A Demographic Study of Polydipsia in an Institution for the Intellectually Disabled

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Objective: To measure the prevalence of primary polydipsia in an Ontario institution for residents with developmental disabilities and to explore the associations of polydipsia with age, sex, and level of mental retardation.

Method: All 798 residents were screened for polydipsia using a behavioural questionnaire completed by caregivers.

Results: Thirty-three cases were detected: the prevalence among the mobile resident population (n = 660) was 5%. We found no association of polydipsia with age, sex, or level of mental retardation.

Conclusions: Physicians should be aware of polydipsia because it is common among residents with moderate, severe, and profound mental disability. Unless screened for specifically, polydipsia may go unrecognized and may place the residents with mental handicap at risk for serious acute and chronic complications.

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Key Words: polydipsia, mental retardation, prevalence, screening, prevention, adults, water intoxication

Primary polydipsia is defined as excessive fluid consumption unrelated to thirst or homeostatic needs (1). It is differentiated from secondary polydipsia based on the exclusion of known etiological factors that disrupt homeostatic regulatory mechanisms, such as medications (antipsychotics) and inappropriate antidiuretic hormone syndrome. The literature on the prevalence and epidemiological characteristics of polydipsia has been based primarily on psychiatric populations. Estimates of its prevalence in institutionalized and chronic psychiatric populations have ranged from 3% to 25% (2). Diagnosis of polydipsia is also important in the developmentally disabled because of the risks associated with the physical consequences of polydipsia. Water intoxication, an acute and potentially fatal complication of polydipsia, can be especially hard to recognize in this population. Chronic complications, including cardiac failure (3), pathological fractures (4), and urinary tract abnormalities (5), add to the complexity of caring for the multiple, long-term medical problems in developmentally disabled individuals.

Two recent British studies have reported on the prevalence of polydipsia among institutionalized individuals with developmental disabilities. Bremner and Regan found a prevalence of 3.5% in a survey of 827 residents (6), and Deb and others found a prevalence of 6.2% in a hospital-based population of 371 (7).

Estimates of the prevalence of polydipsia have been based on different methods of identification. In psychiatric populations, the most sensitive methods of identifying polydipsia have been diurnal weighing to measure water retention (8,9) and urine output (10), urine specific gravity (11) or osmolality (12), and serum electrolytes (8,13). These measures have not been found to be sensitive in the developmentally disabled population. Bremner and Regan identified only 1 case of 31 by urine specific gravity alone, and only 6 cases out of 31 had a low urine specific gravity (6). Both British studies found that morning serum sodiums were insensitive, but they stated that afternoon samples, though difficult to obtain, might have been more useful (6,7). Diurnal weighing and collection of urine samples are also time- and resource-intensive, and samples can be difficult to obtain from individuals with intellectual handicaps. A more practical approach to identifying polydipsia in the mentally retarded population is based on estimates of daily fluid consumption. It is difficult to estimate fluid consumption accurately, especially when

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residents drink directly from water taps or other sources such as toilets. Also, there is no accepted upper limit for normal fluid consumption; the limits used have varied across studies.

One potential indication of normal fluid intake is from the physiological study by Delva and Crammer (8), which restricted intake to 2.5 litres per day (L/day) and achieved normal states of hydration in psychiatric patients with polydipsia. The only available estimate of the normal consumption range in a mentally retarded population is that of Bremner and Regan, who reported a range of 1 to 3.5 L/day in their nonpolydipsic, matched control cohort. Based on these data, the 3 L/day cut-off used by Deb and others may have included nonpolydipsic residents, and thus the polydipsia prevalence rate in their study may have been inflated. The prevalence of 6.2% reported by Deb and others is correspondingly higher (7) than the 3.5% obtained by Bremner and Regan, who used a cut-off of 5 L/day in conjunction with a behavioural criterion (that patients went to extraordinary lengths to obtain fluid) (6).

Finally, the prevalence figures cited above may be underestimates. First, it is unlikely that nonmobile individuals are able to express polydipsic behaviour, yet both British studies calculated prevalence based on the total population of the institution. The likelihood that a mentally retarded individual is polydipsic would be better assessed in terms of the prevalence of polydipsia in the mobile population with intellectual disabilities. Second, staff may be unaware of even marked polydipsia in ambulatory patients (6).

The studies of polydipsia in mentally retarded individuals have yielded inconsistent findings with regard to epidemiological factors of age, sex, and level of mental retardation associated with polydipsia (6,7). Bremner and Regan found that their polydipsic residents were, on average, younger than their institutional population; Deb and others found no statistical difference in age between polydipsic cases and their general resident population. While Deb and others did not comment on sex analysis, Bremner and Regan reported that polydipsia was significantly more frequent in males. Interestingly, studies of polydipsia in psychiatric populations have found the reverse sex ratio (14,15). Finally, polydipsia was significantly associated with a borderline level of mental handicap in the survey by Bremner and Regan; there was no association found with mild, moderate, or severe levels in the survey by Deb and others.

The present study was designed to investigate the prevalence of polydipsia in an ambulatory population of mentally retarded adults in a residential facility. The association between polydipsia and epidemiological factors of age, sex, and level of mental retardation were investigated.

### Methods

#### Participants

We surveyed all 798 residents of a large residential centre for developmental disabilities situated in Eastern Ontario.

#### Procedure

The questionnaire was completed by a primary caregiver for each resident. Residents were screened using the following positive–negative question: “Does this resident have an Excessive Water Drinking Problem? (ie If fluid intake is unrestricted will drink 20 or more cups [5L] of water per day and/or exploit any opportunity to obtain such drink even from baths or urinals.)” The screening question was found to be valid by an interrater reliability study of the cases and matched controls (p 523). The exclusion criteria were coexistent diagnoses of diabetes mellitus, diabetes insipidus, renal disease, congestive heart failure, or the consumption of diuretic medications, which may cause secondary polydipsia.

Information on level of mental retardation was extracted from patients’ records. The assessments were performed in the institution’s psychology department using comprised measures of IQ and functional status as recommended in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (16).

#### Analysis

The prevalence of this syndrome was quantified from the mobile population, defined as those who were able to move to water sources, that is, not confined to bed or push-chair. The distribution of age, sex, and level of mental retardation of polydipsia cases was compared with the mobile population of the institution. Chi-square tests were used to compare the age and sex distributions of the 2 populations. An estimation of the association of polydipsia with level of mental retardation was carried out to determine the odds ratio (OR) of polydipsia and level of mental retardation. Because all cases were mentally retarded, the subjects with mild retardation were used as a baseline for other levels of retardation. Since the number of cases was small, only the crude OR and its 95% confidence interval (95% CI) were estimated. The \( P \) value of the crude OR was calculated using Fisher’s exact test.

#### Results

### Prevalence of Polydipsia

The survey of all residents in the institution identified 37 residents as polydipsic and mobile. Based on our exclusion criteria, 4 of these residents were regarded as possibly having secondary polydipsia, so they were excluded from our sample. Of the 798 institution residents, therefore, 33 were identified as having primary polydipsia, yielding an overall prevalence of 4.1%. When nonmobile residents were excluded from the total population, the prevalence of polydipsia increased to 5.0%.
Factors Associated with Polydipsia

The age and sex distributions of the polydipsic and mobile nonpolydipsic resident groups were very similar. The mean ages were 37.6 and 39.1 years, respectively. A Wilcoxon rank sum test failed to show any difference between the age distributions of the 2 groups ($P = 0.80$). The sex ratios were 2:1 males to females in the polydipsic group and 1.4:1 in the nonpolydipsic group. A comparison using a chi-square test failed to show any significant difference ($P = 0.54$) between groups.

The distributions of polydipsic and nonpolydipsic residents as a function of degree of mental retardation are presented in Table I. The distributions of the 2 groups are similar, with a majority of residents classified as severely and profoundly retarded.

Discussion

The present study of residents in an institution for the care of people with developmental disabilities yielded a prevalence of 5.0% for polydipsia among the 660 mobile individuals. Investigation of factors potentially associated with polydipsia indicated that the disorder was independent of age, sex, and level of mental retardation.

The overall rate of polydipsia (4.1% of the total population) found in our survey was similar to the rates in British institutions of 3.5% reported by Bremner and Regan (6) and 6.2% by Deb and others (7). Given the greater prevalence of severely and profoundly retarded individuals in our population and the possibility that such residents are less able to express polydipsic behaviour, a lower incidence of polydipsia might have been expected.

Even so, our prevalence rate may be an underestimate. An occasional case can be identified by urine specific gravity only (6), and afternoon serum sodiums may have been useful, but we decided these measures were impractical for our purposes. Many of the residents could not cooperate with urine collections and could not give consent for blood tests for an experiment. Deb and others also noted that about half of their cases expressed their abnormal polydipsic behaviour periodically rather than continuously. Repeated surveys may have identified more polydipsia cases in our institution.

Although our study found more males than females with mental retardation and polydipsia, the difference was not statistically significant. Bremner and Regan reported that polydipsia was significantly more prevalent among institutionalized male patients (6). These findings diverge considerably from the psychiatric surveys that have found the opposite sex ratio (8,9), suggesting that there may be differences in the disorders of the 2 populations.

The present study also failed to find any association between level of mental retardation and polydipsia, which was consistent with the Deb and others study but contrasted with the results reported by Bremner and Regan. The different patterns found in the studies may reflect differences in the populations studied.

In our study, there appeared to be a larger proportion of cases with mild mental retardation in the group with polydipsia (9.1%) than in the control group of mobile residents (4.7%), but this difference was not significantly different. Bremner and Regan found a significant association between polydipsia and borderline levels of handicap, although not with mild mental retardation. Their population included a greater proportion of higher-functioning individuals than did our population, and our sample did not have any individuals with borderline mental retardation.

We found that the prevalence of polydipsia among the lowest-functioning subjects was similar to our group with moderate mental retardation. Our study had a very large proportion of patients with severe and profound levels of mental retardation, totalling 84% of the mobile population. It is difficult to compare the prevalence rates of these lower-functioning groups to similar groups in the British studies. The profoundly retarded group in the Bremner and Regan study was very small, and although the proportion of severely retarded was 35% in the Deb and others study, the profoundly retarded were not stratified. In the Deb and others report, however, those classified as severe (IQ < 35) were as likely as the higher-functioning patients to have polydipsia.

<table>
<thead>
<tr>
<th>Level of Retardation</th>
<th>Polydipsia Cases (n = 33)</th>
<th>Mobile Residents (n = 660)</th>
<th>OR (95% CI)</th>
<th>$P$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>3 (9.1%)</td>
<td>31 (4.7%)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Moderate</td>
<td>4 (12.1%)</td>
<td>73 (11.0%)</td>
<td>0.57 (0.12 – 2.56)</td>
<td>0.67</td>
</tr>
<tr>
<td>Severe</td>
<td>6 (18.2%)</td>
<td>153 (23.2%)</td>
<td>0.41 (0.10 – 1.70)</td>
<td>0.20</td>
</tr>
<tr>
<td>Profound</td>
<td>20 (60.6%)</td>
<td>403 (61.1%)</td>
<td>0.51 (0.14 – 1.82)</td>
<td>0.24</td>
</tr>
</tbody>
</table>

(—) Subjects with mild retardation are used as a baseline to compare with other levels of mental retardation.
Conclusion

The finding of a prevalence of 5.0% for polydipsia among the mobile residents of a large Canadian institution for the developmentally disabled is clinically significant and similar to the results of 2 studies in British institutions. Although one British study reported that polydipsia occurred more frequently in males and in those with borderline mental retardation, no associations of polydipsia with age, sex, or level of mental retardation were found in our Canadian population. In fact, we found that polydipsia was equally common among our large groups of severely and profoundly retarded patients. Physicians caring for individuals with all levels of mental disabilities should be aware of polydipsic behaviour because its acute complication, water intoxication, can be difficult to diagnose and is potentially fatal. Appropriate management may also prevent some of the common chronic consequences of polydipsia.

Clinical Implications

- Polydipsia is a common disorder of mentally retarded people (approximately 5%).
- A screening question using behavioural criteria is sensitive and should be employed at regular intervals.
- Management of polydipsia can prevent severe acute complications and may prevent chronic complications.

Limitations

- Our study determined point prevalence and may have underes timated this relapsing disorder.
- Behavioural management of recognized cases appears to have prevented acute complications only retrospectively.
- The prevalence of chronic complications may be common, but it has not been studied systematically.

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References


Résumé

Objectif : Mesurer la prévalence de la polydipsie primaire dans une institution de l’Ontario pour handicapés du développement et examiner les liens entre la polydipsie, l’âge, le sexe et le degré d’arriération mentale.

Méthode : Les 798 résident(e)s ont été sélectionné(e)s d’après l’existence de la polydipsie grâce à un questionnaire sur le comportement qu’ont rempli les prestataires de soins.

Résultats : Trente-trois cas ont été décelés : la prévalence au sein de la population de résident(e)s mobiles (n = 660) était de 5 %. Les auteurs n’ont trouvé aucun lien entre la polydipsie et l’âge, le sexe ou le degré d’arriération mentale.

Conclusions : Les médecins devraient être conscients de l’existence de la polydipsie, qui est courante chez les résident(e)s atteint(e)s d’arriération mentale modérée, grave ou profonde. Sans dépistage spécifique, la polydipsie pourrait passer inaperçue et créer des risques de complications graves et chroniques pour les handicapés mentaux.