Newly Diagnosed Erectile Dysfunction and Risk of Depression: A Population-Based 5-year Follow-Up Study in Taiwan

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ABSTRACT

Introduction. Depression might increase the risk of erectile dysfunction (ED), and ED might further exacerbate depression. The causal relationship between these two diseases remains controversial. In addition, limited evidence is available regarding the age-dependent and time-dependent effects on the association of depression and ED.

Aim. We investigated the hypothesis that ED increases the risk of depression by using a nationwide Taiwanese population-based claims database. In addition, we assessed the age-dependent and time-dependent effects on the association of depression and ED.

Methods. A longitudinal cohort study was conducted to determine the association between patients with ED and depression development during a 5-year follow-up period, using claims data from the Taiwanese National Health Insurance Research Database.

Main Outcome Measures. The study cohort comprised patients who were diagnosed with ED during 1997 to 2005 (N = 2,527). For a comparison cohort, 5 age- and sex-matched patients for every patient in the study cohort were selected using random sampling (N = 12,635). All of the patients were followed-up for 5 years from the date of cohort entry to identify the development of depression.

Results. The main finding of this study was that patients with ED are at an increased risk of developing depression. The adjusted hazard ratio (AHR) for depression was 2.24-fold higher in the patients with ED than in the comparison cohort (95% confidence interval [CI]: 1.83–2.74; $P < 0.001$). Regarding the time-dependent effect, the incidence of depression was highest during the first year of follow-up (AHR: 3.03, 95% CI = 2.08–4.40; $P < 0.001$).

Conclusions. This study demonstrates that patients with ED are at a higher longitudinal risk of developing depression in Asian men, particularly within the first year after the diagnosis of ED. **Chou P-S, Chou W-P, Chen M-C, Lai C-L, Wen Y-C, Yeh K-C, Chang W-P, and Chou Y-H. Newly diagnosed erectile dysfunction and risk of depression: A population-based 5-year follow-up study in Taiwan. J Sex Med 2015;12:804–812.**

Key Words. Erectile Dysfunction; Depression; Population-Based Study; Taiwan Population; Taiwan National Health Insurance Research Database

Introduction

Erectile dysfunction (ED) is defined as "the persistent inability to achieve or maintain an erection sufficient for satisfactory sexual performance" [1]. The prevalence of ED increases with age, and in Asian populations the estimated prevalence of ED is 7–15% (40–49 years of age) and 39–49% (60–70 years of age) [2]. ED occurs through multiple and complex mechanisms, including deterioration of the central or peripheral neural pathways, inadequate arterial supply to the penis, endothelial dysfunction, impaired smooth muscle tone, structural damage of the sinusoidal spaces of the erectile tissue, hormonal disorders, and psychological factors [3]. Although ED is not life threatening, it compromises the quality of life of the patients [4].

Previous studies have indicated that depression is correlated with ED [5,6], and depression was prevalent in patients with ED in specified age groups [7]. A cross-national study of Brazil, Italy, Japan, and Malaysia reported a positive association of depressive symptoms with moderate or complete ED [8]. A population-based cohort study in Taiwan revealed a 3.2-fold higher risk of ED in patients with a major depressive disorder (MDD) and that patients with untreated depression might have a higher risk of developing ED [9]. Shiri et al. suggested a bidirectional relationship between depression and ED in a population-based, prospective study of 50- to 70-year-old Finnish men. ED was strongly associated with both untreated and treated depressive symptoms. In addition, a moderate or severe depressive mood can cause ED [10].

Although the association of depression with ED has been discussed, the causal relationship between these two diseases remains controversial. Depression might increase the risk of ED, and ED might exacerbate depression. It can be difficult to distinguish which occurred first and the causality in an individual patient. In addition, limited evidence is available regarding the age-dependent and time-dependent effects on the association between depression and ED. The present study assessed the hypothesis that patients with ED are at a higher risk of developing depression. A nationwide, population-based study was conducted to estimate the relationship between existing ED and the subsequent development of depression within 5 years of follow-up. In addition, we attempted to determine whether ED is an age-dependent and time-dependent risk factor for depression.

Materials and Methods

Database

A longitudinal cohort study was conducted using the claims data from the Taiwanese National Health Insurance Research Database (NHIRD), provided by the Bureau of National Health Insurance. The NHIRD is managed and publicly released by the National Health Research Institutes (NHRI) in Taiwan. In this study, we used a data set from the Longitudinal Health Insurance Database 2005 (LHID2005), a subset of the NHIRD.

This database contains complete information of the insurants, such as demographic data, dates of clinical visits, diagnostic codes, details of prescription, and inpatient and outpatient expenditure for 1 million beneficiaries randomly drawn from the national population of 23.5 million. The NHRI has claimed that there are no statistically significant differences in age or sex between the randomly sampled group and all beneficiaries of the NHI program.

Study Population

A cohort study design was used to determine the association between patients with ED and depression development during the 5-year follow-up period.

Patients who received a new diagnosis of ED (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] codes 607.84) during ambulatory visits or hospitalization between 1997 and 2005 were included, and all patients were aged ≥18 years. ED was defined based on at least two NHI ambulatory-claim records or at least one inpatient record. To improve the data accuracy, the ICD-9-CM codes were required to be assigned by an urologist.

The date of the initial diagnosis of ED was assigned as the index date for each patient with ED. Each ED cohort patient was matched based on age, sex, and index year to five randomly identified beneficiaries without ED to build the comparison cohort. Patients with the diagnosis of depression (ICD-9-CM codes 296.2, 296.3, 300.4, and 311) before the study period were excluded from both cohorts. In addition, we identified relevant comorbidities, including hypertension (ICD-9-CM codes 401.X-405.X), diabetes mellitus (ICD-9-CM codes 250.X), and hyperlipidemia (ICD-9-CM codes 272.X).

In this study, depression was defined based on at least two depression diagnoses during ambulatory visits or at least one diagnosis during inpatient