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ORIGINAL ARTICLE

Knowledge of pelvic floor disorder in pregnancy

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Abstract

Introduction and hypothesis Pelvic floor dysfunction is a common condition which can lead to distressing consequences such as urinary incontinence (UI), pelvic organ prolapse (POP) and fecal incontinence (FI). Pregnancy is a known major risk factor. This study aims to assess the level of knowledge about pelvic floor disorders among pregnant women in our local population.

Methods A cross-sectional study was conducted in a population of pregnant women in their third trimester. A 47-question questionnaire was distributed to a random sample group. Knowledge scores were calculated. Possible predictive factors for knowledge level such as age, ethnicity, parity, ethnicity and educational levels were studied.

Results Thirty-three out of 104 respondents (31.7%) reported history of urinary incontinence, 3 respondents (2.9%) reported sensation of prolapse, and 1 respondent (0.96%) reported fecal incontinence. The knowledge score for urinary incontinence was the highest at 46.2% and lowest in pelvic organ prolapse at 35.3%. Mean knowledge scores increased significantly with age ($p = 0.021$) and educational level ($p = 0.046$). The nulliparous women scored higher than the multiparous women. Age and educational level had a significant impact on multivariate analysis scores.

Conclusions The knowledge on pelvic floor disorders is poor among our local pregnant women. Healthcare professionals should place increased emphasis on advocating pelvic floor exercises for pregnant women during their routine antenatal care.

Keywords Pelvic floor dysfunction · Urinary incontinence · Pelvic organ prolapse · Fecal incontinence · Pregnancy

Introduction

Pelvic floor dysfunction is common in women. It can lead to distressing consequences in the long term, such as urinary incontinence (UI), pelvic organ prolapse (POP) and fecal incontinence (FI) [1]. Such conditions can adversely affect women's quality of life [2–5]. Early prevention through education and pelvic floor exercise is postulated to improve outcomes for women.

Pregnancy is a known major risk factor for pelvic floor disorders. The enlarging womb places stress on the pelvic floor muscles. Childbirth also plays a contributory role in further weakening the pelvic floor muscles, leading to pelvic organ prolapse, urinary incontinence and fecal incontinence [6, 7]. Other risk factors include heavy lifting, obesity and menopause [8–10].

Pelvic floor dysfunction may not be immediately apparent after pregnancy and childbirth. However, persistence and progression of pelvic floor dysfunction can subsequently affect a woman's social and sexual wellbeing [3, 4]. Pelvic floor exercise has been identified as one of the protective measures and an effective treatment for pelvic floor dysfunction [1, 11–13]. However, uptake of this intervention is poor. Preliminary studies have highlighted the poor knowledge about pelvic floor dysfunction in pregnancy [14–18]. This can be correlated with ignorance about this possible intervention. Although antenatal classes on pelvic floor exercises are provided in our local hospital, the uptake is generally poor because of lack of awareness. There have been no local studies to assess the knowledge about pelvic floor problems in women. We aimed to assess the level of knowledge about pelvic floor disorders among our local pregnant women to identify trends to guide public education campaigns in this area.

Materials and methods

This was a cross-sectional study conducted in a population of pregnant women in their third trimester who attended

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antenatal clinics at KK Women's and Children's Hospital during our study period in February 2018. Sample size estimation was not performed as the primary objective was to have a preliminary assessment of baseline knowledge on pelvic floor issues in our local pregnant women. Our target sample size was 100. The invitation was offered until our target sample size was achieved. The rationale of the study was clearly explained. No incentive was given for completing the survey. Informed consent was obtained prior to completion of the self-administered questionnaire. The results were subsequently analyzed. This study protocol gained ethical approval from the Singhealth Centralized Institutional Review Board.

The questionnaire consisted of 47 questions: 11 on demographic characteristics, 8 on obstetric history and current pregnancy, 4 on personal history of pelvic floor dysfunction and 24 on knowledge of pelvic floor disorders, e.g., urinary incontinence, pelvic organ prolapse and fecal incontinence, as well as how they relate to pregnancy and childbirth. Answers for the knowledge questions were in the form of 'yes'/'no'/'do not know.' The questions were in English, and non-English speaking patients had their questionnaires administered by an appropriate translator. Validated questionnaires on pelvic floor disorders were referenced in the formulation of our local questionnaire [19]. The knowledge scores were calculated by allocating one point to each question answered correctly and zero points for each question answered incorrectly or not answered. Scores were calculated for each of the domains of urinary incontinence, fecal incontinence and pelvic organ prolapse individually and in aggregate across all domains. A copy of the sample is attached in Appendix 1 for reference.

Knowledge scores were calculated and recorded in the domains of urinary incontinence, pelvic organ prolapse, fecal incontinence and across all domains. Possible predictive factors for knowledge level such as ethnicity, parity, ethnicity, educational levels and socioeconomic classes based on types of housing were studied.

The demographics of the respondents were summarized as frequencies for categorical data and means ± standard deviation for continuous variables. One-way ANOVA and non-parametric tests were used to estimate the associations between overall knowledge levels and background characteristics. The data were considered statistically significant when $p < 0.05$.

Results

A total of 105 patients completed the questionnaire. One was incomplete. The remaining 104 responses were analyzed.

The mean maternal age of our respondents was 30.6 years old. The mean gestational age was 34.4 weeks; 90.4% of these women were married, and 50% were nulliparous. In our sample population, 46.2% had previous vaginal deliveries (including instrumental deliveries) and 3.8% had previous cesarean sections only. In terms of education level, 34.6% of the respondents went to university, 24.0% attended junior college or polytechnic institutes, 23.1% went to the Institute of Technical Education (ITE), and 18.3% had received education up to secondary school. Table 1 summarizes the demographics of the respondents.

Looking at the current symptoms, 31.7% of these women reported experiencing urinary incontinence. Of these, 84.8% experienced this during pregnancy, mainly with coughing, sneezing and laughing. Three respondents (2.9%) reported a sensation of prolapse, and one respondent (0.96%) reported fecal incontinence. None of the respondents sought medical attention or treatment for these conditions.

The knowledge score for urinary incontinence was the highest, with a mean score of 46.2% ± 0.3. The knowledge score for fecal incontinence was 39.8% ± 0.3, while that for pelvic organ prolapse was 35.3% ± 0.3. The results are summarized in Table 2.

Table 1 Respondent demographics and characteristics

Parameters	*n* = 104
Maternal age (years) (*n*; %)	
(a) 15–25	14 (13.5)
(b) 26–35	74 (71.2)
(c) 36–41	16 (15.3)
Maternal age (years) (mean ± SD; range)	30.6 ± 5.0 (15–41)
Married (*n*; %)	94 (90.4)
Ethnicity (*n*; %)	
(a) Chinese	45 (43.3)
(b) Malay	41 (39.4)
(c) Indian	8 (7.7)
(d) Others	10 (9.6)
Parity (mean ± SD; range)	0.9 ± 1.2 (0 – 6)
Nulliparous (*n*; %)	52 (50.0)
Vaginal/instrumental delivery (*n*; %)	48 (46.2)
LSCS only (*n*; %)	4 (3.8)
Highest education level (*n*; %)	
(a) Secondary	19 (18.3)
(b) Vocation/ITE	24 (23.1)
(c) Junior college/polytechinc	25 (24.0)
(d) University and above	36 (34.6)
Type of housing (*n*; %)	
(a) HDB flat (1–2 room)	8 (7.7)
(b) HDB flat (3–4 room)	56 (53.8)
(c) HDB flat (5 room/executive condominium)	28 (27.0)
(d) Condominium/private apartment	6 (5.8)
(e) Terrace/semi-detached/bungalow/shophouse	2 (1.9)
(f) rental home/room	4 (3.8)
Employed (*n*; %)	68 (65.4)
Gestational age (mean ± SD; range)	34.4 ± 3.8 (28–41)

ITE, Institute of Technical Education

Table 2 Knowledge scores for each category of pelvic floor disorder

Category	Mean knowledge score (95% CI)
Urine incontinence (mean ± SD; range)	46.3 ± 0.3 (41– 51)
Prolapse (mean ± SD; range)	35.5 ± 0.3 (29–42)
Fecal incontinence (mean ± SD; range)	39.8 ± 0.3 (35–46)

There was a statistically significant positive association among age, parity and employment with knowledge scores. Working women had significantly higher mean knowledge scores than those who were unemployed ($p = 0.026$). Nulliparous women scored significantly higher than multiparous women ($p = 0.009$). Older women performed better in our survey, too ($p = 0.021$). The knowledge scores were higher with higher socioeconomic class based on housing types, although this was not statistically significant. Table 3 summarizes the above findings.

Comparing racial differences in knowledge scores, Chinese respondents had the highest average score of 48%, followed by the Indians. The Malay respondents scored the lowest, with a mean score of 33%. However, this finding was not statistically significant (see Table 4).

There was a positive association between knowledge score and educational level (Table 5). Respondents who went to university and above had the highest average score of 49%, while those who attended up to secondary school scored the lowest with a mean score of 31% (95% CI 16–45%).

On multivariate analysis, mean average scores were significantly associated with age and education level (Table 6).

Table 3 Overall knowledge scores by employment status, parity, age and socioeconomic class

	Mean knowledge score (95% CI)	*p* value
Employed		
a. Yes	45 (39–51)	0.026
b. No	33 (23–42)	
Parity		
a. Nulliparous	45 (38– 53)	0.009
b. Multiparous	36 (29– 43)	
Age		
a. 15–25	24 (1–40)	0.021
b. 26–35yo	42 (36–49)	
c. 36–41	46 (35–46)	
Socioeconomic class		
a. Condominium/terrace	45 (20–70)	0.224
b. HDB 3–5 rooms/EC	41 (36–47)	
c. HDB 1–2 rooms/rental	31 (1–54)	

Discussion

Our survey revealed some important findings regarding the impact of pelvic floor dysfunction in local women. First, up to one in three local women had symptoms of urinary incontinence in pregnancy. On direct questioning, up to 40% of women do not know that pelvic floor exercise in pregnancy can help to prevent urinary incontinence after childbirth. Urinary incontinence can have serious lifestyle implications in women [20]. The mean age of women responding to this survey was 30.6 years. There is an urgent need to create awareness of this issue to encourage women to seek help early.

One area of concern is that of the women who were symptomatic in our study, none sought medical treatment. Social and cultural issues could affect a woman's attitudes toward seeking treatment [21]. The lack of awareness on this issue of pelvic floor dysfunction could also explain the tendency of not seeking medical attention. Though our sample population was small, it highlights the importance of educating our young women of reproductive age. This may help to reduce long-term complications such as procidentia or severe incontinence issues.

Second, in our study, knowledge about pelvic floor dysfunction among third trimester pregnant women in Singapore is dismal. The highest score in our study was 51%. This parallels findings worldwide [16–18, 22]. This highlights the global lack of emphasis on pelvic floor knowledge with resultant inadequate antenatal counseling and education during routine follow-up. Despite being a common condition, pelvic floor disorders might not be perceived as a serious illness compared with other antenatal complications such as pre-eclampsia and gestational diabetes. Therefore, information on routine pelvic floor exercises in pregnancy might not be readily provided to pregnant women locally during routine antenatal care. Even in the UK, where the NICE guidelines [23] recommend offering pelvic floor exercises to women starting from their first pregnancy as a preventive strategy for urinary incontinence, O'Neill et al. [16] found that the knowledge score across all domains for women in London was only 45%. This reflects that more needs to be done to improve uptake of pelvic floor exercises in women, which was also noted to be low in our center. Education remains the key. Pregnant women should be made aware of such

Table 4 Mean overall knowledge score by ethnicity

Educational level	*N*	Mean score	SD	F	*P* value
Chinese	45	48	27	2.558	0.053
Malay	41	33	25		
Indian	8	40	26		
Others	10	38	26		
Total	104	40	27		

Table 5 Mean overall knowledge score by education level

Educational level	*N*	Mean score	SD	F	*P* value
Secondary school	19	31	29	2.759	0.046
ITE	24	34	29		
JC/poly	25	42	27		
Uni and above	36	49	22		
Total	104	41	27		

antenatal education classes via greater publicity and avocation by obstetricians.

Our study reflected positive correlations between knowledge scores and educational qualification, age, parity and employment. These associations were statistically significant on multivariate analysis. This could possibly be explained by later marriage in more highly educated women. This trend is similarly reflected in Singapore's recent Population Trends 2017 (https://www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/population_and_population_structure/population2017.pdf), which reported that the median age at first marriage was the highest for women with university qualification at 28.8 years, followed by post-secondary school and secondary school or below. Patients with a higher educational level and employment status may have better access to resources such as the internet, health magazines, articles or colleagues, which can increase their knowledge on this topic. Greater exposure to antenatal information including access to antenatal classes may influence attitudes toward pelvic floor issues and preventive exercises.

Ethnicity was not a significant factor affecting knowledge scores in our study. This could be due to possible confounders such as parity and age. The total fertility rate was the highest for Malays and lowest in the Chinese population, based on Singapore Population Trends 2017 (https://www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/population_and_population_structure/population2017.pdf). Malay women have a tendency to marry and conceive earlier than women of the other ethnicities [22]. However, the general low scores in the survey reflect the strategic need for population basis education rather than a targeted ethnic focus.

Table 6 Multivariate analysis of overall knowledge scores by age, ethnicity, education level and parity

	B	Standard error	Beta	*P* value
Constant	−0.005	0.156		0.974
Age	0.012	0.005	0.216	0.033
Ethnicity	−0.037	0.022	−0.162	0.092
Education level	0.057	0.024	0.238	0.02
Parity	−0.01	0.023	−0.041	0.683

Interestingly, multi-parity was not associated with better knowledge scores. One would expect women to gain knowledge on pelvic floor disorders from previous pregnancies. However, our study showed that the nulliparous women had significantly better knowledge than the multiparous respondents. This was statistically significant on multivariate analysis. Early childbearing could be associated with lower education levels and employment. Childcare commitments may also reduce these women's attention to their own health. Hence, higher parity does not necessarily lead to increased knowledge. Strategies toward antenatal education should be enforced for all pregnant women regardless of parity.

Looking at specific questions within the specific domains, up to three in four women are aware that pregnancy and childbirth can increase the risk of urinary incontinence. Three in four women are aware that pregnancy weakens the pelvic floor and that pelvic floor exercises in pregnancy can prevent urinary incontinence after childbirth. This is heartening given the number of symptomatic women picked up in this study. However, this knowledge did not apply to other pelvic floor disorders, e.g., pelvic organ prolapse and fecal incontinence. Education needs to extend to all three domains for comprehensive pelvic floor maintenance. Our study did not assess whether these pregnant women were doing pelvic floor exercises in pregnancy. An extension of our local study in this area will be useful to determine if their knowledges scores translate into actual preventive measures.

Conclusion

Our survey has highlighted a few key points. First, pelvic floor dysfunction is prevalent in our local young pregnant women. However, the general knowledge level on pelvic floor disorders among local pregnant women in their third trimester was found to be low. Second, pelvic floor exercises are not routine for pregnant women despite its known benefits. These findings are useful for clinicians to reevaluate public antenatal education campaigns to empower women to make more informed choices about engaging in pelvic floor exercises to reduce their risk of future pelvic floor dysfunction.

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Compliance with ethical standards

Conflicts of interest None.

Appendix

Patient Information Sheet

Study on Knowledge of Pelvic Floor Problems

We would like to invite you to take part in a research study.

The study aims to investigate women's knowledge of pelvic floor problem, in order to improve prevention and treatment. The pelvic problems include urinary incontinence (unable to control urine), pelvic organ prolapse (bulging downwards of the womb at the vaginal opening or outside the vagina) and faecal incontinence (leakage of stool/ faeces from the back passage).

If you agree to participate, we will ask you to complete the attached set of questions. Please be assured that your identity and the information given by you will be kept strictly confidential and that only group data will be reported.

Please respond spontaneously without searching for correct answers on the internet. The survey will take up about 10-15 minutes of your time.

Thank you for your help.

Index number: _____ Date: _____

Question Set
Study on Knowledge of Pelvic Floor Problems in pregnancy

Demographics/ medical history

1. What is your **age**? _____

2. Are you ☐ Married ☐ Single ☐ Divorced?

3. What is your **height?** _____cm

4. What is your **pre-pregnancy weight** _____kg **current weight**: _____kg?

5. What is your **race**?

☐ Chinese ☐ Malay ☐ Indian ☐ Eurasian ☐ Others: _____

6. What is the **highest educational level** you have completed?

☐ Secondary
☐ Vocation / ITE
☐ Junior college / Polytechnic
☐ University and above

7. What type of **housing** are you living in now?

☐ HDB flat (1 – 2 room)
☐ HDB flat (3 – 4 room)
☐ HDB flat (5 room / HUDC / executive condominium)
☐ Condominium / Private apartment
☐ Terrace / Semi-detached / Bungalow / Shophouse
☐ Rental home / room
☐ Others, please specify: _____

8. Do you **work**?

☐ No
☐ Yes : What is your occupation? _____

9. Do you have any **chronic medical problems**? ☐ Yes ☐ No

If yes, please specify: _____

10. Are you on any **long-term medications**? ☐ Yes ☐ No

If yes, please specify the name of the medications: _____

11. Do you currently **smoke**? ☐ Yes ☐ No

If yes, , how many sticks of cigarettes do you smoke in a day?

- ☐ < 5
- ☐ 5 – 10
- ☐ 11 – 20
- ☐ > 20

Information on Pregnancy

12. What is your **Expected Delivery Date?** _____

13. How many weeks pregnant are you (Gestational Age)? _____

14. Is this your first pregnancy?

- ☐ Yes (If Yes, continue to question 20)
- ☐ No (If No, continue to the next question ie question 15)

15. How many times have you been pregnant before (Gravida): _____

16. How many **children** have you ever given birth to (if any): _____

    a. How many were born by normal vaginal delivery: _____

    b. How many were born by forceps or vacuum delivery: _____

    c. How many were born by caesarean section: _____

17. Were any of your previous deliveries complicated by a tear to the back passage or did you have problems controlling your passing motion after delivery?

- ☐ No
- ☐ Yes, please elaborate : _____

18. What was the date of your **last delivery** (if any)? _____

19. Have you ever had any miscarriages/ abortions? ☐ Yes ☐ No

If yes,

    a. How many miscarriages have you had? _____

    b. How many abortions have you had? _____

History of pelvic floor dysfunction

20. Have you ever seen a urologist/urogynaecologist?

- ☐ No
- ☐ Yes, why : _____

21. Have you ever had problems with **urine incontinence (urine leakage)**?

- ☐ No (If No, continue to question 22)
- ☐ Yes (If Yes, please answer the next few parts)

    i. Started ☐ Before pregnancy ☐ During pregnancy. How many weeks? _____

ii. Do you leak when you: (circle options)

Cough / Laugh / Sneeze / Walk / Are in a rush to go toilet

iii. How frequent?

☐ Daily
☐ Few times a week
☐ Few times per month
☐ Few times per year - Please elaborate : _____

iv. Are you taking any treatment

☐ No
☐ Yes, Name of treatment : _____

22. Have you ever had problems with **pelvic organ prolapse (bulging of skin/ womb at vaginal opening or outside of vagina)**?

☐ No (If No, continue to question 23)
☐ Yes (If Yes, please answer the next few parts)

i. Started ☐ Before pregnancy ☐ During pregnancy. How many weeks ? _____

ii. Is it with (circle options)

sensation / feeling with finger / able to see a lump outside vagina

iii. Are you taking any treatment

☐ No
☐ Yes, Name of treatment : _____

23. Have you ever had problems with **faceal incontinence (stool leakage)**?

☐ No (If No, continue to question 24)
☐ Yes (If Yes, please answer the next few parts)

i. Started ☐ Before pregnancy ☐ During pregnancy. How many weeks ? _____

ii. Do you leak when you: (circle options)

Cough / Laugh / Sneeze / Walk / Are in a rush to go toilet

iii. How frequent?

☐ Daily
☐ Few times a week
☐ Few times a month
☐ Few times a year – Please elaborate : _____

iv. Are you taking any treatment

☐ No
☐ Yes, Name of treatment : _____

Below are some general knowledge about urinary incontinence (urine leakage)

24. Leakage of urine only occurs as you get older

☐ Yes ☐ No ☐ Don't know

25. Pregnancy and child birth may lead to urine leakage

☐ Yes ☐ No ☐ Don't know

26. Pelvic floor muscles are not as strong as before, after childbirth

☐ Yes ☐ No ☐ Don't know

27. Thin women are more likely to leak than overweight women

☐ Yes ☐ No ☐ Don't know

28. Is there treatment for urine leakage?

☐ Yes ☐ No ☐ Don't know

29. Physiotherapy can help to prevent urine leakage.

☐ Yes ☐ No ☐ Don't know

30. Pelvic floor exercises when done before pregnancy can help with reducing urine leakage after child birth.

☐ Yes ☐ No ☐ Don't know

31. Medication/Drugs are available in the treatment of some form of urine leakage.

☐ Yes ☐ No ☐ Don't know

32. Surgery can be performed to treat urine leakage.

☐ Yes ☐ No ☐ Don't know

Below are some general knowledge about pelvic organ prolapse (bulging of skin/ womb at vaginal opening or outside of vagina)

33. Pelvic organ prolapse is more common in the young than old

☐ Yes ☐ No ☐ Don't know

34. Pregnancy and child birth may lead to pelvic organ prolapse

☐ Yes ☐ No ☐ Don't know

35. Thin women are more likely to have pelvic organ prolapse than overweight women.

☐ Yes ☐ No ☐ Don't know

36. Is there treatment for pelvic organ prolapse?

☐ Yes ☐ No ☐ Don't know

37. Physiotherapy can reduce development of pelvic organ prolapse.

☐ Yes ☐ No ☐ Don't know

38. Pelvic floor exercises when done before pregnancy can help with reducing pelvic organ prolapse after child birth.

☐ Yes ☐ No ☐ Don't know

39. Medication/Drugs are available in the treatment of pelvic organ prolapse.

☐ Yes ☐ No ☐ Don't know

40. A rubber pessary may be used in the treatment of pelvic organ prolapse.

☐ Yes ☐ No ☐ Don't know

Below are some general knowledge about faceal incontinence (stool leakage)?

41. Stool leakage is more common in the young than old.

☐ Yes ☐ No ☐ Don't know

42. Pregnancy and child birth may lead to stool leakage.

☐ Yes ☐ No ☐ Don't know

43. Thin women are more likely to have stool leakage than overweight women.

☐ Yes ☐ No ☐ Don't know

44. Is there treatment for stool leakage?

☐ Yes ☐ No ☐ Don't know

45. Physiotherapy can reduce development of stool leakage.

☐ Yes ☐ No ☐ Don't know

46. Pelvic floor exercises when done before pregnancy can help with reducing stool leakage after child birth.

☐ Yes ☐ No ☐ Don't know

47. Medication/Drugs are available in the treatment of stool leakage.

☐ Yes ☐ No ☐ Don't know

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