







Female genital mutilation and urinary incontinence: an analytical comparison with Sudan's prevalent demography

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SUMMARY

OBJECTIVE: Female genital mutilation/cutting impacts over 200 million women globally and is linked to obstetric complications as well as long-term urogynecological and psychosexual issues that are frequently overlooked and inadequately addressed. This study aimed to assess the impact of female genital mutilation/cutting on urinary incontinence.

METHODS: This cross-sectional study was conducted in the gynecology department of the Research Hospital located in the Nyala rural region of Sudan. The participants were interviewed to gather socio-demographic and background information. In addition, they received a thorough gynecological examination to evaluate the presence and type of female genital mutilation/cutting. The Incontinence Impact Questionnaire and the Urogenital Distress Inventory were applied to the group with female genital mutilation/cutting and the control group without female genital mutilation/cutting to evaluate urinary incontinence and related discomfort. Subsequently, the scores of both participant groups were compared.

RESULTS: The study compared age, weight, height, BMI, gravida, parity, and sexual intercourse averages between groups. The mean Urogenital Distress Inventory-6 and Incontinence Impact Questionnaire-7 scores of individuals who underwent mutilation were higher than those of individuals who did not undergo mutilation ($p < 0.001$). Notably, participants subjected to infibulation exhibited significantly higher average scores on both measures in contrast with the other groups ($p < 0.001$).

CONCLUSION: A higher proportion of mutilated participants, specifically those with infibulation, are afflicted with symptoms of incontinence.

KEYWORDS: Genital mutilation, female. Infibulation. Sudan. Urinary incontinence.

INTRODUCTION

The cultural practice of female genital mutilation (FGM), also known as female genital mutilation/cutting (FGM/C), has been deeply rooted in the cultural customs of certain regions in Sudan for many centuries¹. FGM/C is a cultural practice that is also widespread in Africa and Asia. It is usually performed by traditional practitioners and has a significant impact on more than 200 million women globally^{2,3}. FGM/C involves the partial or total removal of the external female genitalia often performed without medical supervision or proper hygiene.

The World Health Organization (WHO) classifies the act of cutting the female genital region as “mutilation”⁴. WHO categorized FGM into four distinct kinds. Type I is also referred to as clitoridectomy. Type II entails the partial or total excision of the labia minora and majora, as well as the removal of the clitoris. Type III, which is often referred to as infibulation, entails the surgical removal of a part or the totality of the external genitalia, followed by the surgical approximation

of the remaining labia majora. Type IV comprises a range of injuries to the female vaginal organs⁵.

While some argue that FGM is a customary practice or an important rite of passage. Its potential harmful health effects have gained global recognition⁶. Among these, health risks is an increased incidence of urinary incontinence (UI) among women who have undergone the procedure.

UI refers to the involuntary release of urine, which can significantly affect an individual's quality of life, self-esteem, and overall well-being. The severity and frequency of this condition can vary from occasional minor leakage to more frequent and debilitating symptoms⁷.

While the physical and psychological health effects of FGM have been well examined, the urinary issues resulting from the procedure have not received adequate attention in the existing literature. Abdulcadir et al.'s study conducted in Sudan demonstrated a significant association between FGM and UI among women⁸.

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Similarly, Dirie and Lindmarks's study done in Somalia revealed a high prevalence rate of 80% for UI among women who had undergone FGM⁸.

This study aims to conduct a comprehensive examination of the prevalence of UI among Indigenous Sudanese women who have experienced FGM. This study also aims to examine differences in the characteristics and severity of UI according to different classifications of FGM.

METHODS

This study used a cross-sectional design to evaluate the effect of mutilation on UI in an endemic Sudanese female population. A total of 307 people participated in the study. The research was conducted in collaboration with healthcare professionals, researchers, and local communities within Sudan. Approval was granted by the institutional ethics committee (NSTH.03/903.07.03/689, date: 01.03.2021). The study was conducted in accordance with the Declaration of Helsinki and followed the ethical standards of Turkey.

A representative sample of women who had undergone FGM was selected using a multi-stage sampling technique. Efforts were made to ensure diversity in age groups, marriage status, educational status, circumcise type, and menopausal status to capture a comprehensive picture of the endemic population. Informed consent was obtained from all participants before their inclusion in the study. The exclusion criteria were the presence of a urinary tract infection identified through clinical examination or urine analysis, confirmed renal disease, cervicitis and/or vaginitis, diabetes diagnosis, vaginal and/or urethral surgery, and rejection to participate in the study.

Data collection was carried out through face-to-face interviews using structured questionnaires. The questionnaires were designed based on established instruments used in previous studies exploring the impact of female genital circumcision on UI. We use the Urogenital Distress Inventory (UDI)-6 and the Incontinence Impact Questionnaire (IIQ)-7. Both questionnaires underwent validation in the Arabic language^{9,10}.

The UDI-6 is a validated health-related quality-of-life (HRQOL) tool that assesses the level of distress caused by three categories of urine symptoms: irritative, obstructive/discomfort, and stress¹¹. The total score is from 0 to 100¹². The IIQ-7 is a psychometric questionnaire specifically designed to assess UI. This questionnaire evaluates the psychological and social effects of UI in women. The overall score spans from 0 to 100¹³.

The UDI-6 Total Score of 33.33 and IIQ-7 Total Score of 9.52 were identified as the most effective thresholds for

differentiating between women with symptoms and those without symptoms¹⁴.

The questionnaires were administered to the patients by the local gynecologist. Participants were asked about the frequency, amount, and impact of urine leakage, as well as any associated physical or emotional discomfort.

In the analysis of the data, the SPSS version 25.0 program was used. The suitability of the variables for normal distribution was examined with histogram graphs and the Kolmogorov-Smirnov test. While presenting descriptive analyses, mean, standard deviation, median, and minimum–maximum values were used. The 2×2 eyes were compared with the Pearson chi-square test. Variables not showing normal distribution (nonparametric) were evaluated between groups using the Mann-Whitney U test, and among more than two groups using the Kruskal-Wallis test. Situations, where the p-value is below 0.05, were considered statistically significant results.

RESULTS

The study included a total of 307 participants. The mutilation group consisted of 161 (52.44%), whereas the control group had 146 (47.56%) participants. The average UDI-6 and IIQ-7 scores of circumcised individuals were higher than those of uncircumcised individuals.

The marital status, education, and menopausal status of the circumcised and uncircumcised individuals were compared in this study. The findings indicate that there were no significant differences between the groups. The study compared several factors including age, weight, height, BMI, gravida, parity, and sexual intercourse averages between the two groups. The results indicated that un mutilated participants had a higher average sexual intercourse frequency compared with circumcised individuals ($p < 0.001$).

The UDI-6 and IIQ-7 averages were compared between the groups. The average UDI-6 and IIQ-7 scores of circumcised individuals were higher than those of uncircumcised individuals (Table 1).

A comparison was made between different mutilation types based on their associated UDI 6 and IIQ 7 scores (Table 2). Notably, participants subjected to infibulation exhibited significantly higher average scores on both measures in contrast with the other groups ($p < 0.001$). Evidently, this pattern persisted across both measures (UDI 6 and IIQ 7) illustrating a distinct disparity between those who received infibulation versus those who did not ($p < 0.001$).

The hierarchical regression results for UDI-6 and IIQ-7 scores are detailed in Table 3.

Table 1. The average UDI-6 and IIQ-7 scores of individuals.

	Group				p
	Mutilated		Unmutilated		
	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	
UDI-6	22.27±28.13	5.55 (0-88.8)	15.05±22.67	0 (0-83.25)	0.036
IIQ-7	18.21±25.28	4.75 (0-91.84)	10.38±18.49	0 (0-80.87)	0.015

Mann-Whitney U test.

Statistically significant values are indicated in bold.

Table 2. Comparison of UDI-6 and IIQ-7 scores by circumcision type.

	Circumcised type								p
	Uncircumcised		Clitoridectomy		Excision		Infibulation		
	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	
UDI-6	15.05±22.67	0 (0-83.25)	3.77±11.3	0 (0-49.95)	13.23±20.28	0 (0-77.7)	40.08±30.96	44.4 (0-88.8)	<0.001
IIQ-7	10.38±18.49	0 (0-80.87)	2.65±8.73	0 (0-42.42)	9.5±17.44	0 (0-76.11)	34.49±28.46	38.05 (0-91.84)	<0.001

Kruskal-Wallis test.

Statistically significant values are indicated in bold.

DISCUSSION

FGM has long been an area of research interest due to its profound social, cultural, and health implications. Our study is set against this backdrop, aiming to explore the relationship between FGM's different forms and UI symptoms in Sudan.

Out of 307 participants in our study, 52.44% reported undergoing FGM. This percentage echoes broader statistics within Sudan, where FGM remains a widespread and culturally deep-rooted practice¹⁵.

An elevated risk of health problems is just one of the many negative physical, mental, and emotional outcomes that may result. UI is one of the possible side effects of FGM. Problems with urinating and an increased chance of urine incontinence are among the potential consequences that can arise from the procedure's removal or injury to genital tissues. The level of incontinence that results from mutilation can differ in intensity based on the procedures that were carried out.

FGM procedures involve the removal or alteration of tissues around the urethra¹⁶. This can result in stenosis or occlusion of the urethral orifice, causing urinary flow obstruction. Various degrees of scar tissue occur in the external genitalia, depending on the severity of the excision. Scar tissue can be less elastic and flexible than normal tissue, potentially causing structural changes that affect the normal functioning of the urinary system. This scarring can contribute to UI¹⁷.

The removal of sensitive genital tissues during FGM procedures can lead to nerve damage¹⁸. Neuronal stimulation occurs

in the medial paracentral lobule as a result of vulvar sensations. The anus and vagina are "mapped" together on the medial surface of the cortex, namely, between the central and precentral (marginalis) sulci. If there is a reorganization of neuronal input at the body surface, it may also lead to a reorganization of input to the somatosensory cortex¹⁹.

The connection between mutilation and UI can be comprehended by examining the existing body of literature on childhood sexual abuse and UI²⁰. Several women who have been mutilated recall experiencing intense terror, excruciating pain, and a profound sense of helplessness. Mutilation, such as sexual abuse, is recognized to be a causative factor for post-traumatic stress disorder, somatization, depression, and anxiety^{21,22}. In their study, Geynisman-Tan et al. attributed the increase in UI prevalence in patients with FGM to this relationship⁷.

Furthermore, Emanulle et al.'s systematic review strongly advocated for rigorous evidence in the form of randomized controlled trials to conclusively determine the urological complications associated with FGM, particularly Type III. Our study reaffirms this stance, indicating that infibulation (Type III FGM) is a significant contributor to UI, a sentiment our findings support. In particular, infibulation showed a strong association with UI symptoms²³. Recognizing the study's limitations, particularly its sample size, is crucial.

We determined in this study that the more circumcision damages neighboring tissues and anatomical structures, the higher the rate of incontinence becomes.

Table 3. Hierarchical regression results for UDI-6 and IIQ-7.

UDI-6							
	B	Std. error	Beta	t	95%CI for B		p
Model 1					LL	UL	
Age	0.696	0.097	0.391	7.199	-19.319	38.276	0.518
BMI	-0.456	0.426	-0.055	-1.071	0.506	0.887	<0.001
Gravida	1.827	1.150	0.138	1.588	-1.294	0.382	0.285
Parity	1.781	1.890	0.082	0.943	-0.436	4.090	0.113
Sexual intercourse	-0.757	0.608	-0.064	-1.245	-1.938	5.501	0.347
Model 2							
Age	0.694	0.096	0.390	7.242	0.505	0.883	<0.001
BMI	-0.439	0.422	-0.053	-1.039	-1.269	0.392	0.300
Gravida	1.723	1.140	0.130	1.511	-0.521	3.966	0.132
Parity	1.842	1.873	0.084	0.984	-1.843	5.527	0.326
Sexual intercourse	-0.297	0.628	-0.025	-0.473	-1.534	0.939	0.637
Group*	6.968	2.694	0.135	2.586	1.666	12.270	0.010
IIQ-7							
	B	Std. error	Beta	t	95%CI for B		p
Model 1					LL	UL	
Age	0.642	0.085	0.413	7.589	0.476	0.809	<0.001
BMI	-0.339	0.373	-0.047	-0.909	-1.072	0.395	0.364
Gravida	1.130	1.006	0.097	1.123	-0.850	3.109	0.262
Parity	1.627	1.653	0.085	0.984	-1.626	4.880	0.326
Sexual intercourse	-1.064	0.532	-0.103	-0.1999	-2.111	-0.017	0.047
Model 2							
Age	0.640	0.083	0.411	7.670	0.476	0.804	<0.001
BMI	-0.320	0.367	-0.044	-0.871	-1.043	0.403	0.384
Gravida	1.020	0.992	0.088	1.028	-0.932	2.972	0.305
Parity	1.691	1.630	0.089	1.038	-1.516	4.898	0.300
Sexual intercourse	-0.579	0.547	-0.056	-1.058	-1.655	0.498	0.291
Group*	7.349	2.345	0.163	3.135	2.735	11.963	0.002

Note: 0=unmutilated, 1=mutilated.

*The "Group" parameter was included in the model with two groups coded as 0 for unutilated and 1 for mutilated.

The primary limitations of this study were the omission of urodynamic investigations and the reliance on urine analysis data instead of urine cultures for diagnosing urinary tract infections. These are notable flaws. Notwithstanding these constraints, the study offers an initial understanding of the impact of FGM on the occurrence of UI.

CONCLUSION

Individuals who have been circumcised, particularly those with infibulation, are more likely to experience incontinence

symptoms. Healthcare providers attending to patients with FGM/C should inquire about UI.

AUTHORS' CONTRIBUTIONS

MCD: Data curation, Project administration, Writing – original draft. **HA:** Formal Analysis, Project administration, Writing – original draft. **SMAS:** Writing – original draft, Writing – review & editing. **ÖA:** Data curation, Formal Analysis. **MH:** Data curation, Formal Analysis. **ME:** Data curation, Formal Analysis, Project administration.

REFERENCES

1. Mishori R, Warren N, Reingold R. Female genital mutilation or cutting. *Am Fam Physician*. 2018;97(1):49-52. PMID: 29365235
2. United Nations Children's Fund, Gupta GR. Female genital mutilation/ cutting: a statistical overview and exploration of the dynamics of change. *Reprod Health Matt*. 2013;21(42):184-90
3. Marea CX, Warren N, Glass N, Ahmed W, Pallitto CC. Advancing the measurement of knowledge, attitudes and practices of health workers who care for women and girls who have undergone female genital mutilation/ cutting (FGM/C): a qualitative exploration of expert opinion. *PLoS One*. 2023;18(4):e0284900. <https://doi.org/10.1371/journal.pone.0284900>
4. Earp BD, Johnsdotter S. Current critiques of the WHO policy on female genital mutilation. *Int J Impot Res* 2021;33(2):196-209.
5. Johnson-Agbakwu CE, Chen M, Salad M, Chaisson N, Connor JJ, Robinson BBE. Female genital cutting (FGC) type: proposing a multifaceted, interactive method for FGC self-assessment. *J Sex Med*. 2023;20(11):1292-300. <https://doi.org/10.1093/jsxmed/qdad101>
6. Khosla R, Banerjee J, Chou D, Say L, Fried ST. Gender equality and human rights approaches to female genital mutilation: a review of international human rights norms and standards. *Reprod Health*. 2017;14(1):59. <https://doi.org/10.1186/s12978-017-0322-5>
7. Geynisman-Tan J, Milewski A, Dahl C, Collins S, Mueller M, Kenton K, et al. Lower urinary tract symptoms in women with female genital mutilation. *Female Pelvic Med Reconstr Surg*. 2019;25(2):157-60. <https://doi.org/10.1097/SPV.0000000000000649>
8. Abdulcadir J, Dällenbach P. Overactive bladder after female genital mutilation/cutting (FGM/C) type III. *BMJ Case Rep*. 2013;2013:bcr2012008155. <https://doi.org/10.1136/bcr-2012-008155>
9. Ghroubi S, El Fani N, Elarem S, Alila S, Ben Ayed H, Borgi O, et al. Arabic (Tunisian) translation and validation of the Urogenital Distress Inventory short form (UDI-6) and Incontinence Impact Questionnaire short form (IIQ-7). *Arab J Urol*. 2019;18(1):27-33. <https://doi.org/10.1080/2090598X.2019.1678000>
10. El-Azab AS, Mascha EJ. Arabic validation of the Urogenital Distress Inventory and adapted Incontinence Impact Questionnaires--short forms. *Neurourol Urodyn*. 2009;28(1):33-9. <https://doi.org/10.1002/nau.20609>
11. Uebersax JS, Wyman JF, Shumaker SA, McClish DK, Fantl JA. Short forms to assess life quality and symptom distress for urinary incontinence in women: the Incontinence Impact Questionnaire and the Urogenital Distress Inventory. *Continence Program for Women Research Group. Neurourol Urodyn*. 1995;14(2):131-9. <https://doi.org/10.1002/nau.1930140206>
12. Shumaker SA, Wyman JF, Uebersax JS, McClish D, Fantl JA. Health-related quality of life measures for women with urinary incontinence: the Incontinence Impact Questionnaire and the Urogenital Distress Inventory. *Continence Program in Women (CPW) Research Group. Qual Life Res*. 1994;3(5):291-306. <https://doi.org/10.1007/BF00451721>
13. Uebersax JS, Wyman JF, Shumaker SA, McClish DK, Fantl JA. Short forms to assess life quality and symptom distress for urinary incontinence in women: the Incontinence Impact Questionnaire and the Urogenital Distress Inventory. *Continence Program for Women Research Group. Neurourol Urodyn*. 1995;14(2):131-9. <https://doi.org/10.1002/nau.1930140206>
14. Skorupska K, Grzybowska ME, Kubik-Komar A, Rechberger T, Miotla P. Identification of the Urogenital Distress Inventory-6 and the Incontinence Impact Questionnaire-7 cutoff scores in urinary incontinent women. *Health Qual Life Outcomes*. 2021;19(1):87. <https://doi.org/10.1186/s12955-021-01721-z>
15. Peterman A, Johnson K. Incontinence and trauma: sexual violence, female genital cutting and proxy measures of gynecological fistula. *Soc Sci Med*. 2009;68(5):971-9. <https://doi.org/10.1016/j.socscimed.2008.12.006>
16. Vella M, Argo A, Costanzo A, Tarantino L, Milone L, Pavone C. Female genital mutilations: genito-urinary complications and ethical-legal aspects. *Urologia*. 2015;82(3):151-9. <https://doi.org/10.5301/uro.5000115>
17. Tasmim S, Yousuf Z, Rahman FS, Seelig E, Clevenger AJ, VandenHeuvel SN, et al. Liquid crystal elastomer based dynamic device for urethral support: Potential treatment for stress urinary incontinence. *Biomaterials*. 2023;292:121912. <https://doi.org/10.1016/j.biomaterials.2022.121912>
18. Botter C, Sawan D, SidAhmed-Mezi M, Spanopoulou S, Luchian S, Meningaud JP, et al. Clitoral reconstructive surgery after female genital mutilation/cutting: anatomy, technical innovations and updates of the initial technique. *J Sex Med*. 2021;18(5):996-1008. <https://doi.org/10.1016/j.jsxm.2021.02.010>
19. Einstein G. From body to brain: considering the neurobiological effects of female genital cutting. *Perspect Biol Med*. 2008;51(1):84-97. <https://doi.org/10.1353/pbm.2008.0012>
20. Köbach A, Ruf-Leuschner M, Elbert T. Psychopathological sequelae of female genital mutilation and their neuroendocrinological associations. *BMC Psychiatry*. 2018;18(1):187. <https://doi.org/10.1186/s12888-018-1757-0>
21. Adelufosi A, Edet B, Arikpo D, Aquaisua E, Meremikwu MM. Cognitive behavioral therapy for post-traumatic stress disorder, depression, or anxiety disorders in women and girls living with female genital mutilation: a systematic review. *Int J Gynaecol Obstet*. 2017;136(Suppl 1):56-9. <https://doi.org/10.1002/ijgo.12043>
22. Ahmed MR, Shaaban MM, Meky HK, Amin Arafa ME, Mohamed TY, Gharib WF, et al. Psychological impact of female genital mutilation among adolescent Egyptian girls: a cross-sectional study. *Eur J Contracept Reprod Health Care*. 2017;22(4):280-5. <https://doi.org/10.1080/13625187.2017.1355454>
23. Effa E, Ojo O, Ihesie A, Meremikwu MM. Deinfibulation for treating urologic complications of type III female genital mutilation: a systematic review. *Int J Gynaecol Obstet*. 2017;136(Suppl 1):30-3. <https://doi.org/10.1002/ijgo.12045>

