

A Survey-Based Assessment of the Prevalence and Severity of Chronic Hand Dermatitis in a Managed Care Organization

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Although studies conducted outside of the United States have found a 7% to 12% prevalence of chronic hand dermatitis, no US general population-based estimates have been reported. The objective of this study was to quantify the prevalence of chronic hand dermatitis in a US managed care organization population. A 13-item self-assessment questionnaire was developed and validated, with 85% sensitivity and 95% specificity. The questionnaire was mailed to 2 random member samples from a Massachusetts managed care organization: 502 general members and 878 members with dermatitis. The questionnaire had a 36.74% overall response rate, with a

chronic hand dermatitis point prevalence of 17.49% and 33.33% in the general and dermatitis populations, respectively. Among the general population, the questionnaire results identified 16.94% members who had chronic hand dermatitis but had not sought dermatitis-related medical services. After direct standardization to the 2000 US Census population with respect to age, gender, and race distributions, the projected point prevalence was estimated at 16.36% in the US general population. In conclusion, we found a higher prevalence of chronic hand dermatitis than previously reported. Approximately 1 in 6 members did not seek medical attention, suggesting that chronic hand dermatitis may be underdetected and untreated and may require more awareness and effective management.

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Chronic hand dermatitis, or hand eczema, is a common regional diagnosis whose severity can range from mild xerosis to disabling dyshidrosis; the condition can be the result of either exogenous or endogenous factors, or both.^{1,2} Diagnosis and treatment of chronic hand dermatitis remains a clinical challenge. There is little association between clinical patterns of symptoms and etiology. Not only are there many patterns of eczematous inflammation but also many other differential diagnoses, such as psoriasis and pompholyx, that may appear eczematous.¹

Hand dermatitis causes discomfort and, because of the condition's location, creates embarrassment and may interfere substantially with normal daily or occupational activities.³ Hand dermatitis is the most

common occupational cutaneous diagnosis, comprising 9% to 35% of all occupational diseases and at least 80% of all occupational contact dermatitis.⁴ Although US-based studies have focused on occupational populations,⁵⁻⁸ no US-based studies have evaluated the epidemiology of chronic hand dermatitis in a general population. However, general population-based and occupation-based studies have been conducted outside of the United States⁹⁻²⁹; researchers found the one-year prevalence of chronic hand dermatitis was in the range of 7% to 12%, with higher prevalence among women and individuals aged 20 to 39 years.^{21,22,27} However, the validity of the questionnaires used in these studies was either low or unknown.

This study consisted of the development and validation of a chronic hand dermatitis questionnaire and the administration of this validated questionnaire to random samples of members of a managed care organization in Massachusetts. This is the first epidemiologic study to assess the prevalence and severity of chronic hand dermatitis in a US managed care organization population; the prevalence and severity of chronic hand dermatitis in this population, as well as the extent of underdetection of this condition, also were quantified.

Methods

A 13-item questionnaire was developed by a clinical dermatology professor (J.F.F.) to measure the signs and symptoms of chronic hand dermatitis, location of affected skin, use of prescription and over-the-counter medications, duration and temporality of symptoms, and differential diagnoses. The questionnaire was designed to be self-administered by members. Chronic hand dermatitis was diagnosed and its severity was graded (mild to moderate, moderate, moderate to severe, severe) based on predefined clinical algorithms.

The clinical questionnaire was part of a larger 14-page survey with 102 items and sections relating to over-the-counter drug use, quality of life, work productivity, sociodemographics, and general health status as measured by the Medical Outcomes Study 8-Item Short Form Health Survey.³⁰ This article focuses on the clinical questionnaire of the survey and how the results were used to identify and grade the severity of chronic hand dermatitis. The questionnaire was validated in a dermatology practice in Louisville, Kentucky, with 40 randomly selected adult patients (mean age, 46.60 ± 14.81 years; 30% [12] men) during their clinic visits between November 19, 2003, and December 2, 2003. Each patient completed an informed consent form before participating. The questionnaire was validated

against a dermatologist's evaluation regarding the diagnosis and severity of chronic hand dermatitis; the questionnaire showed a high level of sensitivity and specificity (85% and 95%, respectively). The validated questionnaire then was administered to random samples of adult members of the Fallon Community Health Plan (FCHP), a mixed-model healthcare organization in Massachusetts.

With a target of 500 FCHP respondents, the required sample size for mailing was determined based on a presumed questionnaire response rate of 36% from past study experiences at FCHP. Hence, 1380 FCHP members 18 years or older who were enrolled in the managed care organization continuously between January 1, 2001, and November 30, 2003, randomly were sampled from the FCHP claims database. To estimate the prevalence of chronic hand dermatitis in both the general and dermatitis populations at FCHP, the sample size of 1380 was further partitioned into 502 members from the general population and 878 members from the dermatitis population; this sample size was based on an 85% statistical power to detect a mean prevalence of chronic hand dermatitis of 8% in a general population, which provided a 95% confidence interval of 4.2% to 12.3%. The dermatitis population was identified from members with at least 2 medical claims for nonspecific dermatitis or eczema (*International Classification of Diseases, Ninth Edition* [ICD-9], codes 691.8 or 692) between April 1, 2001, and August 31, 2003.

The questionnaire was mailed to the randomly sampled subjects in 2 separate mailings, each of which was followed by a reminder mailing. All respondents provided informed consent to participate in this study, as approved by the St. Vincent Hospital/Fallon Clinic/FCHP Institutional Review Board.

After the questionnaire responses were received, the diagnosis and severity of chronic hand dermatitis were determined. Demographic and socioeconomic characteristics were compared between members with and without chronic hand dermatitis as identified through the questionnaire responses. The point prevalence of chronic hand dermatitis was calculated as the number of questionnaire respondents with chronic hand dermatitis divided by the total number of respondents from the source population (general or dermatitis). This prevalence was further stratified by age and gender.

Using the prevalence of chronic hand dermatitis found in the FCHP general population, we attempted to extrapolate the condition's prevalence in the US general population. The extrapolation was performed using a direct standardization method for the FCHP general population against

Table 1.

Demographic and Socioeconomic Characteristics of Questionnaire Respondents*

	ChHD Respondents (n=140)	Non-ChHD Respondents (n=367)	<i>P</i> value [†]
Age, y			.073
Mean±SD	48.65±13.20	51.10±14.71	
Gender, n (%)			.949
Female	83 (59.29)	218 (59.40)	
Race, n (%) [‡]			.688
White	127 (90.71)	337 (91.83)	
Education level, n (%)			.825
High school or less	39 (27.86)	106 (28.88)	
Some college	51 (36.43)	123 (33.51)	
Bachelor and above	50 (35.71)	138 (37.60)	
Income levels, n (%) [§]			.471
<40	71 (50.71)	157 (42.78)	
40–80	47 (33.57)	116 (31.61)	
>80	9 (6.43)	32 (8.72)	

*ChHD indicates chronic hand dermatitis.

[†]*P* value for age is based on Student *t* test; for all other variables, *P* value is based on Pearson χ^2 test.

[‡]The race listed is defined as white (non-Hispanic); races not listed include American Indian or Alaskan native, Asian or Pacific Islander, Hispanic, Black (non-Hispanic), and other.

[§]In thousands of dollars.

^{||}Percentages do not add up to 100% because not all respondents answered the question.

the US population from the 2000 US Census with respect to age, gender, and race distributions. The standardized point prevalence of chronic hand dermatitis serves as the projected prevalence in the United States after correcting for the distributional differences in demographic factors between the FCHP and US general populations.

The degree of underdetection of chronic hand dermatitis was measured by the proportion of respondents in the general population who had a diagnosis of chronic hand dermatitis from the questionnaire but had not sought medical services for dermatitis (ICD-9, codes 691.8 or 692), according to the FCHP claims database.

The 2-tailed Student *t* test was used for continuous variables (ie, age) and the Pearson χ^2 test was used for categorical variables (ie, gender, race,

education level, income) to evaluate statistical significance. All data analyses were performed using SAS[®] for Windows (versions 8 and 9.1) and Intercooled Stata[®] for Windows (version 8.2).

Results

Among the 1380 randomly sampled FCHP members who were invited to participate in the study, 507 (36.74%) individuals fully completed the questionnaire. The response rate was similar between the general and dermatitis populations, with 183 (36.45%) and 324 (36.90%) respondents, respectively.

Among the 507 questionnaire respondents, 140 (27.61%) were identified as having chronic hand dermatitis. Table 1 presents demographic and socioeconomic characteristics for the chronic hand dermatitis and non-chronic hand dermatitis

Table 2.

Point Prevalence of Chronic Hand Dermatitis by Age and Gender*

	FCHP General Population			FCHP Dermatitis Population [†]		
	Questionnaire Respondents, n [‡]	ChHD Based on Questionnaire, n [‡]	Point Prevalence, %	Questionnaire Respondents, n [‡]	ChHD Based on Questionnaire, n [‡]	Point Prevalence, %
Entire sample	n=183	n=32	17.49	n=324	n=108	33.33
Age, y						
20–29	15	3	20.00	28	10	35.71
30–49	77	14	18.18	117	44	37.61
50–69	57	9	15.79	136	46	33.82
≥70	19	4	21.05	32	3	9.38
<i>P</i> value [§]			.914			.015
Gender						
Male	68	11	16.18	137	45	32.85
Female	115	21	18.26	186	62	33.33
<i>P</i> value			.720			.927

*FCHP indicates Fallon Community Health Plan; ChHD, chronic hand dermatitis.

[†]Respondents had physicians who filed at least 2 medical claims for them using *International Classification of Disease, Ninth Edition*, codes 691.8 or 692, between April 1, 2001, and August 31, 2003.

[‡]Not all respondents answered all questions.

[§]Based on Pearson χ^2 test and corrected for Fisher exact significance.

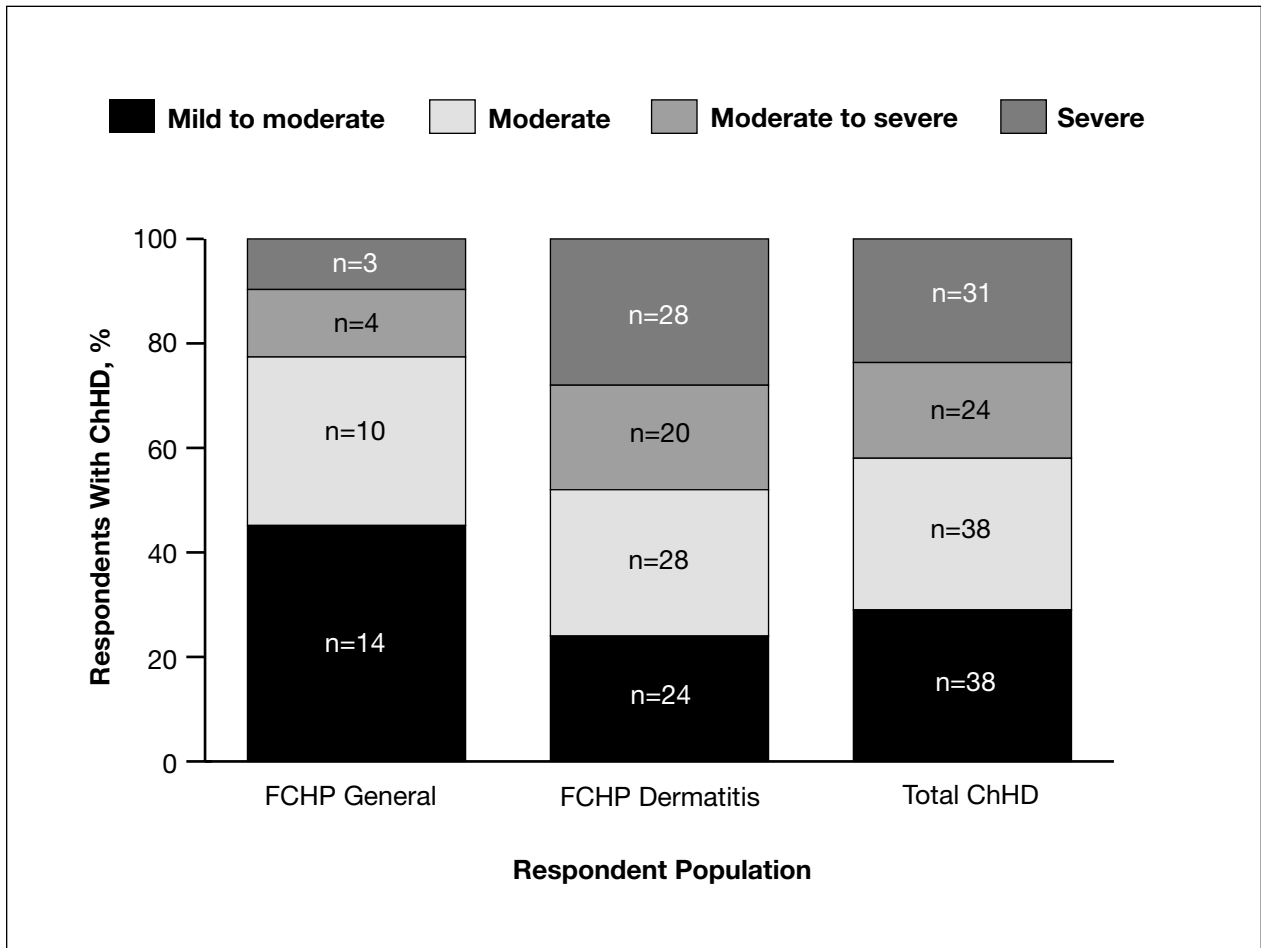
^{||}Based on Pearson χ^2 test.

respondent groups. The 2 groups had similar characteristics, except for age. The chronic hand dermatitis respondent group was younger (mean age, 48.65±13.20 years) than the non-chronic hand dermatitis respondent group (mean age, 51.10±14.71 years). Both groups consisted of approximately 59% women and 91% whites; additionally, both groups had similar distributions in education and income levels.

Prevalence of Chronic Hand Dermatitis—Of the 183 questionnaire respondents from the FCHP general population, 32 met the questionnaire definition for chronic hand dermatitis, yielding a point prevalence of 17.49%. Among the 324 questionnaire respondents in the FCHP dermatitis population, 108 were diagnosed by the questionnaire as having chronic hand dermatitis, resulting in a point prevalence of 33.33%. This suggests that

about one third of the nonspecific dermatitis cases were on the hands.

Table 2 shows the point prevalence of chronic hand dermatitis by age and gender. Age was not significantly correlated with chronic hand dermatitis prevalence for the FCHP general respondent population. Additionally, there was no statistically significant difference in prevalence by gender for either the general or dermatitis respondent populations. In contrast, for the FCHP dermatitis respondent population, members who were 70 years or older (the oldest age category) had a significantly lower prevalence of chronic hand dermatitis ($P=.015$). However, the small number of persons in this age category and the lack of a clear pattern of prevalence by age did not provide enough conclusive evidence about the association between age and prevalence of chronic hand dermatitis.



Chronic hand dermatitis (ChHD) severity across the Fallon Community Health Plan (FCHP) general, dermatitis, and total ChHD populations. The FCHP general population has a higher distribution of mild to moderate severity compared with the FCHP dermatitis population. One member in the FCHP general population and 8 members in the FCHP dermatitis population did not have sufficient information for severity determination.

After standardization against the US general population with respect to age, gender, and race distributions, the projected prevalence of chronic hand dermatitis in the United States was estimated to be 16.36%. This was calculated using 182 questionnaire respondents because one respondent did not provide race information and was excluded. Of the 183 questionnaire respondents from the FCHP general population, 32 respondents had a questionnaire-based diagnosis of chronic hand dermatitis but had no dermatitis-related medical services recorded in the claims database, suggesting that about 16.94% of the general respondent members did not seek medical attention for their chronic hand dermatitis.

Severity of Chronic Hand Dermatitis—The Figure displays the distribution of chronic hand dermatitis severity in the FCHP general, dermatitis, and total

chronic hand dermatitis respondent populations. Of the chronic hand dermatitis respondents from the FCHP general respondent population, 45.16% had symptoms consistent with mild to moderate severity, whereas only 24.00% of the FCHP dermatitis respondent population had similar severity grades ($P=.016$). The condition of chronic hand dermatitis was more severe in the FCHP dermatitis respondent population than in the FCHP general respondent population.

Comment

Our study found that the prevalence of chronic hand dermatitis in the FCHP general respondent population was 17.49%. In addition, 16.94% of respondents with chronic hand dermatitis in the general respondent population did not seek dermatitis-related care, raising a health concern that chronic hand dermatitis may be underdetected and untreated.

Our study is not directly comparable with previous studies that (1) were conducted on non-US populations—often in nongeneral populations—and (2) used different methodologic approaches. For example, Nielsen et al¹¹ reported lifetime prevalence whereas our study reported cross-sectional point prevalence; Yngveson et al^{28,29} and Uter et al⁹ focused on specific population segments and occupations, whereas our study investigated a general population. Among the studies based on general populations, those that relied on medical examinations—such as Nielsen et al¹¹ and the Dutch studies¹³⁻¹⁷—were more likely to have lower estimates of prevalence because they only included patients who consulted a dermatologist for their skin condition.

It is useful to understand the results of our study in the context of previous studies. The studies that are most comparable with our investigation were those performed by Meding and colleagues²¹⁻²⁷ because they primarily used a postal questionnaire to survey a general population (followed by dermatologic examinations of those respondents who self-reported hand eczema); these studies reported a one-year prevalence of 8% to 12%. Nevertheless, this prevalence rate should be regarded with caution because the questionnaire used in the Meding studies was not validated before it was used. When Meding and Barregard²³ actually validated the questionnaire, they found a sensitivity of 53% to 59% and a specificity of 96% to 99%. The authors concluded that with such a low sensitivity, estimates of the prevalence of hand dermatitis were artificially low. Thus, it is possible that the higher prevalence that we found in our study partly was due to our clinical questionnaire, which had a sensitivity of 85% and thus was more sensitive to detecting milder manifestations of chronic hand dermatitis; this sensitivity was evidenced in our study respondent population by the high percentage (45.16%) of mild to moderate chronic hand dermatitis, for which a considerable proportion of persons may not seek dermatologist care.

Meding et al,^{21,22,27} Yngveson et al,^{28,29} and Nielsen et al¹¹ reported that the prevalence of chronic hand dermatitis in females was higher than males. In contrast, our study did not observe any such differences in the point prevalence rates. Furthermore, Meding et al^{21,22} showed that the one-year prevalence of hand dermatitis depended on age and peaked in the 20- to 39-year age bracket. In our study, this trend was not observed in the point prevalence rates; we found that the point prevalence rate declined with age but did not reach statistical significance.

Because the FCHP respondent population had a mean age of approximately 50 years and was about 59% women and 91% white, we standardized the FCHP prevalence measure to the 2000 US Census population with respect to age, gender, and race. The point prevalence was 16.36% for the US general population, which implies there are approximately 34 million adults with chronic hand dermatitis in the United States. Our study also found that 33.33% of respondents with a dermatitis-related condition met the questionnaire diagnosis of chronic hand dermatitis; this prevalence is consistent with the 20% to 35% range of all dermatitis affecting the hands reported by Elston et al.⁴

Our study used a population-based questionnaire approach to address the study objectives. Clinicians may wonder whether the use of health insurance claims data is a more cost-efficient option; however, there are several reasons why the sole reliance on insurance claims data for this study was not feasible. First, although there are ICD-9 codes identifying dermatitis in general, the codes do not identify the specific body areas affected by the disease, thus prohibiting the identification of patients whose dermatitis affects the hands. Second, even if there was a specific diagnosis code for hand dermatitis, such as in the ICD-10, the code only would identify patients who seek a physician's care for the condition. Yet, as we found in this study, a considerable proportion of persons with chronic hand dermatitis did not seek physician care; thus, this identification mechanism would underestimate the true prevalence of the condition. To overcome these problems, our study used a self-assessment questionnaire to estimate the prevalence and severity of chronic hand dermatitis.

Our study found that the questionnaire response rate was 36.74%. We assessed the representativeness of the questionnaire respondents to the source managed care organization population by comparing the sociodemographic characteristics of the dermatitis subgroup versus the random sample of the source population of the managed care organization members. We found that the dermatitis respondent group was similar to the dermatitis general population group based on the gender distribution (57.40% vs 58.30% for women; $P=0.778$), but the former were slightly older than the latter by 3 years (mean age, 50.62 vs 47.52 years; $P=0.001$). This age difference does not appear to be clinically meaningful, though it did reach a statistical significance. Based on the above findings, although the persons who took part in our study were not a true random sample, they were fairly representative of the managed care organization members eligible

to take part in the study. Nevertheless, readers should bear in mind the possible selection bias in the study.

Another limitation of the study is that the questionnaire validation population (based on patients from a dermatology clinic) is not derived from the same population as the study population (based on members from a managed care organization). It was logistically difficult to conduct a questionnaire validation in a managed care organization population because of the low disease prevalence in a general population and the difficulty in accessing medical records in physicians' offices spread over a wide geographic area. When we compared the validation study population with the dermatitis questionnaire respondents, we found that the 2 study samples statistically were similar in terms of age (mean age, 46.60 vs 50.62 years; $P=.055$), gender (70.00% vs 57.40% for women; $P=.063$), race (87.50% vs 89.81% in whites; $P=.325$), and education (20.00% vs 29.62% above high school; $P=.101$). This indicates that the validity of the questionnaire instrument found in the validation study may be generalizable to the survey population.

In summary, this study found that chronic hand dermatitis has a high prevalence in a managed care organization general population—in the context of other population-based studies—and is underdetected and undertreated in this population. Because of the large number of persons affected by chronic hand dermatitis, more awareness and recognition by physicians and the public, as well as more effective prevention and treatments, are necessary to improve the management of this condition. Further research on the impact of chronic hand dermatitis on health outcomes and economics will advance the dermatologic community's understanding of this seemingly silent skin disease.

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