Matching Evaluation between Occupational Contact Dermatitis and Various Jobs in Yazd in During 2007-2012

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Abstract- Skin disorders comprise more than 35% of all occupationally related diseases. 90-95% of work-related dermatoses are contact dermatitis. Effects of occupational dermatitis in the lives of workers are substantial. To plan any preventive program we need basic statistics of the problem, that we had no reliable one which includes a lot of industries in Iran. Therefore we decided to determine occupational contact dermatitis, and it´s subtypes prevalence in various jobs. The objective of this study is determination of occupational contact dermatitis, and it´s subtypes prevalence and comparison among various jobs. In this cross -sectional study, we examined 3061 workers of various industries during 2007-2012 and recognized contact dermatitis cases. Irritant and allergic cases were separated according to clinical judgment of physician and patch test using European standard series. We found 271 (prevalence=8.8%) occupational contact dermatitis cases which 247 (91.1%) were irritant, and the rest were allergic. The highest prevalence was in washing powder production and then glaze and paint workers, mechanists and chemical workers were located. There is a great variability for occupational contact dermatitis in various industries and between different countries. These statistics changes during the time by changing in number of workers and their characteristics, variation in material and process and glove use situation. So every country must have a national data bank of occupational contact dermatitis, which must be updated after a period of time.

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Introduction

Skin is the most common organ which is injured in industry. Skin disorders comprise more than 35% of all occupationally related diseases (1). 90-95% of work-related dermatoses are contact dermatitis. The rest are other dermatoses such as contact urticaria, leukoderma, and infections (2). Reports about this problem is incomplete actually, however, hardship, disability and financial loss caused by this disease are substantial, both for workers and employers. Disability in most cases of hand dermatitis is temporary, but total disability is also possible (1). The total economic impact of occupational contact dermatitis (OCD) is very high (2). Effects of occupational dermatitis in the lives of workers are substantial, and there is a median of 9 days away from work in some industries in USA (3).

Most occupational skin diseases result from contact with chemical substance. These days there are more than 90000 substances in the environment that under certain conditions, all of them can irritate the skin, and approximately 2000 are allergens. Many factors can induce irritant reactions such as intrinsic nature of a substance(i.e., pH, solubility, physical state and concentration), environmental factors(i.e., temperature, humidity, and pressure), and predisposing individual factors(*i.e.*, age, gender, ethnicity, concurrent and preexisting skin disease, and skin region exposed) (1).

Both irritant (ICD) and allergic (ACD) contact dermatitis are representing in the industry, but irritant is much more common than allergic (80% against 20%). The most common site of contact dermatitis is hand, and it should be noted which hand and which site of the hand (dorsum, fingers, palm) was first involved (4).

If we want to diagnose an occupational dermatitis carefully, we must observe history of dermatitis and occupation, as well. All of these information must be achieved by exact questions: description of present illness, current and previous job and description of duties, water exposure, protective device usage,

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affection of other coworkers, out of workplace exposures, history of atopy and previous skin disease, and use of medications (4). The most common predisposing factor for development of ICD in the workplace is atopy, occurring in 15-20% of population. Dry skin and advancing age are important in this field, as well. Diagnosis of a work-related skin disease requires more time than a general dermatologic workup, and a premature diagnosis before studying all the evidences should be avoided because an incorrect diagnosis can have detrimental effects (1).

In many countries, there are statistics about the prevalence and incidence rate of contact dermatitis, but in Iran there is not statistics like this especially according to different jobs. By the way, contact dermatitis is an important problem, and it´s rate is increasing, so we decided to determine its prevalence in various jobs. If we want to plan for decreasing and controlling of this important disease its prevalence and incidence rates will be our substantial requirements.

Materials and Methods

In this cross-sectional study, we investigated 3061 persons who referred to occupational medicine clinic for contact dermatitis during 2007-2012. Everyone examined by the physician to diagnose of contact dermatitis. For patients suspected of having allergic dermatitis, patch testing was done using European standard series and suspected allergens. Other information such as age, sex, job title and detailed duty, current job duration, glove usage and concurrent skin disorders were collected, as well. Some questions were asked to determine if the skin problem is work-related such as onset of current disorder, aggravation of previous skin disorder by working, improvement of the problem in weekends and existence of a similar problem in coworkers.

Persons we studied were from various industries, so we classified them according to their occupational and environmental exposures.

Then all dates were coded and analyzed by SPSS (version 18).

Results

We found 271 patients suffered from occupational contact dermatitis (OCD). Our target group comprised 262 men and just 5 women, which were 98.2% and 1.8%, respectively. Mean age of our target population was 36.61±8.05 with a range of 20-68 years, and their mean work duration was 10.53±5.49 with 2-26 years range.

Prevalence rate of OCD was 8.8% overall, but prevalence's according to jobs were quietly different. The highest prevalence was in washing powder production and some industries were located after it like glaze and paint workers, mechanists and chemical workers. There was no OCD case in some industries like glass industry, drivers, coal workers, carpenters and electrode industry. Differentiation of irritant and allergic types was performed by physician's judgment whenever clinical clues were completely apparent, but in complicated cases patch test was done.247 (91.1%) irritant and 24(8.9%) allergic dermatitis cases were found, totally. We determined number of irritant and allergic cases and their percents according to jobs, as well (Figure 1).

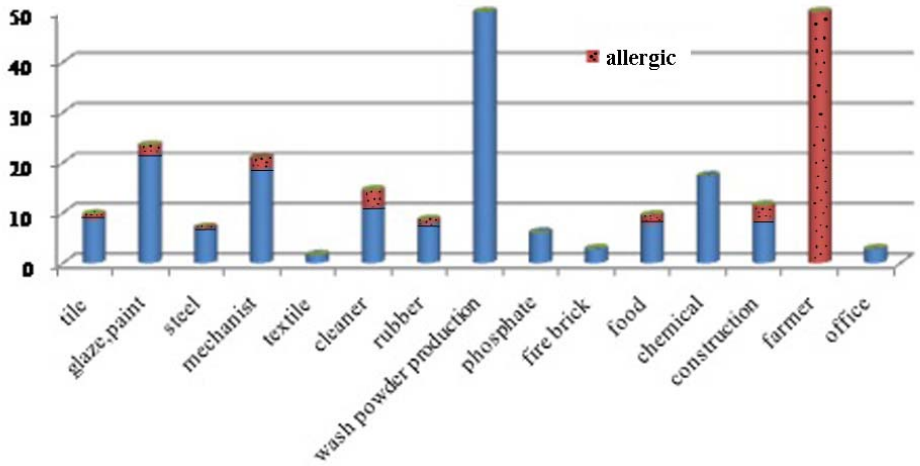

Figure 1. Comparison of OCD,ICD and ACD in various industries.

Table 1. Prevalence of OCD,ICD and ACD and other relevant data in various industries.

	Number of workers	Total dermatitis cases (Prevalence percent)	Irritant dermatitis cases (Prevalence percent)	Allergic dermatitis cases (Prevalence percent)	Mean age±sd	Mean Work duration ±sd	Number of glove user (percent)	Number of hand affected (percent)	Number of concurrent skin disorder (percent)
Tile industry	807	78(9.6)	70(8.7)	8(0.99)	36.3±8.2	11.1±5.6	37(47.4)	76(97.4)	7(8.9)
Glaze and paint industry	269	62(23.4)	58(21.5)	4(1.9)	35.6±7.3	10±5.3	42(67.7)	60(96.8)	1(1.6)
steel industry	397	28(7.03)	27(6.8)	1(0.23)	36.5±9.8	9±5.5	13(46.4)	26(92.8)	1(3.6)
Mechanist	129	26(20.9)	24(18.6)	2(2.3)	35.4±8.1	9.4±4.7	7(26.9)	25996.2)	2(7.7)
Textile industry	245	8(1.63)	8(1.63)	0	40.1±9.5	9.5±5.8	1(12.5)	8(100)	1(12.5)
Cleaner	55	8(14.5)	6(10.9)	2(3.6)	42.8±10.4	9.8±6.5	5(62.5)	7(87.5)	1(12.5)
Rubber industry	338	29(8.6)	26(7.7)	3(0.9)	37.3±4.6	13.5±4.6	16(55.2)	28(96.6)	7(24.1)
washing powder production worker	6	3(50)	3(50)	0	30.3±15.5	11±13	0	6(100)	0
Phosphate industry	33	2(6.06)	2(6.06)	0	41.5±4.9	11.5±0.7	1(50)	2(100)	1(50)
Fire brick industry	71	2(2.8)	2(2.8)	0	40.5±2.1	17.5±3.5	0	2(100)	1(50)
Food industry	63	6(9.5)	5(7.9)	1(1.6)	34±6.2	8.5±4.8	2(33.3)	6(100)	3(50)
Chemical industry	52	9(17.3)	9(17.3)	0	35.3±4.5	7.2±5.4	6(66.7)	8(88.9)	0
Construction worker	61	7(11.5)	5(8.2)	2(3.3)	42.4±11.3	8.4±3.9	6(85.7)	7(100)	1(14.3)
Farmer	2	1(50)	0	1(50)	44	10	1(100)	1(100)	1(100)
Office worker	70	2(2.8)	2(2.8)	0	40	16±2.8	0	2(100)	0
Glass industry	100	0	0	0	0	0	0	0	0
Driver	175	0	0	0	0	0	0	0	0
Coal worker	138	0	0	0	0	0	0	0	0
Carpenter	21	0	0	0	0	0	0	0	0
Electhrod industry	29	0	0	0	0	0		0	0

Mean age, mean work duration, number of workers who use glove, number of hand affected persons and workers who had another skin disorders besides OCD for each job were determined, as well. These data are displayed in table 1. All workers in every job were men except 2 (25%) in the textile industry and in cleaners. There was 1 (11.2%) woman in the chemical industry, as well.

The most common site of lesion were hands, which equaled 260 (95.9), and there were 8, 2, 1cases respectively in feet, forearm and face. Another question was if they use gloves routinely or not. 137(50.6%) used glove regularly, and 134 (49.4%) did not use it. Our patients were assessed for concurrent skin disorders, historically and clinically, and these results summarized in table 2. There was an exact history of atopy only in 4 persons (1.5%). 2 (50%) suffered from irritant and others were allergic. The oldest group were construction workers and cleaners with a mean age of 42.4±11.3 and 42.8±10.4, respectively. The longest work history was in fire brick industry, office workers and washing powder production worker with the mean of 17.5±3.5, 16±2.8 and 11±13, respectively.

Table 2. Matching of concurrent skin disease and ICD and ACD.

	Number of patients (Prevalence percent)	Type of concurrent dermatitis
Contact urticaria	11(4.1)	irritant
Vitiligo	3(1.1)	irritant
dermatophytisis	2(0.7)	irritant
Psoriasis	3(1.1)	irritant
Zona	1(0.4)	irritant
Rhzasea	1(0.4)	irritant
Ichtiosis	1(0.4)	irritant
Seborrheic dermatitis	1(0.4)	allergic

Correlation between age, work duration, glove usage with type of dermatitis were not significant, and *P* values were0.077, 0.205 and 0.098 respectively. Analysis of correlation between sex, job title and concurrent skin disorders was invalid, because of shortage of necessary cases. Correlation between age and work duration with glove usage was not significant too, and *P* values were0.950 and 0.382 respectively.

We analyzed correlations in every industry between type of dermatitis with age, sex, work history, glove usage, site of affection and concurrent skin disorders, wherever it was possible. There wasn´t any significant correlation except type of dermatitis with work history in glaze and paint industry.

Discussion

Work-related dermatoses, in particular hand dermatitis, are still among the most prevalent occupational diseases. 90-95% of work-related dermatoses are contact dermatitis (2). Both irritant (ICD) and allergic (ACD) contact dermatitis are representing in the industry, but irritant is much more common than allergic (80% against 20%) (4).

In many countries, there are statistics about the prevalence and incidence rate of contact dermatitis, but in Iran there is not statistics like this especially according to different jobs. By the way, contact dermatitis is an important problem and its effects on workers lives are significant, so we decided to determine its prevalence in various jobs. If we want to plan for decreasing and controlling of this important disease its prevalence and incidence rates will be our substantial requirements.

OCD prevalence in this study is 8.8% while Rietschl and Lodi both got 19% for OCD (5,6). Keegel in Australia verified 1-year prevalence of 34.5 per 100000for OCD (7). Sun *et al.* had 36% hand dermatitis and Bauer study point prevalence of hand dermatitis was 29.1% in baker´s apprentices (8,9). Smith in Korea demonstrated prevalence rate of dermatitis in Korean nursing students were 6.9% and22.9% in first and fourth year, respectively (10). Smith conducted a similar study in tropical Australia, and demonstrated rate of hand dermatitis in female nursing students were 10.8% and27.4% in first and third year, respectively (11). Another study carried out by Smith among nurses in Japanese teaching hospital and hand dermatitis varied from 6% in the psychiatry department to 48% in the surgical unit and averaging 35% across the entire group (12). It is documented that combination of endogenous and exogenous factors affects the development of OCD. Apart from the type and intensity of exposure to hazardous substances endogenous factors like age, gender, psychological factors, sensitization, atopic constitution and condition of the epidermal barrier can influence OCD. Environmental factors are also important because of their effect on both exogenous and endogenous fields (2). Therefore we see every study reaches a particular number, even in very similar structure of studies like Smith´s studies in Korea and Australia among nurses students prevalence rates are different, maybe due to racial and environmental differences (10,11). Our study has a different result with Smith´s studies, that can be explained by different gender (we had just 5 women), job(we didn´t have health care worker in our target population) and method of screening (they used questionnaire and we examined every case).

In spite of the similar method of screening between this study and Sun *et al.* study, they had 36% hand dermatitis, that it can be due to the difference in the race and job(they had hairdressers and medical workers) partly (8). Lodi *et al.* conducted a wide study in the northern part of Italia, that comprised a lot of jobs (6). In that study total, irritant and allergic dermatitis prevalence's were 19%, 10.6% and 8.4%.Distribution into irritant and allergic dermatitis in most of the studies is different, as well. Both irritant (ICD) and allergic (ACD) contact dermatitis are representing in the industry, but irritant is much more common than allergic (80% against 20%)(4). Most studies had higher percent of irritant dermatitis such as Lodi (10.6% against 8.4%), Sun (58 .5% against 41.5%) and Lim (62.4% against 37.6%) studies (6,8,13), but two studies Rietschl and Kucenic had higher percent of the allergic dermatitis (5,14). Both of them were carried out in America and had about 60% allergic against 32-34% irritant types. In this study we found 247 (91.1%) irritant and 24(8.9%) allergic dermatitis cases. Differences in gender, job titles, kind of exposures, environmental factors, race and ethnicity and screening methods can be responsible of these pattern of distribution. For example in Lodi et al study more than 60% of their target group were women but we had less than 5%.In their study there were hairdressers, housewives, hospital workers, that we didn't have them. Different ethnicity and environment are important too. Meding *et al.* verified prevalence of 15% in mechanics for hand eczema that 19% had ACD (15). Our study which is similar to Lim study in aspects of mean age, higher number of men and job titles, partly, but our ACD prevalence is lower than theirs, which it

can be due to a different race and environmental factors and screening method. Even similarity in job titles can´t say their exposures are similar too. Some studies like Rietschl, Kucenic, Lim and Lodi carried out patch test for all cases but in our study and Sun´s it was done for suspected cases, and it can be very important in distribution pattern of dermatitis types. In Cole study dermatitis prevalence in Ecuadrean farm workers was 55-68%, according to type of exposure to pesticides. In our study prevalence in farmers was 50%, but we had just 2 farmers , that one of them suffered from allergic dermatitis, so we did not observe it a valid quantity (16). In Ryberg *et al.* study textile-related skin problems were assessed and contact allergy to some materials like PPD and TDM was shown , but in our study we did not have any allergic case in textile workers, and we had the lowest prevalence between textile workers (17).

In Lodi and Dickel studies overall prevalences were completely different from per job prevalences that agreed with our study (6,17). Ordering of job titles according to prevalence of dermatitis and introduction of high risk jobs are different in studies too. Factors which mentioned above can influence this order actually. Dickel *et al.* in Northern Bavaria, Germany found the highest ICD rates in hairdressers, bakers and pastry cooks(18). In Bordel-Gomez *et al.* study metal workers, construction workers and hairdressers were the most strongly represented groups(19).In our study washing powder producers, glaze workers, mechanists, chemical workers, cleaners preceded construction workers and steel industry had ninth grade in prevalence, and we did not have hairdressers in our study. In a cohort study Funke found 3-year cumulative incidences in metalworkers, blue collars and white collar workers 15.3%, 14.1% and 6.9%, respectively (20).

According to our study the most important factor which affects OCD is the type of exposures and so there is a great variability for occupational contact dermatitis in various jobs. Correlation between age, work duration, glove usage with type of dermatitis were not significant except correlation between type of dermatitis with work history in glaze and paint industry. In Smith´s studies work duration was important, and there was a significant higher rate of OCD in higher grades of nursing students.

In almost all of studies hands were the most common site of affection. Temporal rate of OCD had a decline in during 1984-2004 in Lim study, but Bordel-Gomez et al study says there is an increase in sensitization to some and a decrease to other substances.

Therefore we see there are many disagreements in studies about OCD, even in relatively principal rules like prelim nation of ICD in distribution pattern.

Our study had some limitations such as, shortage of women that it was unavoidable because women in Iran work in many industries much lower than men, and they usually do official or lab duties in industries. Another limitations was inexistence of some high risk jobs like hairdressers, that it was unavoidable too. Besides we could not do the patch test for everyone, that it can be effective in our results. In conclusion, it seems it is necessary that every country has a national data bank of occupational contact dermatitis, which must be updated after a period of time. Frequency of updating can be verified for each country by continuant studies about occupational dermatitis with involving recent changes in various aspects of industries such as rate of employment, using procedures and materials, investigation of physical and environmental conditions, and execution of immune rules in every industry.

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