



Research Article

Comparison of Urinary Incontinence in Older White and Black Women: A Pilot Study

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Abstract

This pilot-cross sectional study compared UI symptom type and severity, and impact of UI on QoL among older White and Black women. Outcome measures included a three-day bladder diary (3dbd), Incontinence Impact Questionnaire Short Form (IIQ-7), Urinary Distress Inventory Short Form (UDI-6), Medical Epidemiological Social Aspects of Ageing (MESA) questionnaire, and Patient Global Impact of Severity Scale (PGI-S). Participants' characteristics and UI outcomes were analysed with descriptive statistics, Fisher's Exact and Mann-Whitney U tests. Twenty women (10 White, and 10 Black) with mean age of 76.5 (\pm 4.9 years) participated in the study. There were no significant differences in most UI symptoms based on 3dbd, MESA, PGI-S, UDI-6, and IIQ-7. However, older Black women reported moderate and/or severe impact of UI on their emotional health more frequently ($n=7$, 70%) compared to White women ($n=1$, 10%, $p=0.02$) based on the IIQ-7.

Keywords: Urinary incontinence; Racial differences, Minority; Bladder diary; Quality of life

Abbreviations: 3dbd: Three-day bladder diary; QoL: Quality of Life; IIQ-7: Incontinence Impact Questionnaire-Short Form; UDI-6: Urinary Distress Inventory-Short Form; MESA: Medical Epidemiological Social Aspects of Ageing; PGI-S: Patient Global Impact Severity Scale; SUI: Stress Urinary Incontinence; UUI: Urgency Urinary Incontinence; MUI: Mixed Urinary Incontinence; SMUI: Stress Predominant Mixed Urinary Incontinence; UMUI: Urgency Predominant Mixed Urinary Incontinence

Introduction

Urinary Incontinence (UI) is a common pelvic floor disorder amongst women affecting as many as 70% of women aged 60 and older [1]. The International Continence Society

defined UI as a "complaint of involuntary loss of urine [2]." UI has a profound negative impact on psychosocial well-being and quality of life (QoL) [3,4,5]. It also contributes to increased rates in hospitalizations and nursing home admissions [6]. Some reports even suggest UI as a predictor of higher mortality [7].

UI affects older women of all racial and ethnic backgrounds [1]. Although reducing healthcare disparities is a primary objective of the national healthcare agenda [8], there are few studies examining racial differences in UI type, symptom severity, and UI impact on QoL among racially diverse older women. The evidence is further limited by the underrepresentation of older women from diverse ethnic and minority backgrounds in UI research [9,10]. The literature suggests that Black women are more likely to experience urgency UI (UUI) and have greater urine loss than White women [11,12,13]. Black women with moderate UI reported being more bothered by UI symptoms than White women [14].

Finally, cost analyses have also revealed that Black women incur 2.4-fold higher expenses compared to White women for personal, routine UI care [15]. A recent systematic review on nonsurgical UI treatments concluded that there were no UI treatment studies restricted to ethnic minorities to allow across-study comparisons [16]. Understanding UI symptoms and UI impact on QoL in older women of diverse backgrounds is important for clinical decision-making and will allow physicians to provide equitable care and develop culturally competent and responsive UI approaches and treatments for minority women that currently do not exist [16].

Objective

The objective of this pilot study was to compare types and severity of UI symptoms, and impact of UI on QoL among older non-Hispanic White and Black women living in the community utilizing validated UI questionnaires and a 3-day bladder diary (3dbd).

Materials and Methods

This pilot study used a descriptive cross-sectional design. The protocol was approved by the Institutional Review Boards at the University of Maryland Baltimore (#00066737) and Johns Hopkins Bayview Medical Center (#00108819) before initiating recruitment. Detailed methodology has been previously published

[17]. All participants provided written informed consent. Women were recruited from the community through advertisement and urogynecology clinics at University of Maryland Medical Systems, Baltimore VA Medical Center, and Johns Hopkins Bayview Medical Center. Inclusion criteria were: (1) age \geq 70 years, (2) symptomatic UI \geq 3 months, and (3) UI confirmed on a 3dbd. Exclusion criteria were: (1) inability to follow-up or complete 3dbd, (2) cognitive impairment (Mini-Mental State Examination score $<$ 25) (3) post-void residual \geq 150 ml, (4) non-ambulatory (wheelchair user), (5) any uncontrolled medical condition (e.g., congestive heart failure, uncontrolled diabetes, etc.), neurologic, and musculoskeletal conditions (stroke, multiple sclerosis, amyotrophic lateral sclerosis, rheumatoid arthritis), and (6) UI associated with hematuria, urinary tract infection, fistula, pelvic organ prolapse $>$ stage 2, and fecal impaction.

Study candidates completed a phone-screening interview to determine eligibility for the study. The screening process and recruitment strategy have been previously reported [17]. Briefly, after completing a phone-screening interview to determine eligibility, participants provided demographic information about their medical and/or surgical history. They also completed five commonly used UI assessment tools, which are summarized in (Figure 1) and described below to evaluate UI symptom type, severity, and UI impact on QoL.

Assessment Tool	Definition	Outcome Measures
Symptom Type		
MESA	Predominant UI type ¹⁸	SUI and UUI index
3dbd	Predominant UI type UI episodes frequency over three 24-hour periods	SUI, UUI, and MUI index Number of UI episodes
Symptom Severity		
UDI-6	Level of bother by UI ²¹	0-100 (higher scores indicate more bother)
PGL-S	Severity of symptoms ²³	0-3 (higher score indicates greater severity)
MESA	Severity of SUI and UUI symptoms ¹⁹	MESA SUI and UUI scores (higher score indicates greater severity)
Impact of Symptoms on QoL		
IIQ-7	Impact of UI on life activities and QoL ²¹	*0-100 (higher score indicates higher impact)
*Individual item scores reported separately with scale of 1-3 with higher score indicating greater impact on QoL.		

Figure 1: Summary of UI assessment tools used to collect data for study.

The Medical Epidemiologic and Social Aspects of Ageing (MESA) questionnaire is a reliable and validated questionnaire which was developed in 1983 as part of an observational study conducted with 1955 seniors residing in Michigan, United States to study the epidemiology of UI. It was used to identify predominant incontinence type in patients experiencing UI18. It recorded the frequency of

UI episodes and symptoms severity using 9 questions on stress UI (SUI) and 6 questions on UUI. Participants reported their symptoms on a 4-point ordinal scale as “never”, “rarely”, “sometimes”, and “often.” In order to calculate the MESA score, each of the individual SUI and UUI subscale items are summed to give a SUI subscale score out of 27 (maximum for SUI) and UUI subscale score out of 18 (maximum for UUI) [19]. The subscale scores were then converted into UI index (relative proportion of scores) by dividing the total reported score for SUI or UUI subscales by the maximum possible respective subscale score [20]. This conversion to an UI index was necessary to account for the different number of questions in the urgency and stress MESA subscales [20]. We categorized five predominant UI types based on UI index as described Brubaker et al [20]. UI types were 1) pure UUI (SUI index = 0%), 2) pure SUI (UUI index = 0%), 3) mixed UI (MUI) (SUI index = UUI index or $\frac{1}{2}$ SUI index \leq UUI index $<$ SUI index), stress predominant MUI (SMUI) ($0\% <$ UUI index $<$ $\frac{1}{2}$ SUI index), urgency predominant MUI (UMUI) ($0\% <$ SUI index $<$ $\frac{1}{2}$ UUI index)[20]. For example, if a participant had a MESA SUI Index of 7% (2/27) and an UUI index of 17% (3/18), UI type would be categorized as UMUI. The five predominant UI types are depicted in (Figure 2).

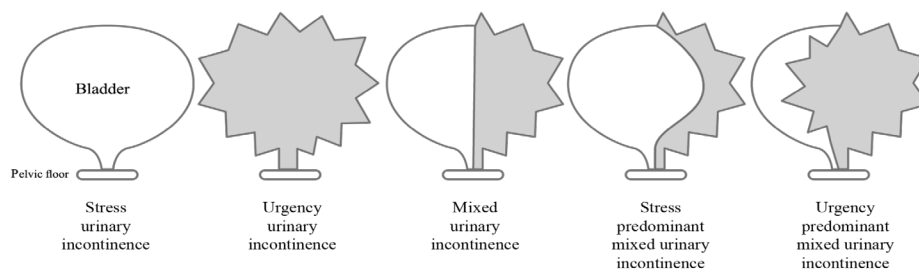


Figure 2: Shows the five different phenotypes of urinary incontinence. The smooth bladder edge represents symptoms of stress incontinence and the jagged bladder edge represents urgency urinary incontinence symptoms.

The Urinary Distress Inventory Short Form (UDI-6) is a commonly used 6-item validated questionnaire asking respondents to rate how much they were bothered by UI symptoms [21]. For instance, participants were asked to rate how much they are bothered by urine leakage when they cough or sneeze, frequent urination, difficulty emptying, etc. Participants rated their symptom bother using the 4-point ordinal scale, “not at all”, “slightly”, “moderately”, and “greatly” with higher scores indicating greater bother. A total score out of 100 was calculated by averaging the individual responses and multiplying the average by 33.3 [21]. A cut-off score of 33.3 or greater indicated the participant experienced a high level of distress from UI symptoms [22].

The Patient Global Impression of Severity (PGI-S) is a single statement questionnaire used to evaluate women’s overall impression of the severity of their UI symptoms. It is significantly correlated with UI episode frequency and incontinence QoL questionnaire [23]. Participants were asked to rate the severity of their UI symptoms on the 4-point ordinal scale, “normal”, “mild”, “moderate”, and “severe.”

The Incontinence Impact Questionnaire Short Form (IIQ-7) is a 7-item validated questionnaire asking respondents to rate how much UI has affected their performance of a variety of life activities including household activities, physical recreation, entertainment activities, travel >30 minutes away from home, social activities,

emotional health (nervousness, depression), and feeling frustrated [21]. Participants rated the impact of their symptoms on their performance of various daily activities using the 4-point ordinal rating scale, “not at all”, “slightly”, “moderately”, and “greatly”. A total score out of 100 was calculated by averaging the individual responses and multiplying the average by 33.3 [21]. A cut-off score of 9.52 or greater indicated the participant experienced a symptomatic impact on QoL from UI symptoms [22].

A 3dbd was used as an objective measure of UI symptoms including incontinence type and number of incontinence episodes. Bladder diaries are commonly used to diagnose incontinence and are frequently used in clinical settings. For this study, a 3-day paper log was used because it has been demonstrated to be both valid and reliable [24, 25]. The 3dbd used was already used in the senior author’s (TS) urogynecology clinic, and collected information on time of void, volume of void, volume of leak, presence of urgency sensation, activities engaged in at time of UI episode, and fluid intake (Appendix A). Participants received standardized instructions on how to complete the bladder diary, including instructions to complete the diary for 3 days (1 day is equivalent to 24 hours) and to document all voiding episodes, incontinence, and fluid intake. The study research staff reviewed the 3dbd carefully with participants for completeness and accuracy, clarifying responses if they were unclear and confirming UI episodes. Data from the completed bladder diaries

was reviewed by a research team member and each episode of incontinence was coded as either SUI, UUI, or MUI. The episodes were individually coded. Research staff verified with a participant the type of each incontinence episode. If the respondent reported symptoms with physical exertion, the episode was coded as SUI. If the respondent reported symptoms with an urgency sensation, the episode was coded as UUI. If the respondent reported the symptoms were accompanied with both physical exertion and urgency or it was unclear, it was coded as MUI. Similarly, to the MESA questionnaire, we calculated UI index to describe 3dbd predominant UI type. UI 3dbd index was calculated by dividing the number of UI episodes for each type of UI (SUI/UUI/MUI) by the total number of UI episodes per participant. The primary UI type was categorized as MUI when the SUI index equaled the UUI index, or all episodes were MUI. UUI was when all episodes were UUI. The UI type was categorized as predominant SMUI when SUI index was greater than the MUI and UUI indices; and as predominant UMUI when the UUI index was greater than the MUI and SUI indices. For example, if 3dbd revealed a total number of 27 UI episodes over the three 24-hour periods with no episodes of SUI (SUI index=0 (0/27)), 19 episodes of UUI (UUI index=70% (17/27)), and 8 MUI episodes (MUI index=30%, (8/27)), it was categorized as predominant UMUI.

De-identified data was stored in the password-protected Access database. IBM SPSS Statistics for Windows version 26 was used for statistical analysis [26]. Descriptive statistics were used to summarize participant characteristics by racial group. Fisher’s

Exact Test was used to compare ordinal responses between groups on the PGI-S and to compare the number of participants who had received previous medical treatment for UI between groups. The Independent Samples Mann-Whitney U Test was used to compare continuous variables between groups. IIQ-7 individual item responses were dichotomized into two groups: 1) “not at all” and “slightly”, and 2) “moderately” and “greatly”. Fisher’s Exact Test was used to compare responses between the racial groups. Statistical significance was set at $p < 0.05$. For continuous measures, the means and standard deviations were reported, and for categorical measures the counts and percentages were reported. Scatter plots were presented for the rankings of the total scores of QoL from the IIQ-7. A bar graph was used to compare the dichotomized emotional health item scores on the IIQ-7 between groups. The sample size was determined a priori.

Results

The demographic characteristics of the study participants (n=20) are summarized in (Table 1). There was an equal number of White (n=10) and Black (n=10) participants. Fifty percent of the participants (n=10) reported experiencing UI symptoms for more than 5 years, 35% (n=7) reported experiencing symptoms for 1-5 years, and 15% (n=3) experienced symptoms for less than 1 year. Thirty five percent of participants (n=7) had previously received medical treatment for UI. White women received UI treatment (n=5, 50%) compared to Black women (n=2, 20%; $p=0.35$).

Outcome	Total (n=20), mean (SD) or n (%)	White (n=10), mean (SD) or n (%)	Black (n=10), mean (SD) or n (%)	p
Demographics				
Age (years)	76.5 (4.9)	74.9 (4.3)	78.1 (5.1)	0.19 ^a
BMI	33.5 (9.0)	32.6 (9.6)	34.4 (8.8)	0.48 ^a
Urinary Incontinence				
Symptom Duration				0.71 ^b
1 year or less	3 (15%)	1 (10%)	2 (20%)	-
1-5 years	7 (35%)	3 (30%)	4 (40%)	-
5+ years	10 (50%)	6 (60%)	4 (40%)	-
Previous Treatment	7 (35%)	5 (50%)	2 (20%)	0.35 ^b
^a Independent Samples Mann-Whitney U Test, normal distribution not assumed. No statistically significant differences between groups. ^b Fisher’s Exact Test (<5 in one cell). No statistically significant differences between groups. SD, standard deviation; BMI, body mass index.				

Table 1: Describes participant characteristics.

Older White and Black women experienced similar UI types (Table 2) based on MESA and 3dbd. There were no statistically significant differences in predominant UI symptom type between the two groups on MESA ($p = 0.10$) nor 3dbd ($p = 0.78$). MUI was the predominant symptom type in 70% of participants in both groups on MESA. UMUI was the predominant type of UI in both older White (50%) and Black (56%) groups based on 3dbd results. There were no participants who reported SUI only UI type based on both MESA and 3dbd. Older White and Black women experienced similar symptom severity across all UI outcomes (Table 2). There were no statistically significant differences in either on the UDI-6 scores ($p=0.12$), nor severity on PGI-S ($p=1.00$) between the two groups. MESA indices between groups were also similar for SUI ($p = 0.68$) and UUI ($p = 0.8$). Older White and Black women reported a similar number of UI episodes ($p = 0.39$) on the 3dbd.

Symptom Type	Total (n=20), n (%)	White (n=10), n (%)		Black (n=10), n (%)		p
MESA						.10 ^b
UUI	1 (5%)	0 (0%)		1 (10%)		-
SMUI	3 (15%)	2 (20%)		1 (10%)		-
UMUI	2 (10%)	1 (10%)		1 (10%)		-
MUI	14 (70%)	7 (70%)		7 (70%)		-
3dbd						0.78 ^b
UUI	3 (16%)	1 (10%)		2 (22%)		-
SMUI	2 (11%)	2 (20%)		0 (0%)		-
UMUI	12 (63%)	6 (60%)		6 (67%)		-
MUI	2 (11%)	1 (10%)		1 (11%)		
Symptom Severity	Total Mean (SD)	White Mean (SD)	White Range	Black Mean (SD)	Black Range	p
UDI6 Total	43.9 (18.9)	37.7 (17.3)	16.7-61.1	50.0 (19.2)	11.1-72.1	0.12 ^a
PGIS	2.8 (.6)	2.8 (0.6)	2-4	2.8 (0.6)	2-4	1.0 ^b
MESASUI	49.5 (30.3)	52.8 (31.5)	7-100	46.2 (30.2)	0-85	0.68 ^a
MESAUUI	42.3 (22.7)	40.1 (22.3)	17-78	44.5 (24.1)	6-72	0.80 ^a
3dbdTotal	15.9 (10.0)	13.7 (7.1)	3-38	18.1 (12.2)	3-45	0.39 ^a
3dbdSUI	1.1 (2.3)	1.3 (2.6)	0-6	0.8 (2.3)	0-7	0.40 ^a
3dbdUUI	12.2 (10.6)	9.6 (8.5)	0-26	15.1 (12.4)	2-43	0.32 ^a
3dbdMUI	2.8 (2.7)	2.8 (2.1)	0-7	2.9 (3.3)	0-9	0.66 ^a

^aIndependent-Samples Mann-Whitney U Test, normal distribution not assumed. No statistically significant differences between groups. ^bFisher's Exact Test (<5 in one cell). No statistically significant differences between groups. *3dbd data for symptom type for one participant was incomplete and omitted from analysis.

MESA, Medical, Epidemiologic, and Social Aspects of Ageing Questionnaire; UUI, urgency urinary incontinence; SMUI, stress predominant mixed urinary incontinence; UMUI, urgency predominant mixed urinary incontinence; MUI, mixed urinary incontinence; UDI6, Urinary Distress Inventory Short Form; PGIS, Patient Global Impact of Severity Scale; 3dbd, three day bladder diary; SD, standard deviation.

Table 2: Summarizes White and Black women's experience of UI symptom type and severity and compares between the two groups.

Older Black women experienced a similar impact of UI on QoL compared to older White women (41.9 ± 28.9 and 32.8 ± 26.0 , $p=0.44$, respectively) based on total IIQ-7 scores (Table 3). Total IIQ-7 scores are shown in Fig. 3. Older Black women reported moderate and/or severe impact of UI on their emotional health more frequently (7 out of 10, 70%) compared to White women (1 out of 10, 10%, $p=0.02$) based on the IIQ-7 emotional health subscale question. (Table 3, Figure 3). Responses on the six other subscale questions (household chores, physical activity, entertainment, travel, socialization, and frustration) were similar between groups.

Outcome	Total Mean (SD)	White Mean (SD) Range	Black Mean (SD) Range	p
IIQ-7 Total	37.34 (27.14)	32.82 (26.00) 0-71.36	41.86 (28.89) 0-80.87	0.44 ^a
Report of moderate to great impact on individual life activities		White n=10 (%)	Black n=10 (%)	p
Ability to do household chores (cooking, housecleaning, laundry)?		1 (10%)	4 (40%)	0.303 ^b
Physical recreation such as walking, swimming, or other exercise?		4 (40%)	4 (40%)	1.000 ^b
Entertaining activities (movies, concerts, etc.)?		3 (30%)	4 (40%)	1.000 ^b
Ability to travel by car or bus more than 30 minutes from home?		4 (40%)	6 (60%)	0.656 ^b
Participation in social activities outside your home?		3 (30%)	4 (40%)	1.000 ^b
Emotional health (nervousness, depression, etc.)?		1 (10%)	7 (70%)	0.019^b
Feeling frustrated?		3 (30%)	7 (70%)	0.179 ^b

^aIndependent-Samples Mann-Whitney U Test, normal distribution not assumed. No statistically significant differences between groups. ^bFisher's Exact Test (<5 in one cell). Statistically significant difference between racial groups for "Emotional health" subscale. SD, standard deviation; IIQ-7, Incontinence Impact Questionnaire Short Form.

Table 3: Describes the impact of UI symptoms in White and Black Women and compares the impact of symptoms on women between the two groups.

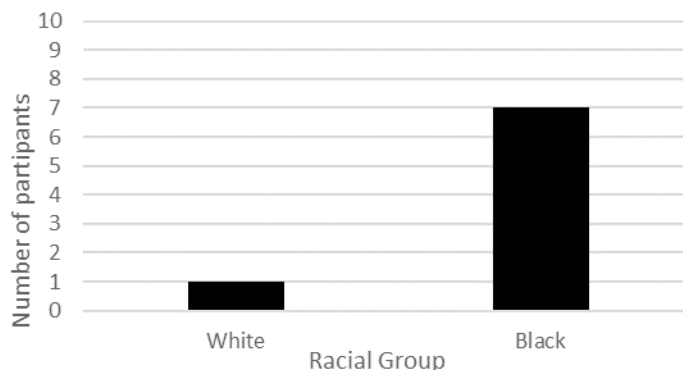


Figure 3: This chart shows the moderate or greater impact of urinary incontinence on emotional health based on the Incontinence Impact Questionnaire- Short Form: emotional health subscale among older White and Black women. The black bar graphs represent the number of women who reported urinary incontinence has a moderate or greater impact on their emotional health by racial groups. Fisher's Exact Test demonstrated significant difference between the two groups ($p=0.02$).

Discussion

Our pilot results revealed that while both older non-Hispanic White and Black women experienced similar UI symptoms, older Black women reported more frequently a moderate and/or severe impact of UI on their emotional health compared to their White counterparts. Most common types of UI in older White and Black women were MUI based on MESA and UMUI based on 3dbd.

This study contributes to the growing body of available epidemiological studies and clinical research data on UI types and symptoms amongst both older White and Black women [1,11-14,27]. The findings from this pilot study are based on 3dbd and validated UI questionnaires among women aged ≥ 70 years with symptomatic UI. It supports existing epidemiological research, which has suggested that MUI and UUI become more predominant UI types in women with advancing age [1]. Previous research showed that Black women were more likely to have UUI compared to White women [14]. This pilot study did not reveal significant differences in types of UI between groups, but it is consistent with other existing studies evaluating the differences in prevalence and UI types among racial and ethnic minority women [1,11-14,27]. MUI was the predominant UI type based on MESA among the participants, and yet, the 3dbd results indicated that UMUI was the predominant MUI type. These findings suggest that using different UI questionnaires and instruments may lead to slightly different results. For instance, while the MESA evaluates stress and urgency UI symptoms separately, the 3dbd collects data based on UI episode and activities during UI. These differences suggest that different types of UI questionnaires and instruments to evaluate UI type may categorize UI differently, which may affect the research conclusions and decisions to treat UI in a clinical setting. Therefore, we suggest utilizing multiple UI questionnaires and instruments to evaluate the differences in UI among older minority women.

The results of this pilot indicated that 70% of older Black participants rated their emotional health as being moderately or greatly impacted by their UI symptoms based on IIQ-7 compared to only 10% of older White women. These findings are consistent with previously published population research by Lewicky-Gaupp et al. who also found that Black women with moderate UI had significantly higher IIQ-7 scores than White women [14]. The authors conducted a telephone survey of 580 women, which demonstrated that Black women (aged 50-51 years) with moderate UI symptoms experienced a more negative impact on QoL than White women [14]. The women in this study were much younger (50-51 years old) than in our cohort. Thus, based on Lewicky-Gaupp and this study, we could suggest that the racial differences, which have a negative impact of UI, may persist among Black women as they age. This conclusion may have significant

implications in developing culturally competent and responsive UI care for older Non-Hispanic Black women suffering from UI. Understanding the impact of UI on QoL may be important for improving understanding of health-seeking behaviours and in screening clients and designing treatment plans. Moreover, to ensure equitable care for Black women, who reported experiencing worse emotional health on the IIQ-7, it is important to prepare culturally competent clinicians to develop culturally responsive care to meet the unique needs of diverse clients.

This pilot is unique for several reasons. First, it included older non-Hispanic White and Black participants who are not only underrepresented in UI research but even excluded from the participation in UI clinical trials [10,28]. Secondly, a comprehensive and detailed comparison of UI types, severity, and impact of UI symptoms on QoL was conducted utilizing the 3dbd in addition to multiple validated UI questionnaires. Thirdly, we evaluated UI types not only utilizing well described in research UI categories such as MUI, SUI, and UUI, but also distinguished whether MUI was predominantly SMUI, UMUI or pure MUI. This approach has been recommended by other researchers [20]. Lastly, this study also looked in-depth at the impact of UI on QoL including on household activities, physical recreation, entertainment activities, travel >30 minutes away from home, social activities, emotional health (nervousness, depression), and feeling frustrated by analysing total scores and individual item responses on the IIQ-7 questionnaire.

This study is limited by a small sample size. However, this was a pilot study by design with a priori determined small sample to obtain preliminary data and eventually design a larger study. We did not conduct multivariate analyses, and the impact of confounding variables such as obesity and other factors affecting UI were not calculated. Wide ranges in UI outcomes made it less likely to find significant differences between groups. Finally, selection bias could be a factor if women who had moderate to severe symptoms were more interested in the study and, therefore, more likely to participate.

This study has several notable strengths. Although the sample size was small, the study sample across the two racial groups (age, BMI, symptom duration, and duration of UI symptoms) allowed for a close examination of multiple UI outcomes between groups of older women. The study provides in-depth pilot data on UI types, symptoms severity, and impact on QoL among understudied population of older women. The responses on the 3dbd were verified with each participant for accuracy and completion to minimize errors and omissions that may occur with 3dbd. The study also included an in-depth analysis of UI impact on QoL utilizing multiple instruments.

Conclusion

Results suggest that while older Black and White women experience similar UI types, severity, and impact of UI on QoL, older Black women reported more frequently a moderate and/or severe impact of UI on their emotional health. As current UI treatment guidelines do not take into consideration racial differences in UI impact on QoL, enhancing healthcare professionals' awareness about UI impact on emotional health among older Black women is necessary to provide culturally competent UI care with greater emphasis on emotional health among older Black women and to decrease healthcare inequities.

Future studies with larger samples are needed to evaluate UI impact on QoL among racially diverse older to allow for robust statistical analyses comparing UI symptoms, with multivariate analyses to control for contributing factors. We also recommend conducting semi-structured interviews to obtain better understanding of how UI affects QoL of diverse older women.

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