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ASSOCIATIONS AMONG WORK PRODUCTIVITY, EMERGENCY-CARE UTILIZATION AND INDIVIDUAL FACTORS IN EMPLOYEES WITH CHRONIC DISEASES

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Abstract

Aim: The aim of this study was to evaluate associations among work productivity, emergency-care utilization and individual factors regarding employees with chronic diseases by using mediation analysis.

Methods: This cross-sectional study involved 143 employees with chronic diseases. Data were collected with a questionnaire including questions and statements about healthcare utilization (emergency-care and hospitalization history), daily medication use, Work Productivity and Activity Impairment (WPAI) scale, State-Trait Anxiety Inventory (STAI) and Fear of inability to carry out duties. After preliminary analyses, potential mediators and independent variables were selected for WPAI subgroups. Then, mediation analyses were performed to clarify the relation between causal and outcome variables by applying a mediator variable describing the underlying mechanism.

Results: In Mediation analyses, Presenteeism score as an outcome variable was associated with the emergency-care service in the direct path (P=0.0000). Increases in T-STAI score was found to be a mediator for the Presenteeism score in the indirect path (P=0.0001).

Conclusion: Emergency-care utilization and increases in Trait-STAI scores were predictive factors for Presenteeism in employees with chronic diseases within the limits of the study.

Keywords: Employee, Chronic diseases, Work productivity, Presenteeism, Emergency-care utilization.

INTRODUCTION

Chronic diseases, being the most prevalent health issue, adversely influence the quality of life of the employees by diminishing their productivity at work and threatening their economic welfare. In terms of health policies, chronic diseases increase the financial burden on health services (Baptista et al., 2019; WHO, 2020). Two types of costs are incurred in health care. Direct costs cover medical expenses, medication expenditures, and hospitalization related to the treatment process depending on the employees' diseases. Indirect costs, on the other hand, comprise productivity losses generated by health conditions, such as disease and disability of the employees. Indirect costs have two major components, namely Absenteeism and Presenteeism. While the former refers to the time lost in the workplace because of employees' diseases, the latter refers to the loss of productivity in the workplace caused by the employees' diseases or health state (Zhang et al., 2016).

Since individual factors and disease-related conditions of employees have serious impact on work productivity and activity impairment, they could be considered as clues for the

improvement of disease management and health state (Basaran et al., 2020; Johns, 2010; Lohaus et al., 2019). Employees with chronic diseases could experience more Absenteeism and Presenteeism than those without a chronic disease (Johns, 2010; Rai et al., 2018; Zhang et al., 2016). Productivity loss caused by Presenteeism could be much greater than productivity loss generated by absenteeism and cause a decline in the efficiency of organizations (Adepoju et al., 2014; Edington et al., 2008; Hemp, 2004; Johns, 2010; Kirsten, 2008). Absenteeism of an employee can be regarded as an objective case that can be measured by calculating the hours of labor loss. However, employers can often define Presenteeism as reduced output, errors, and failure to meet production standards (Rhodes et al., 2015). Therefore, the quality of private life and work life of employees adversely affected by chronic diseases create a strain on the demand for health services, especially emergency-care as unscheduled visits (Hemp, 2004; Kim et al., 2017; Prasad et al., 2004).

The effort to ensure sustainability by using limited resources in the most efficient and effective way is the most fundamental problem in every organization. In this respect, it is of great importance to carefully consider factors related to Presenteeism in order to increase the efficiency of disease management, reduce burden caused by diseases or increase organizational efficiency (CHRODIS PLUS, 2020). Presenteeism as an indirect cost element is affected by different factors regarding chronic disease patterns, individual factors, and organizational policies. Therefore, clarifying relevant factors better is obligatory for organizations (Tsuji et al., 2018). These complex interactions are easily examined by a mediation analysis that assesses both direct and indirect effects of variables (Hayes, 2017).

Therefore, the aim of this study was to evaluate the association among work productivity, healthcare utilization and individual factors regarding employees with chronic diseases by using mediation analysis.

1. RESEARCH METHODOLOGY

The cross-sectional study was carried out at the Municipality of Kocaeli, which is a primary industrial zone of Turkey (Basaran et al., 2020). One hundred forty-three employees working in office environment at the Municipality (n=143, F/M: 21/122, mean age: 44.75±6.94 years) were included in the study. The main criteria for inclusion were volunteering to join the study and having at least one chronic disease. The response rate in the study was 22.44 % of the number of staff

working in the organization. The distribution of chronic diseases was shown in Table 1. No physical disability was detected among participants. None of them was a healthcare worker.

Table 1. The Distribution of Chronic Diseases in the Study Group

	n	(%)
Diabetes mellitus	40	(28)
Cardiovascular disease	34	(24)
Pulmonary disease	17	(12)
Musculoskeletal disease	15	(11)
Thyroid gland malfunction	13	(9)
Allergic rhinitis and sinusitis	6	(4)
Kidney disease	6	(4)
Neurologic diseases	9	(6)
Hematological disease	5	(4)
Skin diseases	5	(4)
Gastrointestinal diseases	4	(3)
Cancer	3	(2)
Reproductive health problems	3	(2)
Psychiatric problems	2	(1)

Data were collected by a structured questionnaire including socio-demographic properties, diagnoses of chronic diseases, duration of the disease, utilization of healthcare (emergency-care and hospitalization history), medication, sleep disorders, self-reported health state (poor vs good), and smoking habits (current smoker vs non-smoker), Work Productivity and Activity Impairment Scale (WPAI) and State-Trait Anxiety Inventory (STAI) in the study (Table 2). In addition, employees coded their 'Fear of failure to carry out their duties/responsibilities' (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always). High scores in these scales indicate that chronic illnesses adversely affect the employees.

Employees reported that the reason for accessing the emergency-care in order to stabilize their medical conditions was because of the acute episodes of their chronic diseases. Employees with sleep disorders also received medical support for this problem. These data were confirmed by the occupational health professional in the organization.

Work Productivity and Activity Impairment Scale (WPAI) is a 6-item instrument to measure impairment during the last seven days in the patients' paid and regular daily activities.

Scores of four main subgroups regarding '*Absenteeism (work time missed)'*, '*Presenteeism (work time lost due to impairment at work)', 'Total work impairment',* and '*Daily activity impairment'* were calculated (M. C. Reilly et al., 1993).

WPAI outcomes are expressed as impairment rates, with higher numbers indicating greater impairment and less productivity, i.e., worse outcomes, as follows (Karacayli et al., 2022; Mumcu et al., 2017; Mumcu et al., 2020; M. Reilly, 2022; M. C. Reilly et al., 1993; Zhang et al., 2010; Zhang et al., 2016):

The WPAI consists of six questions: Q1= currently employed; Q2= hours missed due to health problems; Q3 = hours missed for other reasons; Q4 = hours actually worked; Q5 = degree of health- affected productivity while working (using a 0 to 10 Visual Analogue Scale (VAS)); Q6 = degree of health-affected productivity in regular daily activities (VAS).

Four main outcomes can be drawn from the WPAI and expressed in percentages by multiplying the following scores by 100:

Rate of work time missed due to health problems: Q2/(Q2+Q4)

Health Impairment effect rate on work done :Q5/10

Health Impairment effect rate on overall work: Q2/(Q2+Q4)+[(1-(Q2/(Q2+Q4)))x(Q5/10)]

Health impairment effect rate on daily activities:Q6/10

State-Trait Anxiety Scale includes 20 items scored on four intensity levels of anxiety. The State Anxiety Scale (S-STAI) evaluates the present state of anxiety, whereas the Trait Anxiety Scale (T-STAI) reflects anxiety susceptibility of individuals. An increased score indicates a high level of anxiety. Validity and reliability study of the Turkish form of the scale was performed by Öner and Le Compte. Permission for the Turkish STAI form was obtained (Öner, 1985).

WPAI questions from 1-4 of are not suitable for reliability analysis. Since Cronbach-Alpha values were 0,90 for the last two items using the same scoring method in the WPAI questionnaire, 0,91 for State-STAI and 0,87 for Trait-STAI, internal reliabilities were high for both indices.

The study was approved by the Ethics Committee of the Marmara University Health Sciences Institute (15.10.2018-188) and informed prior consent was given by all the participants. Written permission was obtained from the institution where the study was conducted.

Data were analyzed using SPSS 26.0 statistical program. Mann-Whitney U test, Kruskal Wallis test, and Spearman correlation tests were carried out due to the non-normal distribution of data in the preliminary analysis.

In the study, PROCESS Macro was adapted in SPSS 26.0 for the Mediation analysis (Hayes, 2017). WPAI subgroups as dependent variables were compared according to gender, sleep disorders approved by physicians, smoking habits, need for emergency-care utilization, hospitalization history and self-reported general health state (Table 3). Then, possible mediators were selected according to the results of statistical analyses (Table 4). The relations among scores of WPAI domains and State-STAI, Trait-STAI, fear of inability to work and disease-related factors regarding the number of medication and disease duration were assessed (Table 4). These variables were considered as potential mediators. In the conceptual framework of the Mediation analysis, WPAI subgroups were selected as dependent variables. Besides, healthcare utilization defined as emergency-care utilization (1: present vs 2: absent) and hospitalisation history (1: present vs 2: absent) related factors were selected as independent variables. Furthermore, individual factors regarding sleep disorders, self-reported general health state, anxiety level (S-STAI and T-STAI), duration of the disease or disorder (in years), use of medication and fear of inability to work were possible mediators in this framework.

After multiple mediation analyses were carried out in each sub-group by applying these variables, the most significant variables and mediators were selected for the final mediation analyses in each WPAI subgroups. Moreover, a bootstrap re-sample method was also used to test the mediation effect. Thus, the significance of the results was also interpreted by examining 5000 samples, each of which has the same size as the original data set.

2.FINDINGS

The profile of the employees has been presented in Table 2. Seventy-eight percent of the employees (n=112) had one chronic disease; whereas, the others had two or more chronic diseases. The mean disease duration was 9.17±9.50 years in the study group. Less than half of the group were current smokers (*n*=61, 43%) and had poor health condition (*n*=67, 47%). Utilization of emergency-care during the last year was observed in 27% (n=39) of the group. Hospitalization was seen in 15% (n=21) of the group (Table 2). The mean hospitalization duration was found to be 7.10±12.97 days. In addition, occurrence of medications (1.72±0.88) was significantly higher in employees who needed emergency-care (2.02±0.99) when compared to others (1.57±0.78) (P=0.014).

Table 2. The Profiles of Employees with Chronic Diseases

		n	(%)
Gender	Male	122	(85)
	Female	21	(15)
Marital status	Married	119	(83)
	Single	24	(17)
Number of chronic diseases	1	112	(78)
	≥2	31	(22)
Smoking habits	Current smoker	61	(43)
	Non-smoker	82	(57)
Self-reported general state of health	Good	76	(53)
	Poor	67	(47)
Sleep disorders	Present	49	(34)
	Absent	94	(66)
Emergency-care utilization	Yes	39	(27)
	No	104	(73)
Hospitalization history	Hospitalized	21	(15)
	Non-hospitalized	122	(85)
		Mean	**SD**
Age (years)		44.75	6.94
Education level (years)		8.34	3.90
Disease duration (years)		9.17	9.50
Number of medication/per day		1.72	0.88
WPAI Subgroups			
Absenteeism		3.55	6.98
Presenteeism		19.02	21.41
Overall work impairment		21.15	22.79
Daily activity impairment		23.08	25.18
STAI			
Trait-STAI		37.06	9.54
State-STAI		40.15	8.36
Fear of inability to carry out duties/responsibilities		1.63	0.92

The mean percentages of WPAI subgroups were between 3.55±6.98 (Absenteeism) and 23.08±25.18 (Daily activity impairment). The mean scores of S-STAI, T-Trait, and 'Fear of failure to carry out duties' were 37.06±9.54; 40.15±8.36 and 1.63±0.92 in the group (Table 2). Age was not correlated with subgroup scores of WPAI and STAI, and neither was fear of failure to carry out duties (P>0.05).

The scores of Absenteeism, Presenteeism, and Overall work impairment were substantially higher in the emergency-care utilization, hospitalization history, and self-reported poor health state sub-groups than others (P<0.05). Employees with sleep disorders had low scores of Presenteeism and Overall work impairment compared to others (P=0.015 and P=0.042, respectively) (Table 3).

Trait-STAI scores of these employees (42.36±8.61) were significantly higher than those of the employees without sleep disorders (38.93±8.01)(p=0.009).

In the study group, the score of Daily activity impairment was associated with emergency-care utilization and poor general health state (*P*=0.000 for both). Subgroup scores of WPAI were similar in accordance with gender and smoking habits (*P*>0.05) (Table 3). The number of medications was related to scores of Presenteeism, overall work impairment, and Daily activity impairment (*P*<0.05). In addition, disease duration was associated with both Presenteeism and Daily activity impairment (*P*<0.05) (Table 4).

All subgroups of WPAI were correlated with Fear of failure to carry out duties among the participants (*P*<0.05). The mean scores of S-STAI and T-STAI were correlated with scores of Presenteeism, Overall work impairment, and Daily activity impairment (*P*<0.05) (Table 4). Different combinations were seen among chronic diseases, and the number of the same chronic diseases was particularly low. Therefore, the analysis was carried out on a limited number of employees according to the prevalence of chronic diseases. Scores of WPAI domains of employees with isolated diabetes mellitus (n=27) were similar in patients with isolated cardiovascular disease (n=25)(P=0.738 for Absenteeism, P=0.490 for Presenteeism, P=0.748 for Overall impairment and P=0.10 for Daily activity impairment).

In isolated cardiovascular disease (n=25), scores of Absenteeism and Daily activity impairment were substantially higher in the patient group who needed emergency-care utilization (n=10) than the others (n=15)(P=0.016, P=0.043). Scores of Presenteeism and Overall impairment were correlated with score of 'Fear of inability to carry out duties/responsibilities' (ρ: 0.46 *P*=0.022; ρ: 0.47 *P*=0.022)

Table 3. WPAI Subgroups according to Gender, Sleep disorders, Self-Reported Health State and Healthcare Utilization

		Absenteeism			Presenteeism			Overall work impairment			Daily activity impairment		
		Mean	**SD**	***P***	**Mean**	**SD**	***P***	**Mean**	**SD**	***P***	**Mean**	**SD**	***P***
Gender	Female	3.45	6.82	0.918	21.90	22.50	0.428	24.01	23.23	0.462	28.1	26.95	0.271
	Male	3.56	7.03		18.52	21.27		20.66	22.78		22.21	24.88	
Sleep disorders	Present	2.64	4.87	0.678	23.47	20.47	**0.015***	24.91	21.33	**0.042***	26.94	25.76	0.113
	Absent	4.02	7.84		16.70	21.62		19.19	23.39		21.06	24.78	
Smoking habits	Current smoker	3.32	6.22	0.863	21.64	21.31	0.083	23.50	22.72	0.148	26.72	24.95	0.059
	Non-smoker	3.72	7.52		17.97	21.40		19.40	22.82		20.37	25.16	
Emergency-care utilization	Yes	6.81	7.57	**0.000*****	34.87	24.80	**0.000*****	38.42	25.13	**0.000*****	38.97	28.54	**0.000*****
	No	2.33	6.36		13.08	16.55		14.67	18.10		17.12	21.03	
Hospitalization history	Hospitalized	8.06	9.33	**0.003****	30.95	24.88	**0.006****	34.97	26.63	**0.005****	31.90	28.39	0.069
	Non-hospitalized	2.77	6.22		16.97	20.16		18.77	21.30		21.56	24.39	
Self-reported general health state	Good	2.40	6.57	**0.006****	9.74	13.95	**0.000*****	11.66	15.64	**0.000*****	11.84	17.34	**0.000*****
	Poor	4.85	7.24		29.55	23.51		31.91	24.87		35.82	26.69	

Mann-Whitney U test was used in the analysis. *P<0.05, **P<0.01, ***P<0.001

Table 4. WPAI Sub-groups Related Variables in the Study Group

	Absenteeism		Presenteeism		Overall work impairment		Daily activity impairment	
	ρ	***P***	ρ	***P***	ρ	***P***	ρ	***P***
State-STAI	0.16	0.057	0.29	**0.000*****	0.27	**0.001*****	0.39	**0.000*****
Trait-STAI	0.15	0.057	0.30	**0.000*****	0.27	**0.001*****	0.39	**0.000*****
Disease duration (years)	0.05	0.530	0.19	**0.023***	0.14	0.079	0.23	**0.005****
Number of medication/days	0.07	0.508	0.37	**0.000*****	0.34	**0.000*****	0.23	**0.017***
Fear of inability to carry out duties/responsibilities	0.36	**0.000*****	0.46	**0.000*****	0.46	**0.000*****	0.42	**0.000*****

**P<0.05, **P<0.01, ***P<0.000*

In isolated diabetes mellitus (n=27), Daily activity impairment score was correlated with the score of 'Fear of inability to carry out duties/responsibilities' (ρ: 0.47 *P*=0.013). WPAI scores could not be compared to emergency-care utilization because the number of patients who needed emergency-care was low in this group of patients (n=2).

According to mediation analysis; WPAI sub-groups regarding Absenteeism, Presenteeism, Overall impairment and Daily activity impairment were associated with the Emergency-care utilization in the direct path (*P*<0.05) (Table 5) (Figure 1a-1d). In the indirect path, 'Fear of inability of an employee to carry out the duties' as a mediator for Absenteeism (*P*=0.0041) (Figure 1a). Increases in T-STAI Score was found to be a mediator for both 'Presenteeism' (Figure 1b) and 'Overall Impairment' (Figure 1c) (*P*=0.0001 for both). In addition, Daily activity impairment was associated with long disease duration as a mediator (*P*=0.0102) (Figure 1d) (Figure 1) (Table 5).

Table 5. Mediation Analyses for WPAI Subgroups in Employees with Chronic Diseases

	B	**SE**	***T***	***P***	**LLCI**	**ULCI**
WPAI-Absenteeism						
Constant	0.0561	0.0293	19.154	0.0575	0.0018	0.1140
Emergency-care utilization	-0.0298	0.0133	-2.2395	**0.0267**	-0.0561	-0.0035
Fear of inability to carry out duties/responsibilities	0.0189	0.0065	2.9216	**0.0041**	0.0061	0.0318
WPAI-Presenteeism						
Constant	0.2006	0.1076	1.8648	0.0643	-0.0121	0.4133
Emergency-care utilization	-0.1850	0.0350	-5.2918	**0.0000**	-0.2541	-0.1159
T-STAI	0.0077	0.0019	4.1210	**0.0001**	0.0040	0.0114
WPAI-Overall work impairment						
Constant	0.2347	0.1139	2.0609	0.0412	0.0095	0.4598
Emergency-care utilization	-0.2027	0.0370	-5.4774	**0.0000**	-0.2759	-0.1295
T-STAI	0.0081	0.0020	4.1173	**0.0001**	0.0042	0.0121
WPAI-Daily activity impairment						
Constant	0.5133	0.0847	6.0597	0.0000	0.3459	0.6808
Emergency-care utilization	-0.1922	0.0440	-4.3650	**0.0000**	-0.2793	-0.1052
Disease duration	0.0054	0.0021	2.6046	**0.0102**	0.0013	0.0095

LLCI, Lower level confidence interval; ULCI, upper level confidence interval

A bootstrap analysis with 5000 replications was also applied to estimate the effects of mediation to generate 95% CI (Confidence interval). According to the percentile, bootstrap of mediators were

effective mediators on dependent variables. However, similar relations relevant to hospitalisation were not found.

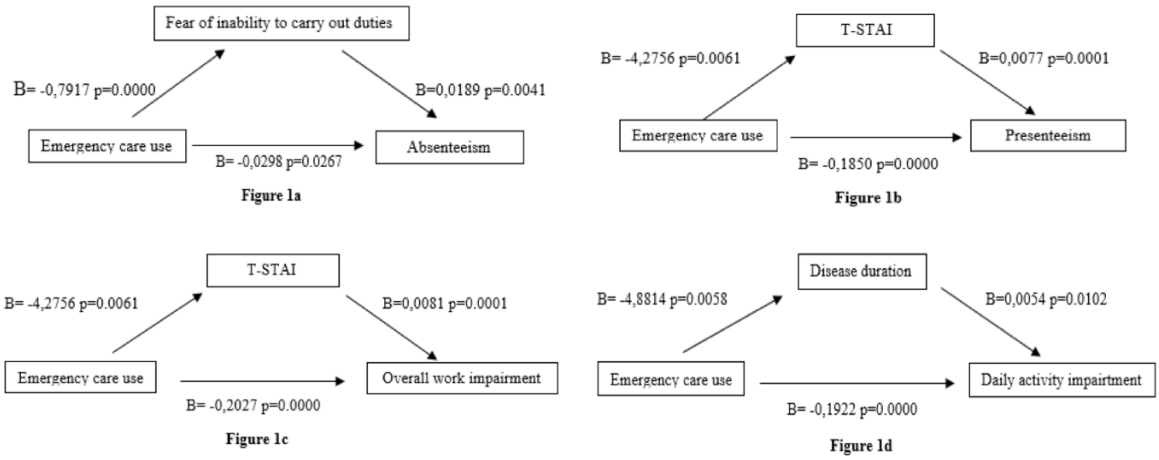

Figure 1. Mediation Analyses of WPAI Subgroups
Figure 1a. Mediation analysis of WPAI- Absenteeism
Figure 1b. Mediation analysis of WPAI- Presenteeism
Figure 1c. Mediation analysis of WPAI- Overall work impairment
Figure 1d. Mediation analysis of WPAI- Daily activity impairment

3. CONCLUSIONS AND RECOMMENDATIONS

Since chronic diseases, being one of the most persistent health problems, affect employees who have an active role in work-life, they prove to be obstructive for organizations due to their economic impact (Silvaggi et al., 2019; WHO, 2020). With this issue in mind, this study aimed to evaluate the relations among work productivity, emergency-care utilization and individual factors regarding employees with chronic diseases by using mediation analysis.

In our study, 'Emergency- care utilization' and 'Hospitalization history' during the last year and 'Self-reported poor health state' were related to 'Absenteeism', 'Presenteeism', and 'Overall work and Daily activity impairment'. In addition, the need for emergency-care was directly associated with all the subgroups of the WPAI questionnaire in the mediator analysis. Uncontrolled symptoms are associated with several unplanned/unscheduled emergency examinations or hospitalization in connection with the risk of mortality and/or morbidity in chronic diseases (CDC, 2020; CHRODIS PLUS, 2020; Mumcu et al., 2017; Mumcu et al., 2020). The occurrence of productivity loss in an organisation where employees needed emergency-care and

hospitalization was inevitable. Productivity losses lead to significant costs in organizations (Adepoju et al., 2014; CDC, 2020; Edington et al., 2008; Fouad et al., 2017; Mumcu et al., 2017; Mumcu et al., 2020; Nakata et al., 2018; Zhang et al., 2016). 'Absenteeism' is frequently used for the evaluation of productivity loss; whereas, 'Presenteeism' is not simply measurable in organizations. Therefore, focusing on 'Presenteeism' gave critical clues for the organisation in the study. Impairment of daily life is also predicted in these circumstances (Mumcu et al., 2017). Therefore, with the help of health education programs and regular medical visits, employees could ensure a healthy life state (Fouad et al., 2017).

In the study group, sleep disorders were found to be associated with Presenteeism and Overall impairment. Increase in Trait-STAI scores were observed in the group of employees with sleep disorders. Since absence from work and lower work performance as well as increase in healthcare costs are observed in the employee group with sleep disorders (Hui et al., 2015), the management of sleep disorder and anxiety level ease the working life of employees.

Rise in scores of T-STAI as a mediator, S-STAI and the 'Fear of failure to carry out duties/responsibilities' and increased number of daily medications were correlated with the worsening of Presenteeism and Overall impairment. In addition, disease duration was associated with Presenteeism. Close relation is observed between productivity loss and work-related stress (Hassard et al., 2018) because employees with chronic diseases may suffer time constraints more, workload and high job demands. Therefore, increases in the stress level, anxiety and depression could be predictable as employees are expected to do the same amount of work with less functional capacity in the workplace (Kirsten, 2008; Lerner et al., 2004; Mumcu et al., 2017; Mumcu et al., 2020; Silvaggi et al., 2019; Smith et al., 2012; Tsuji et al., 2018).

Increase in the number of negative experiences in the work environment could not be managed in long-lasting diseases. Besides, increase in the number of medications per day is associated with the course of the disease (Mumcu et al., 2020; Nakata et al., 2018). At this point, employees receiving support in coping with the course of their disease can keep up with their work-life efficiently (Detaille et al., 2009).

Absenteeism was found to be related to the 'Fear of failure to carry out duties/responsibilities'. Employees with chronic diseases experience more Absenteeism than healthy employees, and lose their jobs in the organizations they are working. (Fouad et al., 2017; Johns, 2010; Rai et al., 2018; Zhang et al., 2016). Therefore, occupational health professionals could help to improve their health

conditions, to maintain income levels (Vooijs et al., 2018) and to change working conditions with decreasing Absenteeism (Varekamp et al., 2010). The framework of the European Union Joint Action 'CHRODIS Plus: Good Practices for Chronic Diseases' (CHRODIS PLUS, 2020) aims to encourage the establishment of supportive workplaces for employees with chronic diseases and to eliminate Absenteeism, Presenteeism, and early retirement (Silvaggi et al., 2019).

The increase in STAI scores (T-STAI and S-STAI), the number of medications, 'Fear of inability to carry out duties/responsibilities' and long disease durations were associated with the Daily activity impairment. Patients with chronic diseases who require medical attention to avoid mortality and morbidity (CDC, 2020) are affected severely (Bronckers et al., 2019). Therefore, it was predicted that this ongoing process would affect daily life adversely.

Diabetes mellitus and cardiovascular disease had similar scores of WPAI subgroups. Emergency-care utilization was also associated with Presenteeism and Overall impairment of patients with cardiovascular disease. 'Fear of inability to carry out duties/responsibilities' was associated with poor Presenteeism and Overall impairment in cardiovascular disease and daily activity impairment in diabetes mellitus. Self-management programs and elective targeted interventions could help employees for better disease management (Adepoju et al., 2014). Therefore, occupational health professionals as mentors in organizations (Redfern et al., 2018) could organize efficient personal intervention programs to improve the physical health and well-being of employees as well as to create a favourable and supportive work environment (Bose, 2013; Varekamp et al., 2010; Vooijs et al., 2018). In addition, employees with chronic diseases should be encouraged to have regular health check-ups to ensure the stability of health state and work life.

Since presenteeism is explained by reduced output, increase in errors, and failure to meet production standards in organizations (Rhodes et al., 2015), it is a hidden risk factor and cost element for organizations. Different methods are used to evaluate work productivity (Prasad et al., 2004). In the present study, Presenteeism was evaluated by using WPAI that was found to be a reliable tool for a 7-day period. Since four sub-groups of the WPAI questionnaire are calculated by 6 questions, it is an easy-to-use and well-accepted tool for measuring Presenteeism in studies (M. C. Reilly et al., 1993). Similarly, the WPAI questionnaire was found to be a reliable tool with a high Cronbach-Alpha value in the present study. In addition, the questionnaire provided reliable

data about Presenteeism that could not be measured easily in organizations. (Fouad et al., 2017; Kirsten, 2008)

Productivity loss could be a variable among specific chronic diseases (Adepoju et al., 2014; Kim et al., 2017; Mumcu et al., 2017; Mumcu et al., 2020; Nakata et al., 2018). Occupational health professionals could calculate the financial burden of chronic diseases at individual levels by using WPAI scale and help employees more effectively.

On the other hand, the study had some limitations, such as data having been collected from a sole organization and the number of volunteer participants being rather low. Therefore, the results reflect only this sample group. Moreover, the economic value of productivity cost was not calculated by using raw estimates (hours×hourly wage) because employees did not want to share their income levels. However, it provided global insight and clues on impairment of work-life and private life among employees with chronic diseases at an organizational level.

In conclusion, emergency-care utilization and increases in Trait-STAI scores were predictive factors for Presenteeism in the employee group with chronic diseases. These factors could be considered as clues for health professionals to assist employees for the improvement of productivity

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