

RELATIONSHIP BETWEEN USE OF DIURETICS AND CONTINENCE STATUS IN THE ELDERLY*

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ABSTRACT—*Although diuretics have been implicated as a cause of urinary incontinence, no evidence has been presented prior to this report to confirm such a relationship. Our epidemiologic survey of 1,956 respondents sixty years of age and older in Washtenaw County, Michigan, revealed 24.6 percent of men and 36.9 percent of women were current users of a diuretic medication. Comparisons between users and non-users of diuretics and continence and incontinence status revealed no significant difference in the prevalence of incontinence in either gender. However, when male respondents who had cystometric examinations were analyzed, it was found that diuretic users who have uninhibited detrusor contractions (UDC) had a significantly higher prevalence of urinary incontinence (85.7%) when compared with non-users with UDC (25%) ($p = 0.009$). Among men who did not have UDC, use or non-use of diuretics showed a similar relationship but did not reach statistical significance ($p = 0.085$). There were too few female respondents with UDC to make meaningful analysis in this group.*

A recent survey of a probability sample of non-institutionalized elderly sixty years of age and older in Washtenaw County, Michigan, revealed a 30 percent prevalence of urinary incontinence: 38 percent for women and 19 percent for men.¹ One of the many suspected causes of urinary incontinence is the use of diuretics, especially in the elderly where its use is expected to be frequent.^{2,3} In an effort to correlate the relationship between use of diuretics and urinary continence status, data from the household survey, clinic evaluation and urodynamic studies of continent and incontinent respondents who were or were not using diuretics were analyzed. This article reports on the associations between the continent status, detrusor function, and the use of diuretics.

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Material and Methods

Sample

The details of the sampling technique were presented in previous publications.⁴ In summary, the subjects consisted of 1,956 respondents aged sixty years and older who were identified and consented to be interviewed in their home from a probability sampling of 13,912 households in the county of Washtenaw, Michigan. Of the respondents interviewed, a total of 1,806 seniors were invited through telephone calls to visit the University of Michigan Turner Geriatric Clinic: 754 underwent the clinic examination. The free clinic evaluation included the completion of an interview, a complete physical examination, and a urine analysis. At the end of the clinic visit, all incontinent and most of the continent respondents were invited to a free urodynamic testing. A total of 169 women

and 94 men participated in the urodynamic testing.

Survey measures

The definition of urinary incontinence was presented in the previous article.¹ In summary, a self-report of urinary incontinence was defined as urine loss of any volume beyond voluntary control with a minimum frequency of six days within the last twelve months. If the frequency was less than six days, the respondent was also considered incontinent if the urine loss fit any one of the conventional clinical types such as: urge, stress, mixed, or other type of incontinence.

A clinic diagnosis of urinary incontinence was based by the clinician on the response to the incontinence question (used in the household) as well as the result of the clinic examination consisting of physical examination including pelvic and rectal examination and a neuro-urologic examination.

The question used to identify diuretic users was as follows: "Now I would like to know if you are regularly taking any of the following medications whether prescribed by a doctor or over the counter. What about diuretics or water pills?" In addition, in the clinic, the respondent was asked again about medications currently taken and all drugs were enumerated and recorded. Diuretics in this study included all diuretics either being taken as a pure preparation or in combination with other drugs, usually an antihypertensive preparation.

The technique of urodynamic testing was presented in a previous article.⁴ In summary a urodynamic diagnosis of uninhibited bladder was based on the criteria of the International Continence Society. As recently reported, the estimated prevalence of uninhibited detrusor among the clinic-diagnosed continent and incontinent respondents were 32.3 percent and 50 percent, respectively for men and 4.9 percent and 12.2 percent, respectively for women.⁴

Data analysis

The Fisher exact test (two-tailed) was used for all comparisons between proportions.

Results

There were 1,613 household respondents who answered the question of diuretic or water pill use. Of the 655 male respondents, 24.6 percent reported regularly using diuretics. Of the 958 women, 36.9 percent also reported taking

water pills regularly. Among the diuretic users, 20.5 percent of the men and 40.2 percent of the women reported urinary incontinence whereas among the non-diuretic users 20 percent of the men and 37.6 percent of the women reported urinary incontinence. These proportions of urinary incontinence between genders are similar to the general prevalence of urinary incontinence that we previously reported (19% for men and 38% for women).¹ In addition, the proportion of incontinence among users when compared with non-users of diuretics was not significant (males, $p = 0.910$; females $p = 0.410$).

In the clinic 23.8 percent of the 298 men tested were currently taking diuretics. Of the 456 women seen in the clinic, 34.9 percent were using diuretics. The prevalence of urinary incontinence as diagnosed by the clinician among the 71 men who were currently taking diuretics was 29.6 percent, whereas for the 227 men who were not taking diuretics, the prevalence of urinary incontinence was 18.5 percent. Among women seen in the clinic, the prevalence of incontinence was 45.9 percent of the 159 users of diuretics, and 47.5 percent of the 297 non-users. The differences of prevalence of incontinence between those taking and not taking diuretics were not significant either among men or women subjects (males, $p = 0.066$; females, $p = 0.768$), although a trend exists among men.

As reported in an earlier article, the estimated prevalence of uninhibited detrusor contraction in men was 32 percent and 50 percent for men who were clinic-diagnosed as continent and incontinent, respectively. In women, it was 4.9 percent and 12.2 percent, respectively.⁴

There were 72 men who had cystometric examination. Of those, 27 had uninhibited detrusor contraction (UDC) and 45 did not have UDC. Of the 27 men with UDC, 7 were currently taking diuretics and of these, 6 or 85.7 percent were clinic-diagnosed incontinent. Of the 20 men who were not taking diuretics, only 5 or 25 percent were diagnosed incontinent. The prevalence of clinic-diagnosed incontinence in the group with UDC and taking diuretics is significantly more than those men with UDC but not taking diuretics ($p = 0.009$).

Of the 45 men who did not have UDC, 8 were taking diuretics of whom 4 or 50 percent were clinic-diagnosed incontinent. In contrast, 8 of 37 or 21.6 percent of the men who did not have UDC and were not taking diuretics were

diagnosed as incontinent. There was no significant difference between the prevalence of urinary incontinence between men without UDC who were taking diuretics and men without UDC who were not taking diuretics ($p = 0.085$).

There were too few cases of UDC in women to report any meaningful results.

Comment

Diuretics have been implicated as a cause of urinary incontinence. However, to our knowledge, no evidence has been presented prior to this article to confirm such a relationship and elucidate its mechanism.

Our findings confirmed the widespread use of diuretics in the elderly. Approximately one of four men and one of three women sixty years and older use diuretics. Wells, Brink, and Diokno⁵ reported a 29 percent use of diuretics among incontinent elderly women seen in a continence clinic. Ouslander *et al.*⁶ in their study of nursing home patients observed no significant difference in the use of diuretics between continent and incontinent patients.

Our findings also confirmed the lack of relationship between diuretics and continence status except for the urodynamic subjects. In the presence of an overactive bladder as manifested by the presence of uninhibited detrusor contractions on cystometry, use of diuretics significantly increases the probability of incontinence more than if no diuretics were used. It is possible that the increased prevalence of incontinence is due to the sudden surge of urine into the bladder as a consequence of diuresis causing the detrusor to trigger the occurrence of an uninhibited detrusor contraction. Because patients with uninhibited bladder have a significantly smaller cystometric and smaller functional bladder capacity (maximum voided volume) when compared with patients without uninhibited bladder,^{4,7} it may be anticipated that patients with small functional bladder capacity without necessarily harboring uninhibited detrusor contraction because of reduced compliance may also be prone to urinary incontinence when given a diuretic. The small bladder capacity or someone with high postvoid residual urine may allow the maximum bladder capacity to be reached prematurely with the diuresis, increasing the intravesical pressure beyond the urethral pressure without necessarily invoking an uninhibited detrusor contraction.

In addition to the physiologic mechanism advanced to explain urgency and urge incontinence, another confounding problem that may coexist is the physical restrictions such as reduced mobility and impaired dexterity. These handicaps could easily prolong the reaction time from the sense of urgency to actual voiding into a urinary receptacle, further increasing the chance of urinary incontinence. Recent analysis of correlates of urinary incontinence revealed a very strong relationship between mobility problems and urinary incontinence.⁴

The influence of diuretics on bladder symptoms was also observed by Shimp *et al.*⁸ in the study of 200 incontinent women recruited from a continence program clinic. It was observed that incontinent women taking diuretics have a positive correlation with nocturia ($p < 0.01$) and a trend toward significance with urge incontinence ($p = 0.056$) when compared with incontinent women not taking diuretics. Although their study included only incontinent women, the findings suggest that diuretics influence the detrusor function as manifested by increased nocturia and urge incontinence.

The result of this observation has significant clinical implications. When one is confronted with an elderly patient with a recent onset of urinary incontinence especially of the urge type, one should specifically seek for concomitant use of diuretics. If the diuretic use correlates with the onset of incontinence, one may attempt to discontinue the diuretic and switch the patient to non-diuretic therapy if medically feasible. Similarly, when one is faced with an elderly male with obstructive symptoms and urge incontinence, one must sort out the role of the diuretic since surgical relief of the prostatic obstruction may not relieve urge incontinence and nocturia in the presence of uninhibited bladder and use of diuretics. If urge incontinence persists postoperatively and diuretics may not be discontinued, the use of bladder relaxants will be in order. As part of the overall incontinence management for patients with mobility or dexterity problems, an easier access to the toilet should be considered, otherwise provisions for toilet supplements such as use of commodes or urinals should be encouraged.

For physicians who prescribe diuretics on a frequent basis, it is important to screen patients in whom urinary incontinence is likely to develop or whose incontinence may worsen with the use of a diuretic. Patients with symptoms and signs suggestive of an overactive bladder

such as urinary frequency, urgency, and nocturia or patients whose functional bladder capacity is small are likely candidates for urge incontinence developing with the use of a diuretic agent. If such a condition occurs, the diuretic should be avoided if possible. If a diuretic has to be used, in the absence of outlet obstruction and significant postvoid residual urine, urge incontinence may be controlled with a bladder relaxant agent.

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