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The relationship between hospital employees' knowledge levels and behaviors about chemical risks and occupational safety and employee health culture

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This study was conducted to determine the relationship between the knowledge levels and behaviors of hospital employees about chemical risks, occupational safety and employee health. Determining the relationship between the factors will be useful for studies on this subject. It has been observed that the study on the relationship between chemical risks for hospital workers and occupational safety and employee health culture is limited. Therefore, it is important in terms of shedding light on future studies and contributing to the literature. Hospital staff, Doctor, Nurse/midwife/EMT, Health Technician/Technician, Cleaning Staff, Pharmacist/Pharmacy Worker, and Secretary were included in the study. The study was conducted with 251 people who agreed to participate in the study. In the study, a 9-question socio-demographic questionnaire, a 20-question chemical knowledge questionnaire created by the researchers and OHS culture scale consisting of 30 questions were used. The data were delivered to the employees via Google form. The collected data were evaluated with Anova correlation and regression analyses in SPSS. When the findings obtained in our study are examined; A statistically significant relationship was found between the level of education, occupation, place of work and exposure to chemical substances of the participants in the study and OSEHCS.As a result of the linear regression analysis of the factors affecting the OSEHCS score, it was concluded that there was a statistically significant difference in the OSEHCS score in those who worked in the profession, those who worked as a doctor and support staff, those who worked in intensive care and operating rooms, and those who did not experience chemical exposure. A relationship was found between the knowledge levels and behaviors of hospital staff about chemical risks and OSEHCS in terms of working year and occupation.

Keywords: *Occupational safety and employee health (OSEH), hospital worker, chemical risks*

INTRODUCTION

Hospitals, which occupy the largest place in the health sector in our country, are faced with great dangers grouped as physical, ergonomic, chemical, biological and psychosocial risks. There are many chemical agents that can cause work accidents and occupational diseases in hospitals, which are the largest workplaces in the health sector. With the development of the chemical industry, the diversity of chemicals continues to increase and it is known that there are approximately 5-7 million various chemicals in the world (Obenaus-Emler et al., 2019). A chemical substance is defined as all elements, compounds or mixtures that can be found in the

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natural structure, during processing, as post-work waste or accidentally. In short, a chemical substance is the naming of substances in a solid, liquid or gaseous state that have a certain chemical formula or composition and are produced for a purpose. The American National Institute of Occupational Health and Safety reported that there are 24 types of biological and 25 types of chemical risks and hazards in hospitals (Meydanlıoğlu et al., 2019). In addition, it has been determined that there are 299 different chemical components in the form of dust, gas, steam and liquid that harm human health in the health sector (Solmaz et al., 2017). With the advancement of medicine, these chemicals have started to be used more and more in hospitals. Healthcare workers may be exposed to chemical risks and hazards such as disinfectants, chemicals used in sterilization such as formaldehyde, anesthetic gases, detergents, volatile chemicals, acid and base solvents and drugs. It is observed that health problems are gradually increasing due to occupational accidents and occupational diseases in the health sectors (10). In fact, every object in our environment has a chemical formula and component. Even water, natural gas used in homes, salt has a chemical formula. However, when chemicals are mentioned, substances that are produced for a specific purpose, that have a negative effect on human health, that must be stored and transported in specially designed packages, and that must be used under supervision by experts come to mind. The basic way of occupational safety and protection is to know the effects of chemical substances in the working environment. It is very important to create a culture of occupational safety in terms of protecting the health of employees, preventing disability and reducing deaths due to toxic causes. For the first time, the concept of occupational safety culture was mentioned in the evaluation report of the nuclear accident that took place in Chernobyl in 1986, organizational error, lack of design and neglect of employees (Wilburn et al., 2004). Security is the state in which people can live fearlessly and safely. Occupational health and safety culture, on the other hand, is defined as the culture of occupational health and safety, on the other hand, the beliefs that belong to the individual or the whole that determine the style, duties and responsibilities of the institution, and fields of action in line with occupational health and safety (Aslanhan et al., 2006). According to the International Labor Organization (ILO), it has been concluded that 4workers per minute and an average of 6300 workers a day die due to work accidents or occupational diseases (Özkan et al., 2006). In the world, an average of 317 million occupational accidents occur annually and it is reported that 2.5 million of them result in loss of life. The occurrence of such a high rate of occupational accidents and loss of life shows that occupational health and safety should be emphasized. In order to reduce work accidents and occupational diseases, the institution should adopt a common occupational health and safety culture and be implemented by all employees.

In our study, it is also aimed to evaluate the risks faced by healthcare professionals against ever-increasing chemicals, to contribute to the planning of the health sector, and to develop existing regulations by determining the relationship between the level of knowledge of employees about the risks and hazards of dangerous chemicals in hospitals with very dangerous workplaces and occupational safety culture.

MATERIALS AND METHODS

Type of Research

This research is of a cross-sectional type.

Place and Time of Research

The research was carried out at the Yozgat Bozok University Research and Application Center. Data were collected in January-March 2022.

Population and Sample of the Research

The universe of the research consists of the employees at the Yozgat Bozok University Research and Application Center.

All employees who agreed to participate in the study were included in the study, as a sample was not selected for the study. The minimum sample size for the research was calculated with the GPower 3.1 program. Before filling out the questionnaire forms, the subjects were informed about the subject and purpose of the study and their verbal consent was obtained.

Data Collection Methods

The data were collected by means of a questionnaire for hospital staff. Before applying the data forms, the employees were informed about the purpose and importance of the research. The data were completed from 252 people who agreed to participate in the study by reaching everyone working in the hospital.

Data Collection Tools

Socio-demographic Questionnaire Form

The questionnaire created by the researchers to find out whether the participants received occupational health and safety training and whether they had a work accident, in addition to their age, gender, marital status, consists of 9 questions.

Chemical Knowledge Level Questionnaire Form

In order to determine the level of chemical knowledge, a 20-item questionnaire was created by literature review by the researchers (16).

Occupational Safety and Employee Health Culture Scale (OSEHCS)

OSEHCS was developed by Güven and İşcan in 2014 and consists of 30 items. Responses to each item in OSEH were scored on a 5-point Likert type, and the degree of agreement was: (5) "Strongly Agree", (4) "Agree", (3) "I am undecided", (2) "I do not agree" and (1) "Strongly Disagree" has been determined. As a result of the internal reliability analysis of the scale, the Cronbach Alpha value was found to be 0.963. Accordingly, it was concluded that the scale was highly reliable. In this study, Cronbach's α coefficient of internal reliability of OSEHCS was found to be 0.969.

Analysis of Data

The data were evaluated in the SPSS program. In the comparison of the arithmetic means of the scores obtained from the scales according to the independent variables, t-test and Anova, Regression were used in independent groups. As the dependent variable; OSEHCS score, socio-demographic and chemical substance knowledge level questionnaire characteristics were taken as independent variables. Occupational health and employee culture level was charted according to socio-demographic and chemical substance knowledge characteristics and analyzed with the chi-square test. A p-value of <0.05 was considered statistically significant in all tests.

Ethic

Institutional permission for the research was obtained from Yozgat Bozok University Research and Practice Chief Physician, and ethics committee approval was obtained from Yozgat Bozok University Ethics Committee. The research was conducted in accordance with the principles of the Declaration of Helsinki.

RESULTS

When the OSEHCS score distribution was examined according to the socio-demographic characteristics of the participants working in the hospital; while there is a statistically significant difference between education level, occupation, place of work and exposure to chemical substances and OSEHCS, there was no significant relationship between gender, age group, years of work and occupational health and safety education (Table 1).

According to the results of the analysis with linear regression (backward) analysis of the factors affecting the OSEHCS score of the hospital staff; It has been concluded that there is a statistically significant difference between those who work in the profession, those who work as doctors and support staff, those who work in the intensive care and operating room as the place of work, and those who are not exposed to chemicals. A significant relationship was not found in those working in the laboratory (Table 2).

When the relationship between the level of OSEH according to the socio-demographic characteristics of the hospital staff is examined; It has been concluded that there is a statistically significant relationship between the place of duty and occupation of the employees and the level of OSEH. The level of OSEH was examined in 3 groups. Examined as insufficient, partially inadequate and adequate level. Those who are male (20.5%), In the 20-29 age range (19.0%), Post-graduate degree (16.8%), Doctors (41.4%), Operating room (25.0%) employees and 1-4 years in the profession It was concluded that (22.8%)

those with a working year had insufficient OSEH level. OSEH A sufficient level of female (24.2%) and male (25.2%) ratios has been reached. The level of proficiency was found to be high in the 30-39 age range. It has been concluded that while an associate degree (32.5%) is high at the education level, it is the lowest level of proficiency in postgraduate (14.3%).

Table 1. OSEHCS score averages according to various characteristics of hospital staff

	Count	Column %	Mean	Standard deviation	t/F	p
Gender	Woman	124	49.4	100.2	18.6	1.35
	Male	127	50.6	96.5	24.9	0.177
Age groups	20-29	121	48.2	95.0	22.2	2.87
	30-39	89	35.5	100.8	22.8	0.059
	40+	41	16.3	102.9	18.8	
Education level	High school and below	74	29.5	102.2	23.9	2.92
	Associate degree	40	15.9	102.0	17.0	**0.035**
	License	95	37.8	97.1	22.3	
	Postgraduate	42	16.7	90.8	21.0	
Occupation	Doctor	29	11.6	85.2	23.0	5.95
	Nurse/Midwife/ATT	121	48.2	99.6	19.7	**0.001**
	Support personnel	51	20.3	105.5	24.6	
	Other Health Personnel	50	19.9	95.6	21.1	
Place of duty	Intensive care	62	24.7	92.5	23.0	4.85
	Operating room	28	11.2	89.0	24.7	**0.001**
	Laboratory	16	6.4	93.8	16.7	
	Clinic	61	24.3	100.4	19.4	
	Other units	84	33.5	105.1	21.2	
Working time in the profession (year)	1-4	79	31.5	93.9	21.0	2.08
	5-9	84	33.5	99.1	23.8	0.104
	10-14	44	17.5	99.1	20.0	
	15+	44	17.5	104.0	21.7	
Getting OHS training	Yes	231	92.0	99.1	22.0	1.94
	No	20	8.0	89.2	21.2	0.054
Exposure to chemicals	Yes	94	37.5	93.7	21.9	2.60
	No	157	62.5	101.1	21.8	**0.010**
	Total	**251**	**100.0**	**98.3**	**22.1**	

OSEHCS**:** Occupational Safety and Employee Health Culture Scale

Table 2. Linear regression (backward) analysis of the factors affecting the OSEHCS score of hospital staff.

Dependent Variable: OSEHCS	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**	**95,0% Confidence Interval for B**	
	B	**Std. error**	**Beta**			**Lower bound**	**Upper bound**
(Constant)	94.811	3.427		27.665	**0.001**	88.061	101.562
Working time in the profession	0.441	0.223	0.123	1.979	**0.049**	0.002	0.880
Occupation=Doctor	-11.424	4.349	-0.166	-2.627	**0.009**	-19.990	-2.858
Occupation = Support personnel	6.660	3.370	0.122	1.976	**0.049**	0.021	13.299
Place of duty = Intensive care	-8.046	3.274	-0.158	-2.458	**0.015**	-14.495	-1.598
Place of duty = Operating room	-9.660	4.538	-0.138	-2.128	**0.034**	-18.599	-0.720
Place of duty = Laboratory	-10.365	5.577	-0.115	-1.859	**0.064**	-21.351	0.620
Exposure to chemicals =No	5.615	2.823	0.123	1.989	**0.048**	0.055	11.176

Independent variables: Age, gender, education level, occupation, place of duty, working time in the profession, receiving OHS training, exposure to chemical substances.
Adj.R^2: 0,119 OSEHCS: Occupational Safety and Employee Health Culture Scale

Table 3. OSEH level according to various characteristics of hospital staff

		OSEH Percent Group				
		Insufficient (0-39)	**Partly insufficient (40-59)**	**Partly enough (60-69)**	**Sufficient (70+)**	**X^2**
		n %	**n %**	**%**	**%**	**P**
Gender	Women	14 (11.3)	52 (41.9)	28 (22.6)	30 (24.2)	4.487
	Male	26 (20.5)	46 (36.2)	23 (18.1)	32 (25.2)	0.213
Age groups	20-29	23 (19.0)	49 (40.5)	27 (22.3)	22 (18.2)	7.506
	30-39	14 (15.7)	32 (36.0)	16 (18.0)	27 (30.3)	0.277
	40+	3 (7.3)	17 (41.5)	8 (19.5)	13 (31.7)	
Education level	High school and below	8 (10.8)	30 (40.5)	14 (18.9)	22 (29.7)	15.783
	Associate degree	4 (10.0)	12 (30.0)	11 (27.5)	13 (32.5)	0.072
	License	16 (16.8)	36 (37.9)	22 (23.2)	21 (22.1)	
	Postgraduate	12 (28.6)	20 (47.6)	4 (9.5)	6 (14.3)	
Occupation	Doctor	13 (44.8)	12 (41.4)	1 (3.4)	3 (10.3)	32.996
	Nurse/Midwife/ATT	13 (10.7)	49 (40.5)	28 (23.1)	31 (25.6)	0.000
	Support personnel	7 (13.7)	15 (29.4)	9 (17.6)	20 (39.2)	
	Other Health Personnel	7 (14.0)	22 (44.0)	13 (26.0)	8 (16.0)	
Place of duty	Intensive care	13 (21.0)	27 (43.5)	13 (21.0)	9 (14.5)	21.817
	Operating room	7 (25.0)	13 (46.4)	4 (14.3)	4 (14.3)	0.040
	Laboratory	3 (18.8)	7 (43.8)	6 (37.5)	0 (0.0)	
	Clinic	8 (13.1)	23 (37.7)	10 (16.4)	20 (32.8)	
	Other units	9 (10.7)	28 (33.3)	18 (21.4)	29 (34.5)	
Working time in the profession (year)	1-4	18 (22.8)	32 (40.5)	14 (17.7)	15 (19.0)	10.289
	5-9	11 (13.1)	34 (40.5)	20 (23.8)	19 (22.6)	0.328
	10-14	6 (13.6)	19 (43.2)	8 (18.2)	11 (25.0)	
	15+	5 (11.4)	13 (29.5)	9 (20.5)	17 (38.6)	
	Total	**40 (15.9)**	**98 (39.0)**	**51 (20.3)**	**62 (24.7)**	

Independent variables: Age, gender, education level, occupation, place of duty, duration of employment, OSH training, exposure to chemicals. OSEH: Occupational Safety and Employee Health

Table 4. Multinomial logistic regression (backward) analysis of the factors affecting the OSEH culture level of hospital staff

OSEH culture level **Reference group: Insufficient (0-39).**		**B**	**Sig.**	**Exp (B)**	**95% CI for Exp (B)**	
					Lower Bound	**Upper Bound**
Partly insufficient (40-59)	Intercept	1.356	**0.001**			
	Place of duty = Intensive care	-0.484	0.267	0.617	0.263	1.448
	Place of duty = Laboratory	-0.360	0.632	0.698	0.160	3.049
	Occupation =Doctor	-1.351	**0.004**	0.259	0.103	0.654
Partly enough (60-69)	Intercept	0.809	**0.010**			
	Place of duty = Intensive care	-0.621	0.217	0.537	0.201	1.439
	Place of duty = Laboratory	0.081	0.918	1.085	0.230	5.116
	Occupation =Doctor	-3.292	**0.002**	0.037	0.005	0.305
Sufficient (70+)	Intercept	1.285	**0.001**			
	Place of duty = Laboratory	-1.474	0.005	0.229	0.082	0.638
	Place of duty = Laboratory	-21.059	0.000	7.146	7.146	7.146
	Occupation =Doctor	-2.553	**0.001**	0.078	0.020	0.307

OSEH: Occupational Safety and Employee Health

Professional support staff (39.2%) was high, while doctors (3.4%) had a low level of competence. When the units he works in are examined; While it was higher in other units (34.5%) and clinics (32.8%), it was concluded that the lowest level was in laboratories. Examining the working year, 15 years and above (38.6%) were found to be sufficient at the highest rate, while 1-4 years (19.0%) was found to be sufficient at the lowest level (Table 3).

When the factors affecting the OSEH culture level of hospital staff are analyzed with multinomial logistic regression (backward); Compared to those with insufficient OSEH culture level, the state of being partially inadequate and partially competent is lower in doctors than in other occupational groups, and the level of proficiency was found to be higher in those who are not doctors, those who do not work in the intensive care unit and laboratory, compared to those with insufficient OSEH culture level (Table 4).

While the proportion of hospital workers who stated that they were at risk of being exposed to chemicals with partially adequate and adequate IGIS culture levels was 74.5% and 66.1%, respectively, Those who stated that they were exposed to chemicals were found to be 41.2% and 25.8%, respectively. The rate of those who stated that they were exposed to formaldehyde, latex, anesthetics, drugs, soda lime, Sevoflurane, bleach and radiation was found to be very low (0.0-10.0%) with a partially sufficient and adequate OSEH level (Table 5).

When the behavior of the participants towards chemical substances is examined; those who said yes (79.3%) to the toxicity of chlorine-based cleaning products were found to be high. They evaluated their chemical knowledge level as sufficient (56.2%). In the event that a chemical substance gets on their clothes, the rate of changing immediately (64.1%) was found to be high. The rate of using PPE during radiation extraction is not related to me (53.0%), while the rate of I usually use (12.7%) and I do not (11.6%) was found to be close to each other. While this question is not about me (59.4%) the level of leakage control of the anesthesia device is the highest, I have no idea (14.7%) with the answer yes (19.9%).

According to the evaluation of the responses to the behaviors towards chemical substances; Proper removal of unnecessary chemicals from the environment (71.3%), presence of clear labels of waste collection containers in the section (74.1%), presence of locked waste collection containers in the section (70.9%), detection status of dangerous substances in marking (56.2%), presence of warning labels in chemicals (82.1%), presence of chemical instructions for use (58.6%), presence of safety data sheet (43.8%) were found to be high. The rate of completion by transferring the decreasing chemicals was found to be high (80.5%).

When the knowledge levels for chemical substances are examined; It was found that the rate of those who participated in the study who received OHS training was high (92.0%), the risk of exposure to chemicals (74.1%) was high, and the rate of those who were exposed to chemicals (37.5%) was high (Fig. 1).

Table 5. OSEH culture level according to the exposure of hospital staff to chemical substance

			OSEH culture level			
		N=251	Insufficient (0-39)	Partly insufficient (40-59)	Partly enough (60-69)	Sufficient (≥ 0)
			N=40 Col.%	N=98 Col.%	N=51 Col.%	N=62 Col.%
Chemical Exposure Risk Existence	Yes	74.1	85.0	74.5	74.5	66.1
	No	25.9	15.0	25.5	25.5	33.9
Chemical Exposure Status	Yes	37.5	47.5	38.8	41.2	25.8
	No	62.5	52.5	61.2	58.8	74.2
Chemical Exposure: Formaldehyde	No exposure	61.8	52.5	60.2	56.9	74.2
	Yes	3.2	10.0	2.0	3.9	0.0
	No	35.1	37.5	37.8	39.2	25.8
Chemical Exposure: Latex	No exposure	60.2	50.0	59.2	58.8	69.4
	Yes	1.6	0.0	4.1	0.0	0.0
	No	38.2	50.0	36.7	41.2	30.6
Chemical Exposure: Anesthetics	No exposure	61.8	52.5	60.2	56.9	74.2
	Yes	1.6	5.0	2.0	0.0	0.0
	No	36.7	42.5	37.8	43.1	25.8
Chemical Exposure: Drugs	No exposure	61.8	52.5	60.2	56.9	74.2
	Yes	1.6	0.0	1.0	3.9	1.6
	No	36.7	47.5	38.8	39.2	24.2
Chemical Exposure: Soda lime Sevoflurane	No exposure	61.8	52.5	60.2	56.9	74.2
	Yes	1.6	5.0	1.0	2.0	0.0
	No	36.7	42.5	38.8	41.2	25.8
Chemical Exposure: Bleach	No exposure	61.8	52.5	60.2	56.9	74.2
	Yes	9.2	10.0	11.2	9.8	4.8
	No	29.1	37.5	28.6	33.3	21.0
Chemical Exposure: Radiation	No exposure	61.8	52.5	60.2	56.9	74.2
	Yes	1.6	2.5	2.0	0.0	1.6
	No	36.7	45.0	37.8	43.1	24.2

OSEH: Occupational Safety and Employee Health

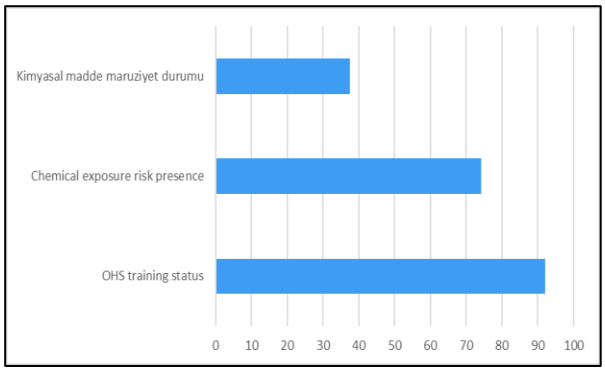

Fig. 1. Knowledge level of hospital staff about chemical substances.

When the distribution of chemical substances in hospital departments is examined; hand (83.3%), surface (82.9%) and cleaning chemicals (79.7%) and latex (58.2%), followed by radiation (31.5%) from high to low, respectively. anesthetic gases (17.1%), fluoroscopy radiation (15.5%), methylene blue (15.1%), mercury-containing instruments (14.3%), surgical smoke (10.8%), laboratory solvents (10.8%), ethyleneoxide (8.8%), methacrylate (7.6%), formaldehyde (3.6%), disinfection materials (0.8%), oxygen-based acidic (0.4%), neutral acidic solution. It was found that 0.4% (Fig. 2).

When the distribution of complaints after exposure to chemical substances in hospital departments is examined; Headache (18.3%), shortness of breath (13.1%) and skin disorders (12.0%) are in the top three, while the absence of symptoms (10.4%), allergic reactions (8.0%), Blurred vision (1.6%), impaired consciousness (1.6%) and intoxication (1.6%), facial swelling (0.4%) and forgetfulness (0.4%) were found to be the lowest (Fig. 3).

When the distribution of chemicals to which the workers are exposed is examined; Exposure to unknown chemicals (10.0%), cleaning chemicals (9.2%) and hand disinfectants (4.0%) are in the top three, Ranking from high to low formaldehyde (3.2%), caudex (2.8%), latex (1.6%), anesthetics (1.6%), drugs (1.6%), Sodalimesevoflurane (1.6%), radiation (1.6%), Hydrogen peroxide gas (1.6%), anesthetic gas (1.2%), descaler (1.2%), instrument disinfectant (1.2%), colodium (2.8%), dialysis solutions (0.8%), opaque (0.4%), glutaraldehyde exposure (0.4%) was found (Fig. 4).

When the distribution of the causes of exposure of the employees to chemical substances is examined; inadequate precautions (10.8%), high workload (10.4%) and lack of PPE (8.0%) were found to be in the first three places. Then, from high rate to low rate, unknown reason (7.2%), carelessness (6.4%), acting in a hurry (3.6%), not using PPE (3.2%), necessity (2.8%) and the job is not suitable for the person (2.4%) (Fig. 5).

DISCUSSION

Hospital services are considered as very dangerous workplaces according to the risks they involve and the level of danger. In this context, it is very important to create an organizational occupational health and safety culture in order to protect the health of employees and prevent them from being harmed by risks. In our study, the relationship between the knowledge levels of health workers working in a university hospital about the risks and hazards of hazardous chemicals and occupational safety culture was determined.

When the OSEHCS score distribution was examined according to the socio-demographic characteristics of the participants working in the hospital; while there is a statistically significant difference between education level, occupation, place of work and exposure to chemical substances and OSEHCS, there was no significant relationship between gender, age group, years of work and OHS education (Table 1). In the studies, it was determined that the occupational health and culture of the employees who had a work accident were lower than those who did not have a work accident (Lee et al., 1998). In our study, the OSEHCS score was found to be low in people exposed to chemicals. In other studies, evaluating the relationship between occupational accident status and occupational health and culture, it has been concluded that the formation of occupational health and culture reduces occupational accidents. In our study, a significant relationship was found between the level of learning and the OSEHCS score.

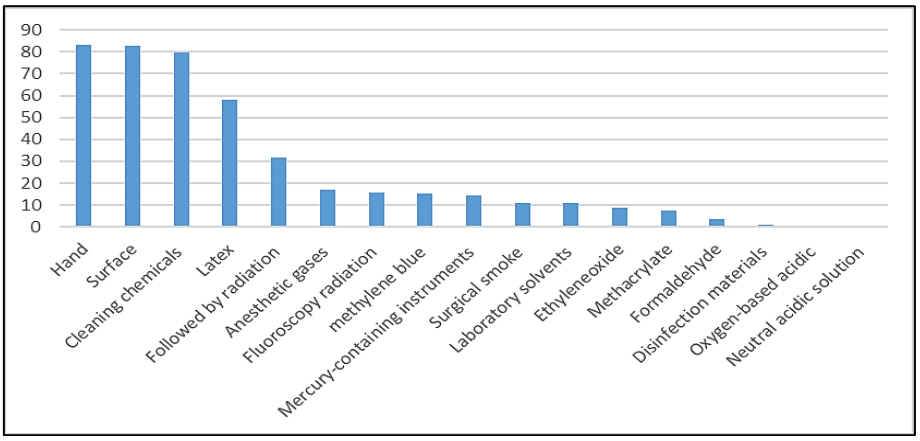

Fig. 2. Distribution of chemical substances in hospital departments.

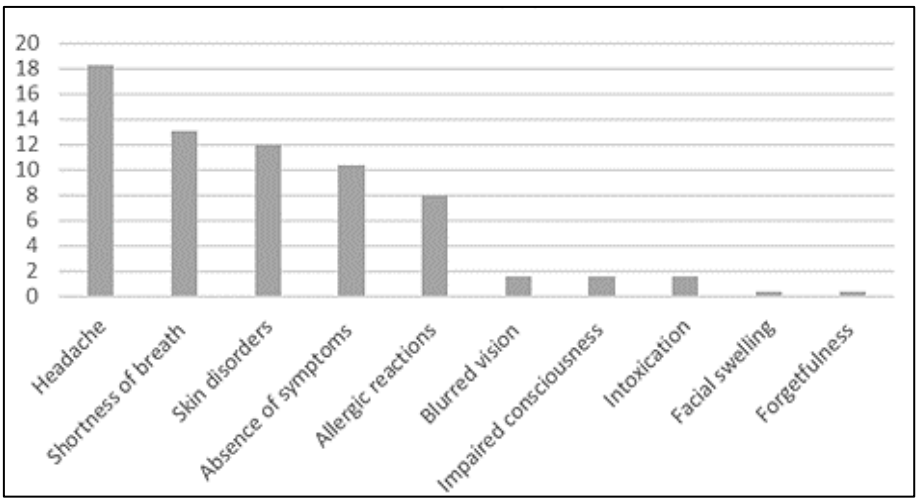

Fig. 3. Distribution of complaints after exposure to chemical substances in hospital departments.

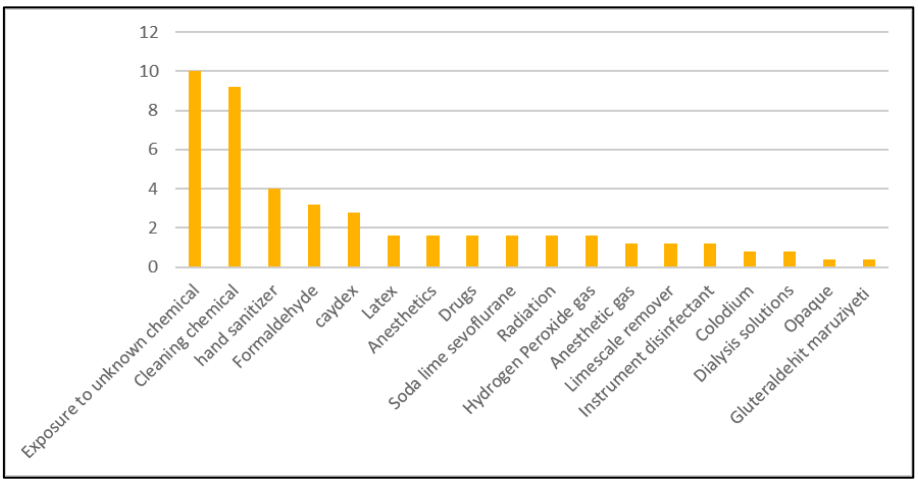

Fig. 4. Distribution of chemicals exposure of employees.

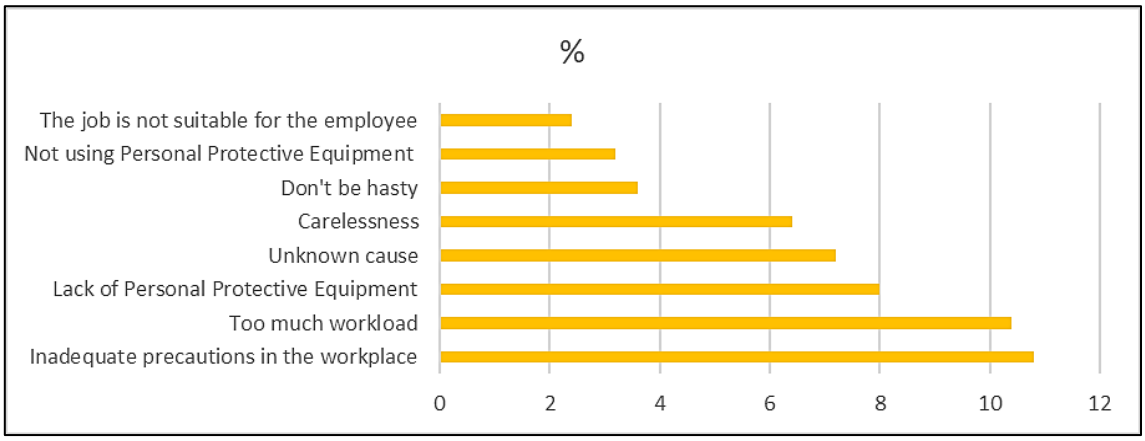

Fig. 5. Distribution of employees' reasons for exposure to chemical substances.

When the studies in the literature are examined, there are studies that support our study finding that there is a relationship between educational status and occupational health culture. Similar to our study result, according to previous study; there is a highly significant difference in the rate of health worker safety according to the occupational group and there is no difference according to gender has been concluded (Tozkoparan et al., 2011). Contrary to our study, there are studies that have concluded that there is a difference between gender and occupational health and safety culture.

According to the results of the analysis, the linear regression (backward) analysis of the factors affecting the OSEHCS score of the hospital staff; It has been concluded that there is a statistically significant difference between those who work in the profession, those who work as doctors and support staff, those who work in the intensive care and operating room as the place of work, and those who are not exposed to chemicals. No significant relationship was found among those working in the laboratory (Table 2). According to the results of the study conducted by Listyowardojo et al. (2012), OSEHCS score was found to be higher and more significant in physicians compared to other employees. As a result of Tüzüner's (2011) study, it was observed that the other OSEHCS scores were found to be high in doctors and support staff, which supports our study (Listyowardojo et al., 2012; Tüzüner et al., 2011). Tozkoparan (2021) has reached that as the working year increases, employees have a greater sense of responsibility in the field of occupational health safety. There are many studies that conclude that the OSEHCS score of employees who have had a work accident is low. It was concluded that the OSEHCS score affected the departments studied. This is because exposure is thought to vary according to risks and hazards.

When the relationship between the OSEH level according to the socio-demographic characteristics of the hospital staff is examined; It was concluded that there is a statistically significant relationship between the place of duty and occupation of the employees and the level of OSEH (Table 3). There are studies that have found a significant relationship between OSH and their place of work. In the study, it is thought that the OSEH level of the employees varies according to the clinics, the variability of the chemicals in the clinics, the risk and danger situations of the clinics. In our study, the OSEH score of doctors was found to be significantly lower than that of other employees,

Males (20.5%), aged 20-29 (19.0%), Graduate (16.8%), Doctors (41.4%), Operating room workers (25.0%) and professionals. It was concluded that there were insufficient OSEH level in those with 1-4 years (22.8%) working years (Table 3). As the working year increases, the increase in clinical experience and the identification of dangers and risks are thought to be effective in increasing the OSEH score. It is thought that the OSEH score may have been determined as low due to the inability of newly recruited employees to identify risks and dangers in an unfamiliar environment or to be unaware of the problems that may arise as a result of the

danger or risks.

As the education level increases, the OSEHCS score decreases. It was concluded that the OSEHCS score was the highest in the support staff and the lowest among the doctors. The highest OSEH score was found in those working in clinics and the lowest in laboratory workers (Table 3). The lowest OSEHCS score was found in those who worked for 1-4 years, and the highest in those who worked for 15 years or more (Table 3). In our study, the OSEHCS score of the physicians was found to be low. OSEHCS score of doctors was found to be lower and significant compared to other occupational groups. The fact is that the education of doctors is postgraduate and therefore as the education increases, the OSEHCS score decreases. From here, it can be counted among the reasons why doctors' OSEHCS score is insufficient. While all of the nurses received compulsory occupational health and safety training in our institution, it was observed that this rate was low for doctors.

The adequacy of OSEH culture level of hospital staff was found to be higher in non-physician, intensive care and laboratory staff (Table 4).

While the proportion of hospital workers who stated that they were at risk of being exposed to chemicals with partially adequate and adequate OSEH culture levels was 74.5% and 66.1%, respectively, On the contrary, these rates were found to be very low in those who stated that they were exposed to chemicals (41.2% and 25.8%, respectively). The rate of those who stated that they were exposed to formaldehyde, latex, anesthetics, drugs, soda lime, Sevoflurane, bleach and radiation was found to be much lower (0.0-10.0%) of those whose iGIS culture level was partially sufficient and adequate (Table 5). It is seen that the reasons for exposure to chemicals arise due to the low level of iGIS culture. It is seen that those who have sufficient or partially sufficient OSEH culture level have developed chemical substance exposure risk awareness, while those who have low OSEH culture level are those who have been exposed to chemicals. According to the results of the study, the increase in the OSEH culture level decreased the exposure rate to the chemical substance. It is thought that exposure to chemicals is caused by the inability of the employees to identify the risks and dangers in the institution where they work or not to show the necessary care. As a result, it is due to the fact that the OSEH culture level is very weak or not formed at all.

When the behavior of the participants in the study towards chemical substances is examined; In general, they evaluated the chemical substance knowledge level as sufficient. The respondents working in the radiation unit, who gave the answer that they usually use PPE during radiation exposure, were found to be high. The number of employees working in the anesthesia unit who checked for anesthesia device leakage was found to be higher than those who did not control. It was concluded that the chemical management and knowledge level of the employees in the university hospital where the research was conducted were generally sufficient. It can be thought that the reason for this is the necessary inspections by the Ministry of Health, compulsory in-service training and controls. It is thought that the quality controls are carried out by the Ministry of Health, the management constantly monitors their follow-ups in this regard, and by making the necessary attempts to avoid penal action, they provide the necessary training to the personnel and provide the necessary inspections in the institution.

According to the evaluation of responses to behaviors towards chemical substances; The questions of the appropriate removal of unnecessary chemicals from the environment in the institution where the research was conducted, the presence of a clear label in the waste collection container, the presence of locked waste collection containers in the section, the detection status of the marking of dangerous substances, the presence of warning labels in chemicals, the presence of chemical instructions for use, the presence of safety data sheet. "yes" answer was found high. When the distribution of chemical substances in hospital departments is examined; hand, surface and cleaning chemicals and latex are high, Then, it was found that from high to low, there was radiation, anesthetic gases, scopy radiation, methylene blue, mercury-containing instruments, surgical smoke, laboratory solvents, ethylene oxide, methacrylate, formaldehyde, disinfection materials, oxygen-based acidic,

neutral acidic solution (Graphic 3). There are 299 different chemical components that can interfere with human health in hospitals,

When the distribution of complaints after exposure to chemical substances in hospital departments is examined; Headache, shortness of breath and skin disorders are in the top three, It was found that the lowest rate was found in the absence of symptoms, allergic reactions, blurred vision, impaired consciousness and poisoning, facial swelling and forgetfulness (Figure 2). According to the evaluation report of NIOSH, it was stated that the most common diseases among the health workers of 2600 hospitals are infection, dermatitis, drug and treatment reactions, especially respiratory problems. These results are similar to our results. When we look at the chemicals we were exposed to in the institution where our study was conducted, it is seen that there are anesthetic substances and anesthetic gases in general (Figure 3). The fact that there are health problems related to this in the symptoms shows that it is in parallel with the studies in this field.

When the distribution of chemicals to which the workers are exposed is examined; Exposure to unknown chemicals, cleaning and hand sanitizer are in the top three, It was found that the ranking from high to low is formaldehyde, caudex, latex, anesthetics, drugs, soda lime sevoflurane, radiation, hydrogen peroxide gas, anesthetic gas, lime remover, instrument disinfectant, collodion, dialysis solutions, opaque, glutaraldehyde exposure (Figure 4). According to these rates, the rate in our study was lower than the world average. It is thought that these variations vary according to the restriction of the purchase of gloves containing latex, and the use of gloves by the personnel. It is thought that exposure to chlorine-based hand disinfectant was high in our study since the period in which the study was conducted was the pandemic period, the use of hand sanitizer was a lot and it was found all over the hospital.

When the distribution of the causes of exposure of the employees to chemical substances is examined; It has been found that taking insufficient precautions in the workplace, having a high workload and not having PPE are in the top three ranks. Then from high rate to low rate; unknown reasons, carelessness, hasty behavior, not using PPE, necessity and unsuitability for the job were found (Figure 4).

CONCLUSION AND RECOMMENDATIONS

In our study to determine the relationship between the knowledge levels and behaviors of hospital employees about chemical risks and occupational safety and employee health, it was concluded that there is a relationship between the OSEHCS score and the place of duty, occupation, working year, exposure to chemical substances and education status. It has been concluded that the OSEHCS score is insufficient for doctors and postgraduate education. It can be concluded that the practice of giving compulsory training to other health workers annually according to the danger class of the Ministry of Health is partially effective. In many studies, it is seen that doctors do not receive this training and their OSEHCS score is lower than other occupational groups. As a result of our study, it is understood that the situation of exposure to chemicals is the chemicals in the operating room and latex, which is mainly used in surgical clinics. It is recommended that more comprehensive research be conducted to measure awareness to chemicals in the operating room. In addition, as a result of our study, it has been determined that headache, skin disorders and allergies are among the complaints experienced after exposure. It is thought that the effects of the exposed substance can be reduced by removing the employees from the environment at certain periods. Studies on the effects of ventilation systems in risky units should be increased. It is recommended that the study be done more comprehensively with other universes.

Limitations of the Study

Only one university hospital employee was included in our study, so it creates a limitation in terms of generalizing the study to the Ministry of Health and private hospitals. The fact that the willingness to participate in the survey application is low among health workers is a limitation.

REPRESENTATIONS

Ethical Approval: Employees were informed about the research and their consent was obtained. Before starting the survey, it was stated that their participation in the research was on a voluntary basis. The research was conducted in accordance with the rules and ethical codes specified in the Declaration of Helsinki.

Conflict of Interest: The authors declare that there is no conflict of interest in this study.

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Declaration of competing interest

The authors declare no financial interests or personal relationships.

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