

## SHORT COMMUNICATION

# Epidemiology of hand dermatitis among rural nursing students in mainland China: results from a preliminary study

DR Smith<sup>1</sup>, N Wei<sup>2</sup>, RX Zhang<sup>3,4</sup>, XH Lian<sup>3</sup>, RS Wang<sup>1</sup>

<sup>1</sup>Department of Hazard Assessment, National Institute of Industrial Health, Tama-ku, Kawasaki, Japan

<sup>2</sup>Department Medical Psychology, Third Teaching Hospital, Hebei Medical University, Shijiazhuang, China

<sup>3</sup>School of Nursing, Third Teaching Hospital, Hebei Medical University, Shijiazhuang, China

<sup>4</sup>Third Teaching Hospital, Hebei Medical University, Shijiazhuang, China

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Smith DR, Wei N, Zhang RX, Lian XH, Wang RS

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## ABSTRACT

**Introduction:** Although hand dermatitis (HD) is known to affect nursing students worldwide, no studies of this disease have yet been conducted in China. Similarly, rural populations are often neglected in international research.

**Methods:** A preliminary study of female students from both grades of a hospital-based nursing school was conducted in Hebei Province, China, approximately 280 km south of Beijing. There were 27 students from the 2nd year of the course (47.4%) and 30 students from the 3rd year (52.6%). The study protocol involved an anonymous questionnaire distributed to a convenience sample of both grades from the nursing school. Statistical differences in prevalence by year of study were calculated using Fisher's exact test for discrete variables and One-way Analysis of Variance (ANOVA) for continuous variables. Statistical associations between HD and demographic items were investigated using the  $\chi^2$  test. Where statistical association with HD were identified, simple logistic regression was also performed to establish a basic risk magnitude. Results were compared with similar populations of student nurses from previous studies in Australia, Japan, Denmark, the Netherlands and Germany.



**Results:** HD prevalence fell from 29.6% in the 2nd year to 13.3% in the 3rd year and averaged 21.1% across both grades. Systemic allergic disease among family members was found to be statistically associated with HD ( $p < 0.05$ ). Overall, our preliminary study showed that HD probably affects Chinese nursing students at rates similar to that of their Japanese counterparts, but at a higher rate than students in other investigations from Germany, Holland and Australia. The identification of familial allergic disease as a possible risk factor for HD was also novel.

**Conclusion:** The investigation was conducted as a preliminary investigation, and as such, our results need to be treated with caution. Further research is recommended to more carefully elucidate the prevalence of HD among larger groups of Chinese nursing students.

**Keywords:** allergic disease, China, hand dermatitis, epidemiology, risk factor, student nurse.

## Introduction

Contact dermatitis of the hands, or hand dermatitis (HD), represents one of the most frequent occupational diseases and is particularly common among working nurses<sup>1</sup>. Previous studies have also highlighted the problems of HD among nursing students or apprentice nurses in Australia<sup>2</sup>, Japan<sup>3</sup>, Denmark<sup>4</sup>, the Netherlands<sup>5</sup> and Germany<sup>6</sup>. To date, however, no research of this nature has been undertaken in mainland China and published in English. Given that there are at least 1.2 million working nurses<sup>7</sup> and approximately 40 000 nursing students graduating every year in China<sup>8</sup>, they represent a vastly understudied cohort. Similarly, rural populations are often neglected in international research. Of the aforementioned nursing student studies, only two were conducted in rural locations<sup>2,3</sup>, only one of which was Asian<sup>3</sup>. Although the booming Chinese economy has brought increased wealth to many metropolitan areas such as Beijing and Shanghai in recent years, industrialisation has not been uniform throughout the country. In this regard, many rural regions have been largely overlooked and a bias towards urban development continues in China, as throughout the world. Given the absence of Chinese student nurse data and the general scarcity of rural nursing research,

a preliminary study of HD within a rural, Chinese nursing school was conducted, for what appears to be the first time.

Although medical examinations for HD are expensive, inconvenient and generally impractical, self-reporting questionnaires have been shown to be sufficiently accurate for the detection of HD among large groups<sup>1,9</sup>. For example, Smit et al.<sup>1</sup> demonstrated that the sensitivity and specificity of their HD questionnaire was 100% and 64%, respectively. Similar findings have been seen in other studies<sup>9</sup>. Simion et al.<sup>10</sup> also reported that questionnaires may even offer supplementary information on skin diseases, beyond that of clinical examination. Given these factors, we considered that an epidemiological investigation of HD among Chinese student nurses would be most appropriately undertaken using a previously-validated, questionnaire-based methodology.

## Methods

The research protocol was initially reviewed and approved by a Chinese university ethics committee and conducted in accordance with ethical guidelines appropriate to China. A convenience sample of students was selected from a typical hospital-based nursing school in the rural area of Shijiazhuang city. Shijiazhuang is located in Hebei province, and is approximately 280 km south of Beijing. Most Chinese



nurses (approximately 99%) are educated in vocational nursing schools, many of which are attached to hospitals<sup>7</sup>. As such, our study group was deemed to be representative of the wider population of student nurses throughout the country. The study protocol involved an anonymous questionnaire and informed consent was implied when students completed and returned this document. The three-page survey form included both demographic items (such as age, sex, year of study) and HD-related questions. All questions were adapted from previous investigations of nursing students<sup>2-6</sup>. The English-language version was translated into Chinese by a team of experienced, bilingual healthcare professionals. It was then assessed for accuracy and clarity within a Chinese nursing setting by experienced nursing professionals, before being back-translated into English and rechecked by the original author. Regarding HD, a positive case was defined when one or more specific symptoms occurred in the past 12 months and had persisted for more than 3 weeks or had reoccurred<sup>5</sup>. Other skin disease questions were asked, with any affirmative response (except HD) considered a positive case for that particular disease.

Questionnaires were distributed to a convenience sample of both grades from the nursing school and collected on the same day. A complete cross-section was obtained by recruiting all students. Data was then entered into a common spreadsheet before being analysed by statistical software. Students were categorised according to their year of study within the nursing school. Statistical differences in prevalence by year of study were calculated using Fisher's exact test for discrete variables and One-way Analysis of Variance (ANOVA) for continuous variables. Statistical associations between HD and demographic items were investigated using the  $\chi^2$  test. Where statistical association with HD were identified, simple logistic regression was also performed to establish a basic risk magnitude. These results were expressed as crude Odds Ratios (OR) with 95% Confidence Intervals (95%CI). Probability values below 0.05 were regarded as statistically significant throughout all analyses.

## Results

We recruited a complete cross-sectional cohort of 57 rural nursing students from a university-based nursing school in Hebei Province, China. All of them completed the questionnaire and the group consisted entirely of females. Nursing students at the university of the present study first begin hospital duties in their second year and become completely hospital-based in the third year. As such, the school contained no 1st year students. However, there were 27 students from the 2nd year (47.4%) and 30 from the 3rd year (52.6%). Their average age ranged from 20.6 to 21.5 years (a statistically significant difference:  $p < 0.01$ ). There were no tobacco smokers at all. Alcohol consumption was also rare among our Chinese nursing students, with only the 2nd years reporting any (14.8%,  $p < 0.05$ ).

Approximately one-quarter (25.9%) of the 2nd year nurses had previously worked as a nurse or nursing assistant, and this figure dropped to 3.3% in the 3rd year group (a statistically significant difference:  $p < 0.05$ ). A higher proportion of 3rd year nurses (26.7%) stated that they had suffered from allergies as a child (2nd year, 11.1%). This was in contrast to a family history of allergic disease, which was reported by 29.6% of the 2nd years and only 23.3% of the 3rd year students (Table 1). HD prevalence fell from 29.6% in the 2nd year to 13.3% in the 3rd year and averaged 21.1% across both (a non-significant difference). Systemic allergic disease among family members was found to be statistically associated with HD during this study ( $p < 0.05$ ). By simple logistic regression, the risk of HD was elevated 4-fold (OR 4.0, 95% CI: 1.0–15.9). The prevalence of miscellaneous skin diseases varied between the two groups as follows: acne or pimples (40.0% to 40.7%), tinea pedis (14.8% to 20.0%) atopic dermatitis (0.0% to 10.0%), skin rashes (0.0% to 6.7%) and other diseases (3.3% to 22.2%:  $P < 0.05$ ). The average rates for these conditions were as follows: acne or pimples (40.4%), tinea pedis (17.5%), atopic dermatitis (5.3%), skin rashes (3.5%) and other skin diseases (12.3%) (Table 2).



**Table 1: Nursing student demographics**

Demographics	Student nurse year	
	2nd <i>n</i> (%) <sup>†</sup>	3rd <i>n</i> (%) <sup>†</sup>
Alcohol drinker*	4 (14.8)	0 (0.0)
Previous nursing*	7 (25.9)	1 (3.3)
Personal allergy	3 (11.1)	8 (26.7)
Family allergy***	8 (29.6)	7 (23.3)
Age (years)** (mean ± SD)	20.6 ± 0.7	21.5 ± 0.8

Second and third year *n* = 27 and 30, respectively.

Statistical differences between year of study : \**p* < 0.05 (Fisher's exact test);

\*\**p* < 0.01 (one-way ANOVA); statistical association with hand dermatitis,

\*\*\**p* < 0.05 ( $\chi^2$  test).

**Table 2: Nursing students' skin disease**

Skin disease	Student nurse year	
	2nd <i>n</i> (%) <sup>†</sup>	3rd <i>n</i> (%) <sup>†</sup>
<b>Acne / pimples</b>	11 (40.7)	12 (40)
Tinea pedis	4 (14.8)	6 (20.0)
Atopic dermatitis	0 (0.0)	3 (10.0)
<b>Scabies</b>	0 (0.0)	2 (6.7)
Other*	6 (22.2)	1 (3.3)
Hand dermatitis	8 (29.6)	4 (13.3)

Second and third year *n* = 27 and 30, respectively.

Statistical differences between year of study : \**p* < 0.05 (Fisher's exact test)



**Table 3: Nursing student hand dermatitis prevalence and rurality**

<i>Nursing students with hand dermatitis</i>			
Country	Urban (%)	Country	Rural (%)
Germany <sup>6</sup>	3.6, 9	Australia <sup>2</sup>	18.5
Holland <sup>5</sup>	13.5	China <sup>†</sup>	21.1
Denmark <sup>4</sup>	32, 39	Japan	23.8
Average <sup>‡</sup>	19.4	Average <sup>‡</sup>	21.1

<sup>†</sup> Present study.

<sup>‡</sup> Determined by adding the total prevalence rates and dividing by the number of studies

## Discussion

With an overall prevalence of 21.1%, the rural Chinese students suffered less HD than a previous investigation of their Danish counterparts (32% to 39%)<sup>4</sup>. A different study conducted in the Netherlands also reported a higher rate among working hospital nurses (47.7%)<sup>1</sup>. Alternatively, the Chinese students' prevalence rate was higher than other investigations of German (3.6% to 9%)<sup>6</sup>, Dutch (13.5%)<sup>5</sup> and Australian (18.5%)<sup>2</sup> nursing students. HD among the Chinese cohort was, however, quite similar to previous research conducted in Japan, where 23.8% of the nursing students reported HD occurring over the past 12 months<sup>3</sup>. Although the prevalence of HD among Chinese nursing students fell between 2nd and 3rd years of nursing study, this decrease was not statistically significant. Regarding rurality, the HD prevalence rate among Chinese students (21.1%) was higher than a similar study from north-eastern Australia (18.5%)<sup>2</sup>, but lower than another rural investigation conducted in Japan (23.8%)<sup>3</sup>. Interestingly, HD research conducted in more urban nursing schools has shown the prevalence to range widely, from 3.6% to 39%<sup>4-6</sup>.

Given this seemingly wide range of variables, it was decided to calculate an average HD rate with respect to rurality. This was achieved by first dividing the results of previous studies (including the present) into either urban or rural subgroups.

Prevalence rates in each subgroup (urban or rural) were then added and the total divided by the number of studies. Studies with two different prevalence rates had both rates included and the result divided by two. This was undertaken because both studies indicating two separate results<sup>4,6</sup> had, in fact, evaluated HD in two separate groups. As a group, it appears therefore, that rural nursing students suffer HD at a rate slightly higher than their urban counterparts (Table 3). Among them, Chinese nursing students seem to suffer HD at the average rate for their geographical subgroup.

## Conclusions

Overall, our preliminary study showed that HD affects rural Chinese nursing students at rates similar to their Japanese counterparts, but higher than other investigations from Germany, Holland and Australia. Regarding rurality, the HD prevalence rate among Chinese students was higher than a similar study from north-eastern Australia, but lower than another rural investigation conducted in Japan. Alternative research undertaken within urban nursing schools has shown the prevalence to range more widely than within our study. However, the generalisability of these results with respect to the wider population of student nurses in mainland China is difficult to ascertain. In one sense, the Shijiazhuang cohort was considered typical of Chinese student nurses, because the majority are trained in hospitals such as that of the





present study. However, the present sample size only represented a fraction of the total number of student nurses in mainland China. As such, it must be remembered that this study was intended only as a preliminary investigation, and the results must be treated with caution. Another issue is that the present study's definition of HD may have differed from researchers in other countries and, more importantly, among student nurses in other countries. Again, this suggests that the international comparison of our results should be undertaken cautiously.

Nevertheless, it appears that HD among rural Chinese nursing students has been documented for the first time in English. This preliminary study has also demonstrated that the basic concept for researching rural nursing students is feasible in mainland China. The identification of family allergic disease as a possible HD risk factor was novel, and is worthy of further investigation in larger studies. Further research is now needed to clarify the aetiology of HD among larger student-nurse cohorts, and to evaluate the complicity of newly identified risk factors, such as family allergy.

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