Urinary incontinence and overactive bladder in the non-institutionalized Portuguese population: national survey and methodological issues

Sofia Gonçalves Correia

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Faculdade de Medicina da Universidade do Porto

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Esta dissertação teve como base dois manuscritos, sendo que colaborei activamente no desenho, recolha, armazenamento e análise da informação, tendo sido responsável pela análise dos dados que reportam, bem como pela versão inicial dos manuscritos:

- Sofia Correia, Paulo Dinis, Francisco Rolo, Nuno Lunet. *Prevalence, treatment and determinants of urinary incontinence and overactive bladder in the non-institutionalized Portuguese population.*

- Sofia Correia, Paulo Dinis, Francisco Rolo, Nuno Lunet. *Yielding of sampling procedures and sample representativeness in a national telephone survey*.

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Background

Introduction

Urinary incontinence and overactive bladder are common conditions in adults, with impact on physical, psychological and social well-being, and represent an important burden to the economy of health services. The assessment of the frequency of urinary incontinence and overactive bladder symptoms in specific settings and the extent to which they are diagnosed and treated is important to define priorities and sustain public health strategies oriented to the reduction of the human and economic burden of urinary dysfunctions.

The wide regional variation in the frequency of these conditions reflects the methodological heterogeneity across studies, as well as cultural differences and heterogeneity in the distribution of their determinants. In addition to subject-specific methodological issues, such as age groups evaluated, the potential effect of the sampling strategy on the representativeness of the samples obtained is an important issue in population-based surveys.

Definition of Urinary incontinence and Overactive bladder

In 2002, the International Continence Society (ICS) provided new definitions for lower urinary tract dysfunction to be compatible with the WHO ICIDH-2 (International Classification of Functioning, Disability and Health) and the ICD10 (International Classification of Diseases) [1].

Urinary incontinence was defined as "the complaint of any involuntary leakage of urine", removing from the original definition "a social and hygienic problem", which could lead to different estimates due to its subjective aspect. The definition of stress urinary incontinence was also revised to "the complaint of involuntary leakage on effort or exertion, or on sneezing or coughing". Urge urinary incontinence is classified as "the complaint of involuntary leakage accompanied by or immediately proceeded by urgency" and mixed urinary incontinence as "the complaint of involuntary leakage associated with urgency and also with exertion, or on sneezing or coughing".

Overactive bladder was equated with the urge syndrome and the urgency-frequency syndrome and defined differently than before as "urgency, with or without urge incontinence, usually with frequency and nocturia, in the absence of infection or other proven etiology". Increased daytime frequency of voiding is "the complaint by the patient who considers that he/she voids too often by day"; nocturia "the complaint that the individual has to wake at night one or more times to void" and urgency is "the complaint of a sudden compelling desire to pass urine which is difficult to defer" [1].

Although individuals with urge and mixed urinary incontinence may be classified as having overactive bladder ("wet OAB"), a great proportion experiences urgency and frequency without incontinence episodes ("dry OAB") [2].

Frequency and risk factors

It is known that urinary incontinence and overactive bladder are common symptoms among adult population worldwide, affecting around 200 million people [3]. Nevertheless, and although several studies were conducted to assess the prevalence of urinary symptoms, the estimates differ considerably across studies and settings [3-13]. Differences in the populations evaluated (*e.g.*: general population, pregnant women, elderly), survey methodology (*e.g.*: telephone, mail or personal interviews), and classification of the outcome (*e.g.*: "any urine leakage in the previous month", "(…) in the last year") contribute to the difficulties in summarizing the results [4].

The next pages describe each condition in terms of frequency and risk factors separately for women and men. Urinary incontinence has a different pathophysiology in women and men and so, which is reflected in the gender differences in the prevalence of its different types, age distribution and risk factors.

Overactive bladder

At the end of the last century no large population-based studies had been conducted to assess the frequency of overactive bladder symptoms [5]. Epidemiologic evidence was predominantly focused on urge incontinence and did not consider common symptoms as frequency and urgency [5-7].

The NOBLE (National Overactive Bladder Evaluation) study, conducted in the United States, evaluated the prevalence in the adult population over 17 years and reported a prevalence of 16.9% in women and 16.0% among men [8]. In Europe, the EPIC study (Sweden, Italy, Canada, Germany and United Kingdom) was the first large investigation assessing the low urinary tract symptoms based on the new ICS definition, in a population aged above 17 years. The prevalence of overactive bladder was 13% in women and 11% in men [9]. While the overall prevalence is similar in both sexes, there are gender differences in the age-specific estimates and regarding the predominant symptoms. It has been reported that women present higher prevalence before their sixties, whereas the prevalence after this age is lower than in men [5,14-16]. Incontinent cases are the most prevalent ones in women while OAB without incontinence predominate among men [6].

Urinary Incontinence

Women

Overall prevalence

In the general population, estimates based on inclusive criteria definitions of urinary incontinence (*e.g.*: "ever", "in the past 12 months") range from 5% in women aged 15 years or more to 69% in women aged over 18 years, with most studies providing estimates between 25% and 45% [4]. In a review published in 2003, the median prevalence of urinary incontinence among woman was 27.6% (range: 4.8-58.4%) [9]. A study in four European countries, which defined urinary incontinence as any leakage or involuntary loss of urine during the preceding 30 days, presented prevalence estimates varying from 23% in Spain to 44% in France [10] and the most recent cross-national study on urinary dysfunction (EPIC study) reported that the proportion of incontinent adult women was 18% and the prevalence was higher than 20% only in Sweden [11].

Two distinct patterns have been described by different authors for the age distribution of urinary incontinence regardless of the type: 1) an increasing trend with age, and the highest prevalence among older women; 2) highest prevalence in the middle aged women (around menopause), with a slight decrease up to the seventies rising again in older ages [12,13]. The review referred above shows the latter pattern when analysing prevalence estimates for any or occasional (ever or in the past 12 months) urinary incontinence whereas a steady increase up to the eighties when considering significant or regular (moderate and severe incontinence on severity index) incontinence [9].

Incontinence type

The ICS definitions used to characterize different types of urinary incontinence are symptom-oriented. To determine the physiopathology of the reported symptoms (urethral insufficiency for stress type and detrusor instability for urge type) it would be necessary the use of urodynamic equipment. Sandvik et al. [14] assessed the validity of diagnostic questions used in surveys against a gynaecologist after urodynamic evaluation. The proportion of stress type increased (from 51% to 77%) and mixed incontinence decreased (from 39% to 11%), while the proportion of urge type remained similar (10% vs. 12%). Therefore, the most frequent error would be a diagnosis of mixed form when it is, in fact, stress urinary incontinence.

The literature concerning the types of urinary incontinence in women is consensual and refers stress incontinence as the most prevalent, followed by mixed and

urge types [6,11,19-22]. Minassian et al. reported a mean prevalence of 50%, 32% and 14%, respectively [9]. However, this distribution is observed among young and middle-aged women. After their forties, stress incontinence tends to decrease and the mixed and urge types increase [4,9,14]. In accordance to what was described above by Sandvik et al., this pattern must be interpreted with caution, considering that mixed urinary incontinence may be overestimated. Several studies do not distinguish the incontinence types and so, the knowledge on this topic is limited [15].

Severity of urinary incontinence

Severity may be measured as the frequency of urine leakage, or using a severity index. The Sandvik's Severity index combines information about frequency (four levels) and amount of leakage (two or three levels) and, by multiplication of these evaluations an index value is reached and categorized in four classes: mild, moderate, severe and very severe [16]. In Norway, the EPICONT study showed, in women over 19 years, that the prevalence of any (regarding the frequency) urinary incontinence was 25% while 7% reported severe or daily episodes [17]. Severity is known to be related to increasing age and associated with a decrease in quality of life [9] and some studies refer that seeking for medical is mode frequent among severe cases [6,12,25,26]. Minassian et al. studied the variation in prevalence of urinary incontinence and risk factors, given different definitions and found that, regarding the stronger associations of known risk factors with severe urinary incontinence when compared to mild one, this may represent transient or non-pathologic states that might not be clinically significant [18].

Incidence and remission

Data on the incidence and remission of urinary incontinence is scarce. In 2005, the epidemiology chapter of the International Continence Society report presented an average annual incidence ranging from 1 to 3% in women aged less than 60 years and to 5 up 11% over this age [4]. A review published in 2008 considering studies reporting Australian data on prevalence and/or incidence in women after 1980, showed that only two studies presented data about the incidence [13]. Liu and Andrews [19] studied elderly participants over 2 years and the annual incidence for stress and urge type, occurring at least occasionally, was 16.5% and 22.6%, respectively and 1.6% and 2.1% when considering "often" (not quantitative assessed) cases.

In the Study of Women's Health Across the Nation, American women aged 40-55 years were followed during 5 years in the and the 1-year incidence of incontinence (occurring at least monthly) was 11% [20].

In the United Kingdom, 79710 women were evaluated at home and presented a baseline 1-year period prevalence of 34.2% urine leakage. The 1-year remission rate was 25.2% and from 12036 continent women followed for a year and it was found a incidence rate of 8.8% [21]. In Cordoba, a Spanish south region, the five-year incidence and remission rates were, respectively, 36% and 14%, in women over 64 years [22].

Risk factors

Several epidemiologic studies evaluated factors associated with the occurrence of urinary incontinence. While some determinants are well established, such as age, obesity or parity or hysterectomy, others have been under study, mostly through cross-sectional evaluations and so, it is necessary some caution extrapolating the results and considering causality inference [9,12].

It is well recognized that urinary incontinence is correlated with age [9,23] with two patterns described above. While some authors report that age is positively associated with urge and stress urinary incontinence, others did not confirm the latter association [23].

Obesity has been established as a strong risk factor for stress and mixed incontinence and a weaker association was observed with urge incontinence and overactive bladder [11,24-27]. A recent systematic review assessing the role of overweight and obesity on urinary incontinence reports strong evidence that, in addition to body mass index, waist-hip ratio and thus abdominal obesity may be an independent risk factor for incontinence in women [24].

Pregnancy is also associated with the occurrence of urinary incontinence [12]. While for some women the urinary incontinence is self-limited to pregnancy, evidence shows that women who are incontinent during pregnancy have a higher predisposition to have the symptoms later in life [23,28,29]. It is still questionable if pregnancy is an independent risk factor for urinary incontinence or the symptoms are attributable to childbirth mechanisms. Parity is known to increase the risk of urinary incontinence, although the magnitude of this association diminishes with age [25]. Some studies refer that after one delivery there is little or no additional risk, while others suggest an increasing risk with increasing parity [23]. A meta-analysis showed that most studies reported parity as a risk factor, although they did not report on peripartum parameters including the mode of delivery that could have an influence on the development of urinary incontinence [9]. Delivery is recognised as a determinant of stress urinary incontinence in women [23]. Rortveit et al., in a study of more than 15000 Norwegian women under 65 years, reported that women with previous caesarean section were at increased risk of stress and mixed urinary incontinence, when compared with the

nulliparous. Women with a vaginal delivery were at a even greater risk compared to those who undergone caesarean [26]. A possible protective effect of caesarean was reviewed by Nygaard. The protection conferred by this mode of delivery compared to vaginal childbirth may be dissipated after further deliveries and decreases with age. It is also pointed out the inconsistency in literature regarding the increasing risk whether caesarean, is done before or on labour [27].

The hormonal changes induced during peri and post-menopausal periods may increase the susceptibility to urinary infections and can cause storage symptoms (urinary urgency and frequency). Therefore, some authors suggest that hormonal replacement may reduce the risk of urinary problems. While some authors report that post-menopausal women are more likely to have severe incontinence, others did not find differences between premenopausal and postmenopausal groups or describe a lower prevalence of urinary incontinence in the later, although only for stress type and not for urge incontinence [9,23]. Oestrogen therapy is one of the treatment options for stress urinary incontinence [28], although a recent review did not find evidence of a benefit of oestrogen replacement therapy [29] and one controlled multicentric study revealed that, after 4 years of treatment with a combination of oestrogen and progesterone, and independently of the women's age, the risk of urge and stress urinary incontinence [30] and the severity of the incontinence increased [31]. Also regarding hysterectomy, the literature is inconsistent. Some authors found positive associations with urinary incontinence whereas other did not find any difference [23,32].

Pathologies as diabetes have been reported to increase the risk of urinary incontinence [33] and the National Health and Nutrition Examination Survey found that two microvascular complications caused by diabetes, macroalbuminuria and peripheral neuropathic pain, were associated with incontinence [34].

Functional (namely mobility limitations) and cognitive (as dementia) impairment are also seen to increase the risk of urinary incontinence [4]. Constipation, smoking, family history and genitourinary prolapse have been studied as possible risk factor for urinary incontinence in women but there are no conclusive answers regarding the role of this factors [35].

Men

Prevalence, incidence and type

The epidemiology of urinary incontinence in men has not been investigated to the same extent than for females. After the ICS new definitions and recommendations in 2002, the number of population based studies increased, and most report lower prevalence estimates in men compared to women [23]. Before 2002, the overall prevalence ranged from 3% to 11% in the few studies available [12]. In 2003, the UrEpik study evaluated almost 5000 men aged 40-79 years in four countries (Boxmeer, The Netherlands; Auxerre, France; Birmingham, United Kingdom; and Seoul, Korea) [36]. Self-reported urine leakage varied from 7.1% (Korea) to 14.8% (United Kingdom). Diokno et al. described, among 21590 American men aged ≥ 18 years, a 12.7% prevalence of an episode of urinary incontinence (any type) in the previous month. Urge incontinence was the more prevalent type (45% of all cases) except among participants with 18-35 years who reported a higher proportion of stress incontinence [37]. The EPIC study presented an overall prevalence of 5.4% and, as the previous one, urge incontinence was the predominant type (overall prevalence 1.2%, stress and mixed type 0.6% each) [11].

Up to date, the literature is consensual describing a steady increase of the urge type with increasing age, which is the major contributor to the overall increase in the frequency of urinary incontinence with age in men. Mixed urinary incontinence also tend to increase with age, while stress incontinence decreases after the forties [8,22,33].

Incidence data is among men is even scarcer than for women. McGrother et al. presented 1-year remission rate of 39.6% (baseline prevalence 14.2%) and an incidence rate of 3.8% [21]. The Spanish study referred above, presented 1-year incidence of 22% and 18% of remission, among elderly participants.

Risk factors

Usually urinary incontinence in men is not an isolated problem and exists with other co-morbidities, such as urogenital symptoms or erectile dysfunction. Increasing age is associated with a higher proportion of incontinent cases [4,12,49] and other urinary symptoms, namely those related to overactive bladder (*e.g.*: urgency, nocturia, feeling of incomplete voiding, reduced flow, also urinary tract infections) showed to be strongly associated with urinary incontinence in men [4,12].

As for women, partial or total immobilization is described to be related with an increase of urinary incontinence, especially among older individuals. Also neurological

disorders, as Parkinson or men who suffered a stroke are more likely to develop incontinence [4].

Prostatectomy, especially radical prostatectomy, is well established as a risk factor for urinary incontinence in men and the risk seems to increase with the increasing age at time of surgery [3,29].

Awareness, seeking behaviour, treatment

Urinary incontinence and overactive bladder have an important negative impact in the quality of life, regarding physical, social, psychological, sexual well-being and daily activities [38]. Even so, urinary symptoms are often under-diagnosed and under-treated [10,36,39,40].

Studies on seeking behaviours are consensual in the reasons commonly described not to get professional care. Generally, the fact that urinary incontinence is disregarded as a serious problem and seen as part of the normal ageing process, ,the low expectations of a possible effective treatment, and the embarrassment or fear of exposing this situation to health professionals may lead to low consultation rates and a low proportion of diagnosed patients [9,11,43]. The report of the symptoms to health professionals is associated with its increasing severity and/or the impact on quality of life [12,25,26,32,36].

McGrother et al. reported similar proportion of men and women seeking for help in the form of consultation (12% and 13%, respectively) with quality of life associated to this behaviour. Independently of quality of life, men (aware of the context of prostate cancer) and older participants were more likely to seek for help [21]. In the UrEpik study, among men with urine leakage, 25.6% of the European participants and only 9.0% of the men in Seoul consulted a doctor [36]. Hunskaar et al. reported that consultation rates in incontinent women varied form 16% in Spain to 36% among the German patients [10].

From those with urine leakage, half reported the used of pads, 5% were taking drugs and 5% had surgery for urinary incontinence problems. In United States, from 13% men with urine leakage episodes, 47% consulted a physician and 30% of those were taking prescribed medicines, 18% underwent some kind of surgery and 4% had a catheter [37].

There are several treatment options for patients suffering with urinary incontinence and management differs according the physiopathology of incontinence. While urge incontinence responds to pelvic floor muscle treatment and anticholinergic medication, for stress incontinence the pharmacologic approach may not have the same impact [39]. It is suggested that pelvic muscle training should be included in first-line conservative management programs for women with stress, urge or mixed urinary incontinence [41].

Concomitantly with pelvic muscle training, women with urge incontinence or overactive bladder should adopt other behavioural changes, such as fluid management or scheduled voiding intervals [24,54].

The pharmacological approach is common in urge incontinence and the efficacy of anticholinergic drugs, which suppress bladder contractions, is well established [42]. The most frequently used drugs are oxybutynin, trospium and propiverine [42-44] and some authors refer their adverse effects (*e.g.*: dry mouth, constipation), as possible reasons for discontinuation [35]. Cystoscopic injection of botulinum toxin in the detrusor muscle has been studied and is a promising alternative for refractory urge incontinence [43].

The absence of effective and well tolerated pharmacological treatments for stress urinary incontinence limits the choices [44]. The pharmacotherapy approach before surgical procedures includes alfa-adrenergic drugs, tricyclic antidepressants such as imipramine and oestrogen [44], although the evidence for the latter is not consensual, as it was referred above [34,35]. Duloxetine, a serotonin and noradrenaline reuptake inhibitor, is in phase III controlled trials and it is suggested that can significantly improve the quality of life of individuals with stress urinary incontinence [45].

Surgery is used especially among stress incontinent types and it is rarely indicated for urge incontinence [35]. Meanwhile, this strategy has been associated with a growing number of women with suboptimal results and there are few studies providing non-surgical treatment options for women with failed surgeries [46]. In women, the more frequent surgical procedures are pubovaginal sling and colposuspension. The latter is expected to cure 80% of the cases. Pubovaginal slings, initially used as a secondary approachafter a failed durgery, are becoming the primary procedure [35].

Methodological issues

The heterogeneity in the results from epidemiological data of urinary symptoms may be a result of several factors. In addition to the different definitions or time frames used to assess urinary incontinence or overactive bladder strategies adopted during the study design, as the sampling procedures or the mode of data collection may affect the estimates [47].

The assessment of urinary dysfunctions using questionnaires instead of clinical or urogynaecologic equipment may overestimate mixed urinary incontinence and underestimate the stress type [14]. Kirschner-hermanns et al. [48] showed a poor correlation between questionnaires and video urodynamic testing in adults aged ≥ 65 years. However, for documenting involuntary detrusor contractions (urge type) urodynamics have also limitations with false positives and false negatives occurring [4]. So, even if ideally self-report measures should be clinically validated, some difficulties remain demonstrating all symptoms in a clinical setting [12].

Additionally, it would be too expensive to carry out studies of thousands participants across wide geographical areas not using questionnaires. Therefore, the International Consultation on Incontinence Questionnaire (ICIQ) develops valid instruments universally applicable both in clinical practice and research [49].

The methods of questionnaire administration may also influence data quality. Information on urinary symptoms is known to be more accurate in self-reported questionnaires due to the embarrassment that may be present with an interviewer [50,51]. Nevertheless those may suffer of a lack of completeness and accuracy of data which may reduce its validity [52] and telephone surveys may be a good cost-effective strategy. Telephone surveys are widely used and may provide accurate estimates on urinary symptoms as in several health issues [5,8,11,53,54].

In addition to the effect of the mode of questionnaire administration, the validity of the estimates may be threatened by the sampling strategy. Telephone directories or random-digit dialing are often used to select participants [55]. However, in the last years the coverage of landline telephones is facing a great decrease and in 2007 Portugal presented the highest decrease among European countries, compared to the previous year [56]. This trend in non-coverage associated with increasing resistance by potential participants answering a telephone surveys may induce bias to the results [57] and the design and interpretation of telephone surveys raises important methodological challenges [54].

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Objectives

The present dissertation is composed by two manuscripts based in a national telephone survey evaluating a sample of non-institutionalized men and women aged 40 years or older to quantify the prevalence and identify the determinants of urinary incontinence and overactive bladder in the Portuguese population.

The specific objectives of the manuscript entitled "**Prevalence, treatment and determinants of urinary incontinence and overactive bladder in the non-institutionalized Portuguese population"** are the following:

- To quantify the prevalence of self-reported and clinically diagnosed urinary incontinence and overactive bladder symptoms;
- To characterize the treatments received by urinary incontinency patients;
- To assess the determinants of both urinary incontinence and overactive bladder symptoms.

The discussion of specific aspects related to the methodology used for this study regarding the sampling procedures, is covered in a second manuscript ("**Yielding of sampling procedures and sample representativeness in a national telephone survey"**), with the following specific objectives:

- To quantify the time spent with interviews and unsuccessful contacts, and to compare the yielding of the contact attempts across regions, days of the week and day periods;
- To compare the demographic and health characteristics of the participants with those of the Portuguese population.

Prevalence, treatment and determinants of urinary incontinence and overactive bladder in the non-institutionalized Portuguese population

Abstract

Background

The prevalence estimates for urinary incontinence (UI) and overactive bladder (OAB) vary across countries and information on the frequency and treatment of these conditions in the Portuguese population is scarce.

Objectives

To quantify the prevalence of UI and OAB and to characterize UI treatment in Portugal.

Methods

The Portuguese mainland telephone number lists (Portugal Telecom "white pages") were used for a stratified sampling by region (NUT II) of subjects aged ≥40 years. Socio-demographic data, smoking habits, obstetric history (women) and past medical history were evaluated in a telephone survey, conducted in early 2008. The prevalence of different types of UI [stress (SUI), urge (UUI), mixed (MUI)] were computed according to the International Continence Society definitions (2002). OAB symptoms were assessed through the Overactive Bladder Assessment Tool, 8 item version. Proportions and respective 95% confidence intervals (95%CI) were weighted according sex and age group distribution to reflect the prevalence in the Portuguese population.

Results

The prevalence of at least one episode of urinary leakage in the previous month was 21.4% (95%CI: 19.0-23.9) in women (SUI: 42.2%), and the highest prevalence was observed among those aged 60-79 (27.1%; 95%CI: 21.8-32.5). In males, the overall prevalence was 7.6% (95%CI: 4.8-10.4) (UUI: 60.2%), higher in those aged ≥80 (21.6%; 95%CI: 6.9-36.3). A clinical diagnosis of UI was reported by 4.5% (95%CI: 3.3-5.7) of individuals, from which 73% (95%CI: 61.9-84.5) had received pharmacological (76.5%), surgical (24.4%) or other (13.1%) treatment. The prevalence of OAB symptoms was 29.4% (95%CI: 26.6.-32.2) in women and 35.1% (95%CI: 29.6-40.6) in men. In men it increased en with increasing age and among women it remained constant.

Conclusion

The prevalence of UI was similar to the described in other European countries. The gap between the proportion of UI episodes and clinical diagnosis emphasizes the need for awareness among both health professionals and general population.

Introduction

Urinary incontinence and overactive bladder are estimated to affect approximately 200 million people worldwide [1]. In 2000, the costs associated with diagnostic, treatment, routine care, management of co-morbidities and loss of productivity due to these conditions were responsible for an expenditure of respectively 19.5 and 12.6 billion dollars in the United States [2].

Several population-based studies [3-12] provide prevalence estimates for urinary incontinence or overactive bladder. However, the heterogeneity in data collection methods, age groups evaluated and definition of the outcomes preclude a sound interpretation of the estimates as well as direct comparisons across regions [8].

In 2002, the International Continence Society (ICS) derived a consensus on overactive bladder and urinary incontinence definitions, enhancing the comparability across epidemiological studies [13]. The most recent surveys presented urinary incontinence estimates varying from 18% [8] to 35% [7] in women and from 7% [8] to 15% [4] in men. Prevalence of overactive bladder is similar in both genders, ranging between 13% [8] and 17% [10] in women and from 11% [8] to 16% in men [10].

In a European survey 11% of the incontinent women were under treatment [7], and in United States pelvic floor exercises were reported by 20% and 6% were receiving pharmacological treatment [14], showing that urinary symptoms are often under-treated, namely in high prevalence settings. This patterns may be explained by the low proportion of people seeking for help when having urinary dysfunctions [7,15], as well as an underutilization of the available treatment options by health professionals [16].

In Portugal, the second National Health Survey, conducted in 1995, reported a prevalence of urinary incontinence of 4.3% in women and 2.6% in men [17]. These results refer to all ages and no information is available regarding overactive bladder symptoms or treatment options. In other studies, not covering the whole country, 18% of women from an urban area reported current urinary incontinence at the time of interview [18] and a prevalence of 51% was observed during pregnancy in women selected at the time of delivery in a regional hospital [19].

Therefore, we aimed to quantify the prevalence of self-reported and clinically diagnosed urinary incontinence and to characterize its treatment, and to quantify the prevalence of overactive bladder symptoms, among the non-institutionalized Portuguese population aged 40 years or older. As a secondary objective, we assessed the determinants of both urinary incontinence and overactive bladder symptoms.

Methods

This investigation is based in a national cross-sectional study evaluating non-institutionalized adults aged 40 years or older by telephone interview.

Sampling

A sample of 385 individuals was selected from each of 5 strata, corresponding to the Portuguese regions *Norte*, *Centro*, *Lisboa*, *Alentejo* and *Algarve*, as defined by the level II Territorial Unit Nomenclature (NUT II) division, to allow prevalence estimates of 50 % with 5 % precision and a confidence level of 95 %, resulting in a total of 1 925 interviews.

The 2007/2008 Portuguese white pages lists were used as the sampling frame for the survey, as described in detail elsewhere [20]. Briefly, all residence telephone numbers presented in the lists were eligible. Within each household, Portuguese speaking dwellers aged above 39 years were eligible. The person who answered the call was invited to participate, if eligible. If the individual was younger than 40 years or not living permanently in the house he/she was asked to enumerate the subjects aged 40 or older living permanently in the house, and who were at home at that moment. The person with the birth day closest to January 1st was selected (considering January 2nd the closest one and December 31st the more distant). If there were no persons meeting the eligibility criteria, another telephone number was selected. All individuals not accepting to participate or quitting during the interview were substituted using the procedures described above. The telephone numbers without dial tone, those for which there was no answer after 10 dial tones or were busy were also replaced.

The minimum response rate (all interviews divided by interviews plus refusals plus cases of unknown eligibility [no replies and busy numbers] [21]) was 27.6% and the cooperation rate (interviews divided by all eligible individuals contacted [21]) was 59.6%. Table 1 presents the characteristics of study participants. Seventy-seven percent were women and half the participants were aged 60 to 79 years. Nineteen percent of women and 24% of men had upper or post-secondary education and 32% of women were housewives. Current or past smoking habits were reported by 11% of women and 56% of men. More than 60% of the participants were overweight or obese.

Table 1 – Sample description (n=1934), by sex.

	Women (n=1483) n (%)	**Men (n=451)** n (%)
Age		
40-59	565 (38.1)	182 (40.4)
60-79	764 (51.5)	221 (49.0)
≥80	154 (10.4)	48 (10.6)
Education level		
Primary not complete	388 (26.2)	67 (14.9)
Primary complete	589 (39.7)	167 (37.1)
Lower secondary	233 (15.7)	106 (23.6)
Upper and post-secondary	272 (18.4)	110 (24.4)
Occupation [a]		
White-collar worker	435 (29.9)	210 (48.0)
Blue-collar worker	558 (38.4)	227 (52.0)
Housewife	460 (31.7)	0 (0.0)
Smoking		
Never	1309 (88.8)	196 (43.8)
Current smoker	84 (5.7)	74 (16.6)
Ex-smoker	82 (5.5)	177 (39.6)
BMI (kg/m^2)		
<18	18 (1.3)	0 (0.0)
18-24	493 (37.1)	138 (31.3)
25-29	540 (40.7)	216 (49.0)
≥30	277 (20.9)	87 (19.7)
Self-reported history of:		
Diabetes	212 (14.3)	76 (16.8)
Asthma or bronchitis	166 (11.2)	46 (10.2)
Prostate cancer	-	20 (4.4)
Uterus/ovarian/breast cancer	72 (4.8)	-
Deliveries		
None	184 (12.4)	-
Exclusively vaginal	1159 (78.4)	
Exclusively caesarean	83 (5.6)	
Vaginal and caesarean	52 (3.5)	
Menopause		-
Yes	1213 (81.9)	
Histerectomy	204 (17.2)	

[a] Actual occupation or the last before retire. White collar includes non-manual occupations (codes I, II, IIIa from National Classification of Occupations). Blue-collar includes manual occupations (codes IIb, IV, VI)

Interview

Interviews were carried out between the 21st January and the 27th February 2008, at week days and Saturdays, mostly after 6 p.m. [20]. All interviewers underwent standardised training and quality-control checks were regularly conducted.

Potential participants were informed about the general aims of the study, which was presented as a general health survey, the estimated duration of the interview (5-7 minutes), and that their answers were anonymous. They were briefly informed about the aims related to urinary incontinence only after acceptance. One person turned off the telephone after receiving this information.

Questionnaire

A structured questionnaire was developed to collect data on aspects related with urinary incontinence and overactive bladder symptoms, socio-demographic characteristics, smoking habits, and previous medical diagnostic of diabetes, asthma or chronic bronchitis, prostate cancer (men) or uterus, ovarian or breast cancer (women). Self-reported weight and height were also collected. Obstetric history was assessed in all women, namely the mode of delivery in previous pregnancies and history of hysterectomy.

Outcome definition

The 2002 ICS definitions [13] were used for urinary incontinence and its different types (stress, urge, mixed). Urinary incontinence was defined as the occurrence of at least one episode of urine leakage in the previous month. Stress urinary incontinence (SUI) was defined as the involuntary urine leakage in the previous month, on efforts such as walking or coughing, and urge urinary incontinence (UUI) as the involuntary leakage immediately preceded by urgency. Mixed urinary incontinence (MUI) was considered present when both stress and urge incontinence were reported by the same subject. It was not possible to establish the type of urinary incontinence in 0.8% of the women and 0.5% of men.

Participants classified as having urinary incontinence were asked to quantify the frequency of urinary leakage as more than once a day, once a day, several times a week (2-6 times), once a week or less often than weekly.

Overactive bladder symptoms (OAB) were assessed through the Overactive Bladder Assessment Tool – OAB-q – 8 item version [22]. This scale comprises items about urgency, with or without incontinence, frequency of voiding and nocturia, according to the ICS definition[13]. The information collected refers to the previous four weeks, and

each item is rated on a six-point Likert scale. The scale asks how bothered the person has been feeling by some bladder symptoms (from zero – "Not at all" to 5 – "A very great deal"). The final score is the sum of the scores obtained in each of the 8 questions (for men 2 points must be added to the score [23]), ranging from 0 to 40. Participants with a final score of 8 or higher were considered to have overactive bladder symptoms [23].

Treatment

Participants were asked about a previous medical diagnosis of urinary incontinence ("Have you ever been diagnosed urinary incontinence or urine leakage by a medical doctor?"). Those answering affirmatively were further inquired about previous pharmacological, surgical or other treatments, and asked to provide their perception of the efficacy of each treatment ("the treatment healed the problem / did not heal, but I got better / I felt no changes in the symptoms / I got worse").

Statistical analysis

Sex- and age-category-specific prevalence estimates and the corresponding 95% confidence intervals (95% CI) are presented, except for treatment characterization for which only the overall estimates are provided. Weighted prevalence estimates were computed for results to reflect the prevalence in the Portuguese population. Each participant was assigned a weight corresponding to the ratio between the number of participants in the same sex, region and age class (45-64; ≥ 65) and the number of Portugal residents in the same sex, region and age class [24].

For analysis, education level was aggregated in categories of maximum academic degree completed: ≤ 4 schooling years (primary education), 5-9 years (lower secondary education), 10-12 years (upper secondary education) and > 12 years (post-secondary education). Occupation was classified according the National Classification of Occupations [25] in white collar – non-manual occupations (codes I, II, IIIa) – blue collar – manual occupations (codes IIb, IV, VI) and housewives. For retired or unemployed participants their last occupation was considered. Smoking status was defined as never smoker, current smoker (at least one cigarette/day), and ex-smoker, if not smoking for at least 6 months up to the date of interview. Self-reported anthropometrics were used to compute the Body Mass Index (BMI): weight (kg) / (height (m))^2. Three BMI classes (<25 kg/m^2; 25-29 kg/m^2; ≥ 30 kg/m^2) and the class of non-respondents (does not know or does not want to answer to the questions on weight and/or height) were used for analysis.

The association between socio-demographic and health-related characteristics and urinary incontinence, and each of its types, and overactive bladder was quantified through odds ratios (OR) and respective 95% confidence intervals (CI). The multivariate logistic regression models fitted to evaluate the independent role of these factors included as independent variables all those associated with the outcome (at a $p<0.10$ level) in univariate analysis as well as those recognised to have a potential confounding effect.

Ethics

The study was approved by the Ethics Committee of the Hospital São João, and all participants provided oral consent.

Results

The prevalence of urinary incontinence in Portugal was 15.1% (95%CI: 13.2-17.0), 4.5% (95%CI: 3.3-5.7) of the subjects reported having been diagnosed for urinary incontinence by a medical doctor, and the prevalence of overactive bladder symptoms (OAB-q: score ≥ 8) was 32.0% (95%CI: 29.1-35.0).

Table 2 – Self-reported urinary incontinence (UI), UI according the frequency of urine leakage, medical diagnosed UI and overactive bladder symptoms (OAB), by sex and age group.

	Any UI	Frequency			Diagnosed UI	OAB
	% (95% CI)	≥ 1 / day % (95% CI)	≥ 1 / week % (95% CI)	< 1 /week % (95% CI)	% (95% CI)	% (95% CI)
Women	21.4 (19.0-23.9)	11.0 (9.1-12.8)	5.2 (3.9-6.6)	4.3 (3.1-5.6)	5.0 (3.7-6.3)	29.4 (26.6-32.2)
40-49 years	15.3 (10.2-20.3)	5.2 (2.1-8.3)	4.9 (1.9-7.8)	5.1 (2.0-8.2)	2.0 (0.0-4.0)	29.4 (22.9-36.0)
50-59 years	20.3 (15.2-25.3)	10.7 (6.8-14.6)	3.9 (1.5-6.3)	4.0 (1.6-6.6)	4.4 (1.7-7.1)	30.6 (24.6-36.6)
60-69 years	25.0 (20.1-29.8)	13.4 (9.6-17.2)	6.3 (3.5-9.1)	4.6 (2.3-7.0)	6.7 (3.8-9.5)	28.9 (23.8-34.0)
70-79 years	27.1 (21.8-32.5)	13.5 (9.4-17.7)	7.7 (4.4-11.0)	4.4 (2.0-6.9)	6.8 (3.9-9.8)	30.2 (24.7-35.6)
≥ 80 years	20.9 (13.8-28.1)	15.6 (9.2-22.0)	2.6 (0.0-5.4)	1.9 (0.0-4.3)	6.6 (2.0-11.2)	25.3 (17.7-32.9)
Men	7.6 (4.8-10.4)	3.5 (1.7-5.3)	1.1 (0.1-2.2)	2.8 (0.9-4.6)	4.0 (1.8-6.1)	35.1 (29.6-40.6)
40-49 years	4.0 (0.0-9.1)	2.1 (0.0-5.8)	no observations	1.9 (0.0-5.5)	4.8 (0.0-11.3)	37.4 (23.6-51.3)
50-59 years	3.9 (0.0-8.4)	0.5 (0.0-1.3)	1.1 (0.0-3.3)	2.3 (0.0-6.1)	1.5 (0.0-3.7)	28.6 (18.4-38.8)
60-69 years	8.6 (2.4-14.8)	4.7 (0.0-9.4)	no observations	3.8 (0.0-8.2)	4.2 (0.0-8.4)	32.9 (23.0-42.9)
70-79 years	13.2 (6.3-20-0)	9.0 (3-0-15.0)	0.6 (0.0-1.6)	2.6 (0.0-5.6)	7.9 (2.3-13.6)	42.0 (31.9-52.0)
≥ 80 years	21.6 (6.9-36.3)	3.8 (0.0-9.9)	11.7 (0.0-24.0)	6.2 (0.0-14.4)	0.7 (0.0-2.1)	47.5 (30.8-64.1)

95%CI – 95% confidence interval

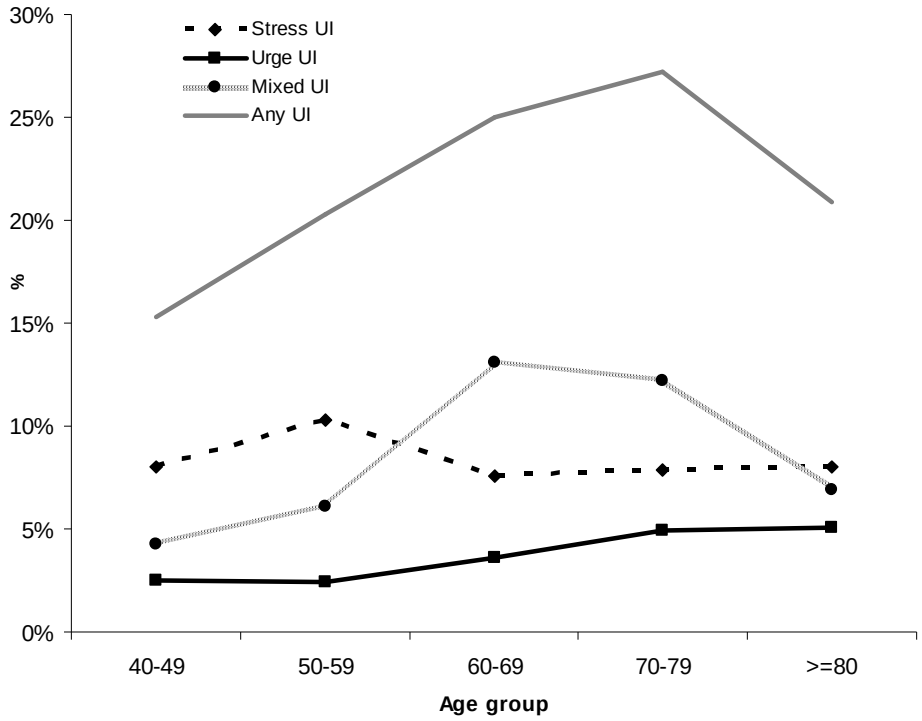
Among women, 21.4% (95% CI: 19.0-23.9) reported the occurrence of at least one episode of urinary leakage on the previous month and SUI was the most common type (42.2%). Fifty-three percent of the incontinent women (95% CI 46.8-60.0) reported daily episodes. The prevalence of urinary incontinence increased up to the age of 70-79 (27.1%; 95% CI: 21.8-32.5) and daily leakage presented an increasing trend with age

(Table 2). The highest frequency of SUI was observed in women between 50 and 59 years (10.3%; 95%CI 6.6-14.0) and it remained constant after the age of 69. The prevalence of UUI increased with age after the sixties, although it remained less frequent than the incontinence of the other two types (Figure 1a).

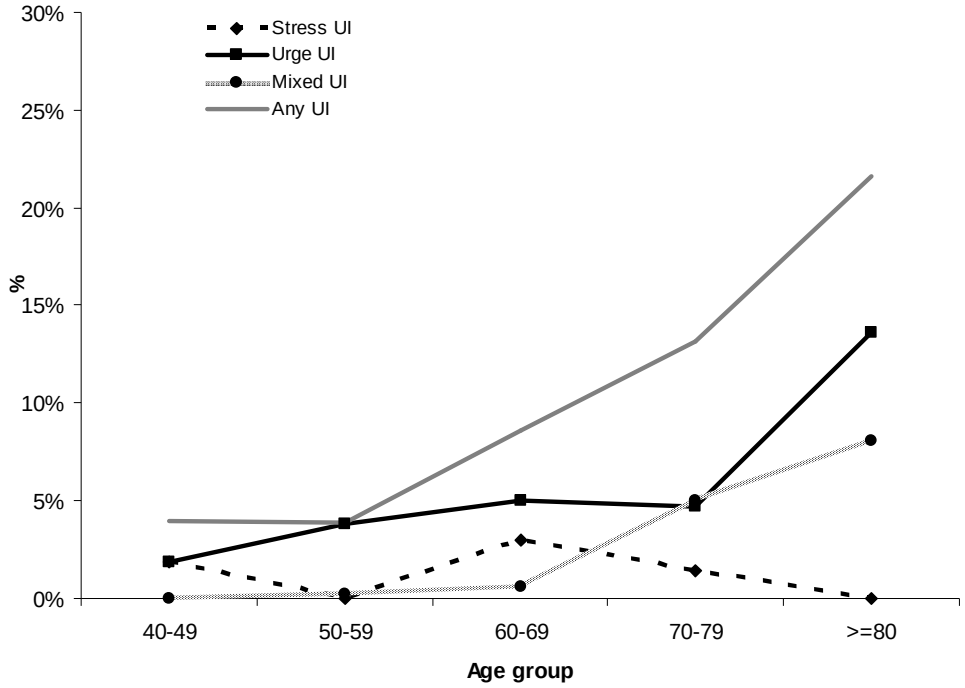
Among men, 7.6% (95%CI 4.8-10.4) were classified as incontinent, from which 47% (95%CI 28.2-66.4) reported daily episodes. UUI was the most frequent type (60.2%), the prevalence of at least an episode of urine leakage in the previous month was higher in subjects aged above 79 years (21.6%; 95%CI: 6.9-36.3) (Table 2). The highest prevalence of SUI was observed at the age of 60-69 years (3.0%; 95%CI: 0.0-7.0) and decreased after that, at the same time that MUI increased (≥ 80 years: 8.1%; 95%CI: 0.0-18.0). Urge urinary incontinence was the most frequent UI type at all age groups, with a steep increase after the age of 79 (13.6%; 95%CI: 1.2-25.9) (Figure 1b).

Figure 1 – Types of urinary incontinence reported by women according the age class a) for WOMEN and b) for MEN.

a)



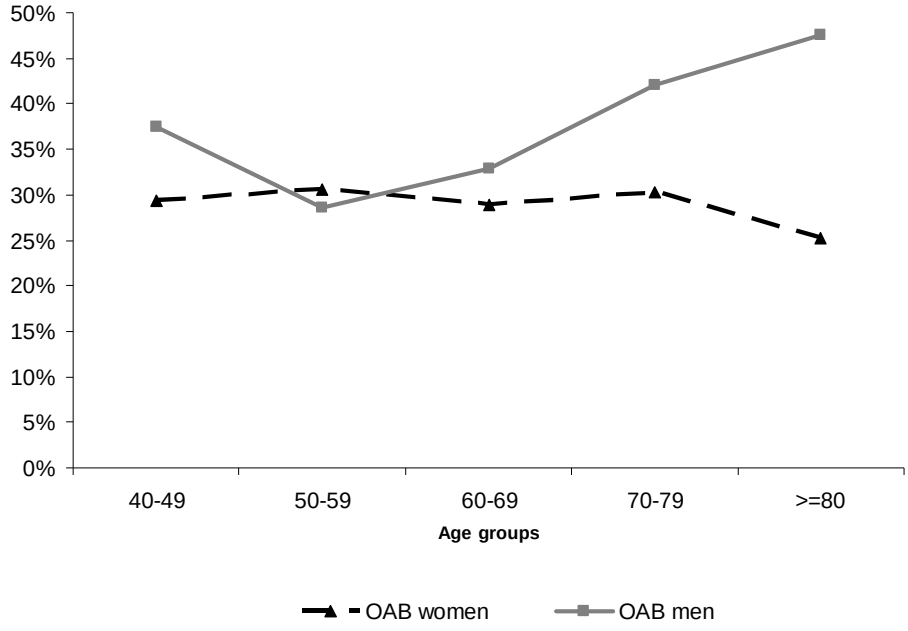
b)



The medical diagnosis of urinary incontinence (ever in life) was reported by 5.0% (95% CI: 3.7-6.3) of women and 4.0% (95% CI: 1.8-6.1) of men, from which 67% of women and 33% of men referred an episode of urine leakage in the previous month, and 81% of women and 67% of men were classified as having overactive bladder symptoms. Seventy three percent of participants with a previous diagnosis reported to have been treated for urinary incontinence. Pharmacological treatment was the most frequent (37% were currently taking medicines and 39% had been treated before), 24.4% were submitted to surgery and 13.1% underwent other treatments. Most participants (70%) referred that the treatment did not suppress the symptoms, despite some improvement. Participants who were submitted to surgery reported more often to have been cured than those receiving pharmacological treatment (29.4% vs. 14.1%). Pelvic floor exercises were the only other treatment referred and 100% of these subjects reported improvement of the symptoms.

The mean score in the overactive bladder symptoms scale was 5.8 in women and 6.9 in men. A final score of 8 or higher was observed in 29.4% (95% CI: 26.6.-32.2) of women and 35.1% (95% CI: 29.6-40.6) of men. Except for women aged 50-59 years, in which the reported proportion of overactive bladder was 30.6% (95% CI: 24.6-36.6), the symptoms were always more prevalent among men. For women the frequency of overactive bladder symptoms tended to decrease with age but in men it did not vary substantially with age (Figure 2).

Figure 2 – Overactive bladder in men and women by age class



Determinants

Among women, obesity, hysterectomy and asthma or chronic bronchitis were associated with an increased risk of both urinary incontinence (BMI ≥30 kg/m^2 vs. <25 kg/m^2: OR=1.65, 95%CI: 1.07-2.52; hysterectomy: OR=1.71, 95%CI: 1.13-2.58; asthma/chronic bronchitis: OR=1.53, 95%CI: 0.97-2.40) and OAB (BMI ≥30 kg/m^2 vs. <25 kg/m^2: OR=1.54, 95%CI: 1.05-2.25; hysterectomy: OR=1.80; 95%CI: 1.23-2.65; asthma/chronic bronchitis: OR=1.59, 95%CI: 1.04-2.44). A positive association with urinary incontinence was also observed with diabetes (OR= 1.37; 95% CI 0.87-2.16),

vaginal (OR=1.76; 95%CI 1.03-3.00) and caesarean deliveries (OR=2.39; 95% CI 1.08-5.29) and menopause (OR= 1.27; 95% CI 0.75-2.15), but the association between the same characteristics and OAB was weaker (Table 3).

Current smoking habits, obesity, deliveries and hysterectomy were positively associated with SUI but not with UUI. Diabetes and menopause showed a positive association with UUI (diabetes: OR=4.24; 95%CI 1.87-9.60; menopause: OR=2.10; 95%CI 0.54-8.11) but not with SUI (diabetes: OR=0.65; 95%CI 0.27-1.55; menopause: OR=1.16; 95%CI 0.59-2.27). Obesity (BMI ≥30 kg/m^2 vs. <25 kg/m^2: OR=1.76, 95%CI: 0.95-3.26), vaginal deliveries (OR=3.38, 95%CI: 1.46-7.81), caesarean deliveries (OR=5.36, 95%CI: 1.63-17.59) and hysterectomy (OR=1.79, 95%CI: 1.00-3.20) were associated with urinary incontinence of the mixed type (Table 4).

Among men, the risk of urinary incontinence increased with age (60-79 vs. 40-59 years: OR=2.11; 95% CI 0.75-5.92; ≥80 vs. 40-59 years: OR=4.62, 95%CI: 1.26-16.83). A similar trend was observed for OAB, although less pronounced. Although not reaching statistical significance, diabetes (OR=2.22; 95%CI 0.91-5.42), non-manual occupation (blue collar vs. white collar: OR=2.46; 95%CI 0.78-7.76), obesity (OR=1.43; 95%CI 0.43-4.73), and prostate cancer (OR=1.40; 95%CI 0.35-5.57) were also positively associated with urinary incontinence. Asthma (OR=0.64; 95%CI 0.20-2.10) and current smoking status (OR=0.67; 95%CI 0.29-1.56) were inversely associated with self-reported urinary incontinence. None of the factors evaluated was associated with OAB, except prostate cancer (OR=2.22; 95%CI 0.82-5.99). Asthma and current smoking status presented point estimates similar to the obtained for urinary incontinence (Table 4).

Table 3 - Association between urinary incontinence and overactive bladder and socio-demographic and clinical characteristics for women and men.

	Urinary Incontinence		Overactive Bladder	
	Women	Men	Women	Men
	OR [a] (95% CI)	OR [b] (95% CI)	OR [c] (95%CI)	OR [d] (95%CI)
Age group (years)				
40-59	1	1	1	1
60-79	1.39 (0.93-2.07)	2.11 (0.75-5.92)	1.00 (0.74-1.33)	1.28 (0.78-2.08)
≥ 80	1.11 (0.58-2.12)	4.62 (1.26-16.83)	0.78 (0.45-1.36)	1.91 (0.88-4.13)
Educational level (years)				
≤ 4	1	1	1	1
5-8	0.94 (0.59-1.50)	1.33 (0.39-4.57)	1.22 (0.82-1.82)	0.75 (0.39-1.43)
> 9	1.01 (0.63-1.62)	1.32 (0.39-4.52)	1.00 (0.66-1.50)	0.79 (0.43-1.48)
Occupation				
White-collar worker	1	1	1	1
Blue-collar worker	1.01 (0.67-1.52)	2.46 (0.78-7.76)	1.00 (0.68-1.45)	1.12 (0.68-1.84)
Housewife	1.02 (0.68-1.54)	-	1.36 (0.93-2.00)	-
Smoking				
Ever smokers	1	1	1	1
Current smokers	1.00 (0.60-1.68)	0.67 (0.29-1.56)	1.08 (0.70-1.67)	0.65 (0.39-1.06)
BMI (Kg/m^2)				
<25	1	1	1	1
25-29	1.10 (0.76-1.59)	1.01 (0.33-3.07)	0.88 (0.63-1.23)	0.91 (0.51-1.62)
≥ 30	1.65 (1.07-2.52)	1.43 (0.43-4.73)	1.54 (1.05-2.25)	1.05 (0.52-2.10)
Diabetes	1.37 (0.87-2.16)	2.22 (0.91-5.42)	1.14 (0.74-1.75)	1.22 (0.66-2.26)
Asthma or Chronic Bronchitis	1.53 (0.97-2.40)	0.64 (0.20-2.10)	1.59 (1.04-2.44)	0.53 (0.24-1.20)
Prostate cancer	-	1.40 (0.35-5.57)	-	2.22 (0.82-5.99)
Delivery				
None	1		1	
Only Vaginal	1.76 (1.03-3.00)	-	1.28 (0.80-2.04)	-
Only Caesarean	2.39 (1.08-5.29)		1.17 (0.56-2.44)	
Both vaginal and caesarean	1.60 (0.66-3.85)		1.80 (0.79-4.11)	
Menopause	1.27 (0.75-2.15)	-	1.18 (0.76-1.84)	-
Hysterectomy	1.71 (1.13-2.58)	-	1.80 (1.23-2.65)	-

OR – Odds Ratio; 95% CI – 95% Confidence Interval.
[a] Adjusted for age, BMI, diabetes, mode of delivery, menopause, hysterectomy, asthma;
[b] Adjusted for age, prostate cancer, education level, smoking habits and occupation;
[c] Adjusted for age, hysterectomy, obesity and region;
[d] Adjusted for age

Table 4 - Association between different types of urinary incontinence (stress, urge and mixed) and socio-demographic and clinical characteristics among women.

	Stress	Urge	Mixed
	Adjusted OR [a] (95%CI)	Adjusted OR [a] (95%CI)	Adjusted OR [a] (95%CI)
Age group (years)			
40-59	1	1	1
60-79	0.76 (0.44-1.29)	0.99 (0.39-2.51)	3.00 (1.53-5.88)
≥ 80	0.84 (0.34-2.09)	1.14 (0.31-4.24)	1.49 (0.52-4.24)
Education level (years)			
≤ 4	1	1	1
5-8	1.29 (0.68-2.45)	1.16 (0.40-3.39)	0.71 (0.35-1.44)
> 9	1.36 (0.74-2.47)	2.07 (0.82-5.19)	0.53 (0.23-1.23)
Occupation			
White-collar worker	1	1	1
Blue-collar worker	0.86 (0.49-1.50)	0.58 (0.24-1.39)	1.57 (0.81-3.03)
Housewife	0.80 (0.46-1.40)	0.70 (0.27-1.78)	1.52 (0.79-2.92)
Smoking			
Ever smokers	1	1	1
Current smokers	1.44 (0.75-2.76)	1.02 (0.28-3.79)	0.61 (0.24-1.56)
BMI (Kg/m^2)			
< 25	1	1	1
25-29	1.28 (0.75-2.18)	0.72 (0.30-1.69)	0.96 (0.56-1.64)
≥ 30	1.38 (0.74-2.56)	0.89 (0.35-2.23)	1.76 (0.95-3.26)
Diabetes	0.65 (0.27-1.55)	4.24 (1.87-9.60)	1.08 (0.61-1.89)
Asthma or Chronic Bronchitis	1.54 (0.83-2.86)	1.61 (0.61-4.23)	0.93 (0.48-1.81)
Uterus, Ovarian or breast cancer	0.59 (0.17-1.99)	0.79 (0.11-5.74)	1.55 (0.63-3.82)
Delivery			
None	1	1	1
Only Vaginal	1.64 (0.75-3.59)	0.51 (0.19-1.38)	3.38 (1.46-7.81)
Only Caesarean	1.79 (0.57-5.59)	0.82 (0.19-3.52)	5.36 (1.63-17.59)
Both vaginal and caesarean	0.86 (0.26-2.80)	0.80 (0.09-7.28)	3.41 (0.96-12.10)
Menopause	1.16 (0.59-2.27)	2.10 (0.54-8.11)	0.87 (0.37-2.05)
Hysterectomy	1.51 (0.85-2.69)	1.16 (0.50-2.72)	1.79 (1.00-3.20)

OR – Odds Ratio; 95% CI – 95% Confidence Interval.
[a] Adjusted for age, BMI, diabetes, mode of delivery, menopause, hysterectomy, asthma

Discussion

The prevalence of urinary incontinence in the Portuguese population aged 40 years or older was 21% for women and 8% for men, according to the definition of the ICS and 5% of individuals were diagnosed ever in life.

A meta-analysis of studies evaluating women presented a median prevalence of 27.6% (range: 4.8%-58.4%), but all studies were published before 2003 and did not used the recent ICS definition [26]. Comparing our results with those from recent surveys, the prevalence among women was lower than in France, Germany and United Kingdom (all around 40%) and Spain (23%), considering that the participants in this cross-national survey were aged 18 years or older [7]. The EPIC study (Sweden, Italy, Canada, Germany and United Kingdom) found for adults over 17 years a global prevalence of 18% in women and 5% in men [8]. In comparison with other Portuguese data, the present survey presented higher estimates than the National Health Survey (NHS) conducted in 1995, which differs methodologically from our study. The NHS evaluated participants of all ages, considered an episode of urinary incontinence ever in life, and information was collected by face-to-face interview at the participants' home [17]. Personal interviews are known to contribute to underreporting of sensitive issues, such as urinary incontinence [27] and, not being possible to carry out a clinical assessment of urinary dysfunctions, telephone interviews are preferred to mailed questionnaires as regards completeness and accuracy of data [28].

The present investigation shows that self-reported urinary incontinence increases with age, continuously among men and up to the seventies in women. Some authors reported an increase in prevalence up to the middle-age (around menopause, in women) and a slight increase in the elderly population [29-31], while others described a steady increase up to the eighties [32]. It is possible that in our study women after 79 years underestimated the symptoms considering them an inevitable part of ageing [7,33] and only the more severe cases may have been reported in this age-group. We did not use any severity index but the frequency of daily leakage tended to increase with age.

Considering the frequency and age distribution of the different types of urinary incontinence, the stress type was the more prevalent among women, peaking at the sixth decade of life, becoming less frequent than mixed urinary incontinence only after the eighth decade of life. This pattern is consistent with the observed in other studies, although the highest prevalence of stress incontinence has been described among the oldest [7,34]. As most other epidemiological studies, we did not use urodynamic equipment

or a gynaecologist assessment to determine the pathophysiology basis of incontinence which may contribute to misclassification of the different types of urinary incontinence. The questionnaire used was validated by Sandvik [35], and according to it mixed urinary incontinence may be overestimated (due to the low specificity of the criteria to classify mixed incontinence). Most of the participants classified as having urinary incontinence of the mixed type would probably be considered to have stress urinary incontinence if other tools were used for a more accurate assessment [35].

Among men, there was a continuous increase in the prevalence of urinary incontinence with age, and urge type was the most frequent among almost all age groups, in accordance with previous reports [4,8,36].

This study showed a low proportion of subjects with urinary incontinence who had already been clinically diagnosed (5%), a phenomenon that has also been described in other settings [7,15]. More than the lack of attention from health professionals (70% got some kind of treatment), this fact probably reflects lower consultation rates. In fact, embarrassment, the perception of UI as a consequence of a natural ageing process or that it will be cured naturally, low expectations of a successful treatment and cultural issues were described as determinants for not seeking medical attention [37-39].

Sixty-seven percent of women and 33% of men with a previous medical diagnosis did not report any episode of urine leakage in the month preceding the interview. It may reflect not only cases of successful treatment, but also the cases of remission that we did not evaluate in this study.

The prevalence of overactive bladder was 29% in women and 35% in men (overall 32%). Our study presented a higher prevalence for the overall overactive bladder prevalence compared to the results from Sifo/Gallup network (17% in men and women aged ≥40 years) [40], the NOBLE study, in United States (17% in women and 16% in men over 17 years) [10] or the EPIC study (13% in women and 11% in men over 17 years) [8], although similar results were observed when analysing the upper age classes.

This instrument that we used (OAB-q) has a specificity of 83% when it was validated against clinical diagnose and so, it is possible that participants who scored 8 or greater can have other metabolic or local pathological factors as the reason for the urinary symptoms [23]. On the other hand, the questionnaire was linguistically validated in Brazilian Portuguese [41] and the psychometric characteristics of the instrument were not assessed in the Portuguese population.

Previous reports showed that age-specific overactive bladder estimates are higher in women up to the sixties and in men after this age [8,10,40]. In our study, the prevalence was higher in men, regardless of the age-group, but if the final score was not

obtained adding two points to the score resulting from the 8 questions of the OAB-q scale, the pattern would similar to the described in literature. We may speculate that Portuguese men do not have a threshold bothersome lower than women, fact that can only be confirmed with the validation of this instrument in our population.

Some other methodological issues should be pointed out when analysing the results. The survey did not include institutionalized participants among whom the prevalence of urinary incontinence is known to be higher [42], and therefore our prevalence figures underestimate the true prevalence, especially in the older subjects. This fact does not further compromise the comparison with results from other studies because most only include community participants [7,8,10].

Portugal, as other countries, is facing a decrease in the number of households with landline telephones [43], which raises some concern regarding the extent to which the sample evaluated represents the Portuguese population. The representativeness of this sample was specifically assessed in a separate publication [20]. Briefly, the sampling procedures used led to a higher proportion of women, elderly, and more educated subjects, in comparison with the Portuguese population aged 40 years or older, but the effect of thus selection bias was minimized considering the age- and sex-specific or weighted estimates. Also, there was no association between education and urinary incontinence or OAB and we do not expect that estimates of the frequency of urinary symptoms are biased as a consequence of our sampling strategy. Additionally, no major differences were found between the estimates obtained in our study and those concerning the Portuguese population in the same sex and age groups regarding health characteristics such as body mass index or smoking habits.

For the interpretation of the results concerning possible associations with the urinary symptoms, we have to take into account the fact that this survey was not designed to assess risk factors. On the one hand, causal inferences must be established cautiously in a cross-sectional design. For example, we do not know when participants were diagnosed for diabetes or prostate cancer and so if there is a temporal relationship with the outcomes. On the one hand, the sample size was defined based on the desired precision for prevalence estimates. Our investigation is not powered enough to assess determinants of these conditions, especially when assessing the association with specific types of incontinence or among men. This explains the wide confidence intervals and the non-significant associations that we have found for some well established risk factors. However, the point estimates are in accordance to what has been described for urinary incontinence and overactive bladder determinants [44-47]. Regarding the role of mode of delivery we can not distinguish the number of pregnancies and deliveries or

evaluate the role of episiotomy or operative vaginal deliveries that may contribute to the risk of urinary dysfunction [46].

This population-based survey presents national prevalence estimates for urinary incontinence and overactive bladder symptoms, and confirms previous knowledge on the determinants of these conditions. Our results show a low proportion of clinically diagnosed urinary incontinence, emphasing the need for better information and awareness of the population in order to involve health care providers and minimize the implications of urinary dysfunctions.

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Yielding of sampling procedures and sample representativeness in a national telephone survey

Abstract

Objectives

To assess the yielding of the sampling procedures and the sample representativeness in a national telephone survey in Portugal.

Methods

The white pages lists (2007/2008) were the sampling frame for subjects >39 years (n=1 934). Time spent with interviews and unsuccessful contacts was quantified. Demographic and health characteristics of the participants were compared with those of the Portuguese population.

Results

The minimum response rate was 27.6 % and the cooperation rate 59.6 %. The proportion of refusals was higher on Saturdays (45.2 % vs. 30.7 %) and evenings (45.2% vs. 36.7%), as well as the selection of men (26.2 % vs. 21.0 %) and active workers (31.8 % vs. 21.8 %). Our sample included a higher proportion of women, elderly and more educated participants than the Portuguese population. Sex- and age- specific estimates of smoking and obesity obtained from our sample were similar to those in the Portuguese population.

Conclusion

Despite the difficulties in reaching participants, this strategy may produce representative samples for assessment of important health indicators.

Introduction

Telephone surveys are an attractive option to collect health related data, allowing the coverage of large populations over wide geographical areas with a reasonable efficiency.

Random-digit-dialling (RDD) and list-assisted frames are the most frequently used methods for gathering probabilistic samples in telephone surveys [1]. Telephone coverage has always been the primary concern in both techniques, but especially in the past few years, due to the notorious decrease of the proportion of households having a landline telephone [2,3] and the increasing inequalities in the distribution of landline telephone ownership across geographical and socioeconomic strata [2,4-6]. The last European Communications Household Survey in 2007 showed an overall decrease in the proportion of households with a fixed telephone line in comparison with the previous year, and Portugal was the country with the highest reduction (40 % of households with fixed telephone, 14 % less than in the previous year) [7].

The increasing trends in non-coverage and non-response rates [8] pose an important challenge to the design of telephone surveys [9]. On the one hand, adjustment techniques have been developed and are often used to decrease the effect of selection bias on the validity of the estimates produced [10,11], and some studies suggest that non-response rates are not so much of a threat to the validity of the survey estimates [12,13]. On the other hand, high response-rates may not be effective in reducing bias, especially when the causes of participation are highly correlated with the survey variables, and the extent of non-response bias depends on the survey design and mode of questionnaire administration [14]. Telephone surveys yielded similar results to face-to-face interviews regarding estimates of smoking habits, or usual dietary intakes [15-17], but some discordance persists in the assessment sensitive issues such as the consumption of alcohol or illicit drugs [17,18].

The relatively low costs of telephone surveys, especially when compared to those involving face-to-face interviews, are usually presented as one of its major advantages [19-21], although some telephone surveys may be more expensive than those relying on mailed questionnaires [22,23] or personal interviews [23]. Additionally, the difficulties in selecting participants are increasing as well. The non-coverage and non-response changes have also consequences in the logistic efficiency of the study, considering the larger number of attempts necessary to contact participants, leading to higher costs [24,25].

We aimed to assess the yielding of the sampling procedures and the representativeness of a sample evaluated in a national telephone survey conducted in

Portugal. The time spent with interviews and unsuccessful contacts was quantified, and the yielding of the contact attempts compared across regions, days of the week and day periods. The demographic and health characteristics of the participants were compared with those of the Portuguese population.

Methods

The telephone survey

A national telephone survey was conducted between the 21st January and the 27th February 2008, to estimate the prevalence of urinary incontinence in non-institutionalized adults aged above 39 years, dwellers in main land Portugal. The methods were previously tested in a pilot study involving 36 subjects. All interviewers underwent standardised training and regular quality-control checks were done during the survey.

Sampling

A sample of 385 individuals was selected from each of 5 strata, corresponding to the Portuguese regions *Norte*, *Centro*, *Lisboa*, *Alentejo* and *Algarve*, as defined by the level II Territorial Unit Nomenclature (NUT II) division, to allow prevalence estimates of 50 % with 5 % precision and a confidence level of 95 %, resulting in a total of 1 925 interviews.

The 2007/2008 Portuguese white pages lists were used as the sampling frame for the survey. These lists include all non-anonymous landline telephone numbers from the Portugal Telecom® supplier and represent 71 % of the landline telephone numbers in Portugal [26].

The page, column and telephone number position within each page were consecutively selected using three different lists of random numbers. A page was selected using a random list, and within each page a column was selected using another list of random numbers. Once a column was selected, the list of number positions in each column was used sequentially by the interviewers until a successful interview (with complete questionnaire) was accomplished.

All residence telephone numbers presented in the lists were eligible, except those belonging to institutions or commercial houses (telephone numbers which could be identified as non-eligible with the information provided in the list were not contacted, and therefore are not considered in this analysis). Within each household, Portuguese speaking dwellers aged 40 or more years were eligible.

The person who answered the call was invited to participate, if eligible. If the individual was younger than 40 years or not living permanently in the house he/she was asked to enumerate the subjects aged 40 or more years, and living permanently in the house, who were at home at that moment. The person with the birth day closest to January 1st was selected (considering January 2nd the closest one and December 31st the

more distant). If there were no persons meeting the eligibility criteria, another telephone number was selected.

All individuals not accepting to participate or quitting during the interview were labelled as refusals and substituted using the procedures described above. The participants answering the questionnaire were not excluded if not accepting to answer only to specific questions.

The telephone numbers without dial tone, those for which we had no answer after 10 dial tones or were busy were also replaced.

Interview

Interviews were conducted from 9.30 a.m. to 9.30 p.m. at weekdays and from 2.00 p.m. to 6.00 p.m. on Saturdays. The pilot study revealed that contacts on Saturday mornings and evenings were less effective and weekend interviews took place only during the Saturday's afternoons. It was also decided in advance that interviews performed after 6.00 p.m. would be overrepresented in an attempt to minimize the probability of oversampling women, older subjects, and unemployed.

Potential participants were informed about the general aims of the study, which was presented as a general health survey, the estimated duration of the interview (5-7 minutes), and that their answers were anonymous. They were briefly informed about the aims related to urinary incontinence only after acceptance. One person turned off the telephone after receiving this information.

Questionnaire

A structured questionnaire was developed to answer the specific aims of the survey (not presented in this manuscript), and including socio-demographic information and regarding smoking habits and self-reported weight and height.

The Portuguese Population

The participants in our survey were compared with the Portuguese population regarding education level, working condition, smoking habits and body mass index (BMI).

National data on the education level distribution and working condition of the population were obtained from the last Census (2001) [27].

The fourth National Health Survey, conducted between February 2005 and February 2006 was used to obtain national estimates of smoking status and BMI. This survey gathered data from a representative sample of the Portuguese population using a multi-stage random probability design. Briefly, participants were selected from individual

households in the five Portuguese mainland regions described above (Azores and Madeira islands were also included in the survey but not considered in this analysis) [28]. The sample unit was the household and all resident subjects at each unit were interviewed face-to-face. The survey included 41 193 persons belonging to 15 239 households (76 % of 19 950 households initially selected) (personal communication).

Trained interviewers conducted face-to-face interviews in each household and obtained information on social and demographic characteristics, lifestyle and health, including smoking habits and self-reported weight and height.

Statistical analysis

Survey methodology

Unsuccessful phone contacts were classified as immediate refusals (subjects not accepting to participate during the introduction or description of the interview), refusals during interview (subjects giving up before the completion of the interview), not eligible (households or subjects not fulfilling the above mentioned eligibility criteria), non-connected (numbers not corresponding to an active telephone account), no replies (number for which there was no reply after 10 dial tones) or busy numbers (numbers for which there was a busy dial tone).

The time spent in interviews or attempted contacts was quantified by the interviewers, except for no replies, non-connected and busy numbers, for which we estimated that respectively 60, 15 and 15 seconds were necessary per each contact attempt.

We estimated that 18 seconds was the minimum necessary time to dial and wait for an answer. This value was added to the duration of each answered call (Tab. 1).

The proportion of unsuccessful calls (non-connected, busy and no-replies) and successful calls classified as non-eligible or eligible (refusals and interviews) were compared across regions (NUT II), days of the week and day periods. For analysis, the periods of the day were classified as morning (9.30 a.m. to 1.59 p.m.), afternoon (2.00 p.m. to 5.59 p.m.) and evening (6.00 p.m. to 9.30 p.m.).

The minimum response rate [all interviews divided by interviews plus refusals plus cases of unknown eligibility (no replies and busy numbers)] and the cooperation rate (all interviews divided by all eligible individuals contacted) [29] were computed.

For interviews we compared the distribution of sex, age and education of the participants according to region, day of the week and period of the day.

Health and demographic estimates

Weighted prevalence estimates were computed for results to reflect the prevalence in the Portuguese population. Each participant was assigned a weight corresponding to the ratio between the number of participants in the same sex, region and age class (45-64; ≥ 65) and the number of Portugal residents in the same sex, region and age class [27].

For the analysis, education level was aggregated in categories of maximum academic degree completed: ≤ 4 schooling years (primary education), 5-9 years (lower secondary education), 10-12 years (upper secondary education) and > 12 years (post-secondary education). Working condition was recorded as employed, unemployed, housewife, retired or other situation (*e.g.* student, permanent incapacity). In the analysis, the latter two were grouped as a single category.

Smoking status was defined as never smoker, current smoker (at least one cigarette/day) and ex-smoker if not smoking for at least 6 months up to the date of interview.

Self-reported anthropometrics were used to calculate the Body Mass Index (BMI): (weight (kg) / (height (m))^2. Three BMI classes: <25 kg/m^2; 25-29 kg/m^2; ≥ 30 kg/m^2 and the class of non-respondents (does not know or does not want to answer to the questions on weight and/or height), were considered for analysis.

Ethics

The study was based on a survey approved by the Ethics Committee of the Hospital São João, and all participants provided oral consent.

Results

Survey methodology

To complete 1 934 successful interviews (median time 5.3 minutes), 8 920 phone calls and attempted telephone contacts had to be conducted, in a total of 308 hours.

No replies comprised 39.6 % of all calls, 12.5 % were non-eligible, 14.7 % were refusals and 8.9 % corresponded to non-connected numbers. The minimum response rate was 27.6 % and the cooperation rate was 59.6 %. Sixty-three percent of the total time was spent with the interviews, 16.5 % with refusals or non-eligible numbers and 20.5 % with unsuccessful contacts (Tab. 1).

Table 1 – Description of the number and time spent in successful and unsuccessful contact attempts.

	n (%)	Median time (minutes)	Total time hours (%)
Interviews	1 934 (21.7)	5.3 [c]	194.3 (63.0)
Immediate refusal	1 231 (13.8)	1.1 [c]	23.9 (7.7)
Refusal during the interview	78 (0.9)	2.3 [c]	3.2 (1.0)
Non-eligible [a]	1 117 (12.5)	1.3 [c]	24.0 (7.8)
Non-connected	793 (8.9)	0.25 [d]	3.3 (1.1)
No reply [b]	3 529 (39.6)	1 [d]	58.8 (19.1)
Busy	238 (2.7)	0.25 [d]	1.0 (0.3)
Total	8 920 (100.0)	---	308 (100.0)

[a] Include non-residences (not identifiable on the list) and individuals not fulfilling the eligibility criteria;

[b] No reply after 10 dial tones;

[c] Computed using information recoded by the interviewers (including 18 seconds considered the minimum necessary time to dial and wait for an answer);

[d] Estimated by the authors.

Algarve presented the highest proportion of unsuccessful contacts (61.7 %) and *Lisboa* the higher proportion of refusals (51.8 %). The proportion of non-eligible contacts was lower in *Alentejo* (18.5 %) and higher in *Centro* (29.4 %). The unsuccessful contacts were less frequent at Saturdays (47.7 % vs. 51.6 %) but the proportion of refusals was higher (45.8 % vs. 39.6 %). In the morning there was a higher proportion of unsuccessful

contacts (60.8 % vs. 45.1 % in afternoon and evening), non-eligible households/individuals were contacted less frequently (19.5 % vs. 28.4 %) and the proportion of interviews among eligible participants was higher (69.3 % vs. 54.8 %) (Tab. 2).

Table 2 – Proportion of accomplished telephone contacts and interviews according regions (NUT II division), days of the week and day periods.

	Telephone contacts (n)	**Unsuccessful contacts** [a] n (%)	**Successful contacts**				
			n	**Non-eligible** [b] n (%)	**Eligible**		
					n	**Refusals** [c] n (%)	**Interviews** n (%)
NUT II							
Norte	1 500	774 (51.6)	726	180 (24.8)	546	159 (29.1)	387 (70.9)
Centro	1 686	795 (47.2)	891	262 (29.4)	629	244 (38.8)	385 (61.2)
Lisboa	2 212	1 079 (48.8)	1 133	321 (28.3)	812	421 (51.8)	391 (48.2)
Alentejo	1 465	642 (43.8)	823	152 (18.5)	671	285 (42.5)	386 (57.5)
Algarve	2 057	1 270 (61.7) [e]	787	202 (25.7) [e]	585	200 (34.2)	385 (65.8) [e]
Days of the week							
Monday-Friday	7 893	4 070 (51.6)	3 823	971 (25.4)	2 852	1 130 (39.6)	1722 (60.4)
Saturday	1 027	490 (47.7) [e]	537	146 (27.2) [f]	391	179 (45.8)	212 (54.2) [g]
Day Periods [d]							
Morning	3 429	2 083 (60.8)	1 346	262 (19.5)	1 084	333 (30.7)	751 (69.3)
Afternoon	2 275	1 189 (52.3)	1 086	319 (29.4)	767	347 (45.2)	420 (54.8)
Evening	3 216	1 288 (40.1) [e]	1 928	536 (27.8) [e]	1 392	629 (45.2)	763 (54.8) [e]

NUT II – Territorial Unit Nomenclature, level II

[a] Includes non-connected, busy and no-replied (after 10 dial tones) telephone calls;

[b] Includes non-residences (not identifiable on the list) and individuals not fulfilling the eligibility criteria;

[c] Includes immediate refusals and refusals during the interview;

[d] Morning: 9.00 a.m. up to 1.59 p.m.; Afternoon: 2.00 p.m. up to 5.59 p.m.; Evening: 6.00 p.m. up to 9.30 p.m.;

[e] $p<0.001$; [f] $p=0.613$; [g] $p=0.02$

Participants' characteristics

Among participants, the proportion of males was similar by region and across week-days, but significantly higher on evening interviews (26.2 % vs. 21.0 % in morning and afternoon).

There were no significant differences in the proportion of participants aged ≥ 65 years according region, day of the week or day period.

The recruitment of more educated participants (>12 years) was more frequent in *Lisboa* (15.9 %) and less likely in *Centro* region (7.5 %) and during Saturdays (21.6 % vs. 14.7 % at week days). No significant differences were found for education according to the day periods.

The proportion of active workers evaluated was similar in all regions (26.2 %) and significantly higher at Saturdays (35.8 % vs. 25.1 %) and during the evening (31.8 % vs. 21.8 %) (Tab. 3).

Table 3 - Sociodemographic characteristics of the participants according to the region (NUT II division), days of the week and day periods.

	n	% Men (n=451)	p	% ≥ 65 years (n=909)	P	% >12 schooling years (n=209)	P	% Active workers (n=507)	p
NUT II									
Norte	387	21.4		42.9		10.3		24.0	
Centro	385	24.9		48.6		7.5		22.6	
Lisboa	391	23.5		46.0		15.9		29.7	
Alentejo	386	22.3		49.2		8.8		25.6	
Algarve	385	24.4	0.768	48.3	0.382	11.4	0.002	29.1	0.104
Days of the week									
Monday-Friday	1 730	23.0		47.3		10.3		25.1	
Saturday	204	26.0	0.342	44.6	0.469	15.2	0.033	35.8	0.001
Day periods [a]									
Morning	699	22.6		48.9		10.2		19.5	
Afternoon	372	18.0		47.9		11.8		26.1	
Evening	863	26.2	0.007	45.1	0.296	10.9	0.699	31.8	<0.001

NUT II – Territorial Unit Nomenclature, level II

[a] Morning: 9.00 a.m. up to 1.59 p.m.; Afternoon: 2.00 p.m. up to 5.59 p.m.; Evening: 6.00 p.m. up to 9.30 p.m.

Comparisons between this survey and the Portuguese demographic and health estimates

Among the participants in our survey the proportion of women (76.7% vs. 54.1%) and the proportion of subjects aged above 59 years (61.4% vs. 46.2%, p<0.01) was higher than in Portuguese population aged above 39.

The telephone survey presented a higher proportion of more educated people than the Portuguese population (more than primary degree: 38.3 % vs. 26.3 % in Census) and differences in the educational level were more pronounced in younger women (Tab. 4). These women (45-64 years) were less often active workers (35.6 % vs. 45.6 % in Census) than the Portuguese women in the same age group. The same happened among males, with a higher proportion of retired men (58.1 % vs. 69.9 % in Census) (Tab. 4).

Table 4 – Comparison of education level and working condition between Census 2001 and the national telephone survey, by age group and sex.

	Women		Men	
	Census [a] (%)	Survey [b] [% (95 % CI)]	Census [a] (%)	Survey [b] [% (95 % CI)]
Academic degree				
Primary complete/not complete				
45-64	69.4	54.7 (50.4-58.9)	62.8	43.2 (34.7-51.6)
≥ 65	87.3	85.6 (82.6-88.6)	80.6	71.0 (64.4-77.6)
Lower secondary				
45-64	13.8	20.5 (17.1-24.0)	16.1	27.1 (19.6-34.6)
≥ 65	6.3	7.9 (5.6-10.2)	8.4	14.1 (8.9-19.2)
Upper secondary				
45-64	7.6	12.2 (9.4-15.1)	10.5	12.4 (7.0-17..7)
≥ 65	3.0	2.7 (1.4-4.1)	4.9	6.4 (3.1-9.8)
Post-secondary				
45-64	9.3	12.6 (9.7-15.4)	10.6	17.4 (11.0-23.7)
≥ 65	3.4	3.7 (2.1-5.4)	6.1	8.5 (4.4-12.6)
Working condition				
Active working				
45-64	45.6	35.6 (31.7-39.8)	69.9	58.1 (49.9-66.4)
≥ 65	3.4	0.9 (0.0-1.7)	7.9	3.8 (0.9-6.6)
Unemployed				
45-64	3.8	8.6 (6.1-11.1)	4.1	5.3 (1.7-8.9)
≥ 65	0.1	0.2 (0.0-0.7)	0.0	no observations
Housewife / other [c]				
45-64	32.1	34.2 (30.1-38.3)	7.9	1.8 (0.0-4.2)
≥ 65	11.5	18.7 (15.3-22.0)	4.3	no observations
Retired				
45-64	18.5	21.4 (17.9-25.0)	18.1	34.7 (26.8-42.7)
≥ 65	85.0	80.2 (76.8-83.6)	87.8	96.2 (93.3-99.1)

[a] Census 2001
[b] Prevalence estimates from the present survey
[c] Other: permanent incapacity, students

Women's smoking habits were similar in both surveys. Among men, our study showed a lower proportion of current and ex-smokers when compared with the obtained in the National Health Survey (NHS) (44.6 % vs. 53.8 %) although the differences were more evident among older participants. Body mass index estimates were also similar in both studies with the highest difference occurring in the proportion of normal or underweight younger women (telephone survey: 43.3 % vs. NHS: 37.5 %). In our study the proportion of non-responses for weight and/or height was higher than in the NHS (6.2 % vs. 1.3 %), especially among women (Tab. 5).

Table 5 – Comparison of smoking habits and body mass index (BMI) presented in the National Health Survey and in the telephone survey, by age class and sex.

	Women		Men	
	NHS [a] (%)	Survey [b] [% (95 % CI)]	NHS [a] (%)	Survey [b] [% (95 % CI)]
Smoking habits				
Never smoker				
45-64	83.2	84.8 (81.7-88.0)	33.5	39.8 (31.4-48.2)
≥ 65	97.8	95.7 (94.0-97.5)	46.2	55.4 (47.9-62.8)
Current smoker				
45-64	9.4	8.7 (6.2-11.2)	28.3	22.6 (15.5-29.7)
≥ 65	0.8	1.6 (0.5-2.7)	10.2	5.3 (2.2-8.5)
Ex-smoker				
45-64	7.4	6.4 (4.3-8.5)	38.1	37.6 (29.4-45.6)
≥ 65	1.4	2.7 (1.3-4.1)	43.6	39.3 (32.0-46.6)
BMI (Kg/m²)				
Underweight / Normal (<25.0)				
45-64	37.5	43.3 (38.9-47.6)	31.3	36.3 (28.1-44.5)
≥ 65	41.2	40.7 (36.0-45.4)	37.0	35.9 (28.7-43.0)
Overweight (25.0-29.9)				
45-64	40.2	37.3 (33.1-41.6)	46.6	44.9 (36.4-53.4)
≥ 65	37.6	38.2 (33.6-42.8)	45.6	44.8 (37.3-52.3)
Obese (≥ 30.0)				
45-64	22.3	19.4 (15.9-22.9)	22.1	18.8 (12.4-25.2)
≥ 65	21.2	21.1 (17.2-25.0)	17.5	19.3 (13.3-25.3)
BMI (Kg/m²)				
Not know / No answer				
45-64	0.7	3.4 (1.9-5.0)	1.6	1.3 (0.0-3.1)
≥ 65	1.9	18.0 (14.7-21.4)	0.9	2.6 (0.3-4.9)

[a] 4th National Health Survey 2005/2006
[b] Prevalence estimates from the present survey

Discussion

This study provides important information for an efficient design of health surveys in this specific setting, and to discuss the validity of the estimates on health-related indicators obtained from list-assisted telephone surveys. Nearly 40 % of the time devoted to the recruitment of participants was spent in unsuccessful contact attempts. There was regional heterogeneity in the yield of the sampling and recruitment procedures. Evenings and Saturdays presented less unsuccessful contacts but also more refusals, and the proportion of interviews was higher during the morning. The participants' socio-demographic characteristics depended on the time of the day and/or the week day in which the interview was conducted. The age- and gender-specific estimates of health-related features were generally in accordance with those described for the Portuguese population in the National Health Survey.

Almost 80 % of the dialled numbers did not allow a successful interview. Fifteen percent were refusals, and among eligible contacts the proportion of subjects not accepting to participate was 40 %, confirming what has been described about difficulties in reaching participants and regarding the increasing resistance to telephone surveys [3,20,21]. Although the number of non replied calls was high, as previously reported in other settings [21,25,30], in our study there was an immediate replacement of all these numbers. The time spent with unsuccessful calls would be even higher if these calls had been repeated. The small proportion of attempted calls to non-eligible numbers of subjects is probably reflecting the age eligibility criteria (individuals older than 39 years), as landline telephones are more frequently owned by older individuals [9], and the fact that most numbers corresponding to non-residences could be identified in advance in the white pages list.

The yield of this sampling strategy was different across the five regions studied. To achieve the same number of interviews it was necessary a higher proportion of unsuccessful contacts in *Algarve*, which is probably related to the large number of households that in this region are occupied only in summer time. *Lisboa* presented the lowest cooperation rate and the *Norte* the highest, certainly due to the urban character of *Lisboa* and the fact that the *Norte* is a Portuguese region with a high proportion of rural districts, a phenomenon previously described in other settings [19,31]. Contact attempts in the evenings or Saturdays were not substantially more effective for participants' selection than those taking place in other day or week periods, contrasting with our expectations [32]. Although the proportion of successful contacts was higher in

these periods, the refusals were also more frequent. Regardless of the effect of non-participation in the validity of the results, it is clear that the survey costs were increased by refusals.

The selection of males and active workers was more frequent after 6.00 p.m. and more educated individuals were recruited predominantly on Saturdays. The latter reflects the higher proportion of *Lisboa* participants evaluated in this week day, which were more educated and more frequently recruited on Saturdays, since the same was not observed for other regions. Considering that telephone surveys tend to oversample women, retired and unemployed people – as happened in this study – evening interviews can be a useful option to reduce this selection bias.

The comparison of response rates across studies is often difficult, given the heterogeneity in the design strategies used and in the definition of response rate. Following the American Association for Public Opinion Research guidelines, in our survey the response rate was 28 % and the cooperation rate 60 %. In 2007, the overall response rate for the Behavioral Risk Factor Surveillance Survey, the world's largest on-going telephone health survey (440 557 participants), was 33.4 %, varying across American states from 13.8 % up to 58.9 %, and the cooperation rate was 72.1 % (from 49.6 % to 84.6) [33]. Cooperation rates are expected to vary across settings, especially due to the different acceptance of telephone surveys by the target populations. For South Australia, Wilson et al.[20] and Yang et al.[21] presented higher cooperation rates than those described above, in electronic white pages surveys conducted in 1995 (83.8 %) and 2003 (71.4 %), respectively. Despite the cultural issues, both studies used introductory letters sent to selected households, which is known to increase the efficiency of the surveys [31,34].

The study objectives may also influence the participation of the selected subjects [14,35]. The present study was presented as a general health survey, without mentioning the specific aims related to urinary incontinence. After acceptance, only one person rang out the telephone, and therefore there were no differential refusals due to the study goals. It is, however, likely that non-respondents to epidemiologic studies have more socially unacceptable behaviours (as smoking) and poorer health status [35], but no information was available in our survey for the assessment of the non-participants' characteristics.

The comparison between the results from our survey and those from the National Health Survey must be done with caution, taking into account the differences in the sampling strategies (telephone directories vs. area sampling), but also regarding the mode of questionnaire administration by the interviewers (telephone vs. personal).

In our survey there was a higher proportion of non-employed and more educated subjects, in accordance to previous reports regarding telephone respondents [4,15,17,36]. This may contribute to explain the lower proportion of smokers that we found among men. The fact may also be reflecting the mode of data collection. The anonymity in telephone surveys may contribute to a higher prevalence of current smokers when compared with face-to-face interviews [15], but some studies observed the inverse [4,37].

The prevalence estimates for body mass index were similar in the two studies, except in younger women. Literature suggests that characteristics that can be confirmed by the interviewer, as body weight, may be reported more accurately in personal interviews [9]. In fact, the telephone survey presented a discrete higher proportion of normal/underweight young women and a higher proportion of missing data, suggesting that this may be a sensitive issue among females. These differences are likely to be a consequence of the differences in the mode of administration, more than the result of differences in the sampling frame approach.

In addition to the methodological aspects discussed above, our results refer to a survey of adults over their forties, and the same pattern may not occur among younger ones. The coverage of landline telephone numbers among young adults (18-25 years) has been declining [38] and Blumberg and Luke, in 2007, reported that young adults (18-29 years) which are landline telephone users were more educated, had a higher income, were less often binge drinkers, smokers and more often obese, when compared to those from wireless-only households [6]. Keeter et al., presented the same pattern, apart from similar estimates for smoking [38].

In conclusion, the knowledge of possible differences in the yielding of the survey according to the call schedules, namely the frequency of unsuccessful contact attempts, and the correspondence between the respondents' characteristics and those from the general population are fundamental issues for an efficient design and planning of telephone surveys. Although the sampling based in telephone directories may induce selection bias, the effect on the sex- and age-specific prevalence estimates of body mass index and smoking habits was minimal. Despite the difficulties in reaching participants, this strategy may produce representative samples for assessment of important health indicators.

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Summary

Introduction

Urinary incontinence and overactive bladder are common conditions in adults, with impact on physical, psychological and social well-being, and represent an important burden to the economy of health services. The assessment of the frequency of urinary incontinence and overactive bladder symptoms in specific settings and the extent to which they are diagnosed and treated is important to define priorities and sustain public health strategies oriented to the reduction of the human and economic burden of urinary dysfunctions. The wide regional variation in the frequency of these conditions reflects the methodological heterogeneity across studies, as well as cultural differences and heterogeneity in the distribution of their determinants. In addition to subject-specific methodological issues the potential effect of the sampling strategy on the representativeness of the samples obtained is an important issue in population-based surveys.

Objectives

This study aimed to:

- Quantify the prevalence of self-reported and clinically diagnosed urinary incontinence and overactive bladder symptoms;
- Characterize the treatments received by urinary incontinency patients;
- Assess the determinants of both urinary incontinence and overactive bladder symptoms (*manuscript 1*)
- Quantify the time spent with interviews and unsuccessful contacts, and to compare the yielding of the contact attempts across regions, days of the week and day periods;
- Compare the demographic and health characteristics of the participants with those of the Portuguese population (*manuscript 2*).

Methods e Results

The Portuguese mainland telephone number lists (Portugal Telecom "white pages") were used for a stratified sampling by region (NUT II) of subjects aged ≥40 years. Socio-demographic data, smoking habits, obstetric history (women) and past medical history were evaluated in a telephone survey, conducted in early 2008

<u>Manuscript 1</u>

The prevalence of different types of UI [stress (SUI), urge (UUI), mixed (MUI)] were computed according to the International Continence Society definitions (2002). OAB

symptoms were assessed through the Overactive Bladder Assessment Tool, 8 item version. Proportions and respective 95% confidence intervals (95%CI) were weighted according sex and age group distribution to reflect the prevalence in the Portuguese population.

The prevalence of at least one episode of urinary leakage in the previous month was 21.4% (95%CI: 19.0-23.9) in women (SUI: 42.2%), and the highest prevalence was observed among those aged 60-79 (27.1%; 95%CI: 21.8-32.5). In males, the overall prevalence was 7.6% (95%CI: 4.8-10.4), UUI: 60.2%, higher in those aged ≥80 (21.6%; 95%CI: 6.9-36.3). A clinical diagnosis of UI was reported by 4.5% (95%CI: 3.3-5.7) of individuals, from which 73% (95%CI: 61.9-84.5) had received pharmacological (76.5%), surgical (24.4%) or other (13.1%) treatment. The prevalence of OAB symptoms was 29.4% (95%CI: 26.6-32.2) in women and 35.1% (95%CI: 29.6-40.6) in men. In men it increased en with increasing age and among women it remained constant.

Manuscript 2

Time spent with interviews and unsuccessful contacts was quantified. Demographic and health characteristics of the participants were compared with those of the Portuguese population with data from Census 2001 and from the fourth National Health Survey.

The minimum response rate of the survey was 27.6 % and the cooperation rate 59.6 %. The proportion of refusals was higher on Saturdays (45.2 % vs. 30.7 %) and evenings (45.2% vs. 36.7%), as well as the selection of men (26.2 % vs. 21.0 %) and active workers (31.8 % vs. 21.8 %). Our sample included a higher proportion of women, elderly and more educated participants than the Portuguese population. Sex- and age- specific estimates of smoking and obesity obtained from our sample were similar to those in the Portuguese population.

Conclusions

The prevalence of UI was similar to the described in other European countries. The gap between the proportion of UI episodes and clinical diagnosis emphasizes the need for awareness among both health professionals and general population. Despite the difficulties in reaching participants, the sampling strategy may produce representative samples for assessment of important health indicators.

Sumário

Introdução

Sintomas de incontinência urinária e bexiga hiperactiva são comuns na população adulta tendo um forte impacto físico, psicológico e social. Por outro lado o seu impacto económico é um factor importante na gestão dos serviços de saúde. É fundamental o estudo da frequência da incontinência urinária bexiga hiperactiva na população, de que forma são diagnosticados e quais as opções terapêuticas utilizadas de forma a definir prioridades e sustentar medidas de saúde orientadas para a redução dos impactos humano e económico destes sintomas. A variação regional da frequência destes sintomas reflecte disparidades culturais mas também diferenças metodológicas. Além estratégias relacionadas com a população de interesse a avaliar, o impacto que diferentes processos de amostragem tem na representatividade das amostras seleccionadas é um importante desafio a considerar em estudos de base populacional.

Objectivos

Com este estudo pretende-se:

- Quantificar a prevalência de incontinência urinária auto-declarada e diagnosticada e de sintomas de bexiga hiperactiva;
- Caracterizar o tipo de tratamento entre os indivíduos com diagnóstico de incontinência
- Quantificar determinantes de incontinência urinária e bexiga hiperactiva (manuscrito1)
- Quantificar o tempo utilizado com entrevistas e contactos sem sucesso e comparar o rendimento das tentativas de contacto entre regiões, dias da semana e horário;
- Comparar caracterísitcas socio-demográficas e de saúde dos participantes com a população Portuguesa. (manuscrito 2).

Métodos e Resultados

Utilizaram-se as listas telefónicas brancas da Portugal Telecom para obter uma amostra estratificada por região (NUT II) de indivíduos com idade igual ou superior a 40 anos. Através de um questionário telefónico realizado em 2008, obteve-se informação socio-demográfica, de hábitos tabágicos, história obstétrica (mulheres) e diagnóstico médico de patologias como a diabetes ou cancro.

Manuscrito 1

A prevalência dos diferentes tipos de incontinência [stress (IUS), por imperiosidade (IUI) e mista (IUM)] foi definida segundo a International Continence Society (2002). Os sintomas de bexiga hiperactiva foram avaliados segundo a Overactive Bladder Assessment Tool – versão de 8 itens. Foram calculadas proporções ponderadas (região, sexo e idade) e respectivos intervalos de confiança a 95% (IC95%).

A prevalência de pelo menos um episódio de incontinência urinária no mês anterior à entrevista foi 21,4% (IC95%: 19,0-23,9) nas mulheres (IUS: 42,2%), e a mais elevada foi encontrada naquelas entre os 60-79 anos (27,1%; IC95%: 21,8-32,5). Nos homens a prevalência global foi 7,6% (IC95%: 4,8-10,4), UIU 60,2%, mais elevada naqueles com idade ≥80 (21,6%; IC95%: 6,9-36,3). Tiveram diagnóstico médico de incontinência urinária 4,5% (IC95%: 3,3-5,7) dos participantes, dos quais 73% (IC95%: 61,9-84,5) foram submetidos qualquer tipo de tratamento. Setenta e seis por cento tomavam/já tinham tomado medicamentos, 24,4% tinham sido submetidos a cirurgia e 13,1% a outro tratamento. A prevalência de sintomas de bexiga hiperactiva foi de 29,4% (IC95%: 26,6-32,2) nas mulheres e 35,1% (IC95%: 29,6-40,6) nos homens. Nestes, a proporção aumentou com a idade enquanto nas mulheres se manteve constante.

Manuscrito 2

O tempo utilizado nas entrevistas e contactos sem sucesso foi quantificado. As características socio-demográficas e de saúde dos participantes foram comparadas com a população Portuguesa através de dados dos Censos 2001 e do quarto Inquérito Nacional de Saúde.

A resposta mínima de participação foi 28% e a de cooperação 60%. A proporção de recusas foi superior aos sábados (45,2 % vs. 30,7 %) e noites (45,2% vs. 36,7%), assim como a proporção de homens (26,2 % vs. 21,0 %) e participantes activos profissionalmente (31,8 % vs. 21,8 %). A amostra sobre-representou mulheres, idosos e indivíduos mais escolarizados do que a população em geral. As estimativas específicas para o sexo e idade foram semelhantes no que diz respeito a hábitos tabágicos e obesidade.

Conclusões

A prevalência encontrada foi semelhante à descrita em outros países Europeus. A baixa proporção de casos diagnosticados enfatiza a necessidade de maior informação relativa a estes sintomas na população. Apesar das dificuldades na selecção dos participantes, este método de amostragem resulta em amostras representativas para a avaliação de importantes características relacionadas com a saúde.