



Prevalence and associated factors of comorbid skin diseases in patients with schizophrenia: a clinical survey and national health database study



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ABSTRACT

Objectives: To examine the epidemiology of and possible risk factors for skin diseases in patients with schizophrenia.

Methods: All of 337 patients with schizophrenia were recruited from the therapeutic community of a psychiatric hospital and underwent a detailed skin examination. The National Health Insurance Research Database (NHIRD) was used to compare the prevalence of skin diseases between patients with schizophrenia and those without.

Results: In the clinical survey, fungal infection (61.4%) and dermatitis (46.9%) were the most common skin diseases. Clozapine users had a lower risk of fungal infection than those on typical antipsychotics [odds ratio (OR)=0.49, 95% confidence interval (CI)=0.30–0.81]. Obese patients were more likely to have fungal infections than those without (OR=1.93, 95% CI=1.20–3.09), and those with diabetes had an increased risk of bacterial infection than those without (OR=2.0, 95% CI=1.06–3.75). NHIRD revealed that the overall prevalence of skin diseases, including infections, dermatitis, hyperkeratosis, pilosebaceous disease, androgenic alopecia, xerosis and stasis, were higher in patients with schizophrenia than in those without (75.1% vs. 72.6%, $P=.01$).

Conclusions: The prevalence of skin diseases is high in patients with schizophrenia, for whom proper skin care is necessary to improve their life quality.

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1. Introduction

Most patients with schizophrenia have at least one chronic comorbid medical condition [1] and an overall mortality rate more than twice that of the general population [2]. Most research on comorbidity in schizophrenia has focused on major illnesses that can cause severe morbidity or mortality, such as cardiovascular diseases, neoplasms and infection [1–3]. Although these studies have reviewed comorbidity in schizophrenia, very few have assessed skin diseases in patients with schizophrenia. As the largest organ of the human body, the skin plays an important role in maintaining a patient's well-being. Skin health greatly affects quality of life [4]. Skin diseases may also have adverse effects on psychiatric disorders [5] and may directly or indirectly increase medical expenses [6]. We believe that proper treatment of skin diseases should be regarded as an integral part of the long-term clinical management of schizophrenia.

Compared with the general population, patients with schizophrenia have higher prevalence of obstetric complications, cardiovascular disease, obesity, diabetes, dental problems and polydipsia [2]. In addition, one study revealed that comorbid medical conditions such as diabetes, hypertension, dyslipidemia and obesity are underdiagnosed and undertreated in hospitalized psychiatric patients relative to populations without mental health disorders [7]. Likewise, we believe that, relative to populations without schizophrenia, some comorbid skin diseases are more prevalent and more frequently underdiagnosed and undertreated in patients with schizophrenia. Until now, as mentioned above, only a small number of studies have focused on the clinical survey of skin diseases in patients with psychiatric disorders [8–12]. These studies suggested a high prevalence of skin diseases in psychiatric patients. Moreover, obesity, diabetes and female sex were all found to be related to specific skin diseases in psychiatric patients [8,12]. Nevertheless, there were a number of limitations to these studies: (1) inclusion of heterogeneous psychiatric diagnoses that did not focus on schizophrenia alone; (2) inadequate sample size; (3) failure to explore

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risk factors that might be related to skin diseases in schizophrenia, such as psychosocial outcomes of schizophrenia (e.g., psychopathology, cognitive deficits and global function) or types of antipsychotics; and (4) failure to discuss the diagnosis and treatment of skin diseases in patients examined in a face-to-face clinical survey and in population-based data.

The aim of this study was (1) to examine the epidemiology of skin diseases, (2) to examine the diagnosis and treatment of skin diseases in clinical survey and population-based data and (3) to explore possible risk factors for skin diseases in patients with schizophrenia. We hypothesized that prevalence of some skin diseases in patients with schizophrenia would be higher than in those without and that skin diseases in patients with schizophrenia would be underdiagnosed or undertreated.

2. Methods

2.1. Clinical data: setting

This study was conducted at Yuli Hospital, a government hospital established in 1966 in eastern Taiwan. At the time of this study, a total of 2562 resident psychiatric patients received humanistic and patient-centered professional care at the hospital. Patients were from all areas of Taiwan; over 96% were diagnosed with schizophrenia. The average age of patients was 53.4 years. The therapeutic community (TC) in this hospital accommodates approximately 600 residents diagnosed with psychotic disorders. Compared with patients in other wards or branches of the hospital, the patients in this TC are more stable in terms of psychiatric symptoms and have greater access to occupational rehabilitation outside the hospital. Four certified psychiatrists, a certified neurologist, a family physician and an internist specializing in endocrinology treated psychiatric and general medical conditions; eight certified psychiatric nurses and 30 nurse aides were working in the TC. Three medical and 10 psychiatric outpatient clinics were arranged every week for prescribing medicine for these patients. Skin diseases were diagnosed and treated by psychiatrists or any other physicians. Patients with skin diseases that could not be properly managed within the TC were referred to dermatologists in general hospitals outside the TC (see Table 5).

2.2. Participants

A total of 337 patients with schizophrenia spectrum disorders were recruited from the outpatient clinic of TC during July 2011. To be included in the study, TC patients had to meet diagnostic criteria for schizophrenia or schizoaffective disorder as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Text Revision Fourth Edition*. Participants were excluded from the study if they had an acute psychotic episode that necessitated a transfer for hospital admission or were unable to sign the informed consent form.

The study was approved by the Institutional Review Board of Yuli Hospital. A written informed consent was obtained after the procedures were fully explained to patients. Demographic and clinical patient data were collected from medical records.

2.3. Measures

Global function was evaluated using the Taiwanese Mandarin version [13] of the Personal and Social Performance (PSP) Scale [14]. Psychopathology was assessed using the Chinese version [15] of the Positive and Negative Syndrome Scale (PANSS) [16]. Cognitive function was assessed with the Chinese version of the Mini-Mental State Examination (MMSE) [17,18]. Each patient was rated on the PANSS, PSP Scale and MMSE by board-certified psychiatrists and certified psychiatric nurses. Each patient was rated by the same rater. All raters reached a high standard of inter-rater reliability with gold-

standard raters from the research training group at Yuli Hospital (intraclass correlations ranged from 0.86 to 0.95). Antipsychotics were categorized into typical antipsychotics (TAs), non-clozapine atypical antipsychotics (NCAAs) and clozapine [19]. Patients concurrently using TAs and NCAAs or TAs and clozapine were categorized into NCAA or clozapine users. Information on antipsychotic dosages was obtained from medical records and was calculated using the defined daily dose (DDD) of antipsychotics according to the database defined by the World Health Organization (http://www.whocc.no/atc_ddd_index/).

2.4. Dermatological examination

Skin examinations were conducted by one board-certified dermatologist. Before undergoing a skin examination, each patient was asked to remove all clothing and to wear an examination gown. After a brief introduction to the patients and questions about their awareness of their skin condition (yes or no), they were given a thorough skin examination. Any findings of skin diseases were carefully documented. All dermatological diagnoses were based solely on clinical symptoms and signs.

2.5. Population-based database

This study used the National Health Insurance Research Database (NHIRD) made available to Taiwan scientists by the Taiwan's National Health Research Institutes. The Ministry of Health and Welfare initiated a single-payer National Health Insurance (NHI) program in 1995, and more than 98% of Taiwan's population of 23 million is included in this program. The NHIRD is composed of original claims data for reimbursement and allows researchers to collect information for all medical services received by enrollees under the NHI program. All records can be linked using internal identification numbers created by NHIRD.

The Longitudinal Health Insurance Database 2000, a random sample of 1,000,000 individuals from NHIRD, was used to analyze the distribution and differences of some common and major skin diseases in outpatient service between patients with schizophrenia and age–sex matched control group. Using a ratio of 1:4, we selected 7749 patients with a diagnosis of a schizophrenia spectrum disorder and 30,996 control participants free from schizophrenia. The inclusion criteria included any outpatient visit with the diagnosis of schizophrenia or schizoaffective disorder made by a psychiatrist between January 2000 and December 2010. Following the deduction of cases for 1,000,000 people, the remainder comprised the sampling base of the control group. After selecting the case and control groups, we used specific *International Classification of Diseases, Ninth Edition* coding to identify any outpatient visits specifically for skin condition. Cases and controls in the NHIRD with skin diseases diagnosed by dermatologists or physicians, regardless of specialty (PROS), were coded in Table 5.

2.6. Statistical analysis

Regarding the clinical survey, the differences between subgroups were examined using a two-sample *t* test for numerical variables and a chi-square test for categorical variables. The outcome variables for the analyses were defined according to the presence of various skin diseases, which were classified into 10 categories, as listed in Table 2. Disease entities for which there were fewer than 10 cases were grouped into an “Other” category and were not included in the regression model analysis. Independent variables included body mass index (BMI), presence of relevant medical conditions (such as diabetes mellitus), patient's awareness of skin condition and schizophrenia-related characteristics (PSP score, PANSS score, MMSE score, types of antipsychotics in use, DDD of

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