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Urinary incontinence in pregnant women and its relation with socio-demographic variables and quality of life

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ABSTRACT

Objective: To investigate the occurrence of urinary incontinency (UI) in pregnant women and its relationship with socio-demographic variables and quality of life.
Methods: A descriptive cross-sectional multicenter study was conducted to investigate 495 women using the International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF). The survey was conducted on the same day of delivery, with the volunteers still in the maternity ward. Statistical analysis of the comparison between groups 1 (incontinence) and 2 (continent) was done using chi-square test for comparison of proportions of women with and without urinary incontinency and logistic regression analysis.
Results: From the total of 495 women studied, 352 (71%) reported having had UI during the last four weeks of pregnancy. Group 1 presented the ICIQ-SF median score of 11 (range 3-21), considered as severe impact in quality of life. Logistic regression analysis showed that there was a closer relation between the self-report of UI with the following variables: level of education below 8 years (OR: 2.99; $p < 0.001$), black women (OR: 2.32; $p = 0.005$), women with more than 3 children (OR: 4.93; $p < 0.001$), obese (OR: 4.22; $p < 0.001$) and normal vaginal delivery (OR: 2.59; $p < 0.001$).
Conclusion: The majority of pregnant women have UI, negatively affecting the quality of their lives.

Incontinência urinária na gravidez e sua relação com as variáveis sociodemográficas e qualidade de vida

Palavras-chave:
Incontinência urinária

RESUMO

Objetivo: Investigar a ocorrência de incontinência urinária (IU) em mulheres grávidas, e a relação com variáveis sociodemográficas e a qualidade de vida.

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Métodos: Estudo multicêntrico do tipo descritivo, transversal, a fim de verificar por meio do *International Consultation on Incontinence Questionnaire – Short Form* (ICIQ-SF) a IU em 495 mulheres. Os dados foram coletados no dia do parto, nas maternidades elegidas. A comparação das proporções entre os grupos 1 (incontinente) e 2 (continente) foi realizada pelo teste de qui-quadrado e a verificação das variáveis que mais se associavam com a IU por análise de regressão logística.

Resultados: No total 71,11% (352) apresentaram IU durante as últimas quatro semanas de gestação. O grupo 1 apresentou escore do ICIQ-SF de 12,11 (min. = 3 e máx. = 21), considerado severo impacto na qualidade de vida. Na análise multivariada de regressão logística encontramos maior relação entre o relato de IU com as seguintes variáveis: escolaridade abaixo de 8 anos (OR: 2,99; p < 0,001), raça negra (OR: 2,32; p= 0,005), mulheres com mais de 3 filhos (OR: 4,93; p < 0,001), obesas (OR: 4,22; p < 0,001) e parto normal (OR: 2,59; p < 0,001).

Conclusão: A maioria das mulheres tinha IU, afetando sua qualidade de vida negativamente.

Introduction

The standardization committee of the International Continence Society (ICS) defines urinary incontinence (UI) as "any involuntary urine leak complaint".[1]

During pregnancy, the most common type of UI is stress urinary incontinence (SUI), in which anatomical changes occur, such as bladder neck hyper mobility and sphincter mechanism incompetence.[2] Bladder neck descent arises from the 12th week of pregnancy.[2] Pelvic floor muscles strength decrease is observed due to the increase of relaxing concentrations, from the 14th to the 24th weeks of pregnancy. Thereafter, stabilization of this concentration occurs, which remains stable until the end of pregnancy.[3]

SUI is a symptom frequently observed during the pregnancy period, mainly in the third trimester of pregnancy, and generally presents a spontaneous resolution after delivery, with prevalence between 20% and 60%.[4] Despite the fact that the pudendal nerve usually recovers two months after delivery, pelvic floor muscle dysfunction may persist for six months.[5] Snooks et al.[6] described that some women still had clinical symptoms of SUI five years after vaginal birth. Other researchers observed a 42% prevalence of UI during pregnancy and a 38% prevalence eight weeks after delivery.[7]

In a retrospective study, Fritel et al.[8] reported SUI prevalence four years after delivery in 19% of patients. According to the ICS, UI is related to deterioration of quality of life, because it is an unpleasant, stressful condition that limits women's activities, leading, in numerous cases, to social isolation. Until now, it is not well understood which, and if so, to what extent socio-demographic variables are related with UI and deterioration of quality of life.

As millions of people suffer from this problem, a number of studies from around the world (the USA, Ireland, Taiwan, and Nigeria)[9–11] have investigated the association between UI and its impact on quality of life.

More information on this subject is still necessary. Therefore, the ICS recommends that every epidemiological study about UI should also include questionnaires assessing this association.[12]

Thus, the objective of this study was to verify the occurrence of UI in Brazilian pregnant women and its relationship with socio-demographic variables and quality of life.

Methods

This study included 495 women. In order to achieve a higher number of women in a shorter period of time, they were interviewed while still in the ward. It must be clarified that, despite the fact that the data was collected immediately post partum, i.e., from the first to the tenth day after delivery, all the questions referred to the third trimester of pregnancy, since the International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF)[13] has questions which refer only to the last four weeks of pregnancy.

All participants of the study signed an informed consent. The study was performed in accordance with the Brazilian regulation regarding research in human beings (Resolution 196/96 from the National Health Council), and was also approved by the ethics committee of each institution.

A descriptive cross-sectional multi-center study was conducted to investigate UI during pregnancy using the ICIQ-SF.[13] It is a simple and brief questionnaire that can be self-administered, which was originally developed and validated in English by Avery et al.[12]

The ICIQ-SF was adapted and validated for Brazilian Portuguese by Tamanini et al.[13] The ICIQ-SF was chosen for its suitability for the Brazilian society.

All women who reported not having any urine loss were defined as "continent"; all women who reported symptoms of incontinence were defined as "incontinent". Furthermore, there was a set of eight items of self-diagnosis, related to the causes or the situations of UI as experienced by the patients, who reported having had the symptoms through the question: 'When do you lose urine?'[13] [responses: 'never,' 'I lose urine before going to the toilet,' 'I lose urine when I cough or sneeze,' 'I lose urine when I sleep,' 'I lose urine when I do physical activities,' 'I lose urine when I finish urinating and I am getting dressed,' 'I lose urine without any apparent reason,' and 'I lose urine all the time'].

The quality of life score ranges from 0-21; the higher the score, the worse the quality of life. The impact on quality of life was defined according to the score of question 5, which is the sum score of results of questions 3, 4, and 5.

This questionnaire has two questions (questions 1 and 2) regarding date of birth and gender, and four questions regarding the frequency, the severity, and the impact of UI

Table 1 – Baseline characteristics (mean) of the diagnostic groups.

Socio-demographic variables	Group 1 Incontinent (n = 352) Mean ± SD	Group 2 Continent (n = 143) Mean ± SD	p
Age	27.44 ± 6.68	26.46 ± 5.99	0.129
BMI	28.58 ± 4.94	27.50 ± 3.96	0.01
Gestational age	38.19 ± 2.88	37.76 ± 2.90	0.002
ICIQ	12.11 ± 4.04	0 ± 0	0.001

BMI, body mass index; ICIQ, International Consultation on Incontinence Questionnaire.

in quality of life: question 3, 'How often do you have loss of urine?'; – question 4 "If so, how much urine do you think you lose?"; question 5, 'In general, what is the impact of this loss ON your daily routine?'; and question 6, 'When do you lose urine?' (Appendix 1 [Portuguese version only]).

The questionnaire defines a result of 0 as no impact; from 1 to 3, as light impact; from 4 to 6, as moderate impact; from 7 to 9, as severe impact; and above 10, as very severe.

Besides the ICIQ-SF, a self-constructed socio-demographic questionnaire was applied to identify patient characteristics, in which data regarding age, race, number of births, type of deliveries, and level of education were collected. Additionally, it was asked whether they performed regular pelvic floor muscle exercises and regular physical activities during pregnancy.

Both the regular practice of physical exercises (such as going to gym, walking, and/or running for one hour, three times per week) and doing household tasks every day were considered to be regular practice of physical activities. Regarding the pelvic floor muscle exercises, only the pregnant women who did at least 20 daily contractions with maintenance of 3 to 5 seconds were considered.

The body mass index (BMI) was defined using the classification of Rosso,[14] which is only used to determine BMI of pregnant women, as follows: underweight (BMI < 19.8), eutrophic (BMI 19.8-26.0), overweight (BMI 26.0-29.0) and obese (BMI $\geq$ 29.0). The BMI was self-reported and confirmed in the antenatal card.

The random sample consisted of 10% of the total number of annual births in two hospitals in Santos (Hospital e Maternidade Dr. Silvério Fontes Santos and Irmandade Santa Casa Misericórdia de Santos, Santos, SP, Brazil), one in Pirassununga (Maternidade da Irmandade Santa Casa de Misericórdia de Pirassununga, Pirassununga, SP, Brazil), one in Curitiba (Hospital e Maternidade Santa Brígida, Curitiba, PR, Brazil), and another in Porto Alegre (Hospital Materno Infantil Presidente Vargas de Porto Alegre, Porto Alegre, RS, Brazil).

The inclusion criterion was healthy women with singleton pregnancies at term. Exclusion criteria were patients who presented clinical or obstetrics interference during pregnancy, urinary or renal infection in the last four weeks, neurological diseases or cognitive deficit, illiterate women, premature birth, and absence of prenatal care.

The statistical analysis was performed by verifying the normal distribution of data, using the chi-squared test for comparison of proportions of women with and without UI and logistic regression analysis to study associations of socio-demographic variables and quality of life with UI. Statistical significance was considered as $p < 0.05$. The Statistical Package for Social Sciences (SPSS), release 15.0, was used for the statistical analysis.

Results

The survey was conducted from January to April, 2009, immediately post partum, while the volunteers were still in the maternity ward. From the total of 495 women studied, 352 (71%) reported having had UI during the last four weeks of pregnancy.

In Table 1, it is observed that group 1 (incontinent) did not present a significant difference to group 2 (continent) regarding age. However, there was a significant difference in the BMI, gestational age, and ICIQ-SF score.

ICIQ-SF scores in group 1 (incontinent) ranged from 3-21, with a mean (± SD) of 12.11 (± 4.04), which implies a very severe impact on quality of life, indicating that UI had a negative effect on Brazilian women's working routines, free time activities, and even sexual intercourse (Table 1).

Table 2 demonstrates that white women were predominant in both groups. However, a higher proportion of black women were found in group 1 when compared to group 2. In addition, group 1 presented a higher proportion of women with a lower level of education (up to four years and between five to eight years of education), a higher proportion of overweight and obesity, a higher incidence of normal vaginal delivery, and a higher proportion of multiparous, when compared with group 2. Of the 352 women that had UI, 296 (84.09%) did not do any regular physical activity, and 348 (98.86%) did not do pelvic floor muscles exercises (Table 2).

Logistic regression analysis demonstrated that level of education ($p < 0.0001$), race ($p = 0.005$), parity ($p < 0.001$), type of birth ($p < 0.001$), and weight ($p < 0.001$) had the highest association with UI (Table 3).

In Table 3, patients who had less than eight years of formal education were three times more likely to have UI than those with higher education. Black women were twice as likely to have UI than white women. Asian women did not present a significant statistical difference. Patients with parity between two and three children were 2.5 times more likely to have UI than nulliparous women and those who had had over three children were five times more likely to have UI. Women who underwent vaginal delivery were 2.5 times more likely to have UI than those who underwent cesarean delivery; overweight and obese women were respectively two and four times more likely to have UI than eutrophic women. Underweight women did not present significant additional risk.

Discussion

In this study, a relation between SUI and anatomical and dysfunctions of the lower urinary tract during pregnancy were

Table 2 – Baseline characteristics (frequency) of the diagnostic groups.

Socio-demographic variables	Group 1 Incontinent (n = 352)		Group 2 Continent (n = 143)		p
	F_I	F_R %	F_I	F_R %	
Ethnicity					
White	228	64.77	122	85.31	< 0.001
Black	119	33.81	19	13.29	
Asian	5	1.42	2	1.40	
Level of education					
Illiterate	—	—	—	—	< 0.001
≤4 years	30	8.52	1	0.70	
5-8 years	135	38.35	22	15.38	
9-11 years	146	41.48	72	50.35	
12 years or more	41	11.65	48	33.57	
Body mass index					
Underweight	100	28.41	48	33.57	0.002
Eutrophic	67	19.03	43	30.07	
Overweight	93	26.42	34	23.78	
Obese	92	26.14	18	12.59	
Mode of delivery					
Vaginal	172	48.86	33	23.08	< 0.001
Cesarean section	180	51.14	110	76.92	
Parity					
1	112	31.82	88	61.54	< 0.001
2-3	159	45.17	47	32.87	
> 4 or more	81	23.01	8	5.59	
Physical activity					
Yes	56	15.91	44	30.77	0.0002
No	296	84.09	99	69.23	
Pelvic floor muscle exercise					
Yes	4	1.14	10	6.99	< 0.001
No	348	98.86	133	93.01	

Table 3 – Logistic regression analysis of socio-demographic variables.

Variables	Odds ratio	95% CI		p
		LL	UL	
Level of education				
Under 8 years	2.99	1.74	5.12	< 0.001
Above 8 years	1.00	—	—	—
Ethnicity				
White	1.00	—	—	—
Black	2.32	1.30	4.13	0.005
Asian	1.08	0.19	6.36	0.929
Parity				
1	1.00	—	—	—
2-3	2.51	1.57	4.02	< 0.001
4 or more	4.93	2.15	11.32	< 0.001
Mode of delivery				
Cesarean section	1.00	—	—	—
Vaginal	2.59	1,58	4,24	< 0.001
Body mass index				
Underweight	1.32	0.74	2.38	0.350
Eutrophic	1.00	—	—	—
Overweight	2.13	1.15	3.98	0.017
Obese	4.22	2.09	8.54	< 0.001

LL, Lower Limit; UL, Upper Limit.

found to be common. Moreover, pregnancy and delivery can trigger other urinary symptoms and affect the quality of life.[2]

In most of pregnant women who reported UI there was a high association with socio-demographic variables such as parity, physical activity, and ethnicity; thus, their lives were negatively affected. The present results corroborate the findings by Scarpa et al.[4]

According to Scarpa et al.,[4] the prevalence of UI was 57.5%. These data are in line with the present study, in which SUI was reported by 71% of women. One explanation for this high prevalence might be that most of the women did not have higher education or were not sufficiently informed regarding the importance of UI prevention during pregnancy. In addition, most women had a parity of two to four children. Only 31.82% were primiparas in group 1. SUI during and directly after pregnancy is the most evident symptom among epidemiological studies, and despite the high rates, very little has been done in order to reduce and prevent it.[15–17]

Simeone et al.[18] reported that urinary loss complaints and/or lower urinary tract symptoms (LUTS) may occur due to the practice of regular physical activities such as volleyball and basketball. High-impact sports were more frequently associated with UI, while low-impact sports were associated with LUTS. The prevalence of LUTS was 54.7%, and 30% for UI.

Salvatore et al.[19] evaluated the prevalence of SUI in 679 women of fertile age practicing recreational sports activity, and UI was reported in 101 women (14.9%). Of these women, 32 (31.7%) complained of UI only during sports activities, 48 (47.5%) only during daily life. and 21 (20.8%) in both circumstances. UI affects a significant proportion of young women and can cause abandonment of the sport or limitation of its practice.

In Brazil, Santos et al.[20] verified the prevalence of UI and the characteristics of urinary loss among nulliparous female physical education students and observed that in 75% of cases urinary loss occurred during the practice of sports.

In the present study, a high prevalence of UI was observed among pregnant women who didn't exercise regularly. Besides, pregnant women do not practice pelvic floor muscle exercises in order to protect their pelvic floor muscles from the changes that occur in their bodies during pregnancy. Only 14 women did pelvic floor exercise during pregnancy in both groups studied.

Unfortunately, some women only decide to begin regular physical activities while pregnant due to fear of weight gain. It is also important to mention that most of the interviewed women were unaware of pelvic floor muscles exercises. All these facts might have contributed to the present results.

SUI before and during pregnancy appears to be associated with parity, age, and BMI.[21–23] This study observed that a higher parity is associated with a higher prevalence of UI.

In the present study, regarding ethnicity, the highest percentage of UI was observed among black women. This is not in agreement with other studies, which show that the highest prevalence of UI was observed in white women.[9] It is known that black women have a higher maximum closing urethral pressure (MCUP) compared to white women.[9] White women have a higher prevalence of UI due to either genetic determinants, anatomy differences, or the overall strength of urethral and pelvic floor muscles which protect black women from UI.[9]

However, in the present study, black women were the most incontinent; this can be explained by their lower social-economic and their lower educational levels. Additionally, in Brazil, there is a lack of public restroom facilities as well as public transport equipped with toilets. In the research, over half of the interviewed women had jobs such as house or office cleaners, cooks, or nannies. Most of them only had the exact amount of money needed for the bus fare to go to work, which made it difficult for them to stop during their journeys to use a toilet. This factor, combined with the kind of physical work they performed, may have contributed to the present findings. Also, most of them lived in the outskirts of their cities, and, consequently, they may have spent over two hours per day commuting.

According to many relevant recent studies,[22–24] excessive weight gain during pregnancy and obesity are risk factors for developing UI during pregnancy. According to Rosso,[14] there were differences between UI and prevalence among the four categories of weight.

Although a significant difference in UI between underweight and eutrophic women was not observed in the present study, a high number (100) of underweight women had UI. One explanation is that in those underweight women, the weakening of the pelvic floor muscles responsible for developing UI might be because the skeletal muscle tissue is sensitive to protein deficiency, as it is a reservoir of protein in the organism.

Therefore, when there is a dietary deficiency of protein, this tissue is depleted, which leads to a reduction in the number of fibers, and a change in the morphological, metabolic, and contractile characteristics of the skeletal muscle fibers.[24] New studies are needed in order to further explore this hypothesis.

Overweight during and directly after pregnancy is a prognostic factor for UI.[24] Also, the logistic regression analysis showed that educational level and ethnicity are major risk factors. The higher the parity, the higher the chances of UI. When associated with excessive weight gain, which may happen post-menopause, it is considered to be another risk factor for UI.[25]

In this study, it was observed that only a minority of pregnant women performed pelvic floor muscles exercises, which may contribute to the explanation of the high rate of UI.[26,27] According to Oliveira,[27] the more frequent pelvic floor muscles exercises with maximal voluntary contraction during pregnancy, the stronger the pelvic floor muscles become, decreasing the prevalence of UI. Lately, there is growing evidence for the importance of adequate awareness and perception of the correct contraction of the pelvic floor muscles to prevent urinary and fecal incontinence and sexual dysfunction in peri- and post-partum women.[28] It is known that selective contraction and relaxation of the pelvic floor muscles to support the passing of the baby during childbirth leads to less damage to the pelvic floor muscles, and less need of episiotomy will occur.[5] Therefore, not only must physiotherapy for pelvic floor muscles be encouraged during pregnancy, but also and mainly after delivery.

A number of authors have described that pelvic floor muscle exercises strengthen these muscles during pregnancy as well as three months after childbirth when compared to a control group.[26,27]

It is of great importance to organize programs of prevention and treatment of UI during and especially after pregnancy and to raise public awareness. In the present study, pregnant women who had higher education had a lower percentage of UI. Thus, it is vital that public health programs are conducted with multidisciplinary teams to train, prevent, and treat UI. Strategic public health programs to prevent UI after childbirth are the focus of research in the USA and in the Netherlands.[29]

It is important that Brazil begins to develop this process. Epidemiological studies such as this one are first steps to show the high prevalence of UI during pregnancy and mainly after childbirth.

UI is a worldwide public health problem, and it may significantly affect women's quality of life. In this study, it was also observed that UI negatively affected pregnant women's quality of life. A multidisciplinary approach in which all relevant health care providers work together to develop valid, evidence-based, high quality peri- and post-partum programs for prevention of pelvic floor disorders such as UI may contribute to avoid this problem. Surely, the inclusion of pelvic physiotherapy specialized in uro-gynecology and obstetrics is a fundamental step. These professionals should be included in the prenatal care team.

The study demonstrated that the majority of pregnant women who had UI were multipara. There were associations with ethnicity, socio-demographic variables, and level of exercise. UI during pregnancy negatively affected women's quality of life.

It is necessary to raise awareness and provide information to both relevant health care providers and the general population regarding specific physiotherapeutic prevention programs in pregnant and post-partum women.

Oliveira C conceived and designed the study, drafted the article, was responsible for orienting students involved with this work, and approved the final version of the manuscript. Seleme M critically revised the article for important and intellectual content. Cansi PF, Consentino R F D C, Kumakura F Y, and Moreira G A, physiotherapy students from BCSS, were in charge of interviewing patients and obtaining data. Berghmans B critically revised the manuscript regarding intellectual content.

Conflicts of interest

The authors declare to have no conflict of interest.

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