Eur Arch Psychiatry Clin Neurosci (2003) 253 : 37–39 DOI 10.1007/s00406-003-0403-z

ORIGINAL PAPER

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Polydipsia

A study in a long-term psychiatric unit

Received: 5 November 2002 / Accepted: 18 December 2002

Abstract This is a retrospective review of the author's experience with polydipsia in a long-term unit for treatment refractory patients at a US psychiatric state hospital during a 5-year period [1996–2000]. Sixty-one patients were admitted to this long-term unit, comprising approximately 1 % of the hospital admissions. Polydipsic patients were followed with diurnal weight changes and other biological measures. This longitudinal study of 61 chronic inpatients suggests that polydipsia is no doubt present in at least 20 % of chronic psychiatric inpatients and hyponatremia in more than 10 %. Two polydipsic patients worsened when switched from clozapine to other atypical antipsychotics. Polydipsia in severe mentally ill patients continues to be a neglected subject and a challenge for psychiatrists. Polydipsic patients should not be switched to other atypical antipsychotics, unless new prospective studies prove that they are as effective as clozapine for polydipsia.

Key words schizophrenia · polydipsia · water intoxication · nicotine · smoking

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Introduction

Primary polydipsia, polydipsia not explained by medical causes, is frequent among chronic psychiatric patients. It can be loosely characterized as a three-stage process: simple polydipsia with accompanying polyuria, polydipsia with water intoxication, and physical complications secondary to ingestion of fluids in large quantities [1]. Polydipsia appears to be frequent in chronic psychiatric inpatients. Unfortunately, all epidemiological surveys underdiagnosed polydipsic patients due to the use of a cross-sectional design. Cross-sectional studies may miss episodic polydipsics.

According to a review of the literature primary polydipsia may be present in more than 20 % of chronic inpatients [1]. Two more recent US surveys and a French study reported 23 % [2], 25 % [3] and 10 % [4] rate of primary polydipsia. Schizophrenia, chronicity and smoking appear to be associated with polydipsia [3].

Previous surveys suggest that an average of 29 % (25 % to 86 %) of patients with polydipsia have a chart history of water intoxication [1]. More recent surveys described 14 % [2] and 31 % [4].

Besides some drugs that decrease the clearance of free water, US studies suggest that male gender, White race (versus Black race), and chronicity may be associated with the development of water intoxication in polydipsic patients [1–3].

Methods

This 160-bed state hospital serves as the primary psychiatric hospital for the severely mentally ill in one third of Kentucky. Annually it has approximately 1600 admissions from 1200 different patients. The main diagnoses are schizophrenia and other psychoses, 35 %; bipolar disorder, 12 %; and major depression, 22 %. The genders are 59 % male and 41 % female. Race is 87 % Caucasian and 12 % African-American. Length of stay most frequently ranges 6–8 days. Treatment refractory patients are transferred to a locked research unit with 30 beds where they are hospitalized for several months or years. Between 1996 and

2000, approximately 5,000 different patients were admitted to the hospital, of which only 61 patients (approximately 1% of the patients) were hospitalized in the research unit. Males comprised 67% (41/61) of the sample. The racial makeup was 87% (53/61) Caucasian and 13% (8/61) African-American. The most frequent DSM-IV diagnosis was schizophrenic psychoses 53% (32/61), divided into schizophrenia 43%, (26/61) and schizoaffective disorder 10% (9/61). Other frequently occurring diagnoses were bipolar disorder (12%, 7/61); other psychoses (13%, 8/61); organic mental disorders (8%, 5/61); and mental retardation without an Axis I diagnosis (8%, 5/61). Comparing with the hospital admissions, there was significant 1) overrepresentation of psychotic patients with non-mood related psychoses (66%, 40/61, 95% confidence intervals, CI, 52% to 77% versus 35%, 560/1600, CI 33% to 37%); and 2) underrepresentation of major depression (2%, 1/61, CI 0% to 9% versus 22% 352/1600, CI 20% to 24%).

Of the 61 patients, their mean patient age was 42 years (standard deviation, SD = 11.9) with the mean age of onset of the psychiatric illness at 23 years (S.D = 11.6). The mean duration of illness before admission to the unit was 19 years (S.D = 10.4). The fact that the long-term patients were hospitalized an average of 62% (S. D. = 31%) of the previous five years further demonstrates the chronicity of the sample. The mean number of state hospitalizations was 10 (S.D = 8.9).

The frequencies for current daily smoking was 72% (44/61), ever daily smoking 77% (47/61); history of alcohol abuse/dependence 39% (24/61), history of drug abuse/dependence 33% (20/61). Most patients were transferred to the long-term unit with multiple psychiatric medications. All 61 patients took antipsychotics at some point during their long-term unit stay.

Upon admission, all new patients on the long-term unit are closely observed for any indications of excessive drinking, which warrant four daily weights. The AM weight is obtained before 8 AM, after the patient voids and before breakfast. After voiding and ensuring that patients are in the same state of dress, they are weighed three additional times: at approximately 11 AM, 3–4 PM and 8 PM. The early AM and the 3–4 PM weights are standard, but times for other weights vary according to the patient's schedule. Normalized diurnal weight gain (NDWG), the percentage of gain from morning to other weights, is derived by dividing the weight gain by the morning weight and multiplying by 100 [5]. An NDWG > 4% is associated with a decrease in serum sodium by at least 10 mM/l and carries a serious risk of water intoxication [5].

AM (first) and PM (approximately 3PM) urine samples were obtained once a week to measure urine concentration of creatinine (UCR) in polydipsic patients. Following Goldman and coworkers' indication [6], a PM UCR < 70 mg/dl in males or < 35 mg/dl in females is considered a sign of polydipsia. On the same day, a 3 PM blood sample was collected to measure serum sodium (normal range 137 mEql/l to 150 mEq/l). The charts were also reviewed for history of polydipsia and hyponatremia before coming to the research unit.

This study is not completely naturalistic since close supervision and specialized treatment were provided for polydipsia. The target weight procedure was used to closely supervise patients and avoid symptomatic hyponatremias but asymptomatic hyponatremias in the low 130s were tolerated. Patients were closely supervised with no access to fluids when the patient reached a high NDWG, suggestive of hyponatremia risk.

Clozapine appears to have a positive effect in many polydipsic patients, decreasing fluid intake and hyponatremia risk [7]. Fourteen patients (23%) were treated with clozapine, while many others refused a clozapine trial. Another four patients had past clozapine trials.

Results

The prevalence of polydipsia was 21% (13/61) in the total sample and 25% (8/32) in the schizophrenic sample. In this small sample, the only variable close to having a significant odds ratio (OR) was ever-smoking, which increased the risk of polydipsia by a factor of 2.5 (0.5 to 12.7) ($\chi^2 = 2.2$, df = 1, p = 0.14). In the schizophrenic sample, this OR also had a p value close to significance. The author highly suspects that another patient had polydipsia (see discontinuation from clozapine), which would increase the number of polydipsics to 14.

During their stay in the unit, seven patients (five males and two females) evidenced clear and repeated episodes of hyponatremia. The two polydipsic females had concurrent factors (one, hypothyroidism and one, paroxetine treatment) that definitely contributed to the hyponatremia since the hyponatremia disappeared when the contributor factors were removed. The prevalence of history of hyponatremia was 11% (7/61) in the total sample and 13% (4/32) in the schizophrenic sample. The prevalence of a history of hyponatremia in the absence of factors causing decrease in free-water clearance was 8% (5/61) in the total sample, 13% (4/32) in the schizophrenic sample, 38% (5/13) among polydipsic patients and 50% (4/8) among polydipsic schizophrenic patients.

The following two cases suggest that clozapine should not be discontinued or switched to other antipsychotics in polydipsic patients. One schizophrenic patient with severe polydipsia and pica behavior had hyponatremic seizures in the past. The patient had been on clozapine for years. Olanzapine was added to the clozapine. As soon as clozapine was discontinued, his behavior significantly worsened and olanzapine had to be switched back to clozapine since he started to have a low sodium concentration (in the 130s) and his UCRs decreased.

A 30-year old autistic woman had been discharged on clozapine and switched to olanzapine, resulting in readmission to the research unit. For her safety, she was completely isolated until clozapine started working; otherwise, she would physically fight to reach water or other drinks. When on 300 mg/day of clozapine, she was able to stay in the day room of the unit. She still drank frequently from the fountain with her mouth, but in small quantities. She was given a cup and allowed to drink freely. In 7 hours, she drank more than 7 liters, gained 10 pounds (NDWG = 5.3%) and became so agitated that the trial was stopped. Her sodium dropped a few points but remained within normal limits (from 146 to 139 mEq/l). She was discharged to a closely supervised environment, with the recommendation of denying her access to cups. In the placement, clozapine was discontinued a second time and switched to quetiapine. She was subsequently readmitted, and was restabilized on clozapine again.

There was another schizophrenic male with probable polydipsia masked by clozapine during his 2-year unit stay. During a convalescent leave, he discontinued clozapine, barricaded himself in his mother's house, became very psychotic, and drank massive amounts of fluids (his mother reported that he drank several gallons per day; a 2 liter Coke lasted 15 minutes). When readmitted to the long-term unit, he responded quickly to clozapine treatment.

Discussion

Despite their relative frequency in chronic psychiatric patients, polydipsia and hyponatremia appear to be neglected by psychiatrists and other physicians. This is worrisome since polydipsia with water intoxication can lead to serious medical complications, including death. This longitudinal study suggests that polydipsia is definitely present in at least 20 % of the most chronic psychiatric inpatients. In these well-studied patients, more than 10 % had a history of hyponatremia.

Acknowledgements This publication was made possible by grant number MH-51380 from the National Institute of Mental Health. Its contents are solely the responsibility of the author and do not necessarily represent the official views of the National Institute of Mental Health. Margaret T. Susce, R. N., M. L. T. helped with editing of this article.

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