

Skin disease symptoms and related risk factors among young workers in high-risk jobs

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Summary

Background. Occupational skin diseases are the one of the most frequent diseases in many industrialized countries. The studies about skin disease (SD) on young workers were limited.

Objectives. In this study, we aim to evaluate the prevalence of SD symptoms and related risk factors among young workers in high-risk occupations.

Methods. This cross-sectional study was undertaken between 2011 and 2012 in two vocational training centres. We included 455 young workers who were working as hairdressers, jewellers, or car mechanics. Data were collected with the Nordic Occupational Skin Questionnaire, which was adapted to Turkish for young workers.

Results. The average age of the young workers was 17.9 ± 1.7 years. Of the 455 young workers, 52.7% were female and 47.3% were male. During the previous 12 months, the prevalence rates of the total SD symptoms, hand/forearm eczema symptoms and urticaria symptoms were 49.7%, 44.4%, and 13.4%, respectively. Those who worked as car mechanics were 5.8 times more likely [odds ratio (OR) 5.807, 95%CI: 2.577–13.085] to have a dry skin type, 2.9 times more likely (OR 2.861, 95%CI: 1.723–4.750) to work for >12 h daily, 2.6 times more likely (OR 2.591, 95%CI: 1.254–5.354) to have worked for >5 years, and 3.0 times more likely (OR 3.049, 95%CI: 1.143–8.135) to have SD symptoms.

Conclusion. The results indicate that young workers in high-risk jobs have a high frequency of SD symptoms. These results could provide the basic data for occupational health professionals to plan SD prevention programmes for young workers.

Key words: eczema; hazardous jobs; NOSQ-2002; occupational skin disease; Turkey; young workers.

Occupational skin diseases (SDs) have been observed to have the most significant risk of occurrence among workers, owing to exposure to allergens or irritants in the workplace (1–4). They are listed as the second most frequent work-related diseases in industrialized countries

(2, 4, 5). Hand eczema has been reported to constitute 90–95% of all occupational SD symptoms (1, 5–7).

SD symptoms, particularly hand eczema, are important health issues in occupations that involve mostly manual work, and such diseases are generally associated with prolonged or frequent contact with water, other liquids, allergens, or irritants (2, 8). Furthermore, exposure to certain heavy metals and contact with dermatitis-causing chemicals such as acids, alkalis and solvents are known to be the most significant risk factors for SD symptoms (2, 9–16). Workers with the highest risk of SD symptoms are those in the healthcare sector, hairdressers, car mechanics, and those in industries such as food production, construction, car manufacturing,

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printing, leather work, and engine servicing (2, 9–13).

According to the 138th Convention of the International Labour Organization, a 'child' is defined as an individual who is aged <18 years. Global laws and regulations on child labour prohibit the employment of children aged <15 years (17–19). The age range of the 'young worker' group is 15–24 years (18, 19). In Turkey, young workers must be enrolled in Vocational Training Centres (VTCs) for their formal education, and are allowed to work as apprentices in hazardous jobs (16, 18).

Young workers constitute one of the most important vulnerable risk groups, and prioritizing youth issues is considered to be crucial in various developing countries (3, 16, 20). In Turkey, according to the Child Labour Survey of 2012, youths aged between 6 and 17 years constituted 20.6% of the total population, and, of this group, 5.8% were employed (21, 22).

SD affects workers of all ages in a wide range of occupations, but young workers have a higher risk than adults (20, 23). Young workers mostly prefer to work as hairdressers, metal workers, jewellers, and car mechanics – occupations that may easily cause SD symptoms (2, 16, 24, 25). In a study performed on young Turkish workers by Esin et al., the frequencies of skin-related symptoms were 58%, 23.9% and 8.2% among hairdressers, car mechanics, and jewellers, respectively (16).

There have been studies on the occupational SD symptoms of young workers in hazardous jobs, but the related literature is very limited. Generally, standardized and reliable tools were not used in these studies. Therefore, there is a need to determine the prevalence of occupational SD symptoms among young workers by using reliable and standardized tools, such as the Nordic Occupational Skin Questionnaire-2002 (NOSQ-2002). By the use of this standardized tool, comparing the prevalence rates of occupational SD symptoms in countries all around the world may be possible (6).

We conducted this study particularly on young apprentices who were employed in high-risk occupations, such as in those in the sectors of jewellery-making, hairdressing, or car repair. Our research focuses on the prevalence of SD symptoms among young workers in high-risk jobs. The aims of this descriptive and cross-sectional study were as follows:

- 1 To determine the prevalence of SD symptoms among young workers who work as jewellers, hairdressers or car mechanics by using NOSQ-2002.
- 2 To investigate the relationship between SD symptoms and general work characteristics.

Materials and Methods

Settings of the study

This descriptive cross-sectional study was undertaken between 2011 and 2012 in VTCs in Istanbul, which are under the jurisdiction of the Ministry of Education. The VTCs train young workers and provide occupational education according to their job interests. Young workers must attend lectures at the VTCs 1 day per week, and they must continue practising and working on the remaining 5 days of the working week in the occupations in which they are being trained. Young workers generally work in establishments such as beauty centres, jewellers and car repair shops in the neighbourhoods where the VTCs are located. After 3 years of education, they graduate and receive an apprenticeship certificate.

Young workers are exposed to many chemical, physical, ergonomic and biological hazards in their workplaces, and they are not sufficiently trained in how to avoid work-related risk factors and use personal protective equipment (PPE). We collected the data from young workers who attended VTCs once a week.

Sampling for the study

The total number of VTCs on the European side of Istanbul was 11, and the young workers were recruited from the two main VTCs near the industrial areas, which had the highest student population. We chose the VTCs that had training programmes in three hazardous occupations, namely jewellers, hairdressers, and car mechanics, because these three occupations were the most hazardous in terms of the development of SD symptoms in young workers.

The total population of the two VTCs comprised 589 young workers, but our sample consisted of 455 young workers who completed a reliable and self-administered questionnaire.

Data collection

Data were collected from self-administered questionnaire forms completed by young workers in the classroom in the presence of their teachers. The class size and days of lectures were noted for each VCT. The average size of the classes was between 20 and 25 students. The aim of this study and the data collection tools were explained to the students before they filled out the questionnaire.

Ethical issues

The study was approved by the Ethics Board Commission of the Istanbul University Cardiology Institute (Number:

B.30.2.IST.0510000/35), and separate written consent of the Ethical Committee of Istanbul Provincial Directorate of National Education was also obtained (Number: B.08.4.MEM.4.34.00.18.580/8781). The young workers who refused to participate and those whose family members refused to let them participate in the study were excluded, and both verbal and written consent were obtained.

Questionnaires

The data were obtained with two data collection tools: a 'young workers general characteristic form', developed by the researchers according to the literature, which included 21 questions related to the workplace characteristics of young workers (6, 16, 26); and the Turkish NOSQ (T-NOSQ).

The NOSQ-2002 was developed by the Nordic Working Group. According to the NOSQ-2002 Guideline that was published by Flyvholm (2002), the questionnaire was based on existing and well-established questionnaires/tools that were available in the literature. The NOSQ-2002 was developed as a self-administered, standardized and reliable tool for the evaluation of occupational SD symptoms (1, 6, 27–29). The new questions related to exposure and urticaria sections were designed for the NOSQ-2002, and included in the NOSQ-2002 as very small number of literature examples regarding these subjects (6, 30, 31).

The long version of the NOSQ-2002 can be used in the general adult population to assess work-related SDs, and it can be adapted to studies performed on specific populations. The validity studies of NOSQ-2002 were carried out by Aktas and Esin, in order to adapt the questionnaire to Turkish and modify it for young workers (32).

The following questions were asked in order to define the SD symptoms: Question D1 – 'Have you ever had eczema-related skin symptoms on your hands such as dryness/redness/cracking or cleavage/exfoliation/excessive itching?'; Question D2 – 'Have you ever had eczema-related skin symptoms such as dryness/redness/cracking or cleavage/exfoliation/excessive itching on your wrist or forearms but not on your elbows or elbow pits?'; Question D5 – 'When was the last time you felt eczema-related skin symptoms such as dryness, redness, cracking, scaling or excessive itching in your hands, wrist or forearms?'; Question U1 – 'Have you ever had itchy wheals or swollen red marks on your hands, wrists or forearms that appeared and disappeared rapidly (within hours) in a day (urticaria or nettle rash)?'; and Question U4 – 'When did you last have these itchy wheals (urticaria) on your hands, wrists, or forearms?'

Data analysis

The data were analysed with SPSS™ version 15. Descriptive statistics of the general and workplace characteristics and frequencies of SD symptoms in the population studies were presented as numbers, percentages, mean and standard deviations. The χ^2 -test was used for the categorical data to assess the associations between variables and SD symptoms. We estimated the association [odds ratios (ORs) and 95% confidence intervals (CIs)] between the factors and the prevalence of SD symptoms. A binary logistic regression analyses with a backward stepwise procedure was performed to identify the factors associated with the occurrence of skin symptoms. The dependent variable of the regression analyses was having one of the SD symptoms, such as eczema or urticaria symptoms, within the last 12 months. A total of 21 general characteristic, work c characteristic and work activities were determined as independent predictors. SD symptoms were uniquely experienced by these young workers, and they were evaluated according to the responses to questions D1, D2, D3, D5, U1 and U4 of the NOSQ. In all analyses, *p*-values of <0.05 were regarded as statistically significant.

Results

General characteristics

The mean age of young workers was 17.9 ± 1.7 years (mean $\pm$ standard deviation), and 67.7% of them were aged <18 years. Approximately 44.6% of them were in their first academic year at a VTC. Among the sample, 52.7% were female, and 47.3% were male. A total of 52.8% of the young workers had a poor perception of their own health (reported as poor in 44.2%, and as very poor in 8.6%) (Table 1).

Work characteristics

It was found that 55.6% of the young workers worked as hairdressers, 22.2% worked as jewellers, and 22.2% as car mechanics. The mean number of working years in the current occupations of young workers was 3.2 ± 2.2 years, and the mean number of total work experience years was 3.6 ± 2.5 years. Additionally, 76.2% of the young workers worked for ≥ 11 h per day, and 32.5% of the participants worked for >12 h per day (Table 1).

The mean numbers of working hours per day and per week were 11.8 ± 1.8 h and 68.4 ± 12.7 h, respectively. Moreover, 68.1% (*n* = 310) of the young workers were not enrolled in an educational programme on occupational

Table 1. General characteristics, work characteristics and their relationship to skin diseases symptoms n = 455

Independent variables	n	Skin disease symptoms				p-Value
		Yes		No		
		n (226)	%	n (229)	%	
Age						
18≤	308	159	51.6	149	48.4	0.23
≥19	147	67	45.6	80	54.4	
Sex						
Female	240	121	50.4	119	49.6	0.74
Male	215	105	48.8	110	51.2	
Education class level						
1 year	203	103	50.7	100	49.3	0.019*
2 years	129	74	57.4	55	64.9	
3 years	123	49	39.8	74	60.2	
Household size						
1–4 individuals	226	109	48.2	117	51.8	0.54
≥5 individuals	229	117	51.1	112	48.9	
Medical history of systemic illness						
Yes	82	45	54.9	37	45.1	0.30
No	373	181	48.5	192	51.5	
Health perception						
Very good	116	42	36.2	74	32.3	0.001*
Good	99	49	21.7	50	21.8	
Poor	201	108	53.7	93	46.3	
Very poor	39	27	69.2	12	19.6	
Occupations						
Hairdressing	253	114	45.1	139	54.9	0.013*
Car mechanics	101	63	62.4	38	37.6	
Jewellery-making	101	49	48.5	52	51.5	
Worked years in present occupations						
≤1 year	82	33	40.2	49	59.8	0.018*
1–5 year	312	169	54.2	143	45.8	
≥6 year	61	24	39.3	37	60.7	
Total working time years						
≤1 year	35	15	42.9	20	57.1	0.67
1–5 year	348	176	50.6	172	49.4	
≥6 year	72	35	48.6	37	51.4	
The age of first starting work life						
≤14 year old	205	94	45.9	111	54.1	0.14
≥15 year old	250	132	52.8	118	47.2	
Employee numbers in the workplace						
≤10 workers	334	164	49.1	170	50.9	0.69
≥10 workers	121	62	51.2	59	48.8	
Weekly off days						
≤1 days	341	171	50.1	170	49.9	0.73
≥2 days	114	55	48.2	59	51.8	
Daily working hours						
8–10 h	108	46	42.6	62	57.4	0.20
11–12 h	199	106	53.3	93	46.7	
≥12 h	148	74	50.0	74	50.0	
Receiving health education in workplace						
Yes	145	57	39.3	88	60.7	0.003*
No	310	169	54.5	141	45.5	
Medical examination before attendes at the work						
Yes	115	47	40.9	68	59.1	0.029*
No	340	179	52.6	161	47.4	

Row percentages are indicated in the table values <0.05 were regarded as statistically significant differences.

Bold data shows that observed value is higher than the expected value.

*Significant difference, $p < 0.05$.

Table 2. Skin disease symptoms frequency of participants in the last 12 months (n = 455)

Skin disease symptoms	n	%
Only eczema symptoms	165	36.3
Only urticaria symptoms	24	5.3
Both eczema and urticaria symptoms	37	8.1
No skin disease symptoms in the last 12 months	229	50.3
Total	455	100

health and safety in the workplace, and 74.7% (n = 340) of them did not undergo a medical examination before they started working life (Table 1).

It was found that hairdressers mostly worked with water (washing, shampooing, etc.), frequently handled cleaning agents soaked in chemicals, and used hand sanitizers, whereas car mechanics and jewellers mostly came into contact with solvents (diesel oil, fuel oil, paint thinners, etc.) and used oils and liquids (sulfuric acid, zinc sulfate, hydrochloric acid, ammonium chloride, etc.) ($p < 0.05$).

In conclusion, it was determined that 35.4% of young workers washed their hands >20 times in a typical working day. In addition, 47.5% of them noted that they used protective gloves at work, and 54.3% of these workers reported that using natural rubber latex gloves led to skin symptoms.

Prevalence of SD symptoms

In order to estimate the prevalence of SD symptoms, we considered the young workers who had skin symptoms such as eczema or urticaria on any hands/forearms within the last 12 months. Approximately half (49.7%; n = 226) of the them reported that they had SD symptoms, and the other half (50.3%; n = 229) specified that they had not had any SD symptoms within the last 12 months (Table 2).

The frequency of eczema symptoms within the last 12 months was reported by 202 (44.4%) young workers ('at the time of study' – 34.2%; 'within the past 3 months' – 38.1%; '3–12 months ago' – 27.7%). Not having eczema symptoms within the last 12 months was reported by 253 (55.6%) young workers, and 4% (n = 61) stated that they had urticaria symptoms during the last 12 months ('during the past 7 days' – 37.5%; '7 days to 3 months ago' – 37.5%; '3–12 months ago' – 25.1%).

According to type of occupation, SD symptoms were observed in 45.1% of the hairdressers, in 62.4% of the car mechanics, and in 48.5% of the jewellers (Table 3).

The most common three anatomical sites of eczema on the hands and forearms of young workers with eczema

symptoms were the dorsum of the hands (68.8%), the webs of the fingers (45.5%), and the fingers (27.2%). Moreover, 80.2% of the young workers reported that their eczema started between the ages of 15 and 18 years.

The frequencies of allergy symptoms accompanying SD symptoms were found to be 35.4% in young workers with allergic conjunctivitis, 34.9% in those with allergic rhinitis, 22.2% in those with atopic dermatitis, and 13.4% in those with asthma. Furthermore, 64.6% of the young workers stated that they developed a rash when they came into contact with metal objects (metal buttons, metal costume jewellery, etc.), 69.4% of them stated that they had dry skin, and 60.1% of them stated that they felt itchy while sweating.

However, hand eczema was not regarded as an occupational disease by 37.6% of the young workers, whereas 68.9% of them believed that their SD symptoms, especially hand eczema, had worsened because of their occupation.

Factors affecting SD symptoms. There was no significant association between SD symptoms and general characteristics, such as sex and age group, of the young workers.

The following variables related to work characteristics, such as working as a car mechanic, working from 1 to 5 years in the current job, not receiving any health education, and not undergoing a medical examination before starting work, were found to be statistically significant with regard to the SD symptoms of the young workers (Table 1).

On analysis of the factors affecting the prevalence of SD symptoms, it was found that having a history of atopic dermatitis (Question A1), having a history of allergic rhinitis (Question A2), having a history of allergic conjunctivitis (Question A3), having a rash caused by metal objects (Question S2), having a dry skin type (Question S3) and feeling itchy while sweating (Question S4) were the factors significantly associated with SD symptoms. While there was no statistically significant difference between the prevalence of SD symptoms and hand washing >20 times a day, the use of gloves, the use of oils/liquids/cutting fluids and contact with paints were associated significantly with SD symptoms.

However, hand washing, the use of hair products and contact with beauty and cleaning products were more frequent among hairdressers with eczema symptoms (n = 101) than among those with no SD symptoms. Moreover, being exposed to higher temperatures and motor oil while working and coming into contact with solvents were significantly more frequent among the car mechanics with eczema symptoms (n = 58). Jewellers with eczema symptoms were significantly more frequently

Table 3. Skin disease symptoms in the last 12 months among young workers divided by occupational type (n = 455)

		Having skin diseases symptoms				p
		Yes		No		
		n	%	n	%	
Occupation types		226	49.7	229	50.3	
Hairdresser	(n = 253)	114	45.1	139	54.9	0.013^a
Car mechanics	(n = 101)	63	62.4 ^a	38	37.6	
Jeweller	(n = 101)	49	48.5	52	51.5	

Row percentages are indicated in the table.

^aThe observed value is higher than the expected value.

*significant difference (p < 0.05).

exposed to acids and alkaline-derived substances (n = 43) than those with no symptoms.

Relationship between the risk factors and SD symptoms. Having any of the SD symptoms was determined to be a dependent variable of the logistic regression model, and a total of 64 independent variables were employed.

Young workers who were car mechanics were more likely (OR 5.81, 95%CI: 2.77–13.09) to have SD symptoms than those trained as hairdressers or jewellers, and this was the strongest predictor (Table 4).

Other statistically significant risk factors were as follows. Those having dry skin, those perceiving their health status as being 'very poor' and those working for >12 h in a normal working day respectively, were more likely to have SD symptoms than the others: OR 2.86, 95%CI: 1.72–4.75, OR 2.79, 95%CI: 1.06–7.30 and OR 2.59, 95%CI: 1.25–5.35, respectively. The young workers who had worked for >5 years were more likely to suffer from SD symptoms than those who had worked for <5 years (OR 3.05, 95%CI: 1.14–8.14). Those who did not receive any health education in the workplace were more likely to experience SD symptoms (OR 2.03, 95%CI: 1.23–3.36). Young workers whose work involved wet working (washing, cleaning, shampooing, etc.), those who developed a rash after working with metal objects and those who worked in places without restrooms respectively, were more likely to have SD symptoms: OR 1.75, 95%CI: 1.05–2.93, OR 2.38, 95%CI: 1.09–5.23 and OR 2.12, 95%CI: 1.27–3.53, respectively. Young workers who came into contact with paints were more likely to report having SD symptoms, as were those who had contact with oils, liquids and cutting fluids (OR 2.04, 95%CI: 1.13–3.68).

Discussion

This study was conducted in order to determine the prevalence of SD symptoms and related factors among young

workers in high-risk jobs. This study was based on the use of the T-NOSQ, which is a rapid and reliable evaluation tool adapted for the SD symptoms of young workers. To our knowledge, our study is the first in which the NOSQ-2002 has been adapted and modified for the young worker population. It has been primarily used to estimate the prevalence of SD symptoms among young workers in high-risk jobs.

According to our study, the prevalence of SD symptoms was very high among young workers as compared with the studies performed previously (16, 26, 33, 34). Among both national and international studies, only a few studies have focused on the prevalence of SD or eczema symptoms in working adolescents. The studies were generally performed on schoolchildren in the early grades, on working adults, and on adolescents who were not active in the workforce.

The results of this study show that young workers in high-risk jobs have a high percentage of SD symptoms and related high occupational risks, owing to the characteristics of their work.

SD symptoms

The frequencies of total SD symptoms, hand/forearm eczema symptoms and urticaria symptoms were found to be 49.7%, 44.4%, and 13.4%, respectively.

The frequencies of the total SDs reported by workers in hazardous occupations were as follows: in a study performed by Esin et al., 58% of hairdressers, 23.9% of car mechanics, and 18.2% of jewellers; in a study performed by Yenigun et al., 54.9% of hairdressing apprentices; in a study performed by Yenilmez, 59.7% of hairdressers and 40.3% of jewellers; and, finally, in a study performed by Robert et al., 59.7% of hairdressers (16, 26, 33, 34). The results of these studies were observed to be similar to those in the related literature.

Although, in our study, the frequency of SD symptoms in hairdressers was found to be 45.1%, this result was

Table 4. The main statistically significant predictors of skin disease symptoms: logistic regression analyses (n = 455)

Variables	Categories	<i>p</i>	Odds ratio	95% CI
Perceiving overall health, as compared to others of young workers own age (Ref: Very good)	Good	0.008	2.55	1.28–5.11
	Bad	0.013	2.09	1.17–3.75
	Very bad	0.037	2.79	1.06–7.30
Occupations (Ref: Hairdresser)	Car mechanics	< 0.001	5.81	2.58–13.09
	Jeweller	0.033	2.28	1.07–4.84
Daily working hours (Ref: 8–10 h)	11–12 h	0.009	2.23	1.22–4.05
	More than 12 h	0.010	2.59	1.25–5.35
The age of first starting work life (Ref: 14 years and below)	15 years and above	0.028	1.74	1.06–2.85
Worked years in present occupations (Ref: less than 5 year)	More than 5 years	0.029	0.31	0.11–0.89
Total working time (Ref: less than 5 year)	More than 5 years	0.026	3.05	1.14–8.14
Receiving health education at workplace (Ref: Yes)	No	0.006	2.03	1.23–3.36
Having rest room in workplace (Ref: Yes)	No	0.004	2.12	1.27–3.53
Wet working (washing, cleaning, shampooing, etc.) (Ref: No)	Yes	0.033	1.75	1.05–2.93
Contacting with oils, liquids, and cutting fluids (Ref: No)	Yes	0.018	2.04	1.13–3.68
Contacting with paints (Ref: No)	Yes	0.015	2.05	1.15–3.66
Having rash from metal objects (Ref: No)	Yes	0.030	2.38	1.09–5.23
Having dry skin type (Ref: No)	Yes	< 0.001	2.86	1.72–4.75

Ref., reference answer category; CI, confidence interval.

$p < 0.05$; Nagelkerke $R^2 = 0.377$.

not statistically significantly. The prevalence of SD symptoms or hand/forearm eczema symptoms was generally observed to be significantly higher in the hairdresser group, according to the results of some other studies (8, 15, 23, 28, 34). However, the prevalence of SD symptoms was found to be significantly higher in the car mechanics in this study. The percentage of car mechanics who suffered from eczema symptoms and had contact with engine oil and chemical agents such as benzene was found to be 95.3%. Moreover, car mechanics use mostly powerful solvents such as paint thinners to remove the motor or engine oil residues from their hands. Various studies have indicated that most metal workers are considered to be among the highest-risk groups regarding SD symptoms (2, 14, 35) and at high risk for hand eczema, with a prevalence of hand eczema during the last 12 months at 15% (36).

Few research studies are available that have analysed the prevalence of SD symptoms in jewellers, and it has been emphasized that jewellers are, apparently, exposed to chemicals, metals, acidic and basic compounds and to heavy metals such as copper and nickel that cause most SD symptoms, particularly eczema symptoms (14, 16, 37). Our study gives a new clue that jewellery-making is also a hazardous job that can lead to SD symptoms.

The most common areas in which the SD symptoms were observed were the dorsum of the hands, the webs of the fingers, and the fingers. Similarly, SD symptoms were commonly found in these areas in a study conducted on an adolescent group (38).

Risk factors for SD symptoms

According to our results, the young workers work almost two times longer than they are supposed to work. Although young apprentices are prohibited from working for >40 h a week in Turkey, the average working hours per week were found to be 68.4 ± 12.7 h.

Although the age of the young workers was not found to be a significant factor in the prevalence of SD symptoms, 67.7% of them were found to be aged <18 years. Owing to the exposure to multiple hazards, the use of dangerous equipment and agents, long working hours per week, and starting working life at an early age, even though this is prohibited by the government, the high prevalence of SD symptoms among young workers is expected. We found that the young workers who had worked for >5 years were 3.0 times more likely to suffer from SD symptoms. In a previous study, it was stated that SDs developed in the first 2–4 years after the workers had started working in a hazardous job (4). This may be attributable to the length of work time, and correlated, obviously, with the duration of the exposure to the allergens and irritants.

In our study, the coexisting atopic symptoms, such as atopic dermatitis, allergic rhinitis, and allergic conjunctivitis, were significantly more frequent in young workers with both SD and eczema symptoms. These findings are similar to those of studies conducted on adolescents (34, 39, 40). A study conducted on electrical workers found that atopic dermatitis resulted in a 4.2-fold increased risk of them having SD symptoms (10). There is strong

evidence that an atopic constitution, especially atopic dermatitis, results in a highly increased risk for the development of eczema or SD symptoms.

According to our results, young workers who perceived their own health status as 'very bad' were 2.7 times more likely to have SD symptoms. Recently, it has been found that hand eczema in young adults is substantially associated with possibly severe social consequences, such as sick leave, pension, or rehabilitation (38). In a previous study, >80% of individuals with eczema reported that hand eczema symptoms negatively affected their mood and daily activities (41).

Receiving health education in the workplace is one of the important factors that can prevent the development of SD symptoms. In studies performed by Runyan et al., the young workers who were provided education on how to use PPE were observed to use gloves more frequently than those who were not. Furthermore, apprentices generally do not receive any training, and rarely receive any type of education (42, 43). In this context, the appearance of SD symptoms in young workers who have not had any training is to be expected. Education could be effective in increasing the level of knowledge about SD and how to avoid it.

It has been found that wet work increases the risk of SD symptoms, as does contact with paints and contact with oils/liquids similar to (44). In a study conducted on young Turkish hairdressers, it was shown that working with liquids and having contact with solvents, hair sprays and hair dyes increased the frequency of hand eczema symptoms (34). It is obvious that constantly working with liquids and specific chemicals causes SD symptoms in young workers, similar to sensitive skin and regular contact with metal objects and having dry skin. Furthermore, the young workers who were itchy while sweating had a higher frequency of SD symptoms. Shiao et al. found that allergy to metal resulted in a 2.3-fold increase in the risk of having eczema symptoms (10).

The use of protective gloves was significantly more frequent among individuals who were suffering from SD symptoms. Similarly, workers with hand eczema symptoms were shown to use protective gloves more frequently than those without such symptoms (45). The apprentices who worked as jewellers, hairdressers and car mechanics generally preferred to not use gloves, because it reduced the speed of work, because the gloves became wet inside easily, owing to their poor quality, and because the gloves usually did not fit the young workers' hands, because they were ergonomically designed for adults (43).

Young workers clearly constitute a high-risk group for the development of SD symptoms. SD symptoms are frequently observed among young workers, and this

phenomenon may affect their future. This study suggests that a questionnaire survey of SD symptoms might be a very effective initial method for planning strategies for the prevention of SD symptoms among young workers in high-risk jobs.

Strengths and limitations

The strengths of this study are the use of a standardized and reliable tool, namely T-NOSQ, for young workers, and the fact that the study was carried out among those who were working in hazardous occupations. The limitations of this study are that the results seem valid only for the study sample, and that the data were collected with a self-reporting method, which is more likely to result in bias (e.g., over-reporting). Furthermore, the study did not include a comparison group composed of unexposed workers with the same sample characteristics.

Conclusion

In conclusion, the study has provided evidence that work characteristics have a strong influence on the skin health of young workers who are frequently exposed to skin-damaging substances in their workplaces. A high frequency of SD symptoms was observed among young workers. SD symptoms were more prevalent in car mechanics than in hairdressers or jewellers. SD symptoms can be a major burden on young apprentices, and are becoming a serious challenge for healthcare providers, and for developing countries where youth labour is widespread.

It is believed that this study can serve as an important example for other countries, especially for developing countries, because it facilitates the international comprehension of research results for SD and eczema prevalence in young workers worldwide. Many vocational schools do not have access to occupational health services, and young workers constitute a substantial risk group in the workplace. Our results can provide the basic data for occupational health professionals, especially occupational or school health nurses, to plan SD prevention programmes for young workers in high-risk jobs.

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