Prevalence of self-reported medical diagnosis of uterine leiomyomas in a Brazilian population: Demographic and socioeconomic patterns in the Pro-Saúde Study

*Prevalência de diagnóstico médico auto-relatado de miomas uterinos em população brasileira: Padrões demográficos e socioeconômicos no Estudo Pró-Saúde**

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Abstract

Introduction: Uterine leiomyomas (UL) are considered the most common tumors of the female reproductive system. However, there are few epidemiological studies about this condition in Brazil. **Aim:** To estimate the prevalence of self-reported history of UL according to demographic and socioeconomic characteristics, and to markers of access to health care. **Methods:** We analyzed data from 1,733 university employees who participated at the baseline waves of the Pro-Saude Study (1999-2001), in relation to three outcomes: (1) self-reported medical diagnosis of UL, (2) UL with symptoms prior to diagnosis, and (3) cases with hysterectomy due to UL. Prevalence and 95% confidence intervals (95% CI) were estimated in relation to strata of variables related to demographic (age, color/race) and socioeconomic characteristics (education, income) and of markers of access to health care (Pap smear, breast clinical exam and private health insurance status). **Results:** The prevalence of medically-diagnosed UL was 23.3% (95% CI - 21.3, 25.2), the UL with symptoms prior to diagnosis of 13.3% (95% CI - 11.7, 15.0) and hysterectomy due to UL, 8.4% (95% CI - 7.5, 10.3). Among participants younger than 45 years old, higher prevalence was observed among women with worse socioeconomic conditions and of black color/race. Among those with 45 years or more, there was higher prevalence among women with better access to health care. **Conclusion:** In this study population of Brazilian women, UL is a relevant health problem, and its prevalence and associated socio-demographic gradients are similar to those observed in other countries.

Keywords: Uterine leiomyoma. Prevalence. Women's health.

Resumo

Introdução: Os miomas uterinos (MU) são considerados os tumores mais comuns do sistema reprodutor feminino; no entanto, existem poucos estudos epidemiológicos sobre essa condição no Brasil. **Objetivo:** Estimar as prevalências de história auto-relatada de MU segundo características demográficas, socioeconômicas e de acesso a serviços de saúde. **Métodos:** Foram analisados dados de 1.733 trabalhadoras de universidade no Rio de Janeiro, participantes da linha de base do Estudo Pró-Saúde (1999-2001), em relação a três desfechos: (1) diagnóstico médico de MU, (2) MU com sintomas prévios ao diagnóstico e (3) casos que realizaram histerectomia pelo tumor. As prevalências e seus intervalos de 95% de confiança (IC 95%) foram estimadas em relação a estratos de variáveis demográficas (idade, cor/raça), socioeconômicas (escolaridade, renda) e marcadoras de acesso a serviços de saúde (teste *Papanicolaou*, exame de mama, plano de saúde). **Resultados:** A prevalência de diagnóstico médico de MU foi de 23,3% (IC 95% - 21,3; 25,2); a de MU com sintomas prévios ao diagnóstico, de 13,3% (IC 95% - 11,7; 15,0) e a de histerectomia pelo tumor, de 8,4% (IC 95% - 7,5; 10,3). Entre participantes abaixo de 45 anos de idade, foram observadas prevalências mais elevadas nos estratos de piores condições socioeconômicas e de cor/raça preta. Entre aquelas com 45 anos ou mais, foram encontradas maiores prevalências entre mulheres com melhor acesso a serviços de saúde. **Conclusão:** Entre as mulheres brasileiras investigadas, os MU constituem problema relevante de saúde, com prevalências e gradientes sociodemográficos similares aos observados em populações de outros países.

Palavras-chaves: Leiomioma. Prevalência. Saúde da mulher.

Introduction

Uterine leiomyomas (UL) are slow-growing monoclonal benign neoplasms that develop in several locations in the uterus[1,2]. They are considered to be the most common tumors in the female reproductive system[3]. Studies performed in the United States have suggested that between 70% and 80% of women aged from 40 to 50 years have UL; however, almost half of these tumors are not even diagnosed, nor do they require treatment, as they do not show clinical signs or symptoms[4-6].

Although rarely associated with malignization or mortality[2,7], UL can have a significant impact on the quality of life of women of reproductive age[8]. Depending on their anatomical position, number and size, these tumors can cause excessive uterine bleeding and/or a prolonged menstrual period[9-11]; feeling of pelvic pressure, increase in abdominal volume[10,12,13]; pain during sexual intercourse[14] and urinary incontinence[15,16]. Additionally, the UL can have a negative impact on the reproductive function and it is associated with infertility and adverse gestational outcomes, such as spontaneous abortions, fetal anomalies, premature births, and a higher number of indications for Cesarean sections[10,17-22].

Epidemiological data on risk factors for the development of UL primarily originate from studies conducted in the United States. In these studies, higher frequencies of tumors stood out among black women[4,23-26], those exposed to factors associated with the increase in ovarian hormones (estrogen and progesterone), those undergoing hormonal therapy[27], those consuming greater amounts of red meat and sausages[28], those aged between 40 and 50 years[4,29], those who had had an early menarche[30-32], those with a high BMI[31,33-36] and fat percentage[37], and those with an increase in weight during adulthood[33,34,38]. On the other hand, lower frequencies of tumors were found in women who practiced physical activities[39], smokers[30,33,40,41], those with a higher number of children[30-31,36,42], those who had reached

menopause[36] and those who consumed greater amounts of fruits, vegetables and fish[28,35].

Whereas studies conducted in the United States indicate prevalences of up to 80%, depending on the characteristics of the sub-groups studied, European studies have revealed significantly lower prevalences of tumors[43]. In Germany, 10.7% of participants of a study performed with 10,241 women aged less than 65 years reported having received a diagnosis of "benign tumor in the uterus"[43,44]. In Italy, UL cases were detected by ultrasound in 21.4% of participants of a study conducted with 341 women aged between 30 and 60 years[45]. In Sweden, these tumors were also diagnosed by ultrasound in 3.3% of women aged from 25 to 32 years and in 7.8% of those aged from 33 to 40 years in a random sample comprised of 335 women[46].

In Brazil, there are few epidemiological data on UL. At present, only one study has been identified, which was conducted with a low-income population cared for in a health clinic of the city of São Paulo. In this study, UL was found in 23% of white women and 42% of black ones. The occurrence of hysterectomy for UL also varied between groups, totaling 4% among white women and 16% among black ones[47].

Several reasons indicate the need for better identification of the characteristics of occurrence of this condition among Brazilian women. UL has a great negative impact on women's health, whether due to the reduction in the quality of life of a significant number of young women of reproductive age[8] or due to the increase in the number of mutilating surgeries[3]. Not less important are the differences between the Brazilian and American contexts, especially with regard to ethnic relations and their interfaces with the remaining demographic and socioeconomic characteristics[48].

Contrasting this lack of evidence, there is growing space for reflection and social policies aimed at women in general and, specifically, the African Brazilian population[49,50]. Governmental policies have sought, mainly in the last decade, "to increase, qualify and humanize comprehensive care for women's health in the *Sistema Único de Saúde* (SUS – Unified Health System) […] aiming to reduce female morbidity and mortality […], considering ethnic peculiarities"[50].

In this sense, special attention has been given to the most frequent diseases and conditions found in the black population, among which is UL[49].

Thus, aiming to contribute to the knowledge about epidemiology of UL, the present study was conducted with women participating in the Pró-Saúde Study and had the purpose of estimating the prevalence of (1) cases of self-reported medical diagnosis of UL; (2) cases of self-reported medical diagnosis of UL, with symptoms prior to diagnosis; and (3) cases of self-reported medical diagnosis of UL, with the performance of hysterectomy. Additionally, the prevalences of these three outcomes were identified in different demographic and socioeconomic strata and according to access to and use of health services.

Methods

The Pró-Saúde Study

The Pró-Saúde Study is a longitudinal investigation conducted among technical-administrative workers of a university located in the city of Rio de Janeiro, Southeastern Brazil. The social determinants of health and health behavior are its main thematic focus. All active workers found in the institution at the beginning of the study (1999) were invited to participate[51].

Study population

Cross-sectional data on the female population participating in the two stages of the baseline of the Pró-Saúde Study, conducted in 1999-2001, were used in the analyses of this study. The eligible population was comprised of 2,466 workers; of these, 1,819 (73.8%) participated in the two stages of the baseline of this study. A total

of 1,733 workers were analyzed after excluding those who did not provide information about the medical diagnosis of UL (n = 86); in general, the latter had poorer socioeconomic conditions, compared to those analyzed in the present study.

Data collection and study variables

Self-administered questionnaires were applied in the workplace by trained field researchers, assisted by supervisors. Questions about the following aspects were included: socioeconomic conditions, gender, ethnic group, geographic and social mobility, experience of discrimination, work-related stress, social support and network patterns, women's health, morbidities, work accidents, work-related behavioral disorders and common mental disorders. Methods used to improve the quality of information, such as pilot studies, validation of scales and test-retest reliability tests, were performed[51].

Outcome

Information about the medical diagnosis of UL was obtained from participants in 1999 through the following question: "Have you ever been informed by a physician that you had uterine leiomyoma, a benign tumor in the uterus?". The test-retest reliability of responses was assessed in a stratified sample (age and level of education) of 98 women who were not eligible for the Pró-Saúde Study (temporary workers of the same university), with an interval of two weeks, and it was considered to be excellent (*kappa* = 0.94 – 95%CI: 0.86; 1.00).

Additionally, participants provided information about age of diagnosis of UL, previous symptoms and performance of hysterectomy as a result of UL. Based on this information, three case definitions were developed and explored separately as outcomes of interest, and the second and third definitions were a sub-set of the first one: (1) totality of cases of self-reported medical diagnosis of UL; (2) cases of self-reported medical diagnosis of UL, with symptoms prior to diagnosis; and (3) cases of self-reported medical diagnosis of UL, with the performance of hysterectomy.

Socioeconomic and demographic variables

Age: discrete variable categorized in two ways: (1) younger than 35 years, from 35 to 44 years, from 45 to 54 years, and older than 54 years; and (2) younger than 45 years, and 45 years and older.

Color/race: in 1999, information about participants' color/race was collected with the open question ("In your opinion, what is your color/race?"). A total of 41 distinct terms were reported to identify participants' color/race (including men). These terms were categorized as follows: white, brown (typical Portuguese words such as *parda, morena, mulata, mestiça* and *cabocla* were used to describe mixed ethnicity), black (typical Portuguese words such as *negra, preta, Africana* and *escura* were used to describe mixed ethnicity) and of Asian descent[52]. Participants of Asian descent were excluded from the analyses due to their small number (n = 8; - 0.5%).

Level of education: complete primary school, complete secondary school, and complete university undergraduate level or higher.

Per capita household income: variable obtained by dividing the total income of those contributing to the household expenses by the number of residents. It was categorized into: less than three minimum wages (MW), three to six MW, and more than six MW (One MW was R$136.00 or US$ 71.57 at the time of this study).

Variables markers of health service access and use

Pap smear test: has never had it performed or had it performed more than three years before, and had it performed less than three years before.

Breast examination (gynecologist): has

never had a breast examination performed or had it more than three years before, and had it performed less than three years before.

Health insurance: yes and no.

Statistical analyses

Prevalences and their 95% confidence intervals (95%CI) were estimated for the three outcomes in the entire study population in demographic, socioeconomic and health service access and use strata. Prevalences were also stratified according to age groups (younger than 45 years, 45 years and older). The cut-off point was defined after changes in the pattern of prevalences were verified close to the age of 45 years in the population studied. Pearson's chi-square test was used to assess the heterogeneity of proportions of sub-groups. Differences with a p-value < 0.05 were considered to be statistically significant.

Data entry and consistency checking were performed with the Epi-Info software. Analyses were made in the R statistical software, version 2.6.2. The present study was approved by the Research Ethics Committee of the University of the State of Rio de Janeiro. There were no conflicts of interest.

Results

Of all 1,733 study participants, 72% were younger than 45 years, 51.9% reported they were white, 62.4% had health insurance, 88.4% had a Pap smear test performed less than three years before and 88.1% had a breast examination performed less than three years before. Slightly less than half (46%) reported they had completed their university undergraduate program and 37% had a per capita household income higher than six MW (Table 1).

The prevalence of medical diagnosis of UL was 23.3% (95%CI - 21.3; 25.3), that of UL with symptoms prior to diagnosis was 13.3% (95%CI - 11.7; 15.0), and that of hysterectomy due to tumor was 8.4% (95%CI - 7.5; 10.3). Figure 1 shows the prevalences of three outcomes according to age groups. There was an increase in the prevalences with the increase in age until 45 years, with a subsequent stabilization after this age (Figure 1).

Table 2 shows the prevalences of three outcomes among the sub-groups formed by the demographic, socioeconomic and health service access and use strata. With regard to the medical diagnosis of UL, apart from the increase in prevalence with age, there were also higher prevalences among black women (32.8% - $p < 0.001$), those who had completed primary education (33.8% - $p < 0.001$) and those who had had a breast examination less than three years before (24% - $p = 0.021$).

This pattern of distribution of prevalences in the strata of covariables was similar to other two outcomes (UL with symptoms prior to diagnosis and cases of hysterectomy due to UL). In both cases, higher prevalences were also found among women with a lower per capita household income (19.7% of those with symptoms prior to diagnosis and 14.3% of cases of hysterectomy due to UL, each with $p < 0.001$) and among those who did not have health insurance (16.6% of those with symptoms prior to diagnosis, with $p = 0.002$; and 11.3% of cases of hysterectomy due to UL, with $p = 0.007$). Differences were not statistically significant according to time of performance of breast examination (Table 2).

Table 3 shows the prevalences of UL by covariables, stratified by age for the three outcomes. Considering the two age groups analyzed, the patterns found were different. Black women and those who had completed primary education had significantly higher prevalences of medical diagnosis of UL in the stratum of women younger than 45 years exclusively (25.6% - $p < 0.001$ and 25.4% - $p = 0.013$, respectively). On the other hand, women aged 45 years and more, who had had the Pap smear test and breast examination less than three years before, showed higher prevalences (40.2% - $p = 0.023$ and 40.8% - $p = 0.007$, respectively). The remaining variables were not significantly different in both

Table 1 - *Demographic, socioeconomic and health services access characteristics in the study population. The Pro-Saúde Study (1999-2001).*
Tabela 1 - *Características demográficas, socioeconômicas e de acesso a serviços de saúde da população estudada. Estudo Pró-Saúde (1999-2001).*

	N	%
Age (years)		
< 35	439	25.3
35 to 44	809	46.7
45 to 54	373	21.5
55 +	112	6.5
Color/race		
White	863	51.9
Brown	393	23.6
Black	406	24.4
Level of education		
University undergraduate level or higher	789	46.0
Secondary education	596	34.7
Primary education	331	19.3
Per capita household income (MW*)		
> 6 MW	611	37.3
3 a 6 MW	623	38.1
< 3 MW	403	24.6
Health insurance		
Yes	1076	62.4
No	647	37.6
Pap smear test		
Less than three years before	1525	88.4
Has never had it/More than three years before	200	11.6
Breast examination		
Less than three years before	1519	88.1
Has never had it/More than three years before	206	11.9

* One minimum wage (MW) was R$136.00 or US$ 71.57 at the time of this study.
The sum of each variable may not correspond to the total number of participants due to loss of data.
* *Salário-mínimo (R$136,00)* .
O somatório da cada variável pode não corresponder ao número total de participantes devido à perda de informação.

age groups (Table 3).

Stratifications of prevalences by age also showed different patterns for UL with symptoms prior to diagnosis. Being black and having a per capita household income lower than three MW were directly associated with the diagnosis of symptomatic UL among women younger than 45 years (13.5% - $p = 0.006$, and 15% - $p = 0.002$, respectively). In contrast, those aged 45 years and more showed no statistically significant differences with regard to the characteristics studied (Table 3).

Concerning cases of hysterectomy due to UL, the same variables were associated with higher prevalences among women younger than 45 years. There were no statistically significant differences with regard to the characteristics studied among women aged 45 years and more (Table 3).

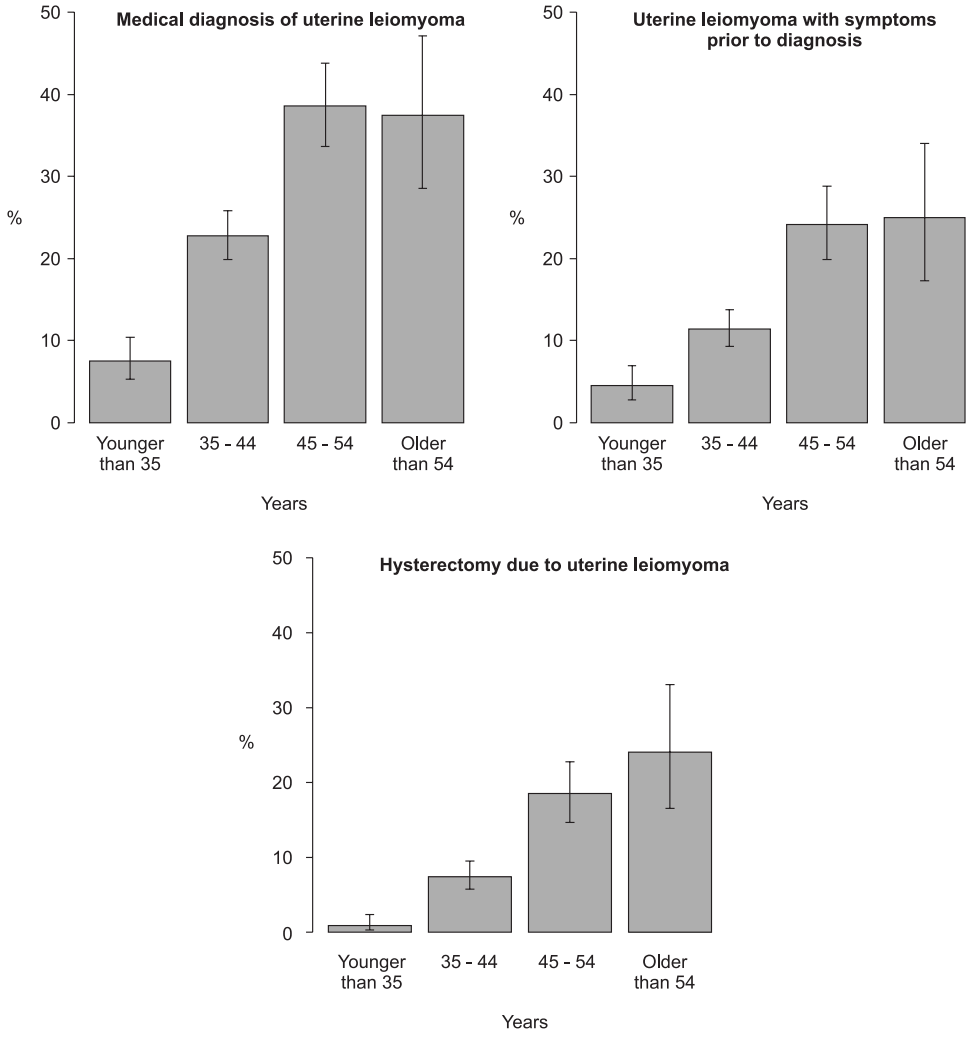

Figure 1 - Prevalence and Intervals Confidence of 95% (95%) of self-reported medical diagnosis of uterine leiomyoma, uterine leiomyoma symptoms prior to diagnosis and hysterectomy for uterine leiomyoma by age. The Pro-Saude Study (1999-2001).

Figura 1 *- Prevalências e seus Intervalos de Confiança de 95% (IC 95%) de diagnóstico médico auto-relatado de mioma uterino, de mioma uterino com sintomas prévios ao diagnóstico e de histerectomia por mioma uterino segundo faixas etárias. Estudo Pró-Saúde (1999-2001).*

Discussion

The prevalences of UL reported in the international literature show great variation: from 3.3% in a Swedish study[46] to 80% in an American study[4], depending on the geographic origin and age group of the population analyzed[3,4]. As many cases of UL are asymptomatic, the methods used to estimate the frequency of tumors can also influence these results[5]. Thus, studies based on the previous diagnosis of UL can generate underestimated prevalences, as asymptomatic cases among participants without a history of diagnosis will probably pass unnoticed, especially if they do not have adequate access to health services[5]. On the other hand, this underestimation decreases in studies that use ultrasound tests, for example.

The prevalences estimated in the present study are in an intermediate position, closer to the American estimates. One must take into consideration the fact that the history

Table 2 - Prevalence (%) of self-reported medical diagnosis of uterine leiomyoma (UL), UL with symptoms prior to diagnosis and hysterectomy for UL by demographic, socioeconomic and health services access characteristics. Pro-Saude Study (1999-2001).

Tabela 2 *- Prevalências (%) de diagnóstico médico auto-relatado de mioma uterino (MU), MU com sintomas prévios ao diagnóstico e histerectomia por MU segundo características demográficas, socioeconômicas e de acesso a serviços de saúde. Estudo Pró-Saúde (1999-2001).*

	Self-reported medical diagnosis of UL		UL with symptoms prior to diagnosis		Hysterectomy due to UL	
	N	n (%)	N	n (%)	N	n (%)
Age (years)						
< 35	439	33 (7.5)	439	20 (4.6)	423	3 (0.7)
35 to 44	809	184 (22.7)	806	92 (11.4)	745	52 (7.0)
45 to 54	373	144 (38.6)	373	90 (24.1)	330	62 (18.8)
55 +	112	42 (37.5)	112	28 (25.0)	97	24 (24.7)
p-value*		<0.001		<0.001		<0.001
Color/race						
White	863	167 (19.4)	863	86 (10.0)	805	43 (5.3)
Brown	393	90 (22.9)	393	55 (14.0)	363	31 (8.5)
Black	406	133 (32.8)	403	80 (19.9)	366	60 (16.4)
p-value*		<0.001		<0.001		<0.001
Level of education						
University undergraduate level or higher	789	167 (21.2)	789	80 (10.1)	742	45 (6.1)
Secondary education	596	118 (19.8)	594	73 (12.3)	552	43 (7.8)
Primary education	331	112 (33.8)	330	74 (22.4)	287	51 (17.8)
p-value*		<0.001		<0.001		<0.001
Per capita household income (MW)						
< 3 MW	611	133 (21.8)	611	61 (10.0)	579	33 (5.7)
3 to 6 MW	623	130 (20.9)	623	70 (11.2)	574	42 (7.3)
> 6 MW	403	106 (26.3)	402	79 (19.7)	364	52 (14.3)
p-value*		0.107		<0.001		<0.001
Health insurance						
Yes	1076	242 (22.5)	1075	121 (11.3)	1003	72 (7.2)
No	647	157 (24.3)	645	107 (16.6)	584	66 (11.3)
p-value*		0.431		0.002		0.007
Pap smear test						
Less than three years before	1525	364 (23.9)	1522	206 (13.5)	1404	121 (8.6)
Has never had it/More than three years before	200	35 (17.5)	200	21 (10.5)	183	17 (9.3)
p-value*		0.055		0.279		0.87
Breast examination						
Less than three years before	1519	365 (24.0)	1517	205 (13.5)	1404	127 (9.0)
Has never had it/More than three years before	206	34 (16.5)	205	22 (10.7)	183	11 (6.0)
p-value*		0.021		0.320		0.218

*p-value refers to Pearson's x^2 test / ***p-valor referente ao teste do x^2 de Pearson.***

of medical diagnosis of UL was reported by participants and that, consequently, these data are subject to underestimation, due to the existence of asymptomatic cases. Some strategies were used to minimize this limitation. The first one, although indirect, was

Table 3 - Prevalence (%) by age of self-reported medical diagnosis of uterine leiomyoma (UL), UL with symptoms prior to diagnosis and hysterectomy for UL by demographic, socioeconomic and health services access characteristics. Pro-Saude Study (1999-2001).

Tabela 3 *- Prevalências (%) estratificadas por idade de diagnóstico médico auto-relatado de mioma uterino (MU), MU com sintomas prévios ao diagnóstico e histerectomia por MU segundo características demográficas, socioeconômicas e de acesso a serviços de saúde. Estudo Pró-Saúde (1999-2001).*

	Self-reported medical diagnosis of UL		UL with symptoms prior to diagnosis		Hysterectomy due to UL	
	< 45 years	≥45 years	< 45 years	≥45 years	< 45 years	≥45 years
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Color/race						
White	94 (14.1)	73 (37.2)	46 (6.9)	40 (20.4)	17 (2.7)	26 (14.8)
Brown	53 (18.9)	37 (32.7)	28 (10.0)	27 (23.9)	10 (3.7)	21 (21.9)
Black	67 (25.6)	66 (45.8)	35 (13.5)	45 (31.2)	27 (11.4)	33 (25.4)
p-value*	<0.001	0.084	0.006	0.071	<0.001	0.061
Level of education						
University undergraduate level or higher	115 (17.6)	52 (38.5)	53 (8.1)	27 (20.0)	26 (4.2)	19 (15.3)
Secondary education	66 (14.4)	52 (37.7)	39 (8.6)	34 (24.6)	18 (4.2)	25 (20.5)
Primary education	33 (25.4)	79 (39.3)	19 (14.7)	55 (27.4)	10 (8.7)	41 (23.8)
p-value*	0.013	0.955	0.051	0.306	0.094	0.199
Per capita household income (MW)						
> 6 MW	84 (17.4)	49 (38.3)	34 (7.0)	27 (21.1)	17 (3.7)	16 (14.0)
3 to 6 MW	76 (15.8)	54 (38.3)	40 (8.3)	30 (21.3)	15 (3.4)	27 (21.1)
< 3 MW	46 (19.7)	60 (35.5)	35 (15.0)	44 (26.0)	21 (9.8)	31 (20.8)
p-value*	0.427	0.841	0.002	0.503	<0.001	0.285
Health insurance						
Yes	150 (17.9)	92 (38.7)	69 (8.2)	52 (21.8)	33 (4.2)	39 (18.1)
No	66 (16.2)	91 (38.1)	43 (10.6)	64 (26.8)	21 (5.6)	45 (21.8)
p-value*	0.500	0.971	0.211	0.251	0.373	0.407
Pap smear test						
Less than three years before	197 (17.7)	167 (40.2)	102(9.2)	104 (25.1)	48 (4.6)	73 (19.9)
Has never had it/more than three years before	19 (14.1)	16 (24.6)	10 (7.4)	11 (16.9)	7 (5.7)	10 (17.9)
p-value*	0.345	0.023	0.594	0.203	0.823	0.853
Breast examination						
More than three years before	201 (18.0)	164 (40.8)	105 (9.4)	100 (24.9)	52 (5.0)	75 (20.9)
Has never had it/More than three years before	15 (11.8)	19 (24.1)	7 (5.6)	15 (19.0)	3 (2.5)	8 (12.3)
p-value*	0.105	0.007	0.204	0.328	0.342	0.149

*p-value refers to Pearson's x^2 test / ***p-valor referente ao teste do x^2 de Pearson.*

the assessment of reliability of the question about the diagnosis of UL, which indicated an excellent pattern. The second one was the exploration of the three outcomes, which, apart from enabling the assessment of the severity of UL, tested different levels

of specificity of information about tumors reported. The third one was the use of variables markers of access to health services in the analyses. In this sense, a great part of the study population had reasonable conditions of obtaining a medical diagnosis of tumors, although asymptomatic, as they had health insurance and had had a Pap smear test and breast examination performed less than three years before.

On the other hand, as workers excluded from the analyses, as a result of their not providing information about UL, had a poorer socioeconomic profile than participants, the prevalences of UL, symptomatic UL and hysterectomy due to UL were probably underestimated.

As in other studies, the prevalences of UL increased with age[4-6]. Epidemiological studies have found higher frequencies of tumors in women aged between 40 and 50 years, thus strengthening the hypothesis of the role of hormonal imbalance in their development. According to this hypothesis, UL tumors would result from an excess of blood estrogen and progesterone; thus, the longer one is exposed to this imbalance, the greater the chance of developing tumors[2,7].

Despite the cross-sectional design of this study, the results suggest that age is a possible modifier of the association between UL and the remaining variables analyzed, as the pattern of distribution of prevalences varied in the demographic, socioeconomic and health service access and use sub-groups according to the age group analyzed. Significant differences were more frequent among women younger than 45 years. In this group, the greatest prevalences were found among black participants and those with poorer socioeconomic conditions.

On the other hand, women aged 45 years and more did not show significant differences in estimates, according to their demographic and socioeconomic pattern. Higher prevalences were only found among those who reported having greater access to medical diagnosis, i.e. Pap smear test and breast examination performed less than three years before.

The remaining results corroborate the findings of studies performed in the United States with women from different color/race groups. According to these studies, compared to white women, tumors in black women occur between two and nine times more frequently in all age groups, in addition to the higher number of tumors, more severe symptoms, younger ages when diagnosed, and higher rates of hysterectomy[4,23-26,53,54]. However, the causes of ethnic inequality in the occurrence of UL remain unknown and possible explanatory mechanisms have been scarcely studied in the literature.

Epidemiological studies suggest that risk factors established for these tumors, such as those associated with reproductive life and lifestyle, could only explain a small fraction of color/race inequalities[4,23,26]. Marshall et al, for example, found a relative risk for UL of 3.25 (95%CI 2.71; 3.88) and that of hysterectomy due to UL of 1.82 (95%CI 1.17; 2.82) among black women, after adjusting for variables such as age, body mass index (BMI), length of time since previous pregnancy, history of infertility, alcohol use, smoking, leisure-time physical activities, age of menarche, age of first pregnancy, use of oral contraceptives and marital status[23]. Faerstein et al reported that black women had a nine times greater chance of presence of UL (OR: 9.4; 95%CI: 5.7; 15.7), after adjusting for age of menarche, use of oral contraceptives, smoking, body weight, arterial hypertension, diabetes mellitus, and history of pelvic inflammatory disease[26]. Baird et al observed an odds ratio of 2.7, (95%CI: 2.3; 3.2) for black women, after adjusting for BMI and parity[4].

With regard to socioeconomic variables, there are few studies on their associations with the occurrence of UL, thus hindering comparisons between the present study and the epidemiological literature. The great majority of etiological studies on UL analyze proximal factors associated with hormonal imbalance (estrogen and progesterone), not dealing with the social determinants (distal factors) of this causal chain. In this sense, variables such as level of education

have been analyzed[30,31,34,39,42] as possible confounders of the remaining associations, thus not being the main focus of analysis.

Nonetheless, considering the few studies that approach the association between level of education and UL, some were found to lack such association[4,40,55,56] and one study showed a direct association[28]. Two studies dealt with the influence of exposures occurring during the intrauterine life and childhood[57,58] and found direct associations between tumors and parents' low level of education, food insecurity, and low household income during childhood among white women[57], but not among black ones[58].

There is much yet to be investigated in terms of how biological mechanisms are associated with socioeconomic and demographic characteristics, influencing health outcomes such as UL and including ways of determination apart from hormonal imbalance or health behavior. The present study showed indications that the frequency of UL is higher among black women and those with poorer socioeconomic conditions. Other epidemiological studies of a longitudinal analytical nature can better clarify the causal relations of interest, enabling action strategies related to this problem to be more effective and regulated by the search for greater equality in the sphere of women's health.

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