational diseases (ODs) greatly affect call center operators (CCOs) who experience demanding work expectations and adverse working conditions in their workplace. The aim of this study was to evaluate the sociodemographic and job characteristics of CCOs diagnosed with OD, and to describe the changes in employment status after diagnosis. **Methods:** This descriptive study is based on the electronic data records of Istanbul Occupational Diseases Hospital available from February 2007 to March 2018. **Results:** According to the health board reports, 122 of the 173 (70.5%) CCOs had a confirmed OD diagnosis, 85.2% were females and the mean age was 27.5 years. Vocal cord disorders were the most frequent ODs (64.8%), followed by hearing loss (12.5%), dysphonia (10.2%) and temporomandibular disorders (4.7%). Vocal cord nodules (VCN) were found to be more frequent among females compared to males (92.9% vs 62.4%,  $p < 0.001$ ). Although not statistically significant, the frequency of VCN was also higher in subjects working overtime (14.6% vs 6.3%), having gastroesophageal reflux disease (82.3% vs 73.9%) or thyroid nodules (100% vs 73.7%) and being current smokers (41.7% vs 13.3%). Following the OD diagnosis, 43.8% of the cases were dismissed, 18.7% quit their job, and 9.4% still held the same job position. Only 28.1% changed unit within the workplace. **Conclusion:** Including the CCOs who were diagnosed with an OD at a very young age and at an early stage of their working life into vocational rehabilitation programs and employing them under appropriate conditions is essential to proper health and safety protocol.

## 1. INTRODUCTION

A call center (CC) is defined as “a work environment in which the main business is conducted via the telephone while simultaneously using display screen equipment” [1]. The CC industry is relatively new and one of the fastest-growing areas of employment in Turkey and around the world. According to the Turkish CC Association, 135,820 people were employed in all the CCs throughout the country in 2020 and the total employment forecast for 2021 was estimated at 145,000 people [2]. While the

number of employees working in the CC industry in the United States of America was around 2,8 million people in 2020, there were approximately 400,000 CC workers in the Philippines and 300,000 CC workers in India in 2015 [3-4].

Call center operators (CCOs) rely on their voice as main resource to fulfill work duties, they also utilize a headset and display screen equipment to communicate with customers. There are numerous job demands and grueling working conditions in this sector such as increased workload, high job demands, low control, increased emotional

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and cognitive demands, time pressure, pressure for productivity, shift work, insufficient 'time out', non-ergonomic working conditions, sitting for extended periods of time, repetitive motions, excessive/overuse and/or misuse of the voice, long-term use of headphones, exposure to noise/sudden sounds, exposure to electromagnetic fields. Because of these extensive workplace risk factors, work-related diseases (WRDs) and occupational diseases (ODs) are likely to be more frequent among CCOs [5]. The literature highlights some major health problems among CCOs such as musculoskeletal diseases, visual fatigue, acoustic shock/hearing loss, ear infections, voice disorders, insomnia, stress, anxiety, depression and burnout syndrome [6-8].

Although CCs are a new field of work, they are risk-prone areas in terms of WRDs and ODs, which adversely affect the occupational health and safety of all employees. ODs are often chronic and progressive health issues that have a negative impact on socioeconomic and working life conditions such as: disability, quality of life, productivity, prolonged absenteeism in the workplace and unemployment. While individuals diagnosed with ODs suffer from significant social and economic damages, the negative effects of ODs are also observed on a community level [9].

The aim of this study was to evaluate the sociodemographic and job characteristics of CCOs who consulted an occupational disease hospital, and to describe the changes in their employment status following the diagnosis of an OD. Information regarding to what extent the CCOs have changed their jobs or had to quit their job after being diagnosed with OD is unclear. To our knowledge, this is the first study representing the characteristics of CCOs with officially diagnosed ODs, types of ODs and changes in employment status for CCOs after the diagnosis with an OD.

## 2. METHODS

### 2.1. Study sample and data collection

The study sample of this descriptive study is based on the electronic data records of Istanbul Occupational Diseases Hospital (IODH). IODH

is one of the three occupational disease hospitals in Turkey, and is specialized in occupational exposures with the mandate to establish the final diagnosis for ODs. All files of the CCOs who have applied to the hospital for OD evaluation from February 2007 to March 2018 were selected from the electronic data records and retrospectively reviewed by the researchers. Only cases with confirmed OD based on the ODs list of Turkey [10] were included for implementation of a questionnaire via phone calls. Oral consent was obtained from all the participants at the beginning of telephone interviews.

The research was carried out after the approval and permission of the IODH and the Research Ethics Committee of Istanbul Kanuni Sultan Süleyman Research and Training Hospital (KA EK/2018.10.29). Sociodemographic variables (age, gender), detailed work history, telephone numbers, and health board reports containing information about diagnosis of ODs were obtained from the case files. Information about the process and employment status following the diagnosis of OD in the workplace, was based on phone interviews.

#### 2.1.1. Questionnaire

The 11-item structured questionnaire was prepared by the researchers. It included information such as educational background, smoking habits, pre-employment examination, occupational health and safety training status, detailed work history, institutions that pre-diagnosed ODs and referred the employee to the IODH, and the process and changes in employment status after diagnosis of an occupational disease. The process in the workplace following the diagnosis of an OD was categorized as: (a) dismissal with legal rights, (b) dismissal without legal rights, (c) leaving work, (d) still working, in the same job position and (d) still working, department transfer.

### 2.2. Statistical Analysis

Descriptive findings of numerical variables were expressed in terms of mean and standard deviation, minimum and maximum values and categorical variables in percentage. Pearson's Chi-square test and

Fisher exact test were performed to compare categorical variables; Student t-test and Mann Whitney U test were used to compare two independent groups; p value of  $< 0.05$  was considered as statistically significant at 95% confidence level. SPSS, version 21.0 (IBM, Armonk, NY) was used for data analysis.

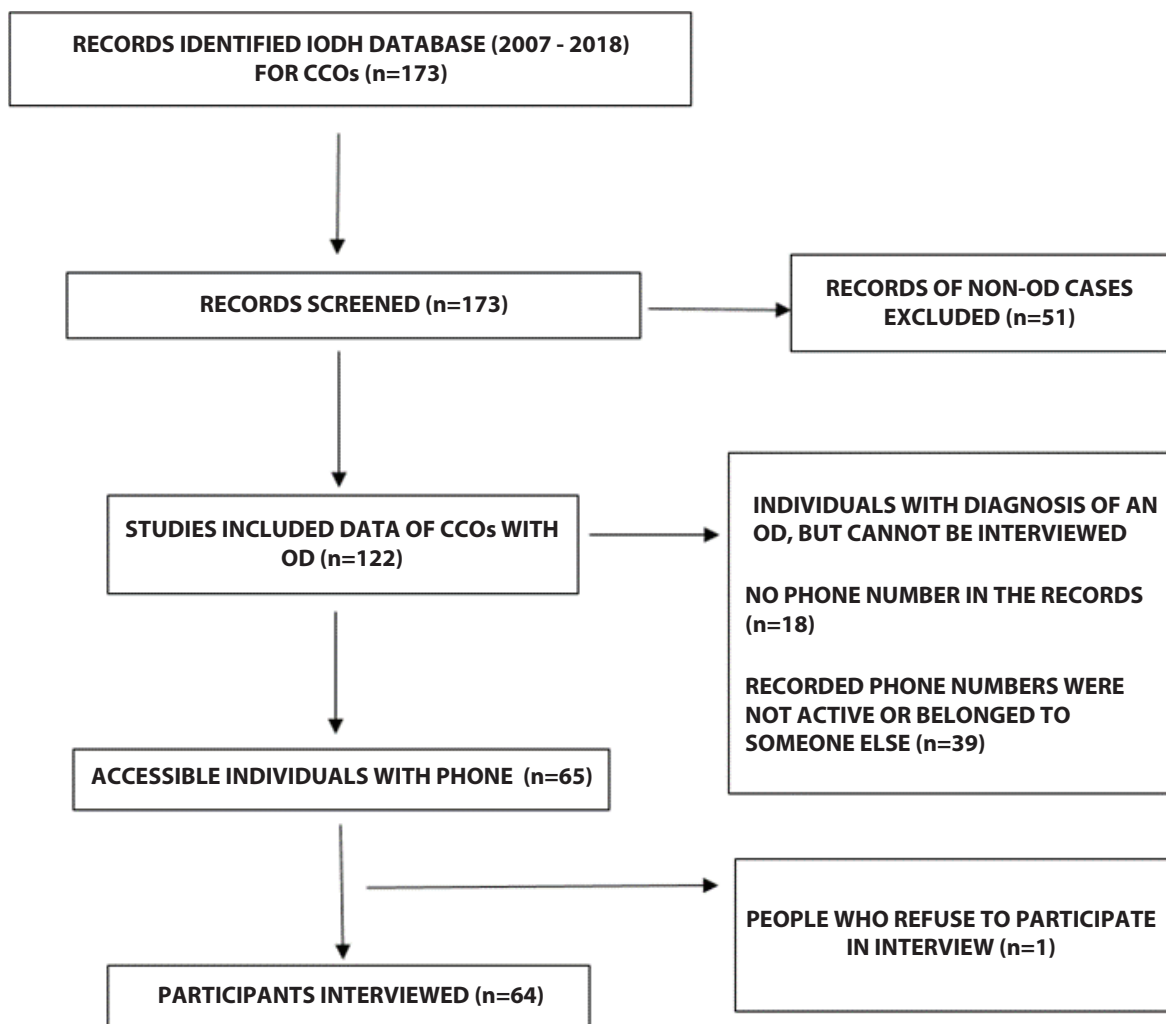
### 3. RESULTS

#### 3.1. Characteristics of the study group

According to the health board reports, 173 CCOs applied for OD assessment. Of these, 51 (29.5%)

were diagnosed with “no disease” or a disease unrelated to their profession, while the diagnosis of OD was confirmed in 122 cases (70.5%). Out of 122 case files, 57 people (46.7%) could not be interviewed either because there was no phone number in the case file records ( $n=18$ ), or the recorded phone numbers were not active or reassigned to someone else. Of the remaining 65 people whose phone numbers were active and accessible, one employee refused to answer the questionnaire, and a total of 64 (52.5%) participants were interviewed (*Figure 1*).

The mean age of the cases with OD diagnosis was  $27.5 \pm 4.4$  years and 85.2% were female. The mean length of service in a CC was  $45.4 \pm 27.1$



**Figure 1.** Study flow diagram.

months. While 47.5% of the cases were working in banking-insurance, 30.3% of them were working in the telecommunication sectors. Most of the patients (62.3%) applied directly by their own request without any referral to the IODH. The most common complaints were hoarseness (66.7%), sore throat (8.3%), decrease in hearing and tinnitus (7.6%) respectively. Characteristics of cases with an OD diagnosis are presented in *Table 1*.

**Table 1.** Characteristics of cases with diagnosis of an occupational diseases (n=122).

	N.	%
<b>Service in a call center (months)</b>		
< 12	5	4.1
12 – 23	12	9.8
24 – 35	22	18.0
36 – 47	16	13.1
48 – 59	21	17.2
≥ 60	29	23.8
<b>Employer</b>		
Finance or insurance	58	47.5
Telecommunication	37	30.3
Other	27	22.2
<b>Admission requested by†</b>		
Occupational physician	25	20.5
Employee	76	62.3
Another physician	4	3.3
<b>Main complaint†</b>		
Hoarseness	88	66.7
Sore throat	11	8.3
Pain of jaw	6	4.5
Vocal thickening	4	3.0
Decrease in hearing / tinnitus	10	7.6
Hand-wrist pain	3	2.8
Without any complaint *	4	3.0
Others **	6	4.5

† data was unavailable in files of 17 cases, the number of complaints was 132.

\* Observed in audiogram findings in routine/periodical physical examinations.

\*\* Other complaints were cough, low back pain, otalgia, itchy ears.

All cases with an OD diagnosis (n=122) are included for analysis. Six of them had two different ODs diagnosis. The distribution of ODs is presented in *Table 2*. The most frequent ODs were vocal cord diseases (including nodules and polyps of vocal cords) at 64.8%, followed by hearing loss at 12.5% and dysphonia at 10.2%. Temporomandibular disorders (TMD) affected 4.7% of the study population and compressive neuropathies in the upper limb were 3.9% of cases. The other five OD diagnoses were generalized anxiety disorder, otitis externa, chronic laryngitis, acute laryngitis and occupational exposure to other risk factors.

Approximately 18% (n. 23) of those diagnosed with an OD has been concurrently diagnosed with a non-OD. The most common reported diagnoses as non-OD were mental disorders (30.4%). Three of them were generalized anxiety disorders, two were post-traumatic stress disorders, one of them was the depressive behavior disorder concomitant with lichen planus and one of them was a depressive episode.

### 3.2. Interviewed group

Sociodemographic and occupational characteristics of the 64 interviewed CCOs are presented in *Table 3*. Mean age of the group was  $28.0 \pm 4.6$  years; 79.3% of CCOs were female and 31.2% of them were referred by occupational physicians. The median time between the onset of the complaints and the diagnosis of an OD was 12 months, and the total number of applications to health institutions during this period was five.

Of the 63 cases whose smoking status was known at the time of diagnosis, 61.9% had never smoked, 3.2% had quit smoking, and 34.9% were still smoking. Additionally, 27.0% of the 63 CCOs had gastroesophageal reflux and 9.5% of them had thyroid nodules. All of the interviewed cases were at least high school graduates, and 46.9% of them were post-secondary graduates or higher. The main jobs of interviewed CCOs were outbound calls (n. 23; 35.9%), inbound calls (n.19, 29.7%), and mixed calls (n. 22; 34.4%). The mean length of service in a CC was  $51.2 \pm 28.2$  months, mean weekly working hours were  $46.5 \pm 4.2$  hours, and 32.8% of CCOs in the interviewed group were working overtime. Of the 75.0% of those who underwent a pre-employment

**Table 2.** Distribution of diagnosed occupational diseases in 122 cases.

<b>Diagnosed Occupational Diseases*</b>	<b>N.</b>	<b>%</b>
Vocal cords disorders (including nodules and polyps)	83	64.8
Dysphonia	13	10.2
Hearing loss	16	12.5
Temporo-mandibular disorders	6	4.7
Compressive neuropathies in the upper limb	5	3.9
Others‡	5	3.9
Total	128	100

\* Six of the cases had two different OD diagnosis (four of them had both diseases of vocal cords and hearing loss, one of them had both diseases of chronic laryngitis and diseases of vocal cords, one of them had both temporomandibular joint disorders and hearing loss).

‡ One of each diagnosis for generalized anxiety disorder, otitis externa, chronic laryngitis, acute laryngitis and occupational exposure to other risk factors.

**Table 3.** Sociodemographic characteristics, health status of interviewed call center operators (n=64).

	<b>N.</b>	<b>%</b>	<b>Mean ± sd or Median</b>
<b>Educational background</b>			
High school	21	32.8	
Junior college	13	20.3	
University and higher	30	46.9	
<b>Smoking habits †</b>			
Never	39	61.9	
Current smoker	22	34.9	
Quit smoking	2	3.2	
Gastroesophageal reflux†	17	27.0	
Thyroid nodules†	6	9.5	
<b>Type of call center</b>			
Inbound	19	29.7	
Outbound	23	35.9	
Mixed call	22	34.4	
Working overtime	21	32.8	
Pre-employment examination	48	75.0	
Vocal cord examination	32	50.0	
Time between onset and diagnosis of occupational disease (months)			12
Total number of applications to health institutions			5
Duration of service in a call center (months)			51.2 ± 28.2
Working time (hours/weekly)			46.5 ± 4.2
Working overtime	21	32.8	

† Data was unavailable in one case.

examination, none of them stated that they had a vocal cord examination, and simultaneously 50.0% stated that they had received training on hearing and the use of voice before entering the job but could not apply the training appropriately. *Figure 2* indicates the employment status after the OD diagnosis: 43.8% of the cases were dismissed, 18.7% quit their job, and 9.4% still held the same job. Only 28.1% changed units within the workplace.

### 3.3. Comparison of occupational VCN and other ODs

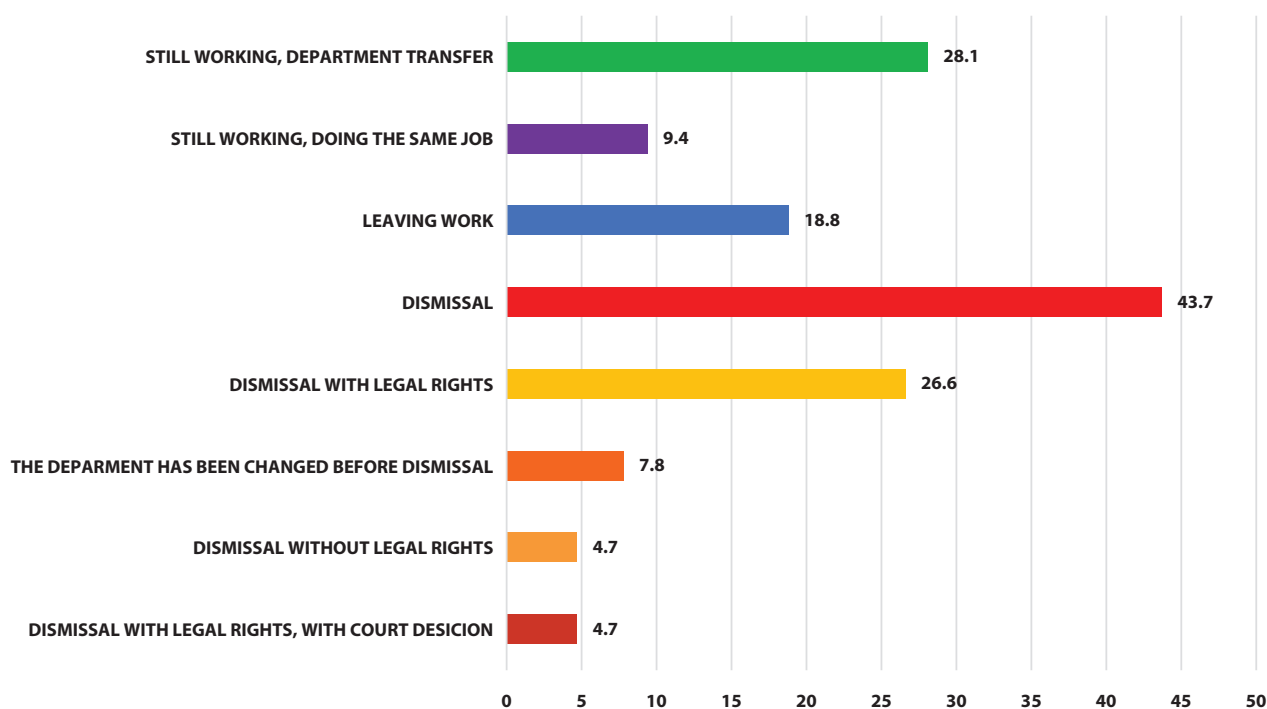
VCN compared to other ODs with respect to some characteristics of CCOs are presented in *Table 4*. The mean age at diagnosis ( $27.6 \pm 4.3$  years and  $27.4 \pm 4.8$  years respectively,  $p=0.894$ ) and the median length of service in a CC (48 months and 43 months respectively,  $p=0.330$ ) did not differ significantly for occupational VCN and other ODs.

Only gender was statistically different between the groups, more females than males had a VCN (92.9% vs 62.4%,  $p=0.000$ ). Occupational VCN

cases were characterized by a higher proportion of subjects working overtime (14.6% vs 6.3%), having gastroesophageal reflux disease (82.3% vs 73.9%) or thyroid nodules (100% vs 73.7%), and higher frequency of current smokers (41.7% vs 13.3%). However, none of these variables showed statistically significant differences between the groups.

## 4. DISCUSSION

This is the first study to describe the characteristics of CCOs who have had an officially recognized OD diagnosis, and to investigate the types of ODs and the employment status of CCOs after being diagnosed with an OD. The higher rates of officially diagnosed OD in women and young people among CCOs in this study can be a reflection of the higher female and youth employment rates observed in the CC industry. Similar to this study, previous studies reported that the majority of CCOs are women and young workers with a high educational level [11-15]. Young employees may be in the majority as the CC market is still



**Figure 2.** Employment status changes of Call Center Operators after referral to an Occupational Diseases Hospital.

**Table 4.** Occupational Vocal Cord Nodules (VCN) and other Occupational Diseases (OD) by some variables.

	VCN		Other ODs		p†
	N	%	n	%	
<b>Gender*</b>					
Female	104	92.9	18	7.1	0.000
Male	26	68.4	12	31.6	
<b>Working Overtime</b>					
Yes	7	14.6	1	6.3	0.383
No	41	85.4	15	93.8	
<b>Types of Call Center</b>					
Inbound	14	29.2	5	31.3	0.955
Outbound	17	35.4	6	37.5	
Mix	17	35.4	5	31.3	
<b>Gastroesophageal reflux</b>					
Yes	14	82.3	34	73.9	0.485
No	3	17.7	12	26.1	
<b>Thyroid nodules</b>					
Yes	6	100	42	73.7	0.150
No	0	0.0	15	22.3	
<b>Smoking habits</b>					
Never	27	56.3	12	80.0	0.109
Current	20	41.7	2	13.3	
Quit	2	2.1	1	6.7	
<b>Employment status after OD diagnosis</b>					
Dismissal/Leaving work	9	56.2	31	64.6	0.600‡
Same job position	1	6.3	5	10.4	
Department transfer	6	37.5	12	25.0	
Service in a call center (months)	48		43		0.330¥

† *Chi-square test*, ‡ *Fisher exact-test* and ¥ *Mann Whitney U test* performed, respectively.

\*Row percentage was given.

growing. At the same time, CC is defined as a “female ghetto”, that is a work environment typically characterized by high turnover rates and limited opportunities for promotion, in which women often with children are employed part-time [16]. The findings regarding the high education level of CCOs are in line with the findings from some previous studies [13-15].

Previous studies report that about 25-30% of CCOs were working longer than 3 years in a CC [12-15]. In this study the proportion of subjects working longer than 3 years was higher (50%). The

CCOs who participated in this study worked for a longer period of time, which may have exposed them more to risk factors and made them more prone to develop occupational diseases.

Similarly to this study, previous studies have demonstrated that the main symptoms related to high vocal demands reported by CCOs are hoarseness, sore throat, vocal fatigue, dry throat, voice failures, effort to speak and loss of voice [11,17-19]. It has been shown that CCOs are required to use their voice more to increase their productivity and

performance, which exposes them to various health problems according to many studies [17-19].

Occupational diseases of CCOs were largely the result of their job duties which required constant talking or listening. VCN may be the most frequently diagnosed OD in CCOs due to increased and inappropriate use of voice. Since hoarseness – which is the most common complaint in VCN – cannot be ignored, it facilitates the diagnosis of the disease, and at the same time its relationship with work and disease can be easily established. Coherently with this study, various studies demonstrated that women have more voice disorders than men, especially when exposed to intense voice use [11, 20-21]. Some authors also claim that women are more affected by vocal disorders because of anatomical differences between men and women making them more susceptible to vibratory trauma [21-22]. In this study, smoking and gastroesophageal reflux disease rates were found to be higher in cases with VCN, however the difference was not statistically significant. Beside the overuse, inappropriate use of the vocal mechanism that is influenced by behaviors like smoking or health issues like gastroesophageal reflux may also play a role in the mechanism of voice disorders [23].

Following phonatory and laryngopharyngeal diseases, hearing loss was the most common OD in the study group. The risk of hearing loss is reported in many studies investigating hearing problems in CCOs [24-28].

There are few studies in literature on TMD in CCOs. A study reports a higher incidence of some TMD signs and symptoms in CCOs who answered more calls daily and who considered their stress level as 'high' [29]. The existing studies evaluate mainly TMD signs and symptoms among CCOs, while this is the first study reporting TMD as an OD in CCOs.

Although there is much literature on the psychosocial risks and their consequences faced by CCOs [5, 7, 30-31] there was only one case diagnosed with mental OD in this study. However, 30% of the accompanying diseases were mental diseases in the study population. Since mental illnesses are not included in the OD diagnosis list in Turkey [10], physicians may avoid diagnosing ODs for mental

illnesses that occur as a result of psychosocial risk factors in the workplace.

Another important result of this study refers to the changes in the employment status of CCOs following the diagnosis of an OD in the workplace. This study found that OD diagnosis negatively affected more than 70% of CCOs professional life, and only 28.1% of them were transferred to a more appropriate job in the same workplace. This finding was consistent with the literature indicating that voice problems can interfere with both productivity and professional performance, leading to negative perceptions from superiors [11, 32-33]. This also suggests the need to identify appropriate job tasks to minimize the impact of voice problems and thus eliminate or mitigate negative perceptions. The lack of adequate legal regulations regarding the placement of workers diagnosed with OD in suitable jobs may have led to such a result [34]. Similarly, it was reported that 53.5% of the cases diagnosed with OD had to quit their jobs, and being diagnosed with OD increased the risk of being unemployed 3 times [35]. A Finnish study [36] reported that 14% of patients diagnosed with occupational asthma (OA) were unemployed, and half of them were unemployed due to a diagnosis of OD. French research showed that 44% of workers diagnosed with OA had to quit their jobs, while 32% continued to be exposed to OA-causing factors [37]. It has been determined that 65% of the workers who applied for compensation due to work-related musculoskeletal diseases in France returned to the same job even though their work ergonomics did not change, and 18% were dismissed [38]. In Croatia after an OD diagnosis 12 of the 95 participants lost their jobs and only five participants were included in an occupational rehabilitation program [39]. The need to protect, rehabilitate and maintain employment of employees diagnosed with OD is underlined in all publications, regardless of the country in which the research is conducted. This issue remains a major occupational health concern for call center operators.

Since this study did not have a control group, the risk factors for all ODs were not determined and could not be discussed. In addition, the characteristics of patients who have not been diagnosed with OD due to insufficient information in their medical



records were not presented. Another limitation of this study is that the interviewed patients were half the total recorded CCOs cases, either because there was no phone number in the case file records, or because their registered phone numbers were inactive or reassigned to someone else.

## 5. CONCLUSION

In this study, ODs among CCOs were largely the result of their jobs requiring constant talking or listening. Training on hearing, use of voice and training based working practices should be an important component of occupational health and safety programs in CCs. It is essential that the CCOs diagnosed with an OD at a very young age and at a very early stage of their working life should be included in vocational rehabilitation programs and employed under appropriate conditions.

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**INSTITUTIONAL REVIEW BOARD STATEMENT:** The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Ethics Committee of Istanbul Kanuni Sultan Süleyman Research and Training Hospital (KA EK/2018.10.29).

**INFORMED CONSENT STATEMENT:** Informed consent was obtained from all interviewed subjects.

**DECLARATION OF INTEREST:** The authors declare no conflict of interest.

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