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Original article

Unnatural Causes of Death and Suicide Among Former Adolescent Psychiatric Patients

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A B S T R A C T

Purpose: Compared with the general population, adolescent psychiatric patients are subject to premature death from all causes, but suicide-specific mortality rates in this population have not been carefully investigated. Therefore, we examined the high mortality due to unnatural causes, particularly suicide, using standardized mortality ratios (SMRs) relative to sex, diagnosis, and type of psychiatric service.
Methods: A total of 3,029 patients aged 10–19 years presented to the outpatient clinic of a general hospital in Seoul, Korea, or were admitted to that hospital for psychiatric disorders from January 1995 to December 2006. Unnatural causes mortality risk and suicide mortality risk in these patients were compared with those in sex- and age-matched subjects from the general Korean population.
Results: The SMR for unnatural causes was 4.6, and for suicide it was 7.8. Female subjects, the young, and inpatients had the highest risks for unnatural causes of death or suicide. Among the different diagnostic groups, patients with psychotic disorders, affective disorders, and personality disorders had significantly increased SMRs for unnatural causes, and those with psychotic disorders, affective disorders, and disruptive behavioral disorders had significantly increased SMRs for suicide.
Conclusions: The risks of unnatural death and suicide are high in adolescent psychiatric inpatients in Korea, but not as high in adolescent outpatients. Effective preventative measures are required to reduce suicide mortality in adolescent psychiatric patients, particularly female patients admitted for general psychiatric care.

IMPLICATIONS AND CONTRIBUTION

The present study indicates that the risks of unnatural death and suicide are particularly high in female adolescent patients who have been admitted for general psychiatric care. Effective preventative measures are required to reduce suicide mortality among this high-risk group.

Korea has the highest suicide rate of all the countries in the Organization for Economic Cooperation and Development (OECD). The mean age-standardized rate of suicide in Korea is 11.3 per 100,000 [1], and suicide is the most frequent cause of death in adolescents and young adults [2]. In addition, previous studies of suicide in adult psychiatric patients have shown that the younger the patients, the higher the standardized mortality ratios (SMRs) [3–7]. Therefore, we were particularly interested in suicide-specific mortality risk in adolescent psychiatric patients.

Most studies on mortality in child and adolescent psychiatric patients report all causes SMRs only [8–12], and cause-specific mortality rates are not well-investigated in this population owing to small sample sizes or difficulty in obtaining causes of death. We are only aware of one study of adolescent psychiatric patients that differentiates unnatural causes mortality from natural causes mortality [10]. In that study, which included only psychiatric inpatients and was conducted in Oslo, Norway, SMR for unnatural causes (including drug overdose, suicide, homicide, and accident) was significantly elevated in both sexes. The SMRs were 8.5 (95% confidence intervals [CI]: 6.7–10.6) for male patients and 15.8 (95% CI: 10.8–22.4) for female patients; suicide-

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specific SMRs were 6.8 (95% CI: 3.4–12.1) for male patients and 19.0 (95% CI: 10.6–31.3) for female patients; and drug overdose SMRs were 54.1 (95% CI: 32.9–84.3) for male patients and 83.3 (31.0–178.0) for female patients.

To establish effective strategies to prevent the premature deaths of adolescent psychiatric patients, detailed information on the cause-specific mortality in various diagnostic groups and different treatment settings is required. Therefore, we have investigated unnatural causes mortality and suicide mortality further by calculating SMRs relative to diagnosis, age, and type of hospital service (inpatient/outpatient), as well as sex-specific SMRs.

Methods

Subjects

The subjects consisted of all patients who presented to a psychiatric outpatient clinic of a general hospital located in Seoul, Korea, or who were admitted to that hospital for a psychiatric disorder, during a 12-year period (from January 1995 to December 2006), and who were aged 10–19 years at the time of the hospital visit. The data were censored either on the date of death or on December 31, 2009, because this is the date when the latest available data on the National Statistical Office (NSO) mortality were obtained. Person-years (the number of years that each individual was under observation) were calculated for each patient.

Information about whether the patients were alive on December 31, 2009, was provided by linkage to the database of the NSO. For those who were dead, causes of death were also established through linkage to the database of the NSO. All deaths in Korea are reported to the NSO by a document of death notice, which contains the cause of death. However, death by suicide is sometimes misreported as death by other cause, such as car accident, by a bereaved family because of a social stigma of suicide. On the other hand, all deaths caused by suicide, homicide, or accidents are investigated by the National Police Agency (NPA). The police interview the individuals who knew the dead person well, such as family members, partner, friends, and/or neighbors, and make an investigation report on suicide, homicide, or accidents. When comparing the NSO and NPA data using national identification numbers, 96.6% of suicide cases in the NPA data were also counted as suicide cases in the NSO data [13].

For the purposes of the present study, we identified subjects who had died because of unnatural causes (ICD-10 *External causes of morbidity and mortality* V01-Y98). The NSO data and hospital records were matched using the unique national identification number assigned to all Korean citizens.

Statistical analysis

The unnatural causes mortality and suicide-specific mortality of the study subjects were compared with those of the corresponding general population of Korea. SMRs and 95% CIs were calculated using a person-years method with a free software program Person-years and Mortality COMputation Program 1.41 (Dirk Taeger, Dortmund, Germany) [14]. The SMR compared the observed numbers of deaths with the expected numbers of deaths. The person-years method calculated the total number of years that a person was at risk for each calendar year. The expected numbers of unnatural deaths and suicide-specific deaths were calculated from the age-, sex-, and cause-specific mortality rates of the general population in Korea, for each calendar year. These specific mortality rates were obtained from the NSO.

First, the sex-specific unnatural causes and suicide-specific SMRs were calculated. Next, the patients were divided into those who had received general psychiatric care (inpatients) and those who had not (outpatients). Unnatural causes and suicide-specific SMRs were then calculated for each type of care. Three psychiatric residents reviewed and confirmed the ICD-10 diagnoses that had been recorded in the electronic medical records by a board-certified psychiatrist. The medical record requirements of the participating hospital included one primary diagnosis and several auxiliary diagnoses based on the ICD-10 coding. Diagnosis of those with multiple psychiatric disorders was made according to the primary ICD-10 diagnosis provided in the electronic medical records. Although a primary psychiatric diagnosis existed in most medical records, 6.3% of those records included an unclear diagnosis (i.e., mental disorder, not otherwise specified, or no ICD-10 F code diagnosis). For these cases, a board-certified psychiatrist made the diagnosis based on the clinical information provided in the medical records. For the purposes of the present study, these diagnoses were collapsed into eight diagnostic groups: psychotic disorder (F20–F29), affective disorders (F30–F33), neurotic disorders (F40–F48), disruptive behavioral disorders (F90–F92), mental retardation (F70–F79), personality disorders (F60–F69), eating disorders (F50), and other psychiatric disorders (diagnoses not included in the aforementioned diagnoses). Although previous studies indicated that substance abuse conferred a risk for death by suicide in adolescents [10,15], substance use disorders were not separated from the other diagnoses because of insufficient statistical power (only 13 patients [4.3%] had a primary diagnosis of substance use disorders).

Unnatural causes and suicide-specific SMRs were then calculated for these diagnoses.

The observation period for each patient was divided into three age spans: from first presentation to hospital to 19 years of age; from 20 to 24 years of age; and 25 years and older. Unnatural causes and suicide-specific SMRs were then calculated for these ages.

To identify independent predictors for death by unnatural causes and suicide in adolescent psychiatric patients, sex, type of hospital service, diagnosis, and age were concurrently entered into the Cox proportional hazards model.

Table 1
Characteristics of the 3,029 adolescent psychiatric patients

Characteristics	N (%)
Sex, male	1,847 (61.0)
Age at first hospital visit, mean ± SD (years)	15.3 ± 2.8
Type of care	
Inpatient treatment	709 (23.4)
Outpatient treatment only	2,320 (76.6)
Psychiatric diagnosis	
Psychotic disorders	355 (11.7)
Affective disorders	615 (20.2)
Neurotic disorders	781 (25.8)
Disruptive behavioral disorders	558 (18.4)
Mental retardation	101 (3.3)
Personality disorders	109 (3.6)
Eating disorders	62 (2.0)
Other diagnoses[a]	448 (14.8)

[a] "Other diagnoses" includes organic mental disorders, substance use disorders, developmental disorders, tic disorders, and other childhood behavioral and emotional disorders.