

Work Environment and Hand Dermatitis among Nurses in a Chinese Teaching Hospital

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Abstract

Objective: The aim of this study was to investigate the effects of the working environment on hand dermatitis (HD) prevalence among nurses in a Chinese teaching hospital.

Methods: We utilised a previously validated, self-reporting survey which was translated into Chinese.

Results: The prevalence of HD among nurses was 18.3%, although this rate varied between departments, ranging from 9.4% in gynaecology to 26.7% in intensive care (P for Trend=0.3167). Logistic regression indicated that wet work was the most important HD risk factor, with a 9-fold increase (OR 9.0, 95%CI 1.2–74.9, P=0.0342). Allergic disease was also related to HD, with a 4.6-fold increase noted (OR 4.6, 95%CI 1.4–15.0, P=0.0096).

Conclusions: Overall, the prevalence of HD among Chinese hospital nurses appears to be less than that of their foreign counterparts. Nevertheless, the burden of this disease does seem to vary with respect to department of employment within the hospital.

Key words: work environment, hand dermatitis, China, nurse, wet work

Introduction

Although hand dermatitis (HD) is reasonably common within the community environment, its occurrence is not random, and numerous intrinsic and extrinsic risk factors have been documented (1). Among them, the effects of the working environment are known to be particularly important (2, 3). Occupationally, HD represents one of the most significant diseases for hospital staff (4, 5), and is known to be highly prevalent among nurses (6, 7). Most importantly, it is repeated exposure to irritants and allergens within the work environment that may eventually lead to HD. Irritants in the workplace are often responsible for initial cases of HD, which may eventually progress to allergic sensitisation (8). Even within nursing, the prevalence of HD varies widely by department, and ranges from 6% to 48% (3). Differences in occupational exposure to chemicals and other workplace irritants are usually the reasons for

these differences in HD prevalence (9, 10).

In recent years, significant economic development has changed the health care system of mainland China, and there are at least 1.2 million nurses working in this country (11). Despite the very large number of staff, HD research is relatively uncommon and very few manuscripts have been published in English. Quite possibly, this has occurred because the large-scale detection of HD by clinical methods is very expensive and time-consuming. Furthermore, in busy environments such as hospitals, clinical examinations would involve significant disruption to the staff. For these reasons, the efficacy of self-reporting questionnaires has been investigated for use among large-scale cohorts. Two previous validation studies have shown the sensitivity and specificity of HD questionnaires to be acceptable (12, 13), and a third demonstrated that surveys may also elucidate supplementary information when the skin condition is below a clinically detectable level (14). For these reasons, we considered it necessary to investigate the interactions between the work environment and HD among Chinese hospital nurses using a previously-validated questionnaire survey.

Materials and Methods

For this study, we utilised a previously validated self-

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reporting survey (7, 9, 12) which was translated into Chinese. The document was then evaluated for clarity and understanding by a panel of Chinese health care experts, before being back-translated into English and rechecked against the original. Another group of experienced nurse managers evaluated the final Chinese version for ease of understanding among the target population of hospital nurses. Our questionnaire consisted of a simple 'tick box' style anonymous form, divided into three main categories, with the first focussing on personal items such as age, sex, alcohol consumption, tobacco smoking and the presence of allergic disease (atopic dermatitis, asthma, allergic rhinitis or hay fever). The second section focussed on employment-related issues such as weekly working hours, total duration of employment, occupational exposure to latex products and the presence of 'wet work'. The number of hand washes usually performed per work shift was requested, as well as the type of hand wash performed (water only, soap, disinfectant or surgical scrub). The category 'wet work', referred to any regular occupational contact with water (other than hand washing), such as washing patients, bathing patients or general cleaning. A question regarding preventive treatment strategies for the hands (such as regular usage of moisturising cream) was also asked.

The final section focussed on specific HD symptoms that are known to be indicative of this disease (3–10). Briefly, they included: red hands or redness between the fingers, scaling of the hands or fingers with fissures, vesicles on the hands or between the fingers, swollen red hands or fingers, and itching of the hands or fingers with or without fissures (3, 7, 9, 12). To ascertain a HD event occurring over time, we specifically asked nurses if any of their symptoms had occurred in the past 12 months and if so, had it persisted longer than 3 weeks or recurred. Accordingly, an HD case was defined using established criteria (3, 7, 9, 12), requiring two or more HD symptoms occurring in the past 12 months and either a protracted (longer than 3 weeks) or recurring (more than once) course.

After gaining approval from ethical review boards in both Japan and China, we recruited a complete cohort of clinical nurses from a tertiary teaching hospital in Shijiazhuang city. Shijiazhuang city is the capital of Hebei province and is located approximately 280 kilometres southwest of Beijing. There were five basic departments within the hospital, arranged largest to smallest as follows: surgery, intensive care, miscellaneous, gynaecology and internal medicine. The miscellaneous department comprised an amalgam of sections with small staff numbers, such as rehabilitation, infection control and radiotherapy. The head nurse of each department distributed our questionnaires, and all were collected within a 2-day period. Informed consent was implied when nurses completed and returned their forms.

Data were anonymously entered into a spreadsheet program before being analysed by statistical software. HD prevalence was evaluated as a group mean and also by individual hospital departments to determine the relative effects of environmental exposure to different workplace irritants. HD prevalence was also calculated with respect to personal items such as allergic disease and hospital wet work. Statistical differences in HD prevalence between hospital departments were evaluated (P for Trend) using Pearson's chi-square and Fisher's exact test.

Logistic regression was also performed to evaluate HD risk factors, with the results expressed as adjusted odds ratios (OR), 95% confidence intervals (95%CI) and probability (P) values. P values below 0.05 were considered statistically significant throughout the analysis.

Results

We initially received 206 replies from a total group of 214 hospital nurses (96.3%). Among them, 18 questionnaires were excluded due to incompleteness or if the subject was not a registered nurse. A further 8 male nurses were excluded to reduce gender confounding, leaving a homogenous final cohort of 180 female registered nurses (87.4%). The breakdown of numbers by work environment was as follows: surgical unit (25.6%), intensive care (25.0%), miscellaneous (20.0%), gynaecology (17.8%) and internal medicine (11.7%) (Table 1). Their average age was 32.7 years (SD 8.2) and most (77.2%) were married. Occasional alcohol consumption was not very common (16.7%) and all were non-smokers. The presence of current allergic disease was reported by 13.9%. Regarding workplace factors, their average number of working hours per week was 42.2 (SD 4.7) with a mean career length of 12.0 years (SD 7.8). Regular wet work was reported by 4.4% of them, although all nurses washed their hands every day. The mean number of hand washes per work shift was 27.4 times (SD 16.1). The overall HD prevalence among nurses within this study was 18.3% (Table 2). This rate varied between the departments, however, ranging from 9.4% in gynaecology to 26.7% in intensive care (P=0.3167, a non-significant trend). The prevalence of HD also varied with respect to personal factors, with the lowest rate occurring in married nurses (19.4%) and those who drank alcohol (23.3%). Higher rates were seen among nurses reporting current allergies (32.0%) and those involved in regular wet work (37.5%). None of these differences were statistically significant. There were no relationships between

Table 1 Personal information of staff

	n	(%) ^a
Personal items		
Alcohol drinker	30	(16.7)
Currently married	139	(77.2)
Current allergy	25	(13.9)
Wet work	8	(4.4)
Department		
Surgical unit	46	(25.6)
Intensive care	45	(25.0)
Miscellaneous	36	(20.0)
Gynaecology	32	(17.8)
Internal medicine	21	(11.7)
Mean±SD		
Average age	32.7±8.2 years	
Weekly work	42.2±4.7 hours	
Total career	12.0±7.8 years	
Hand wash/shift	27.4±16.1 times	

^a percentage of all nurses (N=180).

Table 2 Prevalence of hand dermatitis by category

	HD ^a	Total ^b	(%) ^c
Personal items^d			
Alcohol drinker	7	30	(23.3)
Currently married	27	139	(19.4)
Current allergy	8	25	(32.0)
Wet work	3	8	(37.5)
Department^e			
Surgical unit	8	46	(17.4)
Intensive care	12	45	(26.7)
Miscellaneous	5	36	(13.9)
Gynaecology	3	32	(9.4)
Internal medicine	5	21	(23.8)
Overall prevalence	33	180	(18.3)

^a number of nurses with hand dermatitis (HD) in each category, ^b total number of nurses in each category, ^c percentage of nurses with HD in each category, ^d statistical differences in HD prevalence investigated using Pearson's chi square and Fisher's exact test (all non-significant), ^e P for trend across departments also non-significant.

Table 3 Risk factors associated with the presence of hand dermatitis

Risk factors ^a	Category	Number		Logistic regression		
		n	(%) ^b	OR ^c	(95% CI)	P value
Wet work	No	177	(98.3)	1.0	—	—
	Yes	3	(1.7)	9.0	(1.2–74.9)	0.0342
Current allergy	No	172	(95.6)	1.0	—	—
	Yes	8	(4.4)	4.6	(1.4–15.0)	0.0096

^a risk factors calculated simultaneously using logistic regression and expressed as odds ratios (OR) with 95% confidence intervals (95%CI) and probability (P) values, ^b percentage of all nurses in each subcategory (N=180), ^c OR adjusted for age, alcohol consumption, marital status, weekly work hours, total duration of employment, department of employment and number of hand washes per shift.

the type of hand wash performed (water only, soap or disinfectant) and HD. There was also no relationship between the presence of HD and the use of preventive treatment strategies such as hand moisturiser. Nevertheless, when adjusted for personal items, some statistically significant correlations were demonstrated. Logistic regression showed that wet work was the most important HD risk factor, with a 9-fold increase (OR 9.0, 95%CI 1.2–74.9, P=0.0342). Allergic disease was also related to HD, with a 4.6-fold increase noted (OR 4.6, 95%CI 1.4–15.0, P=0.0096).

Discussion

The prevalence of HD in the current study was 18.3%, which is lower than that from previous research conducted among nursing staff in the United States (25.9%) (6), the Netherlands (28.8%) (7), Japan (35%) (3) and Australia (50.0%) (15). It is higher, however, than community investigations conducted in the Netherlands (7.1% to 10.6%) (8, 9) and Sweden (11.8%) (10). Other studies have shown HD prevalence among general hospital staff to be 21.2% in Italy (2), 55.6% in the United States (5) and 69.6% in Poland (4). These differ-

ences in prevalence suggest that HD occurs at varying levels depending on the type of hospital work and the country of study. When considered internationally, Chinese nurses appear to suffer this disease at a relatively low rate. Although the prevalence of HD varied widely with respect to hospital department (ranging from 9.4% to 26.7%), this was not a statistically significant trend.

Logistic regression showed no correlations between department and elevated HD prevalence. This was surprising, as previous studies have revealed that the work environment, particularly the work department, can be a significant HD risk factor (3, 6). Other research has shown that increased hand washing frequency may also be an important HD risk factor (3, 5, 6, 15). Interestingly, hand washing frequency and HD showed no correlations in our study, even though the rate of this activity (27.4 times) was similar to that in previous American research (29.8 times) in which a significant correlation was revealed (6). Another Japanese investigation also demonstrated the complicity of hand washing, even when the frequency of hand washing (15 times) was less than that in the present study (3). The reasons why hand washing was not found to be a risk factor in our study are difficult to understand, although one reason may be the overall low level of systemic allergy among the Chinese (13.9%). In the aforementioned Japanese study, systemic allergy ranged from 19% to 71% (3). Quite possibly, hand washing alone may be insufficient to cause HD among nurses if their background level of allergy is below a certain threshold (15).

The identification of wet work and systemic allergy as statistically significant HD risk factors is consistent with previous research (1–6, 15–17). Wet work is commonly encountered during nursing work and the irritant properties of water are well known (15–17). The mechanism behind this interaction is probably related to the constant extraction of natural moisturizing factors from the skin and the gradual exhaustion of the skin's horny layer (17). Similarly, individuals suffering allergies may experience more severe, acute symptoms of the skin than those who are not (5). In turn, such a mechanism may then increase the possibility of developing chronic HD. Allergies may also increase the dermal susceptibility to irritation and prolong the healing process (3). In a previous Swedish study, HD was shown to be a long-lasting disease with a relapsing course (18). In this manner, chronic allergic dermatitis may then progress to chronic HD among sensitised people. Such symptoms would easily register as a positive case during epidemiological research such as ours.

Conclusion

Overall, the prevalence of HD among Chinese hospital nurses appears to be less than that in their foreign counterparts. Nevertheless, the burden of this disease does seem to vary with respect to the department of employment within the hospital. The identification of wet work and allergic disease as significant HD risk factors was consistent with previous research. Further research is required to more clearly elucidate the complicity of environmental influence on occupational diseases such as HD.

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