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Fecal and Urinary Incontinence Associated with Pregnancy and Childbirth

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ABSTRACT

Introduction: Fecal incontinence (FI) and urinary incontinence (UI) are major problems faced by women worldwide, with pregnancy and delivery representing two major risk factors for these conditions. The prevalence of FI and UI varies across studies. In our region, only a few publications have addressed this topic. **Aim:** The aim of this study was to determine the prevalence of FI and UI in Saudi pregnant women, their characteristics, and a specific clinical pattern that could identify patients that are at a risk for incontinence. **Materials and Methods:** This was a questionnaire-based cross-sectional study conducted over a 3 months period in 2017, among pregnant women attending King Abdulaziz University Hospital, Jeddah, Saudi Arabia. **Results:** Our study included 393 pregnant women. FI was reported by 24 patients (6.1%), and fecal urgency was reported by 30.5%. UI was reported by 84 patients (21.4 %). When patients with no UI were compared with patients with UI, the only statistically significant factor was BMI ($p = 0.043$). There were no statistically significant differences when comparing patients with FI versus no-FI, and fecal urgency versus no-fecal urgency. However, laceration (OR: 1.696, $p = 0.036$), episiotomy (OR: 1.413, $p = 0.029$), constipation (OR: 1.944, $p < 0.001$), hypertension (OR: 1.993, $p = 0.022$), and Bristol stool scale score ($p = 0.002$) were statistically significant factors for determining fecal control. **Conclusion:** FI and UI are frequently associated with pregnancy and delivery, but their prevalence is underestimated. The role of the practitioner is crucial in preventing and treating these conditions, and in impeding their harmful effects on the post-pregnancy quality of life of Saudi women.

Keywords: Fecal incontinence, urinary incontinence, fecal urgency, pregnancy, delivery, Childbirth, Jeddah, Saudi Arabia.

1. INTRODUCTION

Fecal incontinence (FI) affects the lives of over 5% of women worldwide; this condition is a major problem (1). Females have a higher tendency than males to classify their FI as moderate to severe (2). Following delivery, 0.7%–22% of women reported FI, with symptoms persisting in some for 3 to 4 years after delivery (3–5). Pregnancy and delivery are predisposing factors for FI and are likely to occur later in life (6, 7). Studies have shown that pregnancy, vaginal delivery, and pelvic floor injury are correlated with FI (8, 9). Women who exclusively had cesarean sections (CSs) as a mode of delivery, and those with anal sphincter tears, can still develop FI (10). Previous reports have also drawn associations with differences in obstetric practice including different rates of CS, epidural analgesia, and episiotomy prevalence (11, 12).

Some studies have suggested that pudendal nerve injury may cause urinary incontinence (UI) and FI, and that CS can prevent these injuries from occurring (13–16). In contrast, other studies found that CS does not have a protective effect (17). Most studies focused on the effect of vaginal delivery as a cause of FI and investigated the symptoms of pregnant women in the third trimester and at 6 weeks postpartum (18). FI during pregnancy and the postpartum period is common across the world; studies on this topic have been conducted in the United States of America (USA), Europe, Hong Kong, the United Arab Emirates (UAE), and others. In the USA,

a population-based survey was conducted in the state of Oregon among women who were between 3 and 6 months postpartum. Among the 8,774 participants, 2,569 (29%) reported FI after delivery (19). In Barcelona, a cross-sectional study was conducted on patients who had undergone ultrasound examinations in a tertiary-care medical center. Among the 228 patients, 93 (40.8%) had experienced FI (20). In Hong Kong, 328 nulliparous pregnant women received a standardized questionnaire that included questions about FI, UI, and stress UI; they found that 4% of women experienced UI within 12 months after delivery (21).

In another cross-sectional study conducted in the UAE, the prevalence of FI among 225 multiparous women was approximately 23% (22). Studies on FI in pregnant women in Saudi Arabia are scarce; thus, less is known about the magnitude of this health condition among Saudi women.

2. AIM

The aim of this study was to determine the prevalence of FI and UI in Saudi pregnant women and to identify a specific clinical pattern in patients at risk.

3. MATERIALS AND METHODS

A cross-sectional study was conducted at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia, over 3 months in 2017. The inclusion criteria were female gender, primigravida or multigravida, and having received treatment at KAUH. We excluded women with spinal cord injury, multiple sclerosis, muscular dystrophy, or cerebral palsy.

Patients were asked to fill out a self-administered questionnaire. The first part asked questions about sociodemographic characteristics, and the second part included medical history questions. Sociodemographic Variables of interest included patients' sociodemographic characteristics such as age, family income, body mass index (BMI), education, and ethnicity. Medical history variables of interest were diabetes mellitus, hypertension, and smoking. Data were collected on delivery circumstances, such as route of delivery, episiotomy, and laceration. Main study variables were the presence of FI or urgency, UI, and constipation or diarrhea using Bristol stool scale score (23).

With a confidence level of 95% and a margin of error of 5%, our sample size calculation determined that 385 would be adequate to estimate the prevalence of fecal and urinary incontinence in our city that includes 4 million people. Thus, our final sample of 393 met this criterion.

Quantitative variables are presented as mean and standard deviation. Qualitative variables are presented as frequency and percentage. We used the chi-square test with odds ratios (ORs) to identify the significant factors associated with FI and UI. The analysis was performed by assuming a 95% confidence interval and using the Statistical Package for the Social Sciences version 20 (IBM, Armonk, NY, USA).

4. RESULTS

Among the 434 potential patients, 393 (90.55%) were eligible to participate in our study. All patients were pregnant women being treated at KAUH during the 3-months study period. In total, 127 patients had a family income below 5,000 Saudi riyals, and 51.9% of them went to university. With regard to ethnicity, 3.6% (n = 14) were Asians and 11.2% (n = 44) were Africans. Regarding associated medical conditions, 8.4% (n = 33) had diabetes mellitus and 9.2% (n = 36) had hypertension. 17 (4.3%) patients were smokers.

FI was reported by 24 patients (6.1%), whereas fecal urgency was reported by 30.5%. UI was reported by 84 patients (21.4 %) (Table 1). We determined the mean ± standard deviation for no FI versus FI in terms of age (33.46 ± 6.77 years vs. 30.08 ± 6.03 years), BMI (27.06 ± 4.32 kg/m2 vs. 28.8 ±

	Frequency	Percentage
Urinary incontinence		
No	309	78.6
Yes	84	21.4
Fecal urgency only		
No	273	69.5
Yes	120	30.5
Fecal incontinence only		
No	369	93.9
Yes	24	6.1
Fecal urgency/incontinence		
No	266	67.7
Yes	127	32.3

Table 1. The frequency and percentage of urinary incontinence, fecal urgency only, fecal incontinence only, and fecal urgency/incontinence (n = 393)

Variables	No fecal incontinence (n = 369) Mean ± SD (min–max)	Fecal incontinence (n = 24) Mean ± SD (min–max)	p-value
Age in years	33.46 ± 6.77 (19–48)	30.8 ± 6.03 (21–43)	0.065
BMI	27.06 ± 4.32 (14–46)	28.8 ± 4.6 (21–39)	0.053
Gravidity	3.3 ± 2.2 (0–13)	2.4 ± 1.3 (1–6)	0.052
Number of SVDs	2.6 ± 2.4 (0–12)	1.7 ± 1.7 (0–6)	0.075
	No fecal urgency (n = 273) Mean ± SD (min–max)	Fecal urgency (n = 120) Mean ± SD (min–max)	
Age in years	33.31 ± 6.83 (19–48)	33.27 ± 6.57 (21–48)	0.956
BMI	26.92 ± 4.06 (17–46)	28.8 ± 4.6 (17–48)	0.082
Gravidity	3.2 ± 2.2 (0–13)	3.2 ± 2.1 (0–10)	0.858
Number of SVDs	2.5 ± 2.3 (0–12)	2.6 ± 2.3 (0–10)	0.558
	No urinary incontinence (n = 309) Mean ± SD (min–max)	Urinary incontinence (n = 84) Mean ± SD (min–max)	
Age in years	33.31 ± 6.79 (19–48)	30.8 ± 6.03 (20–46)	0.916
BMI	26.94 ± 4.35 (14–46)	33.2 ± 6.6 (18–42)	0.043*
Gravidity	3.2 ± 2.2 (0–13)	3.3 ± 2.01 (0–9)	0.623
Number of SVDs	2.5 ± 2.4 (0–12)	2.8 ± 2.2 (0–9)	0.214

Table 2. Comparison of the mean ± SD of age, BMI, gravidity, and number of SVDs for those with no fecal incontinence (n = 369) vs. fecal incontinence (n = 24), no fecal urgency (n = 273) vs. fecal urgency (n = 120), and no urinary incontinence (n = 309) vs. urinary incontinence (n = 84)

Factors	No fecal incontinence or urgency (n = 266)	Fecal incontinence or urgency (n = 127)	Odds ratio 95% CI	p-value
Delivery				
C/S (89)	62	27	1.126	.094
SVD (304)	204	100	(0.675–1.877)	
Laceration				
No (349)	241	108	1.696	.036*
Yes (44)	25	19	(0.896–3.211)	
Episiotomy				
No (265)	188	79	1.413	.029*
Yes (128)	80	48	(0.906–2.203)	
Constipation				
No (217)	161	56	1.944	<.001*
Yes (176)	105	71	(1.267–2.982)	
Diarrhea				
No (351)	241	110	1.490	.067
Yes (42)	25	17	(0.773–2.871)	
Smoking				
No (376)	254	122	0.867	.206
Yes (17)	12	5	(0.299–2.517)	
DM				
No (360)	241	119	0.648	.221
Yes (33)	25	8	(0.284–1.480)	
HTN				
No (355)	245	110	1.993	.022*
Yes (36)	19	17	(0.998–3.981)	
Family Income				
Less than 5000 (127)	87	40	-	.340
5000–15000 (223)	146	77		
More than 15000 (43)	33	5		
Bristol Stool Scale				
1 or 2 (38)	16	22	-	.002
3, 4, or 5 (341)	243	98		
6 or 7 (14)	7	7		
Education				
Illiteracy (27)	14	13	-	.394
Primary–Secondary (162)	114	48		
University (204)	138	66		
Ethnicity				
Black (44)	31	13	-	.385
White (328)	218	110		
Asian (14)	12	2		
Other (7)	5	2		

Table 3. Results of the Chi-square test indicating the factors that may affect fecal control (n = 393; CI: 95%)

4.6 kg/m2), gravidity (3.3 ± 2.2 vs. 2.4 ± 1.3), and number of spontaneous vaginal deliveries (SVDs) (2.6 ± 2.4 vs. 1.7 ± 1.7). There were no statistically significant between-group differences. Similarly, we compared patients with no fecal urgency (n = 273) and patients with fecal urgency (n = 120) in terms of age, BMI, gravidity, and number of SVDs. We found no statistically significant between-group differences. When patients with no UI (n = 309) were compared with patients with UI (n = 84), the only statistically significant factor was BMI, which was 26.94 ± 4.35 kg/m2 vs. 33.2 ± 6.6 kg/m2 (p = 0.043) (Table 2).

A total of 127 patients (32.3%) experienced problems with fecal control. We analyzed the associations between delivery, laceration, episiotomy, constipation, diarrhea, smoking, diabetes mellitus, hypertension, family income, Bristol stool scale score, education level, and ethnicity with fecal control. The strength of association was assessed by OR using a 95% confidence interval. Our results revealed that laceration (OR: 1.696, p = 0.036), episiotomy (OR: 1.413, p = 0.029), constipation (OR: 1.944, p < 0.001), hypertension (OR: 1.993, p = 0.022), and Bristol stool scale score (p = 0.002) were statistically significant factors for determining fecal control (Table 3).

5. DISCUSSION

The prevalence of FI in our sample was 6.1%, and 30.5% (n = 120) of cases reported fecal urgency. UI following delivery occurred in 84 patients (21.4%). Laceration, episiotomy, constipation, hypertension, and Bristol stool scale score were significantly associated with FI. BMI was found to be associated with UI.

Our study had some limitations. First, this was a single-center cross-sectional survey conducted over a limited period. Even though these factors prevented us from including a larger sample of patients, our sample exhibited sociodemographic, clinical, and obstetrical diversity.

The prevalence of FI and UI found in this study differs from that reported in other studies (19, 20, 22). Differences in prevalence may stem from the different definitions used for FI and UI, from the disparities in the studied samples, and from the different data collection methods. When we analyzed the association between age, gravidity, and number of SVDs with the presence or absence of FI, no statistical associations were found. A possible explanation for this result could be the imbalance in the size of the two groups (24 patients in the FI group vs. 369 in the no FI group).

In this study, the only significant modifiable risk factor for UI was BMI; this result was consistent with an earlier finding (17). In fact, weight control represents a protective factor against developing post-delivery incontinence disorder in high-risk women (e.g., those suffering from inflammatory bowel disease) (24, 25).

There is a controversy regarding the association between delivery method and FI occurrence in our data, although there were more reports of fecal control problems among women with SVD than among those with CS. In a prospective cohort study of singleton primiparas at a university hospital in the Czech Republic, the proportion of women with FI symptoms after SVD was higher than that after CS. The proportion of patients with UI after SVD was almost twice as that in the CS cohort (26).

Although other studies had similar findings, two large population-based studies (one Norwegian and one Australian) demonstrated that CS has no protective effect against the occurrence of FI or UI (27, 28).

As demonstrated by our findings, neither sociodemographic characteristics nor smoking are considered to be risk factors for FI or UI (29).

The anatomical proximity between the urogenital sector and anal sector relates to the main consequences of CS on the posterior perineum. The anal and vaginal mucosa

are separated only by a tendinous structure (30). The mechanical stress exerted on the anal sphincter during fetal expulsion is the source of potentially harmful tears (31). FI resulting from obstetric anal sphincter injury can occur either spontaneously or after an episiotomy (32). Our data highlighted an association between episiotomy, laceration, and FI. The findings of other studies on the preventive role of episiotomy against perineal rupture or nerve damage are controversial. According to a literature review, this could be due to differences in episiotomy technique. Patients who had selective mediolateral episiotomy had a lesser risk of developing anal incontinence than those who had midline episiotomy; however, the decision to perform an episiotomy should be made on a case-by-case basis (33).

Patients with constipation and Bristol stool scale scores between three and five were at a higher risk for FI. Pregnancy is frequently associated with gastrointestinal disorders, particularly constipation and FI. Constipation may be associated with FI because they share common risk factors, and hormonal changes during pregnancy can weaken the pelvic floor muscles (34).

FI was significantly more prevalent among women with hypertension, which was not the case for women with diabetes mellitus. Laine et al. (35) found that hypertension was significantly associated with FI among nulliparous women.

Although our study was an observational cross-sectional study, the heterogeneity of the patients (according to sociodemographic characteristics) enables us to estimate the prevalence of FI associated with pregnancy among Saudi women attending KAUH. However, because our survey was a single-center survey, we cannot generalize our results to all women of Saudi Arabia. More multicenter studies on this topic are needed in Saudi Arabia.

6. CONCLUSION

In our study population, the prevalence of FI was relatively low; however, UI occurred more frequently among pregnant women. Episiotomy, laceration, constipation, hypertension, and Bristol stool scale score were significantly associated with FI. In contrast, the only modifiable risk factor that had a statistically significant association with UI was BMI. The prevalence of incontinence (particularly FI) among females could be underestimated because many assume this to be an expected condition during pregnancy and do not report it to their physicians. Practitioners should inquire about these conditions with their patients to help prevent further complications, treat symptoms in a timely fashion, and potentially mitigate the effect of these conditions on the quality of life of the affected women.

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REFERENCES

1. Ditah I, Devaki P, Luma HN, Ditah C, Njei B, Jaiyeoba C, et al. Prevalence, trends, and risk factors for fecal incontinence in United States adults, 2005-2010. Clin Gastroenterol Hepatol. 2014; 12: 636-643.e1.
2. Drossman DA, Li Z, Andruzzi E, Temple RD, Talley NJ, Thompson WG, et al. U.S. householder survey of functional gastrointestinal disorders. Prevalence, sociodemography, and health impact. Dig Dis Sci. 1993; 38: 1569-1580.
3. Burgio KL, Zyczynski H, Locher JL, Richter HE, Redden DT, Wright KC. Urinary incontinence in the 12-month postpartum period. Obstet Gynecol. 2003; 102: 1291-1298.
4. Schraffordt ES, Vervest HAM, Oostvolgel HJM. Anorectal symptoms after various modes of vaginal delivery. Int Urogynecol J Pelvic Floor Dysfunct. 2003; 14: 244-249.
5. Solans-Domenech M, Sanchez E, Espuna-Pons M, Pelvic Floor Research Group. Urinary and anal incontinence during pregnancy and postpartum. Obstet Gynecol. 2010; 115: 618-628.
6. Sato T, Konishi F, Minakami H, Nakatsubo N, Kanazawa K, Sato I, et al. Pelvic floor disturbance after childbirth: vaginal delivery damages the upper levels of sphincter innervation. Dis Colon Rectum. 2001; 44: 1155-1161.
7. Kepenekci I, Keskinkilic B, Akinsu F, Cakir P, Elhan AH, Erkek AB, et al. Prevalence of pelvic floor disorders in the female population and the impact of age, mode of delivery, and parity. Dis Colon Rectum. 2011; 54: 85-94.
8. Thom DH, Rortveit G. Prevalence of postpartum urinary ncontinence: a systematic review. Acta Obstetet Gynecol. 2010; 89: 1511-1522.
9. Solans-Domenech M, Sanchez E, Espuna-Pons M, Pelvic Floor Research Group. Urinary and anal incontinence during pregnancy and postpartum. Obstet Gynecol. 2010; 115: 618-628.
10. Borello-France D, Burgio KL, Richter H, Zyczynski H, Fitzgerald MP, Whitehead W, et al. Fecal and urinary incontinence in primiparous women. Obstet Gynecol. 2006; 108: 863-872.
11. Shek K, Dietz H. Intrapartum risk factors for levator trauma. BJOG. 2010; 117: 1485-1492.
12. Gossett DR, Su RD. Episiotomy practice in a community hospital setting. J Reprod Med. 2008; 53: 803-808.
13. Snooks SJ, Swash M, Henry M, Setchell M. Risk factors in childbirth causing damage to the pelvic floor innervation. Int J Colorectal. 1986; 1: 20-24. doi:10.1007/bf01648831
14. Snooks SJ, Swash M, Setchell M, Henry MM. Injury to innervation of pelvic floor sphincter musculature in childbirth. Lancet. 1984; 8: 546-550.
15. Allen RE, Hosker GL, Smith ARB, Warrell DW. Pelvic floor damage and childbirth: a neurophysiological study. BJOG. 1990; 97: 770-777.
16. Smith ARB, Hosker GL, Warrell DW. The role of partial dener-

vation of the pelvic floor in the aetiology of genital prolapse and stress incontinence of urine. A neurophysiological approach. BJOG. 1989; 96: 24-28.
17. McKinnie V, Swift S, Wang W, Woodman P, O'Boyle A, Kahn M, et al. The effect of pregnancy and mode of delivery on the prevalence of urinary and fecal incontinence. American journal of obstetrics and gynecology. 2005; 193: 512-517.
18. Chan S, Cheung R, Yiu K, Lee L, Chung T. Prevalence of urinary and fecal incontinence in Chinese women during and after their first pregnancy. Int Urogynecol J. 2012; 24: 1473-1479.
19. Guise J, Morris C, Osterweil P, Li H, Rosenberg D, Greenlick M. Incidence of fecal incontinence after childbirth. Obstet Gynecol. 2007; 109: 281-288.
20. Parés D, Martinez-Franco E, Lorente N, Viguer J, Lopez-Negre J, Mendez J. Prevalence of fecal Incontinence in women during pregnancy: A large cross-sectional study. Dis Colon Rectum. 2015; 58: 1098-1103.
21. Chan S, Cheung R, Yiu K, Lee L, Chung T. Prevalence of urinary and fecal incontinence in Chinese women during and after their first pregnancy. Int Urogynecol J. 2012; 24: 1473-1479.
22. Rizk D, Hassan M, Shaheen H, Cherian J, Micallef R, Dunn E. The prevalence and determinants of health care-seeking behavior for fecal incontinence in multiparous United Arab Emirates females. Dis Colon Rectum. 2001; 44: 1850-1856.
23. Blake MR, Raker JM, Whelan K. Validity and reliability of the Bristol Stool Form Scale in healthy adults and patients with diarrhoea-predominant irritable bowel syndrome. Aliment Pharmacol Ther. 2016; 44: 693-703.
24. Kozeluhova J, Kotyza J, Balihar K, Krcma M. Risk of anal incontinence in women with inflammatory bowel diseases after delivery. Bratisl Lek Listy. 2017; 118: 328-333.
25. Jelovsek JE, Chagin K, Gyhagen M, Hagen S, Wilson D, Kattan MW. Predicting risk of pelvic floor disorders 12 and 20 years after delivery. Am J Obstet Gynecol. 2018; 218: 19.
26. Huser M, Janku P, Hudecek R. Pelvic floor dysfunction after vaginal and cesarean delivery among singleton primiparas. Int J Gynaecol Obstet. 2017; 137: 170-173.
27. Rotveit G, Daltveit AK, Hannestad YS, Hunskaar S. Urinary incontinence after vaginal delivery or cesarean section. N Engl J Med. 2003; 348: 900-907.
28. MacLennan AH, Taylor AW, Wilson DH, Wilson D. The prevalence of pelvic floor disorders and their relationship to gender, age, parity and mode of delivery. BJOG. 2000; 107: 1460-1470.
29. Abdullah B, Ayub SH, Mohd Zahid AZ, Noorneza AR, Isa MR, Ng PY. Urinary incontinence in primigravida: the neglected pregnancy predicament. Eur J Obstet Gynecol Reprod Biol. 2016; 198: 110-115.
30. Herschorn S. Female pelvic floor anatomy: the pelvic floor, supporting structures, and pelvic organs. Rev Urol. 2004; 6: S2-10.
31. Norderval S, Oian P, Revhaug A, Vonen B. Anal incontinence after obstetric sphincter tears: outcome of anatomic primary repairs. Dis Colon Rectum. 2005; 48: 1055-1061.
32. Harvey MA, Pierce M, Alter JE. Obstetrical anal sphincter injuries (OASIS): Prevention, recognition, and repair. J Obstet Gynaecol Can. 2015; 37: 1131-1148.
33. Dupuis O, Madelenat P, Rudigoz RC. Fecal and urinary incontinence after delivery: risk factors and prevention. Gynecol Obstet Fertil. 2004; 32: 540-548.
34. Shin GH, Toto EL, Schey R. Pregnancy and postpartum bowel changes: constipation and fecal incontinence. Am J Gastroenterol. 2015; 110: 521-529.
35. Laine K, Egil Skjeldestad F, Sandvik L, Staff AC. Prevalence and risk indicators for anal incontinence among pregnant women. ISRN Obstet Gynecol. 2013; 947572.