# RESEARCH

Prevalence of stress urinary incontinence symptoms and their impact on the quality of life of Palestinian women: the first large cross-sectional study among the general population

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# Abstract

**Background** Little studies were conducted to assess the prevalence of stress urinary incontinence among Palestinian women. This study was conducted to determine the prevalence of stress urinary incontinence symptoms, their impact on the quality of life, and the risk factors that were associated with stress incontinence symptoms among Palestinian women.

**Methods** This study was conducted in a cross-sectional design from 2023 to 2024. The data were collected through an interviewer-administered questionnaire. The questionnaire collected the demographic and health characteristics of the women. Additionally, the questionnaire also contained the PRAFAB questionnaire (PRAFAB-Q). Moreover, the questionnaire included the Assessment of Quality of Life (AQoL)-8D scale.

**Results** Data were collected from 386 Palestinian women (response rate = 85.8%). The mean age of women in this study was  $37.1 \pm 14.7$  years. In this study, 104 (26.9%) reported stress urinary incontinence symptoms. Of the women, 102 (26.4%) reported urinary leakage during coughing, 100 (25.9%) reported urinary leakage during sneezing, and 94 (24.4%) reported urinary leakage during laughing. The women who had a family history of stress incontinence were 2.5-fold (95% CI: 1.2–5.2) more likely to have stress incontinence symptoms compared to the women who did not have a family history of stress incontinence. Similarly, the women who were overweight/obese were 2.0-fold (95% CI: 1.1–3.7) more likely to have stress incontinence symptoms compared to the women who were underweight or had a normal weight. PRAFAB-Q scores were predicted by place of residence, family history of stress incontinence, and being recruited from a hospital.

**Conclusion** The study reported a high prevalence of stress urinary incontinence and identified the risk factors that were associated with stress incontinence symptoms among Palestinian women. The findings showed that the

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intensity of stress urinary incontinence symptoms was associated with deteriorated quality of life of the affected women. These findings could be used by urologists, gynecologists, obstetricians, and other healthcare providers caring for women to design ways to reduce the burden of stress urinary incontinence among Palestinian women and improve their quality of life.

Keywords Stress incontinence, Women's health, Lower urinary symptoms, Quality of life

# Background

Stress urinary incontinence is a silent epidemic that has a serious impact on the quality of life of the affected patients [1]. Stress urinary incontinence is one of the most prevalent health problems in older age that is often reported among women [2]. This health condition was reported to cause physical, psychological, social, sexual, and economic issues leading to poor quality of life [3].

The prevalence of stress urinary incontinence among adult women was estimated at 46% [4]. Although the prevalence rates of stress urinary incontinence were variable, in general, these rates increased with age, body mass index (BMI), and during pregnancy [4, 5]. The other risk factors reported in the previous studies included White race and vaginal delivery [6]. Obesity and pregnancy can increase the intra-abdominal pressure. This can weaken the pelvic floor innervation and musculature [7]. This, in turn, can lead to more stress urinary incontinence symptoms. Additionally, these risk factors also contributed to the severity of the symptoms and their impact on the quality of life of the affected women [8].

The pathophysiology of stress urinary incontinence includes a reduction in urethral resistance in the absence of detrusor activity [9]. Exercises for the pelvic floor muscles and weight loss in overweight or obese women are examples of effective early therapies [10]. The mechanism of stress urinary incontinence is still imperfectly understood. Additionally, the optimal treatment strategies for the affected women still need further improvements. For women with bothersome symptoms that do not improve with previous treatments, there are still additional options, such as pessaries or surgery (most frequently mid-urethral mesh sling surgery) [6].

Stress urinary incontinence is a distinct type of urinary incontinence that is characterized by involuntary loss of urine while performing physical activity or movements that increase abdominal pressure [6]. These also include sneezing, coughing, laughing, exercising, and/or lifting heavy weights/objects. Given that the female reproductive and urine systems have similar physical characteristics, females are more likely to experience urinary issues that interfere with sexual function [1, 2, 9]. It is believed that stress urinary incontinence causes various selfesteem issues and anxiety in women. Female sexual function is impacted by the fear and anxiety of stress urinary incontinence during sexual intercourse, and this is linked to the unpredictable nature and chronicity of stress urinary incontinence [11].

In Palestine, a study was conducted to assess urinary incontinence among Palestinian women who had type 2 diabetes mellitus [12]. The study reported a high prevalence of urinary incontinence among Palestinian women with type 2 diabetes mellitus. However, few studies were conducted to assess the prevalence of stress urinary incontinence among Palestinian women with other risk factors. Therefore, this study was conducted to determine the prevalence of stress urinary incontinence among Palestinian women and to assess the risk factors that could be associated with stress urinary incontinence among Palestinian women. Additionally, the impact of stress urinary incontinence symptoms on the quality of life of the affected women was also assessed.

### Methods

### Study design

This study was conducted in a cross-sectional design. The study design was chosen because of its utility in enabling a reliable estimation of the prevalence of stress urinary incontinence symptoms among women. Therefore, the cross-sectional study design was the most appropriate design to meet the objectives of the study. The study was conducted and reported in adherence to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement. Adherence to the STROBE statement is shown in Supplementary Table S1.

# Settings

This study was conducted among women in the general Palestinian society. Because we aimed to recruit a large sample of Palestinian women from the general society to assess the prevalence of stress urinary incontinence, women were approached, invited, and recruited from universities, schools, primary healthcare centers, hospitals, and other places where women can be conveniently approached. The women who participated in this study were recruited in the period between October 2023 and March 2024.

# Participants

The target population of the study was Palestinian women in the general society. The eligibility criteria included Palestinian women, living in villages, cities, and refugee camps, expressing willingness to participate in the study, and providing informed consent.

### Variables, data collection, and measurements

In this study, demographic variables of the women including age, weight, and height were collected. The body mass index (BMI) was calculated from weight and height as body weight divided by the square of the body height. The BMI was categorized as follows: underweight weight: less than 18.5 18.5 kg/m<sup>2</sup>, normal weight: 18.5 to less than 25 kg/m<sup>2</sup>, overweight: 25 to less than 30 kg/  $m^2$ , and obese: 30 kg/m<sup>2</sup> or greater [13]. The place of residence was collected as city, village, or refugee camp, the marital status of the women was collected as never married (single) or ever married (currently married, divorced, or widow), and the employment status was collected as employed or unemployed. The women were also asked about their health status including smoking, history of parturition, menopause, history of diabetes mellitus, history of hypertension, history of pelvic surgery, history of chronic cough, and family history of stress urinary incontinence.

The women were asked to report stress urinary incontinence symptoms including urinary leakage during coughing, laughing, sneezing, and/or exercise.

To assess the severity and impact of stress urinary incontinence symptoms among women, the PRAFAB Questionnaire (PRAFAB-Q) was used [14, 15]. The PRA-FAB-Q objectively and subjectively assessed the aspects of stress urinary incontinence symptoms in terms of protection (use of pads), amount (of urine leakage), frequency (of urine leakage), adjustment (changes in behaviors as a result of stress urinary incontinence symptoms), and body image (impact of stress urinary incontinence symptoms on self-image). Each part of the PRAFAB-Q contained 5 items and each item can be awarded up to 4 points (1 to 4). The maximal total PRAFAB-Q score can be 20 points (range 5–20) [16].

The impact of stress urinary incontinence symptoms on the quality of life of the women was assessed using the 35-item Assessment of Quality of Life (AQoL)-8D scale [17]. The AQoL-8D scale assessed the impact of stress urinary incontinence symptoms on 8 domains: independent living (4 items), pain (3 items), senses (3 items), happiness (4 items), mental health (8 items), coping (3 items), relationships (7 items), and self-worth (3 items) of the women. Items in each domain can be awarded up to 4–6 points. The maximal total AQoL-8D score can be 175 points (range 35–175). A higher score indicated severe deterioration in the quality of life of the affected woman.

The data were collected through an interviewer-administered questionnaire. The questionnaire collected the demographic and health status variables of the women. The interviews were conducted by final-year medical students who were trained to conduct interviews with patients to collect their demographic information, and past medical and surgical history, and inquire about their health complaints. During the interviews, the women had the opportunity to ask the interviewer to clarify/ explain any unclear item.

### Validity and reliability

Both, the PRAFAB-Q and the AQoL-8D scales are reliable and valid tools. Previous studies have established that the scales had acceptable internal consistency and stable test-retest scores [14, 18]. As the women were native Arabic speakers, the items in the questionnaire were in Arabic. The items were translated from English to Arabic (forward translation). To assess the accuracy of the translation, the items were back-translated from Arabic to English (back translation) as previously done for other languages [19]. In this study, the PRAFAB-Q had a Cronbach's alpha of 0.84 and the AQoL-8D had a Cronbach's alpha of 0.95. These values indicated acceptable internal consistency of the scales used in this study.

### Sample size and sampling technique

At the time of the study, approximately 1.5 million women were living in the West Bank of Palestine. The sample size was calculated using Raosoft sample size calculator (http://www.raosoft.com/) at a confidence interval of 95% and a margin of error of 5%. The response proportion was set at 50%. The sample size needed for this study was 385 women. A convenience sampling approach was followed to recruit the sample size needed for this study. To account for potential refusal to participate, it was planned to invite 450 women.

### Data analysis

The data collected in this study were handled and analyzed using IBM SPSS v.24. The categorical data were described using frequencies (n) and percentages (%). Continuous data were described using means±standard deviations (SD). Distributions of categorical variables were assessed using Chi-square tests. To control potentially confounding factors and to calculate the odds ratios (OR), the variables that were significantly associated in the Chi-square tests were included in a multivariate logistic regression model. Continuous data were compared using t-tests or analysis of variance (ANOVA), as appropriate. Correlations were investigated using Pearson's correlations. To control potentially confounding factors, the variables that were significantly associated in the t-tests and ANOVA were included in a multiple linear regression model. The goodness-of-fit was assessed

**Table 1** The variables of the women who participated in this study (n = 386)

| Variable                                       | Mean±SD<br>or <i>n</i> (%) |
|--|----------------------------|
| Age (years), (mean ± SD)                       | 37.1±14.7                  |
| Weight (kg), (mean±SD)                         | $71.8 \pm 14.9$            |
| Height (cm), (mean ± SD)                       | $161.5 \pm 7.7$            |
| BMI (kg/m²), (mean±SD)                         | $27.9 \pm 9.5$             |
| BMI categories                                 |                            |
| Underweight, <i>n</i> (%)                      | 10 (2.6)                   |
| Normal weight, n (%)                           | 121 (31.5)                 |
| Overweight/obese, n (%)                        | 253 (65.5)                 |
| Place of residence                             |                            |
| City, n (%)                                    | 228 (59.1)                 |
| Village, n (%)                                 | 121 (31.3)                 |
| Refugee camp, <i>n</i> (%)                     | 37 (9.6)                   |
| Marital status                                 |                            |
| Never married, n (%)                           | 129 (33.4)                 |
| Ever married, <i>n</i> (%)                     | 257 (66.6)                 |
| A history of parturition, <i>n</i> (%)         | 201                        |
|  | (52.1%)                    |
| Employment status                              |                            |
| Employed, n <i>n</i>                           | 123 (31.9)                 |
| Unemployed, n (%)                              | 263 (68.1)                 |
| Health status                                  |                            |
| Smokers, n (%)                                 | 55 (14.2)                  |
| Smoking pack years, (mean $\pm$ SD)            | $9.4 \pm 12.5$             |
| A history of diabetes mellitus, <i>n</i> (%)   | 44 (11.4)                  |
| A history of hypertension, <i>n</i> (%)        | 32 (8.3)                   |
| A history of pelvic surgery, <i>n</i> (%)      | 65 (16.8)                  |
| A history of chronic cough, <i>n</i> (%)       | 25 (6.5)                   |
| Menopause, n (%)                               | 74 (19.2)                  |
| A family history of stress incontinence, n (%) | 37 (9.6)                   |
| The place from where the women were recruited  |                            |
| Hospital, n (%)                                | 180 (46.6)                 |
| University, n (%)                              | 77 (19.9)                  |
| School, <i>n</i> (%)                           | 42 (10.9)                  |
| Primary healthcare center, n (%)               | 87 (22.5)                  |

BMI: body mass index, SD: standard deviation

using the  $R^2$ . Variance inflation factors of less than 1.8 and tolerance values of >1.2 indicated an absence of multicollinearity problems. A p-value of <0.05 indicated statistical significance.

# Results

### Characteristics of the women

Of the 450 women invited, data were collected from 386 Palestinian women, giving a response rate of 85.8%. The mean age of the women who participated in this study was  $37.1\pm14.7$  years. The majority of the women (n=253, 65.5%) were overweight or obese. Of the women, 228 (59.1%) lived in cities, 257 (66.6%) were ever married, and 123 (31.9%) were employed. The variables of the women are shown in Table 1.

| Symptoms                             | n (%)      |
|--------------------------------------|------------|
| Stress urinary incontinence symptoms | 104 (26.9) |
| Urinary leakage during coughing      | 102 (26.4) |
| Urinary leakage during laughing      | 94 (24.4)  |
| Urinary leakage during sneezing      | 100 (25.9) |
| Urinary leakage during exercise      | 45 (11.7)  |

**Table 3** PRAFAB-Q scale answers among the women who had stress urinary incontinence symptoms

| Item                                     | n (%)     |
|--|-----------|
| Protection                               |           |
| Never                                    | 76 (73.1) |
| Sometimes                                | 20 (19.2) |
| Usually                                  | 6 (5.8)   |
| Always                                   | 2 (1.9)   |
| The amount of urine                      |           |
| A drop or less                           | 60 (57.7) |
| A trickle                                | 35 (33.7) |
| Wets noticeably my protection or clothes | 6 (5.8)   |
| My protection is soaked/leaks frequency  | 3 (2.9)   |
| Involuntary loss of urine occurs         |           |
| ≤1/week                                  | 83 (79.8) |
| < 3/week                                 | 15 (14.4) |
| >3/week                                  | 4 (3.8)   |
| Every day                                | 2 (1.9)   |
| Adjustment implications of urine loss    |           |
| None                                     | 84 (80.8) |
| Stopped physically demanding activities  | 17 (16.3) |
| Stopped most physical activities         | 3 (2.9)   |
| l almost never go out                    | 0 (0)     |
| Body/self-image                          |           |
| Not bothered                             | 62 (59.6) |
| Annoying/troublesome                     | 25 (24)   |
| Feel dirty                               | 15 (14.4) |
| Disgusted                                | 2 (1.9)   |

# Prevalence of stress urinary incontinence symptoms among the women

In this study, 104 (26.9%) women reported stress urinary incontinence symptoms, and 282 (73.1%) women did not report stress urinary incontinence symptoms. Of the women, 102 (26.4%) reported urinary leakage during coughing, 100 (25.9%) reported urinary leakage during sneezing, and 94 (24.4%) reported urinary leakage during laughing. The stress incontinence symptoms reported by the women are shown in Table 2.

# Answers of the women on the PRAFAB-Q

The mean PRAFAB-Q score was  $7.0\pm2.6$ . The distribution of the answers of the women on the PRAFAB-Q items is shown in Table 3.

### Answers of the women on the AQoL-8D scale

The distribution of answers of the women on the AQoL-8D scale is shown in Table 4. The mean AQoL-8D overall score was  $61.5\pm18.4$ . The scores of the 8 domains: independent living, pain, senses, happiness, mental health, coping, relationships, and self-worth are shown in Supplementary Table S2.

# Association between the variables of the women, stress urinary incontinence, PRAFAB-Q scores, and AQoL-8D scores

When the categorical variables were compared using Chi-square tests, stress urinary incontinence was significantly associated with older age, being overweight/obese, being married, having a history of diabetes mellitus, having a history of hypertension, having a history of parturition, being in menopause, and having a family history of stress urinary incontinence. These associations are shown in Supplementary Table S3.

The PRAFAB-Q scores were significantly higher for the women who were older than 50 years, lived in refugee camps, had a history of diabetes mellitus, had a history of hypertension, were in menopause, had a family history of stress incontinence, and were recruited from hospitals. These associations are shown in Supplementary Table S3.

There was a significant positive correlation (Pearson's r=0.38, p-value < 0.001) between AQoL-8D scores and PRAFB-Q scores. Similarly, the women who reported stress urinary incontinence symptoms also reported deteriorated quality of life as indicated by the AQoL-8D overall scores and the scores of the 8 domains: independent living, pain, senses, happiness, mental health, coping, relationships, and self-worth. The differences between the scores of the women who reported stress incontinence symptoms and those who did not report stress incontinence symptoms are shown in Supplementary Table S4.

When the variables that were significantly associated in the univariate analysis were included in a multivariate logistic regression model. The model showed that the women who had a family history of stress incontinence were 2.5-fold (95% CI: 1.2–5.2) more likely to have stress incontinence symptoms compared to the women who did not have a family history of stress incontinence. Similarly, the women who were overweight/obese were 2.0-fold (95% CI: 1.1–3.7) more likely to have stress incontinence symptoms compared to the women who were underweight or had a normal weight. These results are shown in Table 5.

When the variables that were significantly associated in the univariate analysis were included in a multiple linear regression model. The model showed that PRA-FAB-Q scores were predicted by place of residence, having a family history of stress incontinence, and the place from where the women were recruited. These results are shown in Table 6.

# Discussion

Stress urinary incontinence is one of the prevalent burdensome urological health conditions that affect a considerable proportion of women around the world [4, 20, 21]. Although the prevalence of stress urinary incontinence was previously reported among different populations including women, however, there is still a paucity of studies investigating the prevalence and the risk factors that could be associated with this bothersome urological health condition among Palestinian women. For the first time, this study aimed to fill this gap in the literature by assessing the prevalence of stress urinary incontinence among Palestinian women and identifying potential risk factors associated with this condition within the general Palestinian society. It is noteworthy to mention that stress urinary incontinence as characterized by leakage of urine during activities like laughing, sneezing, and coughing can impact the quality of life of the affected women [6]. Therefore, understanding the prevalence and the risk factors of stress urinary incontinence among Palestinian women could be important in informing decisions to mitigate the modifiable risk factors reduce the prevalence of this burdensome condition, and improve the quality of life of Palestinian women. The findings of this study could be valuable to urologists, gynecologists, obstetricians, and other healthcare providers caring for women.

In this study, the prevalence of stress urinary incontinence symptoms among Palestinian women was 26.9%. This prevalence rate was consistent with those reported in the literature. Previous studies have reported that stress incontinence affects between 15 and 30% of women around the world [6, 21]. It is important to note that the prevalence of stress urinary incontinence varied by the population investigated, the prevalence of other risk factors, and the methodology used to inquire about the frequency of the symptoms [6]. Stress urinary incontinence was previously shown to be influenced by age, number of vaginal deliveries, central obesity, and the health of the pelvic floor [6, 7, 9, 10]. The findings reported in this study were consistent with those reported among women elsewhere. These findings indicate that urologists, gynecologists, obstetricians, and other healthcare providers should consider assessing and addressing stress urinary incontinence symptoms among women at risk.

The results of this study showed that many demographics and health-related risk factors were associated with stress urinary incontinence among Palestinian women. These factors included older age, obesity, menopausal status, diabetes, hypertension, and family history of stress incontinence. These results were consistent with

| Та | b | le 4 | Distri | bution of | <sup>F</sup> answers of | f the women | on the AQoL-8D scale |
|----|---|------|--------|-----------|-------------------------|-------------|----------------------|
|----|---|------|--------|-----------|-------------------------|-------------|----------------------|

| Independent<br>living       I can do all these tasks very easi<br>do you need with<br>jobs around your<br>place of residence<br>(e.g. preparing<br>food, cleaning,<br>gardening)?       I can do all these tasks very easi<br>I can do these tasks relatively ea<br>I can do these tasks only very ske<br>I can do none of these tasks by<br>gardening)?         2       How easy or dif-<br>food, big with tasks | y without any help<br>sily without help<br>wly without help<br>unless I have help<br>nyself | 256 (66.3)<br>94 (24.4)<br>28 (7.3)<br>6 (1.6)<br>2 (0.5)<br>195 (95.5)<br>124 (32.1) |
|---|---|---|
| <ol> <li>How much help<br/>do you need with<br/>jobs around your<br/>place of residence<br/>(e.g. preparing<br/>food, cleaning,<br/>gardening)?</li> <li>L can do all these tasks very easi<br/>I can do these tasks relatively ea<br/>I can do these tasks only very ske<br/>I cannot do most of these tasks by<br/>I can do none of these tasks by<br/>Enjoyable and easy</li> </ol>                            | y without any help<br>sily without help<br>unless I have help<br>nyself                     | 256 (66.3)<br>94 (24.4)<br>28 (7.3)<br>6 (1.6)<br>2 (0.5)<br>195 (95.5)<br>124 (32.1) |
| <ul> <li>do you need with<br/>jobs around your<br/>place of residence<br/>(e.g. preparing<br/>food, cleaning,<br/>gardening)?</li> <li>I can do these tasks relatively ea<br/>I can do these tasks only very ski<br/>I cannot do most of these tasks<br/>I can do none of these tasks by<br/>Enjoyable and easy</li> </ul>  | sily without help<br>wly without help<br>unless I have help<br>nyself                       | 94 (24.4)<br>28 (7.3)<br>6 (1.6)<br>2 (0.5)<br>195 (95.5)<br>124 (32.1)               |
| <ul> <li>jobs around your<br/>place of residence<br/>(e.g. preparing<br/>food, cleaning,<br/>gardening)?</li> <li>I can do these tasks only very sli<br/>I cannot do most of these tasks<br/>I can do none of these tasks by<br/>Bardening)?</li> <li>How easy or dif-<br/>food, the set of these tasks by<br/>Bardening)?</li> </ul>   | wly without help<br>unless I have help<br>nyself  | 28 (7.3)<br>6 (1.6)<br>2 (0.5)<br>195 (95.5)<br>124 (32.1)                            |
| <ul> <li>place of residence<br/>(e.g. preparing<br/>food, cleaning,<br/>gardening)?</li> <li>How easy or dif-</li> <li>Enjoyable and easy</li> </ul>  | unless I have help<br>nyself  | 6 (1.6)<br>2 (0.5)<br>195 (95.5)<br>124 (32.1)  |
| <ul> <li>(e.g. preparing<br/>food, cleaning,<br/>gardening)?</li> <li>How easy or dif-<br/>Enjoyable and easy</li> </ul>  | nyself  | 2 (0.5)<br>195 (95.5)<br>124 (32.1)   |
| <ul> <li>gardening)?</li> <li>How easy or dif- Enjoyable and easy</li> </ul>  |   | 195 (95.5)<br>124 (32.1)  |
| 2 How easy or dif- Enjoyable and easy   |   | 195 (95.5)<br>124 (32.1)  |
|   |   | 124 (32.1)  |
| Ticult is it for you No difficulty  |   | (- )  |
| to get around by A little difficulty  |   | 50 (13)   |
| your place of Moderate difficulty   |   | 11 (2.8)  |
| residence (e.g. to A lot of difficulty  |   | 2 (0.5)   |
| go shopping, or I cannot get around without he visiting)?   | p   | 4 (1.0)   |
| 3 How easy or dif- Very mobile  |   | 149 (38.6)  |
| ficult is it for you No difficulty with mobility  |   | 201 (52.1)  |
| to move around I have some difficulty with mob  | lity (for example, going uphill)  | 26 (6.7)  |
| (using any aids<br>or oquipment I have difficulty with mobility. I d  | an go short distances only  | 6 (1.6)   |
| vou need e.g. a I have a lot of difficulty with mo  | pility. I need someone to help me   | 2 (0.5)   |
| wheelchair, frame, I am bedridden<br>or stick)?   |   | 2 (0.5)   |
| 4 How difficult is it These things are very easy for m  | e to do   | 294 (76.2)  |
| for you to wash, I have no real difficulty in doing   | these things  | 74 (19.2)   |
| toilet, dress your- I find some of these things diffic  | ult, but I manage to do them on my own  | 15 (3.9)  |
| self, eat, or care for<br>Wany of these things are difficu  | t, and I need help to do them   | 0 (0.0)   |
| I cannot do these things by mys   | elf at all.   | 3 (0.8)   |
| Pain  |   |   |
| 5 How often do you Very rarely  |   | 271 (70.2)  |
| experience serious Less than once a week  |   | 68 (17.6)   |
| Once or twice a week  |   | 27 (7.0)  |
| Three to four times a week  |   | 3 (0.8)   |
| Most of the time  |   | 17 (4.4)  |
| 6 How much pain or None at all  |   | 251 (65.0)  |
| experience?   |   | 118 (30.6)  |
| I suffer from severe pain   |   | 10 (2.6)  |
| I suffer unbearable pain  |   | / (1.8)   |
| / How often does Never  |   | 1/9 (46.4)  |
| with your usual   |   | 126 (32.6)  |
| activities?   |   | 63 (16.3)<br>12 (2.1)   |
| Often   |   | 12(3.1)   |
| Always  |   | 6 (1.6)   |
| 8 How well can you I have excellent sight   |   | 171 (44 3)  |
| see (using Your I see normally  |   | 109 (28 2)  |
| glasses or contact I have some difficulty seeing thi  | has sharply (e.g. small print, objects in the distance, or watching television)             | 96 (24 9)   |
| lenses if they are  | aroly   | 7 (1.8)   |
| needed)?  |   | 2 (0.5)   |
| l am completely blind   |   | 1 (0.3)   |

# Table 4 (continued)

| #  | Item/domain   | Answers  | n (%)      |
|----|---|--|------------|
| 9  | How well can  | I have excellent hearing   | 237 (61.4) |
|    | you hear (using   | I hear normally  | 112 (29.0) |
|    | your hearing aid if needed)?  | l have difficulty hearing things clearly. Often, I do not understand what is said. I usually do not take part in<br>conversations because I cannot hear what is said | 31 (8.0)   |
|    |   | I hear very little   | 5 (1.3)    |
|    |   | l am completely deaf   | 1 (0.3)    |
| 10 | How well do you   | No trouble being understood  | 321 (83.2) |
|    | communicate with  | I have some difficulty being understood by people who do not know me   | 50 (13.0)  |
|    | others (e.g. talking,   | I am understood only by people who know me   | 12 (3.1)   |
|    | being understood<br>by others and<br>understanding<br>them)?  | I cannot adequately communicate with others  | 3 (0.8)    |
|    | Happiness   |  |            |
| 11 | How content are   | All the time   | 102 (26.4) |
|    | you with your life?   | Mostly   | 190 (49.2) |
|    |   | Sometimes  | 86 (22.3)  |
|    |   | Almost never   | 5 (1.3)    |
|    |   | Never  | 3 (0.8)    |
| 12 | How enthusiastic  | Extremely  | 121 (31.3) |
|    | do you reel?  | Very   | 147 (38.1) |
|    |   | Somewhat   | 95 (24.6)  |
|    |   | Not much   | 21 (5.4)   |
| 10 | Line of the state | Not at all   | 2 (0.5)    |
| 13 | feel happy?   | Always   | 131 (33.9) |
|    | icernappy.  | Usualiy  | 156 (40.4) |
|    |   | Almost neuron  | 92 (23.6)  |
|    |   | Never  | 6 (1.6)    |
| 14 | How often do you  | Evtremely  | 174 (45 1) |
|    | feel pleasure?  | Mainly   | 131 (33.9) |
|    |   | Moderately   | 69 (17.9)  |
|    |   | Slightly   | 8 (2 1)    |
|    |   | Not at all   | 4 (1.0)    |
|    | Mental health   |  | . (,       |
| 15 | How often do you  | Never  | 135 (35.0) |
|    | feel depressed?   | Almost never   | 99 (25.6)  |
|    |   | Sometimes  | 122 (31.6) |
|    |   | Often  | 14 (3.6)   |
|    |   | Very often   | 13 (3.4)   |
|    |   | All the time   | 3 (0.8)    |
| 16 | How often do  | Never  | 149 (38.6) |
|    | you have trouble  | Almost never   | 87 (22.5)  |
|    | sleeping?   | Sometimes  | 114 (29.5) |
|    |   | Often  | 29 (7.5)   |
|    |   | All the time   | 7 (1.8)    |
| 17 | How often do you  | Never  | 109 (28.2) |
|    | teel angry?   | Almost never   | 74 (19.2)  |
|    |   | Sometimes  | 144 (37.3) |
|    |   | Often  | 39 (10.1)  |
|    |   | All the time   | 20 (5.2)   |

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# Table 4 (continued)

| #          | Item/domain          | Answers                              | n (%)                 |
|------------|----------------------|--------------------------------------|-----------------------|
| 18         | Do you ever          | Never                                | 339 (87.8)            |
|            | feel like hurting    | Rarely                               | 36 (9.3)              |
|            | yourself?            | Sometimes                            | 6 (1.6)               |
|            |                      | Often                                | 3 (0.8)               |
|            |                      | All the time                         | 2 (0.5)               |
| 19         | How often did        | Never                                | 141 (36.5)            |
|            | you feel in despair  | Occasionally                         | 118 (30.6)            |
|            | over the last seven  | Sometimes                            | 91 (23.6)             |
|            | days?                | Often                                | 21 (5.4)              |
|            |                      | All the time                         | 15 (3.9)              |
| 20         | How often did you    | Never                                | 116 (30.1)            |
|            | feel worried in the  | Occasionally                         | 169 (43.8)            |
|            | last seven days?     | Sometimes                            | 50 (13.0)             |
|            |                      | Often                                | 36 (9.3)              |
|            |                      | All the time                         | 15 (3.9)              |
| 21         | How often do you     | Never                                | 137 (35.5)            |
|            | feel sad?            | Rarely                               | 148 (38.3)            |
|            |                      | Some of the time                     | 74 (19.2)             |
|            |                      | Usually                              | 19 (4.9)              |
|            |                      | Nearly all the time                  | 8 (2.1)               |
| 22         | Do vou normallv      | Always calm/tranguil                 | 104 (26.9)            |
|            | feel calm and tran-  | Usually calm/tranguil                | 124 (32.1)            |
|            | quil or agitated?    | Sometimes                            | 141 (36.5)            |
|            |                      | Usually agitated                     | 14 (3.6)              |
|            |                      | Always agitated                      | 3 (0.8)               |
|            | Coping               |                                      | 5 (0.0)               |
| 23         | How much energy      | Always energetic                     | 114 (29.5)            |
|            | do you have to       | Usually energetic                    | 161 (41.7)            |
|            | do the things you    | Occasionally energetic               | 93 (24.1)             |
|            | want to do?          | Usually lacking energy               | 0 (0.0)               |
|            |                      | Always lacking energy                | 18 (4.7)              |
| 24         | How often do vou     | Always                               | 149 (38.6)            |
|            | feel in control of   | Mostly                               | 170 (44.0)            |
|            | your life?           | Sometimes                            | 58 (15.0)             |
|            |                      | Only occasionally                    | 6 (1.6)               |
|            |                      | Never                                | 3 (0.8)               |
| 25         | How much do          | Completely                           | 139 (36.0)            |
|            | you feel you can     | Mostly                               | 192 (49.7)            |
|            | cope with life's     | Partly                               | 42 (10.9)             |
|            | problems?            | Verv little                          | 10 (2 6)              |
|            |                      | Not at all                           | 3 (0.8)               |
|            | Relationships        |                                      | 2 ()                  |
| 26         | How much do vou      | Immenselv                            | 150 (38.9)            |
|            | enjoy your close     | A lot                                | 187 (48.4)            |
|            | relationships (fam-  | A little                             | 27 (7.0)              |
|            | ily and friends)?    | Not much                             | 19 (4.9)              |
|            |                      | l hate it                            | 3 (0.8)               |
| 27         | How satisfying are   | Very satisfying                      | 2 (0.0)<br>200 (51 R) |
| <i>_</i> / | your close relation- | Satisfying                           | 147 (38.1)            |
|            | ships (family and    | Neither satisfying nor dissatisfying | 27 (22)               |
|            | friends)?            | I Innleasant                         | 2 (0, Q)<br>2 (0, Q)  |
|            |                      |                                      | /                     |

Answers

Sometimes

Never

Rarely

# Table 4 (continued) # Item/domain

How often do

isolated?

you feel socially

28

| n (%)      |
|------------|
| 183 (47.4) |
| 129 (33.4) |
| 62 (16.1)  |
| 10 (2.6)   |
| 2 (0.5)    |
| 241 (62.4) |
| 103 (26.7) |
| 20 (0.0)   |

|    |                                    | Often  | 10 (2.6)   |
|----|------------------------------------|--|------------|
|    |                                    | Always   | 2 (0.5)    |
| 29 | How often do                       | Never  | 241 (62.4) |
|    | you feel socially                  | Rarely   | 103 (26.7) |
|    | excluded or                        | Sometimes  | 38 (9.8)   |
|    | left out?                          | Often  | 2 (0.5)    |
|    |                                    | Always   | 2 (0.5)    |
| 30 | How happy are                      | Very happy   | 142 (36.8) |
|    | you with your                      | Generally happy                                    | 165 (42.7) |
|    | close and intimate                 | Neither happy nor unhappy                          | 71 (18.4)  |
|    | relationships?                     | Generally unhappy                                  | 4 (1.0)    |
|    |                                    | Very unhappy                                       | 4 (1.0)    |
| 31 | Does your health                   | Unaffected   | 294 (76.2) |
|    | affect your relation-              | Some parts of my family role I cannot carry out    | 76 (19.7)  |
|    | ship with your                     | Many parts of my family role I cannot carry out    | 8 (2.1)    |
|    | family?                            | I cannot carry out any part of my family role      | 8 (2.1)    |
| 32 | Does your health                   | Unaffected   | 310 (80.3) |
|    | affect your role in your community | Some parts of my community role I cannot carry out | 61 (15.8)  |
|    |                                    | Many parts of my community role I cannot carry out | 7 (1.8)    |
|    | (e.g. residential,                 | I cannot carry out any part of my community role   | 8 (2.1)    |
|    | cultural activities)?              |  |            |
|    | Self-worth                         |  |            |
| 33 | How much of a                      | Not at all   | 191 (49.5) |
|    | burden do you feel                 | A little   | 129 (33.4) |
|    | you are to other                   | A moderate amount                                  | 45 (11.7)  |
|    | people?                            | A lot  | 17 (4.4)   |
|    |                                    | Totally  | 4 (1.0)    |
| 34 | How often do you                   | Never  | 255 (66.1) |
|    | feel worthless?                    | Almost never                                       | 64 (16.6)  |
|    |                                    | Sometimes  | 34 (8.8)   |
|    |                                    | Usually  | 10 (2.6)   |
|    |                                    | Always   | 23 (6.0)   |
| 35 | How much confi-                    | Complete   | 207 (53.6) |
|    | dence do you have                  | A lot  | 134 (34.7) |
|    | in yourself?                       | Moderate   | 41 (10.6)  |
|    |                                    | A little   | 3 (0.8)    |
|    |                                    | Not at all   | 1 (0.3)    |
|    |                                    |  |            |

a previous study that investigated stress urinary incontinence among Palestinian women with diabetes and other studies that were conducted among women elsewhere [6, 7, 9, 10, 12]. All these factors are known to weaken the pelvic floor muscles, decrease support of the urethra, and predispose women to stress urinary incontinence [9, 10]. Therefore, healthcare providers should consider interventions that can improve the strength of the pelvic floor muscles and improve the support of the urethra [6, 10].

The PRAFAB-Q scores were significantly associated with older age, living in unfavorable conditions like living in refugee camps, and having other health conditions that are known to deteriorate urological bother symptoms like diabetes, hypertension, and multiparity [15, 16]. In this study, the women who were recruited from refugee camps had significant PRAFAB-Q scores compared to the women who were recruited from cities and villages. These findings indicated more severe stress urinary incontinence symptoms and a more pronounced impact on the quality of life of the affected women living in refugee camps. Our results can be explained by the unfavorable living conditions of the women living in refugee camps including high psychosocial stress, overcrowding, limited access to healthcare facilities, and

|   |                           |                    |                    |       |                 |     | 95% CI f | or OR |
|---|---------------------------|--------------------|--------------------|-------|-----------------|-----|----------|-------|
| Variable                                | Category                  | β                  | SE                 | Wald  | <i>p</i> -value | OR  | Lower    | Upper |
| Age (years)                             | < 50                      | Refere             | Reference category |       |                 |     |          |       |
|   | ≥ 50                      | 0.0                | 0.4                | 0.0   | 0.989           | 1.0 | 0.5      | 2.2   |
| Marital status                          | Never married             | Refere             | ence cate          | egory |                 |     |          |       |
|   | Ever married              | -0.3               | 0.4                | 0.4   | 0.536           | 0.8 | 0.3      | 1.7   |
| A history of diabetes mellitus          | Yes                       | Refere             | ence cate          | egory |                 |     |          |       |
|   | No                        | -0.1               | 0.4                | 0.1   | 0.734           | 0.9 | 0.4      | 1.9   |
| A history of hypertension               | Yes                       | Refere             | ence cate          |       |                 |     |          |       |
|   | No                        | -0.4               | 0.4                | 0.6   | 0.432           | 0.7 | 0.3      | 1.7   |
| Menopause                               | Yes                       | Refere             | ence cate          |       |                 |     |          |       |
|   | No                        | -0.5               | 0.4                | 1.4   | 0.244           | 0.6 | 0.3      | 1.4   |
| A family history of stress incontinence | Yes                       | 0.9                | 0.4                | 6.4   | 0.011           | 2.5 | 1.2      | 5.2   |
|   | No                        | Refere             | ence cate          |       |                 |     |          |       |
| A history of parturition                | Yes                       | Refere             | Reference category |       |                 |     |          |       |
|   | No                        | -0.2               | 0.4                | 0.4   | 0.507           | 0.8 | 0.4      | 1.6   |
| BMI categories                          | Underweight/normal weight | Reference category |                    |       |                 |     |          |       |
|   | Overweight/obese          | 0.7                | 0.3                | 4.8   | 0.028           | 2.0 | 1.1      | 3.7   |

### **Table 5** Predictors of having stress incontinence symptoms

BMI: body mass index, OR: odds ratio, SE: standard error

### Table 6 Predictors of PRAFAB-Q scores

| Variable                                      | Unstandardized Coefficients | SE   | Standardized Coefficients | t     | <i>p</i> -value |
|---|-----------------------------|------|---------------------------|-------|-----------------|
| Age   | -0.21                       | 0.79 | -0.04                     | -0.26 | 0.793           |
| Place of residence                            | 1.11                        | 0.36 | 0.29                      | 3.08  | 0.003           |
| A history of diabetes mellitus                | 0.50                        | 0.72 | 0.07                      | 0.69  | 0.491           |
| A history of hypertension                     | 1.29                        | 0.72 | 0.17                      | 1.79  | 0.077           |
| Menopause                                     | -0.12                       | 0.81 | -0.02                     | -0.15 | 0.882           |
| A family history of stress incontinence       | 1.27                        | 0.62 | 0.18                      | 2.06  | 0.042           |
| The place from where the women were recruited | -0.71                       | 0.20 | -0.32                     | -3.57 | 0.001           |

SE: standard error, t: t statistics

limited affordability of healthcare services which are known to exacerbate health conditions including stress urinary incontinence symptoms [22, 23]. Moreover, the women who were recruited from hospitals had significantly higher PRAFAB-Q scores compared to the women who were recruited from schools, universities, and primary healthcare centers. These findings indicated that comorbidities can exacerbate stress urinary incontinence symptoms. These findings were consistent with those reported in previous studies [15, 16]. Together, these findings indicated that healthcare providers should consider environmental and contextual factors when assessing women with stress urinary incontinence symptoms. Moreover, these results indicated that the PRAFAB-Q can be used to screen for stress urinary incontinence and monitor improvements brought by treatments and other nonpharmacological interventions [14].

The Palestinian women who reported stress urinary incontinence also reported deteriorated quality of life as measured by the AQoL-8D scale. These findings were not surprising as stress urinary incontinence is known to deteriorate the quality of life of the affected patients [24, 25]. Understanding the negative impact of stress urinary incontinence on the quality of life and wellbeing of women might motivate designing measures and interventions to screen for and address this bothersome health issue.

## Limitations

Because a convenient sample was used in this study, there is a possibility for selection bias. This bias could have limited the external validity of the results. Second, the study was conducted using a questionnaire. It could have been more interesting to clinically assess the women by urologists who are competent in evaluating the symptoms. The study was conducted using a cross-sectional design. This design has many disadvantages including limitations in establishing causal relationships between the variables.

### Conclusion

The study reported a high prevalence of stress urinary incontinence and identified the risk factors that were associated with stress incontinence symptoms among Palestinian women. The findings showed that stress urinary incontinence symptoms were predicted by having a family history of stress incontinence and being overweight/obese. Moreover, the intensity of stress incontinence symptoms was associated with deteriorated quality of life of the affected women. These findings could be used by urologists, gynecologists, obstetricians, and other healthcare providers caring for women to design ways to reduce the burden of stress incontinence among Palestinian women and improve their quality of life.

## **Supplementary Information**

The online version contains supplementary material available at https://doi. org/10.1186/s12905-024-03360-0.

Supplementary Material 1

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#### Author contributions

Hatim Hijaz, Riad Amer, and Ramzi Shawahna were involved in the conception and design of the work, analysis and interpretation of data, and drafting and final approval of the manuscript. Mohamad AboAlheija, Eleen Masarweh, and Yara Qasem were involved in the data acquisition, analysis, drafting of the work and final approval of the version to be published. All authors approved the final manuscript.

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### Data availability

All data analyzed in this study were included in the manuscript or as supplementary materials. The datasets used in the analysis or entered into statistical software can be obtained from the corresponding author upon making a reasonable request.

### Declarations

### Ethics approval and consent to participate

Approvals were obtained from the Institutional Review Board of An-Najah National University (Ref. # Med.Nov.2023/27). Written informed consent was obtained from each participant. Moreover, approvals were also obtained from the Ministry of Health and managers of the hospitals/clinics. The women provided informed consent. All data were kept confidential and the privacy of the women was protected.

### **Competing interests**

The authors declare no competing interests.

### Consent to publication

Not applicable.

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