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The Impact of Urinary Incontinence on the Quality of Life during Pregnancy among Saudi Women: A Cross-Sectional Study

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Abstract **Objective:** To evaluate the prevalence and impact of urinary incontinence (UI) on the quality of life (QOL) of pregnant women in Saudi Arabia. **Methods:** This cross-sectional study recruited 1,286 pregnant women across Saudi Arabia (January-March 2023).Sociodemographic and obstetric data were collected. Validated instruments assessed UI severity (ICIQ-UI SF) and QOL related to lower urinary tract symptoms (ICIQ-LUTSQoL). Multivariable linear regression analyzed associations between UI and QOL. **Results:** UI prevalence was 31.3%. Overweight status (35.6%), multiple prior pregnancies (70.6%), vaginal delivery (63.1%), and third-trimester pregnancy (72.9%) significantly associated with UI. Notably, 67.8% of women did not seek medical attention. Regression analysis revealed all UI types (moderate, frequent, constant) independently predicted worseQOL ($p<0.001$ for all). **Conclusions:** This study demonstrates a high prevalence of UI among pregnant women in Saudi Arabia, with a significant negative impact on QOL. Increased awareness of UI risk factors, the importance of seeking help, and treatment options are crucial. Educational interventions could be implemented in antenatal care settings and public health campaigns.

Key Words urinary incontinence, pregnancy, quality of life

1. Introduction

Urinary incontinence is a common problem that affects many women during pregnancy. It is characterized by the involuntary leakage of urine, which can occur during activities such as sneezing, coughing, or laughing. While it is often seen as a normal part of pregnancy, urinary incontinence can have a significant impact on the quality of life of expectant mothers [1].

While there are many different reasons why pregnant women experience urine incontinence, these alterations are typically related to the physical changes brought on by pregnancy. The expanding foetus compresses the bladder, causing more frequent urine and a reduction in bladder capacity. The muscles that control the bladder can become weaker due to hormonal changes, which is another factor. Furthermore, the pelvic floor muscles which are crucial for managing urination may become even more strained as a result of the additional weight increase associated with pregnancy [2].

Urinary incontinence can have a major negative effect on a pregnant woman's quality of life. A lot of women say they feel ashamed or self-conscious about their illness, which can make them withdraw socially and stop doing things they used to love. They may experience tension and worry as a result of their leakage concern, which could be detrimental to their physical and emotional health [3].

Urinary incontinence can be difficult to manage , but there are strategies to lessen its negative effects on a pregnant woman's quality of life. Kegel exercises, commonly referred to as pelvic floor exercises, are a good way to enhance bladder control and strengthen the muscles that control urine. To assist avoid or lessen the severity of urine incontinence, it is advised that pregnant women do these exercises in their regular regimen [4].

Changes in lifestyle that can assist manage urine incontinence can also be beneficial for pregnant women, in addition to pelvic floor exercises. This include keeping a healthy

weight, drinking plenty of water, and avoiding substances that aggravate the symptoms of incontinence, like alcohol and caffeine [5]. Pregnant women can create a treatment plan that is customised to their unique requirements and circumstances by seeking assistance from healthcare specialists, such as pelvic floor physical therapists or obstetricians [6].

In this cross-sectional study, we aim to investigate the impact of urinary incontinence on the quality of life during pregnancy among Saudi women. By understanding the prevalence and effects of this common issue, we hope to highlight the importance of early detection and appropriate management strategies to improve the overall well-being of expectant mothers in Saudi Arabia.

2. Method

A. Study Design

Cross-sectional survey

B. Study Setting and Duration

All regions of Saudi Arabia (January 1, 2023 - March 31, 2023)

C. Sampling

Snowball sampling (non-probability sampling)

D. Sample Size Calculation

The initial target sample size of 384 was calculated using the OpenEpi calculator with a 95% confidence interval and a 5% margin of error. However, the final sample size was determined to be 1290 due to factors such as potential attrition rates, subgroup analyses, or the need for increased statistical power to detect smaller effect sizes.

The general formula for calculating sample size in a cross-sectional study with a single proportion can be expressed as:

$$n = \frac{Z^2 \times p(1-p)}{E^2}$$

Where:

- n is the required sample size
- Z is the Z-score corresponding to the desired confidence level (e.g., 1.96 for a 95% confidence interval)
- p is the estimated proportion of the population with a particular characteristic
- E is the margin of error

E. Inclusion Criteria

1) Saudi women who are pregnant, regardless of gestational age.
2) Women who are willing and able to provide informed consent to participate in the study.
3) Women who can communicate effectively in Arabic or English to answer study questionnaire.
4) Women with the ability to understand and complete the quality of life assessments.
5) Pregnant women experiencing urinary incontinence or have had a history of urinary incontinence during their current pregnancy.

F. Exclusion Criteria

1) Women who are not pregnant at the time of the study.
2) Non-Saudi women residing in Saudi Arabia.
3) History of childhood enuresis
4) Pelvic surgery or organ prolapse
5) Nocturnal enuresis
6) Continuous urinary leakage
7) Mental illness, psychosis, or poorly controlled diabetes mellitus

G. Data Collection

Google Forms was used to create an Arabic questionnaire. The study encompasses the following elements: the survey's objectives, participation request, socio-demographic details, obstetric characteristics, the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) for determining UI, and the ICIQ-LUTSqol (a questionnaire adapted from the King's Health Questionnaire) for assessing QOL.

There were 20 questions on the ICIQ-LUTSqol, one of which asked how severe UI was and how it affected everyday activities on a scale of 1 to 10. On a four-point scale (coded from 1 to 4), the answers to the final 19 questions covering seven domains were tallied as follows: "1-not at all," "2-slightly," "3-moderate," and "4-a lot." According to the particular items in each category, the seven domains are: role restrictions, physical limits, social limitations, personal connections, emotions, sleep, and severity measurements. The total score ranges from 19 (not at all) to 76 (a lot), with higher scales denoting greater impacts on quality of life. A score that was higher than the median was considered to indicate a low quality of life.

H. Statistical Analysis

RStudio (R version 4.2.2) was used for data analysis. Frequencies and percentages were used to represent categorical data, while the median and interquartile ranges (IQRs) were used to show continuous variables. The corresponding 95% confidence intervals (CIs) for the prevalence of urine incontinence were expressed using a one-sample proportions test with continuity correction. By building a multivariable linear regression analysis utilising the stepwise selection approach (backward selection), risk factors for low quality of life were examined. Results were given as 95% confidence intervals and beta coefficients. At $p < 0.05$, statistical significance was taken into account.

3. Results

A. Demographic and obstetric characteristics

Data from 1290 participants were initially collected. However, four records were excluded because the respondents declined to participate; therefore, we analyzed 1286 responses in the current study. A total of 462 participants indicated that they suffered from UI during pregnancy, accounting for 35.9% of the sample (95% CI, 33.3 to 38.6). Among those with UI, 87% of women had no health problems, whereas

Parameter	Category	N (%)
Age	18 to 30	126 (31.3%)
	31 to 40	217 (54.0%)
	41 to 50	53 (13.2%)
	51 to 59	4 (1.0%)
	≥ 60	2 (0.5%)
Nationality	Saudi	321 (79.9%)
	Non-Saudi	81 (20.1%)
Education	High school	65 (16.2%)
	Diploma	25 (6.2%)
	Bachelor	252 (62.7%)
	Post-graduate	60 (14.9%)
Region	Northern	29 (7.2%)
	Southern	28 (7.0%)
	Central	72 (17.9%)
	Eastern	48 (11.9%)
	Western	225 (56.0%)
BMI category	Underweight	10 (2.5%)
	Healthy	126 (31.3%)
	Overweight	143 (35.6%)
	Obese	123 (30.6%)
Number of previous pregnancies	Once	81 (20.1%)
	From 2 to 5 times	284 (70.6%)
	More than 5 times	37 (9.2%)
Obstetric history*	Vaginal delivery	241 (63.1%)
	Caesarean section	72 (18.8%)
	Vaginal and caesarean section	69 (18.1%)
*the variable had 20 missing records		

Table 1: Demographic and obstetric characteristics (N=402)

5.2% had pelvic organ prolapse, 4.3% had poorly controlled diabetes, 2.2% had nocturnal enuresis, 0.6% had chronic UI, and 0.6% had a mental illness that led to enuresis. Therefore, 402 women had UI and no concomitant health problems, with a prevalence of 31.3% (95% CI, 28.7 to 33.9). The latter subgroup was further analyzed in the subsequent analyses. More than half of them aged 31 to 40 years (54.0%) were residing in the Western region (56.0%) and had a bachelor's degree (62.7%). The majority of women under study were Saudis (79.9%). Overweight and obesity were prevalent among 35.6% and 30.6% of the sample, respectively. Additionally, 70.6% of women had 2 to 5 previous pregnancies, and 63.1% of women underwent vaginal deliveries (Table 1).

B. Characteristic of women with urinary incontinence

In general, a total of 604 urine leakage symptoms were reported among patients, of which stress, urge, and mixed incontinence symptoms represented 82.1%, 47.3%, and 6.7%, respectively (Figure 1). Furthermore, UI symptoms occurred in the third trimester among 72.9% of women, and 33.8% of them had urine leakage several times a day. More than half of women leaked small amounts of urine (57.7%) and had told someone close to them about their problem (50.7%). Only 18.2% of women had consulted a physician regarding their problem; of them, only 11.3% declared that their problem had been completely resolved. Of those who did not consult a physician, 67.8% of women indicated that the problem was not severe enough to require medical attention (Table 2).

*Small amount means only drops of urine, moderate amount indicates wetting of pads and large amount refer

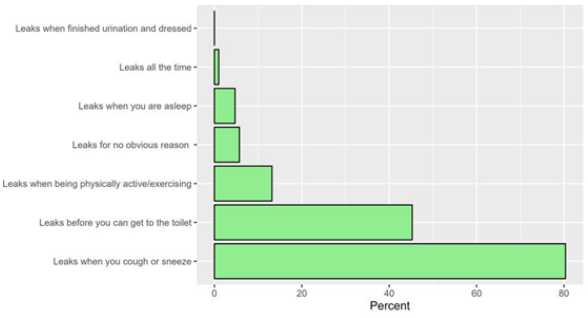

Figure 1: The proportions of incontinence categories out of symptomatic women (n = 604)

Parameter	Category	N (%)
Trimester (time of beginning of UI)	First trimester	41 (10.2%)
	Second trimester	68 (16.9%)
	Third trimester	293 (72.9%)
How often do you leak urine?	About once a week or less often	80 (19.9%)
	Two to three times a week	87 (21.6%)
	About once a day	89 (22.1%)
	Several times a day	136 (33.8%)
	All the time	10 (2.5%)
How much urine do you usually leak?*	Small amount	232 (57.7%)
	Moderate amount	155 (38.6%)
	Large amount	15 (3.7%)
Have you told someone close to you about this problem?	Yes	204 (50.7%)
	No	198 (49.3%)
Has the doctor been consulted with this problem?	Yes	73 (18.2%)
	No	329 (81.8)
If the answer is no, what is the reason for not consulting a doctor?**	I did not think it was a big problem that needs medical attention	221 (67.8%)
	I did not know that there is a medical treatment for urinary incontinence	30 (9.2%)
	I thought it was normal to experience this with aging	21 (6.4%)
	Embarrassment from the topic	30 (9.2%)
	I did not want to take a consultation from a male doctor	2 (0.6%)
	Other reasons	22 (6.7%)
If yes, what is the outcome of the medical consultation that you requested?	Problem not solved	37 (52.1%)
	Problem partially solved	26 (36.6%)
	Problem completely solved	8 (11.3%)

Table 2: Characteristic of women with urinary incontinence (N=402)

to significant leakage of urine. **descriptive statistics are based on the responses of 329 participants who did not consult a doctor regarding UI (the variable had three missing responses). ¥descriptive statistics are based on the responses of 73 participants who consulted a doctor regarding UI (the variable had two missing responses).

C. Characteristics of the quality of life

The median (IQR) QOL score was 33.0 (27.0 to 42.0), with a minimum of 19 and a maximum of 76. The items of the QOL domain showed excellent internal consistency (Cronbach's alpha = 0.929, 19 items). Based on the median value, 206 participants (51.2%) had poor QOL (≥ 33). The distribution of participants' ratings of their perceived effects of UI on daily activities on a 1-10 scale is depicted in Figure 2. Regarding the scores of QOL subscales, we standardized the scores to their percent values to be easily interpreted. The highest median (IQR) scores were related to the severity measures (median = 62.5, IQR = 50.0 to 75.0), whereas the lowest scores were reported for the personal relationship

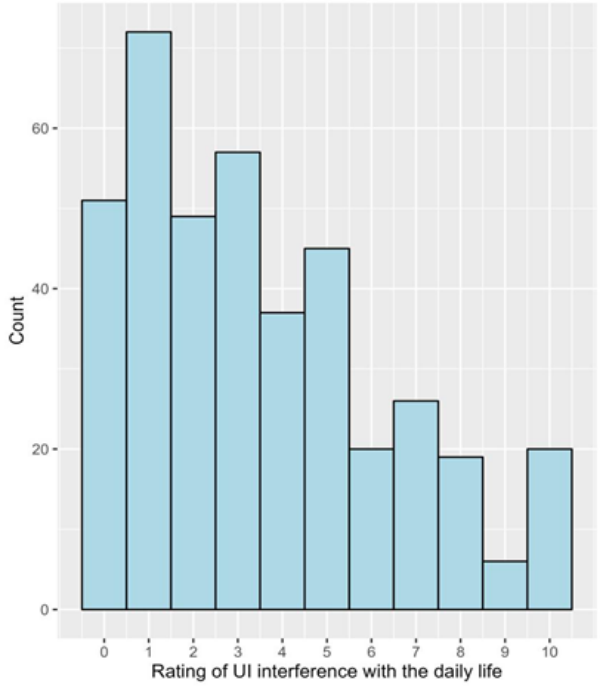

Figure 2: A histogram showing the frequency distribution of participants' rating of UI effects on the daily activities

Subscale	Median (IQR)	Mean ± SD
Emotion limitation	41.7 (25.0 to 50.0)	44.4 ± 22.1
Personal relationship	25.0 (25.0 to 50.0)	38.2 ± 19.2
Physical limitation	37.5 (25.0 to 50.0)	44.1 ± 21.1
Role limitation	37.5 (25.0 to 50.0)	44.7 ± 19.9
Severity measures	62.5 (50.0 to 75.0)	63.9 ± 18.1
Sleep limitation	37.5 (25.0 to 50.0)	39.9 ± 19.1
Social limitation	37.5 (25.0 to 50.0)	43.7 ± 22.9

Table 3: Descriptive data of the standardized subscale scores of patients' QOL

(median = 25.0, IQR = 25.0 to 50.0, (Table 3).

D. Risk factors for higher scores of the QOL

Risk factors for poor quality of life among women with UI were assessed by constructing a generalized linear regression model using the QOL score as a dependent variable. We incorporated all of the demographic and incontinence-related variables in the preliminary model as independent variables, and the significant variables of interest were further selected by implementing a bootstrap procedure to assess the variability of model selection under a stepwise approach. The final model included the following independent variables: trimester, frequency of urine leakage, amount of urine leaked, and physicians' consultation, as well as the types of incontinence (urge, stress, and mixed). The model showed no influential values, and no independent variables showed a risk of multicollinearity (the variance inflation factor was < 5 for all independent variables).

Results of the multiple regression model showed that the risk of a high QOL score (indicating poorer quality of life)

Parameter	Category	Beta	95% CI	p-value
Trimester	First trimester	Ref	Ref	
	Second trimester	4.55	-0.17, 9.28	0.060
	Third trimester	0.8	1.00, 4.83	0.699
How often do you leak urine?	About once a week or less often	Ref	Ref	
	Two to three times a week	3.53	-0.02, 7.09	0.052
	About once a day	3.21	-0.37, 6.79	0.079
	Several times a day	6.57	3.25, 9.90	<0.001
	All the time	12.3	4.85, 19.7	0.001
How much urine do you usually leak?	Small amount	Ref	Ref	
	Moderate amount	4.49	2.14, 6.84	<0.001
	Large amount	5.16	1.00, 11.5	0.112
Urge	No	Ref	Ref	
	Yes	3.00	0.54, 5.45	0.017
Stress	No	Ref	Ref	
	Yes	4.75	1.32, 8.19	0.007
Mixed	No	Ref	Ref	
	Yes	6.49	1.25, 11.7	0.016
Has the doctor been consulted with this problem?	No	Ref	Ref	
	Yes	2.23	-0.72, 5.18	0.139

Table 4: Risk factors for the QOL among women with urinary incontinence

was independently associated with the leakage of a moderate amount of urine (beta = 4.5, 95%CI, 2.1 to 6.8, p < 0.001), as well as the leakage of urine several times a day (beta = 6.6, 95%CI, 3.3 to 9.9, p < 0.001) and all the time (beta = 12.3, 95%CI, 4.9 to 19.7, p = 0.001). Additionally, higher scores of QOL were significantly predicted by all types of incontinence, including urge incontinence (beta = 3.0, 95% CI, 0.5 to 5.5, p = 0.017), stress incontinence (beta = 4.8, 95% CI, 1.3 to 8.2, p = 0.007) and mixed incontinence (beta = 6.5, 95% CI, 1.3 to 11.7, p = 0.016, Table 4).

The same significant variables were further assessed for the seven subscales of QOL (Table 5). Results showed that role limitation was independently associated with being in the second trimester (p = 0.026), leakage of urine several times a day (p = 0.005) and all the time (p = 0.011), leakage of a moderate amount of urine (p < 0.001) and having an urge or mixed incontinence (p = 0.020 for both). Physical limitation was also predicted by being in the second trimester (p = 0.011), urine leakage several times a day (p = 0.004) and all the time (p = 0.007), leakage of a moderate amount of urine (p = 0.002), and consulting a physician with the problem, as well as having urge (p = 0.005), stress (p = 0.016) and mixed incontinence (p = 0.001). Regarding social limitation, results indicated that it was associated with urine leakage several times a day (p = 0.027), leakage of a moderate amount of urine (p < 0.001), as well as having urge (p = 0.003), stress (p = 0.017) and mixed incontinence (p = 0.007). Higher scores of the personal relationship limitation were associated with being in the second trimester (p = 0.017) and urine leakage several times a day (p = 0.003). In contrast, emotional limitation was associated with leakage of a large amount of urine (p = 0.025) and stress incontinence (p = 0.030). Additionally, leakage of urine several times a day (p = 0.027) and all the time (p = 0.018), urine leakage in a moderate amount (p = 0.002), and urge incontinence (p = 0.032) were independently associated with sleep limitation.

Items indicative of incontinence severity were associated with urine leakage two to three times a week ($p = 0.022$), once a day ($p = 0.008$), several times a day ($p < 0.001$) and all the time ($p < 0.001$), as well as leakage of a moderate amount of urine ($p = 0.002$, Table 5).

4. Discussion

According to this study, there is a 31.3% association between UI and Saudi Arabian pregnant women. It demonstrates that stress incontinence is the kind most frequently linked to a low quality of life. Trimester, parity, BMI, age, and mode of delivery were the primary statistically significant variables associated with UI. Moreover, SUI is the most common type of user interface, with MUI and UUI coming in second and third, respectively, with percentages of 82.1%, 47.3%, and 6.7%. Ethiopia (58.9%, 30.14%, and 10.69%, respectively) and Malaysia (64.8%, 24.8%, and 6.7%, respectively) also saw results along similar lines [7], [8].

Furthermore, almost two-thirds of pregnant women are multiparous, whereas only 20.1% are primigravidae, making this one of the most significant risk factors for UI during pregnancy. Overall, these results are consistent with a Brazilian study that found patients who had two to three children had three times the likelihood of having UI compared to nulliparous women, and patients who had more than three children had five times the likelihood of having UI [9]. This may be the result of mechanical strain sustained during repeated delivery, which can lead to damage to the neurological and connective tissues of the pelvic organs as well as injuries to the muscle, fascia, and ligamentous disruption [10]. According to this study, the likelihood of developing UI rises in the third trimester (72.9%) compared to the first and second trimesters (10.2% and 16.9%, respectively). Urine leakage occurs due to strain on the bladder caused by two major factors: the growth of the uterus and the increase in foetal weight with gestational age [11].

The percentage reach of UI was much higher for vaginal deliveries (63.1%) than for Caesarean sections (18.8%). According to a systematic review and meta-analysis study, vaginal delivery is linked to an almost two-fold higher incidence of long-term SUI than Caesarean section due to perineal injury sustained during childbirth [12], [13]. These results are in close agreement with that study. The perspectives of expectant mothers regarding UI are further clarified by our study. While just 18.2% of women asked for assistance, 67.8% of the other group did not; yet, this is not a serious issue that requires medical care. Just 13% of pregnant women in the Netherlands sought assistance for UI, according to a comparable survey [14]. However, Saudi women who had seen a doctor for their health issues were less likely to report having a bad quality of life. This study revealed a substantial limitation in every QOL domain across all UI types, particularly in severity measures (pad usage, hydration restriction, changing pants, and urine odour), which was the domain most adversely affected, and then emotional limitation.

Conversely, the category that was least impacted was interpersonal interactions. Our regression analysis showed that, in our population, UI severity had the greatest impact on QOL. Previous research from Malaysia and Europe, which demonstrated that severity was the most important predictor of QOL among pregnant women with UI, irrespective of the kind of UI, predicted this outcome [15]. Furthermore, mid-trimester, urge, stress, mixed, and moderate to severe urine leakage were additional characteristics associated with low quality of life in pregnant women with UI. The mid-late trimester, all forms of UI, and age over 35 were the Malaysian study's predictors of poor quality of life [2]. Our research showed that Saudi Arabian pregnant women with UI had a notably lower quality of life. In addition, pregnant women with severe UI have a much lower quality of life (QOL) because they limit their fluid intake to minimise the frequency with which they must use the restroom at home or in public.

Additionally, frequent nighttime pee leaks reduce the quantity and quality of sleep. Because UI affects all QOL domains, the patient's life may be significantly influenced in a number of ways. From a psychological standpoint, UI can lead to concerns about a bad odour and the need to change pants frequently. It can also affect a pregnant woman's emotional and sexual health, as well as her ability to engage in her favourite activities. Low self-esteem can result from all of this. Most women do not seek treatment, despite the fact that it can help lessen the severity of their symptoms and improve their quality of life, even when their symptoms cause them great distress and interfere with their everyday activities. Therefore, it is imperative to raise public awareness about UI risk factors, the value of seeking help, the availability of treatment, and its outcomes, either through antenatal care visits or through general public education.

A. Study Strengths

The study provides a unique focus on investigating the impact of urinary incontinence on the quality of life during pregnancy among Saudi women, addressing a significant yet underexplored issue in women's health. By honing in on this specific aspect, the research has the potential to contribute valuable insights to the existing body of knowledge related to pregnancy-related concerns for women in Saudi Arabia.

Utilizing a cross-sectional design, the study captures data at a single point in time, offering a comprehensive snapshot of the prevalence and impact of urinary incontinence on quality of life among pregnant Saudi women. This design enables efficient data collection across a diverse range of participants and can facilitate a cost-effective and timely analysis of the research objectives.

The structured questionnaire developed for the study, incorporating validated tools like the ICIQ-UI SF and ICIQ-LUTSqol, ensures the collection of standardized and reliable data for thorough analysis. By employing these rigorous measurement instruments, the research maintains scientific rigor and facilitates meaningful comparisons with existing

Parameter	Category	Role limitation	Physical limitation	Social limitation	Personal relationship	Emotion limitation	Sleep limitation	Severity measures
		Beta (95% CI)	Beta (95% CI)	Beta (95% CI)	Beta (95% CI)	Beta (95% CI)	Beta (95% CI)	Beta (95% CI)
Trimester (time of beginning of urinary incontinence)	First trimester	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Second trimester	0.72 (0.09 to 1.36) p = 0.026	0.87 (0.20 to 1.53) p = 0.011	0.73 (0.00 to 1.47) p = 0.052	1.16 (0.21 to 2.11) p = 0.017	0.40 (-0.71 to 1.50) p = 0.484	0.36 (-0.28 to 0.99) p = 0.269	0.16 (-0.99 to 1.32) p = 0.78
	Third trimester	0.12 (-0.42 to 0.66) p = 0.657	0.34 (-0.23 to 0.91) p = 0.238	0.22 (-0.41 to 0.86) p = 0.485	0.44 (-0.37 to 1.25) p = 0.286	-0.14 (1.00 to 0.80) p = 0.769	0.08 (-0.47 to 0.62) p = 0.783	-0.04 (1.00 to 0.95) p = 0.941
How often do you leak urine?	About once a week or less often	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Two to three times a week	0.43 (-0.05 to 0.91) p = 0.079	0.38 (-0.12 to 0.88) p = 0.135	0.35 (-0.21 to 0.90) p = 0.222	0.65 (-0.07 to 1.36) p = 0.078	0.24 (-0.59 to 1.08) p = 0.57	0.25 (-0.23 to 0.72) p = 0.312	1.03 (0.15 to 1.90) p = 0.022
	About once a day	0.42 (-0.06 to 0.90) p = 0.086	0.27 (-0.23 to 0.77) p = 0.294	0.07 (-0.49 to 0.63) p = 0.802	0.55 (-0.17 to 1.27) p = 0.135	0.12 (-0.72 to 0.96) p = 0.786	0.30 (-0.18 to 0.78) p = 0.222	1.20 (0.32 to 2.08) p = 0.008
	Several times a day	0.65 (0.20 to 1.09) p = 0.005	0.70 (0.23 to 1.17) p = 0.004	0.59 (0.07 to 1.11) p = 0.027	1.04 (0.37 to 1.71) p = 0.003	0.52 (-0.26 to 1.30) p = 0.189	0.50 (0.06 to 0.95) p = 0.027	1.99 (1.17 to 2.80) p <0.001
	All the time	1.30 (0.30 to 2.29) p = 0.011	1.46 (0.41 to 2.51) p = 0.007	0.94 (-0.22 to 2.10) p = 0.114	0.88 (-0.61 to 2.38) p = 0.247	1.35 (-0.39 to 3.09) p = 0.13	1.21 (0.21 to 2.20) p = 0.018	4.17 (2.35 to 5.99) p <0.001
How much urine do you usually leak?	Small amount	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Moderate amount	0.64 (0.33 to 0.96) p <0.001	0.52 (0.19 to 0.86) p = 0.002	0.68 (0.31 to 1.04) p <0.001	0.38 (-0.10 to 0.85) p = 0.121	0.41 (-0.14 to 0.96) p = 0.148	0.49 (0.18 to 0.81) p = 0.002	0.92 (0.35 to 1.50) p = 0.002
	Large amount	0.75 (-0.11 to 1.60) p = 0.087	0.23 (-0.67 to 1.13) p = 0.616	0.62 (-0.37 to 1.61) p = 0.222	0.00 (1.00 to 1.28) p = 0.997	1.71 (0.22 to 3.20) p = 0.025	0.61 (-0.24 to 1.47) p = 0.159	1.01 (-0.55 to 2.57) p = 0.203
Urge	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Yes	0.39 (0.06 to 0.72) p = 0.02	0.50 (0.15 to 0.85) p = 0.005	0.59 (0.21 to 0.97) p = 0.003	0.43 (-0.06 to 0.93) p = 0.088	0.35 (-0.23 to 0.92) p = 0.237	0.36 (0.03 to 0.69) p = 0.032	0.29 (-0.31 to 0.90) p = 0.339
Stress	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Yes	0.44 (-0.02 to 0.91) p = 0.059	0.60 (0.11 to 1.08) p = 0.016	0.66 (0.12 to 1.20) p = 0.017	0.69 (0.00 to 1.39) p = 0.05	0.90 (0.09 to 1.70) p = 0.03	0.33 (-0.14 to 0.79) p = 0.167	0.80 (-0.05 to 1.64) p = 0.064
Mixed	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Yes	0.84 (0.14 to 1.54) p = 0.02	1.21 (0.47 to 1.95) p = 0.001	1.14 (0.32 to 1.96) p = 0.007	0.59 (-0.46 to 1.64) p = 0.273	0.80 (-0.43 to 2.03) p = 0.202	0.47 (-0.23 to 1.17) p = 0.191	1.18 (-0.11 to 2.46) p = 0.073
Has the doctor been consulted with this problem?	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Yes	0.17 (-0.22 to 0.57) p = 0.390	0.60 (0.19 to 1.02) p = 0.005	0.17 (-0.29 to 0.63) p = 0.465	0.08 (-0.52 to 0.67) p = 0.797	0.46 (-0.23 to 1.16) p = 0.189	0.38 (-0.01 to 0.78) p = 0.058	0.55 (-0.17 to 1.27) p = 0.137

Table 5: Results of the multivariable linear regression analysis for the risk factors of QOL scores

literature on urinary incontinence and quality of life during pregnancy.

Incorporating the ethical requirement of obtaining informed consent from participants underscores the study's commitment to upholding ethical standards in research. By ensuring that participants are fully informed about the study's purpose, procedures, and potential implications, the research safeguards participant rights and confidentiality, enhancing the credibility of the study.

5. Study Limitations

The generalizability of the study's findings may be constrained by the specific focus on pregnant Saudi women, limiting the applicability of the results to broader populations. Unique cultural, healthcare, and socio-economic factors prevalent in Saudi Arabia may restrict the transferability of the findings to other contexts and populations.

Relying on self-reported data, particularly concerning sensitive topics like urinary incontinence and quality of life, introduces the potential for bias and subjectivity. Participant responses may be influenced by recall biases or social desirability, impacting the accuracy and reliability of the data collected for the study.

The cross-sectional design's inherent limitations restrict the study to a single data collection point, preventing the establishment of causal relationships between urinary incontinence and quality of life during pregnancy. Longitudinal studies would offer a more robust understanding of the dynamic interplay between these variables over time.

Possible response bias stemming from self-selection of participants volunteering for the study may lead to differences in characteristics or experiences compared to non-participants, potentially introducing selection bias. Addressing this bias is crucial to maintaining the study's internal validity and ensuring the generalizability of the findings to the target population.

6. Conclusion

Approximately 31% of pregnant women in Saudi Arabia encounter urinary incontinence, a condition that can markedly affect their quality of life irrespective of the specific type of urinary incontinence. Therefore, it is imperative to raise awareness among pregnant women about the risk factors associated with urinary incontinence, emphasize the significance of seeking help, and ensure that information regarding available treatments and their outcomes is readily accessible. This education and support can be effectively integrated into routine antenatal care visits and augmented by enhancing public awareness initiatives. By taking proactive measures to address urinary incontinence in pregnant women, we can improve their overall well-being and quality of life during this crucial stage of pregnancy.

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Ethical Approval

Final Approval From the Biomedical Research Ethics Committee. Approval No. (HAPO-02-K-012-2023-01-1406)

Conflict of interest

The authors declare no conflict of interests. All authors read and approved final version of the paper.

Authors Contribution

All authors contributed equally in this paper.

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