

## Prevalence and Risk Factors Associated with Overactive Bladder

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### ABSTRACT

**Introduction:** The pathophysiology and management of overactive bladder (OAB) has been the subject of intensive research, but the prevalence of OAB in the community has not been well documented. This study aims to determine the prevalence of OAB among men and women attending the Universiti Kebangsaan Malaysia Medical Centre (UKMMC). This study also shows the impact of OAB on daily life activities and associated risk factors.

**Methods:** Four hundred respondents, aged between 18 to 70 years and visiting UKMMC, were interviewed and scored using the validated OAB screener. Information on sociodemographic data, the effects of OAB on daily living activities, and possible risk factors were included in the questionnaire.

**Results:** The prevalence of overactive bladder in the study population was 42%. The most common symptom complaint was nocturia (94%). Gender ( $p = 0.004$ ) and family history ( $p = 0.016$ ) were related to a higher prevalence of overactive bladder. Males were significantly affected with the odd ratio of 1.792 compared to females. Race, age, monthly income, occupation, family, and smoking history were not associated with OAB. The most commonly affected activity of daily living in OAB patients is sleep disturbance (43.5%).

**Conclusion:** The study has shown that the prevalence of OAB is relatively high in the Malaysian community, especially among males, and those with a positive family history. This has warranted closer attention to the issue. Preemptive measures should be taken by health care givers, the government, and the community to raise OAB awareness among society.

### INTRODUCTION

The International Continence Society (ICS) defines overactive

bladder (OAB) as "urgency, with or without urge urinary incontinence (UI), usually associated with frequency and nocturia" [1]. However, many studies have used different

**KEYWORDS:** Prevalence; Overactive bladder; Daily living activities; Risk factors

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definitions of OAB in their results, which have made comparisons across studies difficult, and the prevalence rates have differed widely [2-6].

Using the ICS definition, a study among Asian men in 11 countries found that the estimated prevalence of OAB among men was 29.9% [7], whereas another study done on women showed the prevalence of OAB was 54.1% [8]. Also, from these 2 studies, it was found that OAB was more common among professional workers (43%), high-income groups (26%, income of > RM 2660), and urban dwellers (64%). With increased age, there was an increased incidence of OAB; i.e., the prevalence was 53% in men aged > 70 years [7,8]. Other than that, there is a significant relationship between OAB and a positive family history [7,8].

A study was conducted on the role of nicotine in the micturition reflex in rats. It was found that nicotine had significant stimulation on the nicotinic acetylcholine receptors on bladder activity [9]. Another population-based study done in Finland showed that a history of smoking may increase the risk of lower urinary tract symptoms, with the odds ratios of 1.39 and 1.34 for current and former smokers, respectively, compared to men who never smoked [10]. However, additional research on the association of smoking and OAB needs to be done to establish this possible linkage more clearly.

OAB has a significant impact on the quality of life of men who are affected by disturbing urinary symptoms [11,12]. Wagner et al. (2002) also reported a significant association between OAB and urinary tract infection, fall injuries, and more frequent visits to their physicians [13]. In the NOBLE study, Stewart et al. (2003) found that OAB has a significant impact on quality of life, quality of sleep, and mental health, in both men and women [5]. Studies have found that most people with OAB used non-medical coping strategies and would like to speak with a health care provider about their disturbing symptoms [14,15].

The pathophysiology and management of OAB has been the subject of intensive research, but the prevalence of OAB in the community has not been well documented [16,17]. Published reports on the effects of OAB on quality of life are also limited [10], suggesting that OAB is generally under-diagnosed and under-treated [18]. Globally, except for a European report [19], there has been no comprehensive epidemiological survey on OAB. We, therefore, aim to conduct a population-based study in a multiethnic population in Malaysia and determine the prevalence of OAB in men and women. We also study how OAB affects the activity of daily living in this group and if there are any associated sociodemographic and health-related attributes.

OAB can be treated, which involves behavioral therapy, physiotherapy, and pharmacotherapy. Most clinicians would start treatment by physiotherapy through bladder training, which is a reasonable first-line therapy. However, pharmacotherapy allows the patient to improve more rapidly. Anticholinergic drugs are the main pharmacotherapy agents, such as oxybutynin and tolterodine. A study was conducted to determine the effectiveness of anticholinergic drugs in the treatment of OAB. Results have shown that anticholinergics produce significant improvements in OAB symptoms; however, the effectiveness of these drugs is still unclear [20].

The general objective of this research was to study the epidemiology of overactive bladder among men and women attending UKMMC. Our specific objective was to determine the prevalence of OAB in the population in UKMMC, the sociodemographic and health-related attributes in this population, the impact on activities of daily living in OAB patients, and, last but not least, to identify the risk factors associated with OAB.

## MATERIALS AND METHODS

The Research and Ethical Committee, Faculty of Medicine, University Kebangsaan, Malaysia (FF-291-2010), approved this research.

This is a cross-sectional, face-to-face, community-based survey. It was conducted in all the clinics, the main lobby, the visitor's lobby, and all the departments in UKMMC, except the urology clinic. Private rooms were sought in the designated locations to ensure respondent confidentiality. The fieldwork took 4 months. The respondents were men and women, aged between 18 to 70 years, coming to UKMMC. They were patients from all clinics, the relatives of the patients, and the staff of UKMMC (except the urology clinic). Two hundred men and 200 women were randomly selected for this study (convenience sampling). Patients, relatives, and staff in UKMMC who refused to participate; those unable to respond to the questionnaire accordingly; those who have other obvious pathological problems, such as urinary tract infection, stones, BPH, etc.; or patients who are being treated in the urology clinic were excluded from this study.

The diagnostic criteria of OAB was based on the International Continence Society (ICS) definition of OAB: "OAB is urgency, with or without urge urinary incontinence (UI), usually associated with frequency and nocturia after the exclusion of any obvious pathology such as infection or stones."

We used the questionnaires from the OAB screener—OAB-V8 study—and collected data on the symptoms of urgency, frequency, nocturia, and urge urinary incontinence, and how each of these symptoms bothered them. Having the score of 8 or greater indicated that the respondent had overactive bladder. For sociodemography, health status, and daily living activity disturbance, a questionnaire was designed to document the participants' sociodemographic data; e.g., age, gender, race, etc.).

The questionnaire was self-administered by the respondents who were assisted by medical students, when necessary. During the face-to-face interview, written consent was obtained from the respondents.

The prevalence of OAB symptoms (urgency, frequency, nocturia, and urge incontinence) was described in percentages. The association between these symptoms and the sociodemographic data and health status were analyzed using the chi-square test. All data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), version 19, and OpenEpi ([www.openepi.com/OE2](http://www.openepi.com/OE2)).

## RESULTS

### *Study Population Demographics*

A total of 400 respondents, comprised of men and women aged between 18 to 70 years who fulfill the inclusion criteria, were included in the survey. The mean age for men and women was  $40.3 \pm 8.3$  and  $38.6 \pm 7.4$  years, respectively. Table 1 shows the distribution of the study population according to gender. Although each age group was well represented (Table 2), the majority (35.8%) was in the middle-age group (46 to 60 years). Table 3 shows the distribution of the study population according to race. Most of the respondents were nonprofessionals (35.3%) and the unemployed (32.0%) (Table 4). Most of the respondents were from a low socioeconomic group with 36.0% (144/400) at a monthly income less than RM 500 (Table 5). Among the 193 respondents who were parous, the majority had had 1 to 4 childbirths (49.2%) (Table 6).

### *Prevalence of Overactive Bladder*

The prevalence of overactive bladder in the study population was 42% (168/400). The distribution of the OAB population, according to the questions asked in the OAB-V8 screener, is shown in Table 7. It was noted that question 5, about nighttime urination, was the most common complaint among OAB

Table 1. Frequency distribution of study population, according to gender.

<http://dx.doi.org/10.3834/uij.1944-5784.2012.02.06t1>

Gender	<i>n</i>	%
Male	207	51.8
Female	193	48.3
Total	400	100

Table 2. Frequency distribution of study population, according to age group.

<http://dx.doi.org/10.3834/uij.1944-5784.2012.02.06t2>

Age group (years)	<i>n</i>	%
18-30	110	27.5
31-45	101	25.3
46-60	143	35.8
61-70	46	11.5
Total	400	100

Table 3. Frequency distribution of study population, according to race.

<http://dx.doi.org/10.3834/uij.1944-5784.2012.02.06t3>

Race	<i>n</i>	%
Malay	319	79.8
Chinese	53	13.3
Indian	24	6
Other	4	1
Total	400	100

patients (94.0%).

### *Factors Related to the Occurrence of Overactive Bladder*

Table 4. Frequency distribution of study population, according to occupation.

<http://dx.doi.org/10.3834/uij.1944-5784.2012.02.06t4>

Type of occupation	<i>n</i>	%
Professional	78	19.5
Nonprofessional	141	35.3
Retiree	53	13.3
Unemployed	128	32
Total	400	100

Table 5. Frequency distribution of study population, according to monthly income.

<http://dx.doi.org/10.3834/uij.1944-5784.2012.02.06t5>

Monthly income (RM)	<i>n</i>	%
< 500	144	36
501-1500	90	22.5
1501-2500	82	20.5
2501-3500	45	11.3
> 3500	39	9.8
Total	400	100

Table 6. Frequency distribution of study population, according to parity.

<http://dx.doi.org/10.3834/uij.1944-5784.2012.02.06t6>

Number of births	<i>n</i>	%
Nulliparous	75	38.9
1-4	95	49.2
> 5	23	11.9
Total	193	100

Table 7. Frequency distribution of study population, according to questions.

<http://dx.doi.org/10.3834/uij.1944-5784.2012.02.06t7>

Questions	<i>n</i> = 168	%
Q1. Frequent urination during daytime?	140	83.3
Q2. An uncomfortable urge to urinate?	100	59.5
Q3. A sudden urge to urinate with little or no warning?	103	61.3
Q4. Accidental loss of small amounts of urine?	76	45.2
Q5. Night-time urination?	158	94
Q6. Waking up at night because you had to urinate?	150	89.3
Q7. An uncontrollable urge to urinate?	88	52.4
Q8. Urine loss associated with a strong desire to urinate?	87	51.8

Gender and family history were significantly related to a higher prevalence of OAB. Race, age, monthly income, occupation, smoking, a history of pelvic surgery, radiotherapy, and constipation were not associated with the occurrence of OAB (Table 8).

**Gender:** There was a significant relationship between gender and a prevalence of OAB ( $p = 0.004$ ). The majority of the population with OAB was male. The odds of having OAB among males were 1.8 times more than females.

**Ethnicity:** Ethnicity (Malays versus non-Malays) was not significantly related to the prevalence of OAB in the Malaysian community ( $p = 0.996$ ).

**Age:** The age of the respondents was divided into 4 groups (18 to 30 years old, 31 to 45 years old, 46 to 60 years old, and 61 to 70 years old). The result showed that age was considered an insignificant risk factor for OAB ( $p = 0.125$ ).

**Monthly Income:** The result showed that monthly income, which implies the socioeconomic status of the respondents, was insignificant as a risk factor of OAB ( $p = 0.078$ ).

**Occupation:** Occupations of the respondents, which were divided into professional, nonprofessional, retiree, and

Table 8. Demographic factors and their relation to the occurrence of OAB.

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Factor	OAB		p value	Odds ratio	95% Confidence interval
	Yes	No			
Ethnicity					
Malay	134 (42%)	185 (58%)	0.996	1.001	0.611-1.641
Non-Malay	33 (40.7%)	31 (59.3%)			
Gender					
Female	67 (34.7%)	126 (65.3%)	0.0004	1.792	1.198-2.680
Male	101 (48.8%)	106 (51.2%)			
Age					
18-30	45 (40.9%)	65 (59.1%)	0.125	1.250 (18-30 vs 31-45)	0.716-2.182
31-45	36 (35.6%)	65 (64.4%)		0.744 (31-45 vs 46-60)	0.440-1.259
46-60	61 (42.7%)	82 (57.3%)		0.572 (46-60 vs 61-70)	0.293-1.119
61-70	26 (56.5%)	20 (43.5%)			
Monthly income (RM)					
< 500	64 (44.4%)	80 (55.6%)	0.078	0.8 (< 500 vs 501-1500)	0.4718-1.356
501-1500	45 (50%)	45 (50%)		1.412 (501-1500 vs 1501-2500)	0.7724-2.58
1501-2500	34 (41.5%)	48 (58.5%)		1.417 (1501-2500 vs 2501-3500)	0.6627-3.028
2501-3500	15 (33.3%)	30 (66.7%)		1.45 (2501-3500 vs > 3500)	0.5613-3.746
> 3500	10 (25.6%)	29 (74.4%)			
Occupation					
Professional	28 (35.9%)	50 (64.1%)	0.113	0.8014 (professional vs nonprofessional)	0.4526-1.419
Nonprofessional	58 (41.1%)	83 (58.9%)		0.5357 (nonprofessoinal vs retiree)	0.2829-0.1014
Retiree	30 (56.6%)	23 (43.4%)		1.906 (retiree vs unemployed)	0.9976-3.643
Unemployed	52 (40.6%)	76 (59.4%)			
Family history					
Yes	38 (55.1%)	31 (44.9%)	0.016	1.895	1.123-3.198
No	130 (39.3%)	201 (60.7%)			
Smoking					
Yes	37 (50%)	37 (50%)	0.122	1.489	0.897-2.741
No	131 (40.2%)	195 (59.8%)			
Pelvic surgery					
Yes	27 (35.1%)	50 (64.9%)	0.170	0.697	0.416-1.169
No	141 (43.7%)	182 (56.3%)			
Radiotherapy					
Yes	4 (66.7%)	2 (33.3%)	0.217	2.805	0.508-15.495
No	164 (41.6%)	230 (258.4%)			
Constipation					
Yes	40 (48.8%)	42 (51.2%)	0.163	1.414	0.868-2.302
No	128 (40.3%)	190 (59.7%)			
Parity					
Nulliparous	32 (40.5%)	47 (59.5%)	0.229	1.362 (nulliparous vs 1-4)	0.7341-2.526
1-4	32 (33.3%)	64 (66.7%)		1.8 (1-4 vs > 4)	0.6126-5.289
> 4	5 (21.7%)	18 (78.3%)			

Table 9. Frequency distribution of population with OAB according to changes in activity of daily living (ADL).

<http://dx.doi.org/10.3834/uij.1944-5784.2012.02.06t9>

Activity of daily living	Affected (%)	Not affected (%)
Sleep interrupted	73 (43.5)	95 (56.5)
Intimate relationship with spouse	32 (19)	136 (81)
Workplace performance	38 (22.6)	130 (77.4)
Travelling hindrance	29 (17.3)	139 (82.7)
Personal hygiene	38 (22.6)	130 (77.4)
Social life	28 (16.7)	140 (83.3)
Self-esteem	22m(13.1)	145 (86.9)

unemployed, were insignificant risk factors for OAB ( $p = 0.113$ ).

**Family History:** A positive family history of bladder dysfunction was significant among OAB respondents ( $p$  value = 0.016). The odds of having OAB in those with a positive family history were 1.9 times higher compared to those without.

**Smoking:** A smoking background was an insignificant risk factor among OAB respondents ( $p$  value = 0.122). However, the odds of smokers having OAB were 1.5 times higher than nonsmokers.

**Pelvic Surgery:** Results showed that a history of pelvic surgery was insignificant in OAB respondents ( $p$  value = 0.170), and the odds of having OAB among those who had a previous surgery were 0.7 compared to those without any history of surgery.

**Radiotherapy:** The majority of OAB respondents did not have a significant history of radiotherapy ( $p$  value = 0.217). The odds ratio of OAB among those having radiotherapy exposure compared to those without radiotherapy was 2.8.

**Constipation:** Difficulty in passing motion was not a significant risk factor of OAB ( $p$  value = 0.163), with the odds ratio of 1.4.

**Parity:** The number of parity was divided into 3 groups (nulliparous, 1 to 4, and more than 4). Results showed

that the insignificance of parity was a factor related to the occurrence of OAB among female respondents ( $p$  value = 0.229).

## Activity of Daily Living (ADL) in OAB Patients

The most common complaint affecting the activity of daily living of OAB patients (Table 9) was sleep disturbance (43.5%).

## DISCUSSION

Currently, there are multiple screening tools used for the diagnosis of OAB internationally. In our current research, the questionnaire adopted was based on OAB-V8, which has been validated for use in a primary care setting to diagnose OAB. It was designed and refined by Coyne KS et al. to determine how troubled the respondents are by bladder symptoms [21]. A patient can self-score his or her level of inconvenience and determine whether or not to approach his or her physician regarding possible treatment options. Having the score of 8 or greater indicates that the respondent is having OAB.

The prevalence of OAB in the study population was 42% (168/400). We found that the prevalence of OAB in Malaysia was 4 times higher than that reported by Irwin et al. in their population-based survey of 5 countries [22]. Their study found that the overall prevalence of OAB was only 11.8%. This could be attributed to the different methodology adopted for data collection and our multiracial composition in Malaysia. Irwin et al. used a population-based, cross-sectional telephone survey in 5 countries, which differed from our validated questionnaire of a face-to-face interview with respondents in UKM. Also, the small sample size of 400 we chose also may have contributed to the difference. Through the current survey, the recognition of OAB among the population was minimal. This was probably due to poor dissemination of information by the mass media and social stigma. Poor education and inaccessibility to medical care are also contributing to underreporting of OAB.

The symptoms are the most important element for the diagnosis of OAB. Hence, all our OAB respondents were diagnosed based on symptoms that constitute urgency, frequency (daytime and nighttime), and urge urinary incontinence. Cheung WW et al., in their study on the prevalence of OAB among male urologic veterans, found that 95% reported urinary frequency and 85% nocturia [23]. However, another study by Lapitan MC et al., on the epidemiology of OAB among females in Asia, found that the most common symptom was urgency, which was present in 65.4%, followed by frequency (55.4%) [8]. Our findings concurred with Cheung WW et al., where the highest symptom



complaint among OAB patients was nocturia [23].

A study by Stewart WF et al., conducted in a US population, showed that the overall prevalence of OAB was similar between men (16.0%) and women (16.9%) [5]. A study conducted in Venezuela showed females were more affected than males (25.6% in women versus 13.7% in men,  $p < 0.005$ ) [24]. A study conducted in the US (New York) shows that OAB was present in 60.5% of men and 48.3% of women ( $p = 0.058$ ) [23]. Our finding was somehow consistent with the latter where there was a significant relationship between gender and the prevalence of OAB, with the majority of the OAB population being male. The odds of having OAB among males were 1.8 times more than females.

The previous study has shown that increased age is a strong risk factor associated with OAB, and it has been proposed that this is due to decreasing bladder capacity, estrogen deficiency, degenerative neuronal control, and connective tissue changes as age progresses [8,25]. This finding is supported by the National Overactive Bladder Evaluation (NOBLE) study, which showed that the prevalence of OAB symptomatology increases with age in both men and women [8]. However, we found that the age of the respondents was considered an insignificant risk factor for OAB. Surprisingly, there was evidence of a decreasing trend in OAB patients as age increases, suggesting that somehow, with increasing age, one may have protective factors toward OAB. Unfortunately, up to date, there is no specific research being done on this pattern, and the reason is unknown. One of the limitations from our research was that the number of respondents from each age group was not evenly distributed and bias of the result may exist.

So far, there was no research done to investigate the influence of ethnicity towards OAB. In Malaysia, there was no specific research done to compare the 3 main races, namely the Malay, Chinese, and Indian population. It was found that the difference between the prevalence of OAB among the ethnic groups (Malay versus non-Malay) was insignificant ( $p = 0.996$ ,  $OR = 1.001$ ). The relationship between overactive bladder with occupation and monthly income were also insignificant. The result was similar with the outcome of the study conducted on Asian women [8]. However, the odds ratio for monthly income showed an increasing trend. This pattern was consistent with a study done on Asian men, which reported a higher incidence of OAB in the high-income group [7]. This might be related to their awareness towards OAB symptoms, as well as the need to seek treatment among this group.

Previous studies have related many risk factors to OAB, such

as relevant smoking history and childbirth history, among others [7,8]. A genetic locus (D13S171) was found in patients with detrusor overactivity (DO) or OAB phenotypes in a study revealing its genetic linkage in Australia and the United Kingdom [26]. A positive family history of OAB symptoms was evident and proved significant in this study ( $p = 0.016$ ,  $OR = 1.895$ ), therefore suggesting a possible genetic predisposition. However, more studies should be done to validate this theory.

In a study on the roles of central and peripheral nicotinic receptors in the micturition reflex in rats, nicotinic acetylcholine receptor activation of the C-fiber afferent nerves in the bladder induces detrusor overactivity. Other than that, the receptors in the spinal cord and brain have an excitatory and inhibitory effect on the bladder, as well, indicating that there is influence on the bladder lining from nicotine exposure [9]. Yet, smoking history was insignificant in our study ( $p = 0.122$ ,  $OR = 1.489$ ). It may be due to the sample distribution of the male-to-female ratio being about 0.5. The smoking prevalence rate was higher among Malaysian males compared to women (49.2% compared to 3.5%, respectively) in a study where 4 countries (Singapore, the Philippines, Vietnam, and Malaysia) were explored pertaining to gender and tobacco issues. Therefore, our results may be biased in that only the male respondents have a significant influence on smoking history [27].

Studies have shown that prior pelvic and reconstructive surgeries may denervate the bladder [28,29]. Patients who underwent a hysterectomy may experience OAB symptoms postoperatively due to the disruption of autonomic nerve fibers running along the pelvic plexus. However, this pathophysiology is not well understood, and most studies only involved women post hysterectomy or post pelvic organ prolapse (POP) surgery. Therefore, this opens a new opportunity to study pelvic surgeries as a predictive factor of OAB in both genders. Nevertheless, prior pelvic surgery was found insignificant in our study ( $p = 0.170$ ,  $OR = 0.697$ ).

There was no evidence of radiotherapy being a significant risk factor in causing OAB symptoms ( $p = 0.217$ ,  $OR = 2.805$ ). Though researchers have investigated the possibility of pelvic radiotherapy effects on the bladder causing urinary incontinence [35], there is not yet a definitive pathophysiology to this condition. Therefore, more objective research should be done, specifically to evaluate this risk factor.

There was no clear evidence to relate constipation as a risk factor to OAB ( $p = 0.163$ ,  $OR = 1.414$ ). However, other studies have revealed its significant occurrence with OAB, which further exacerbate the symptoms [30-32]. This is due to a shared

pathophysiology, a side effect of the antimuscarinic drugs in treating OAB, or due to dietary reasons in order to control the OAB symptoms. Along with poor fluid intake, constipation has been a common complaint among OAB patients.

Research has been conducted, revealing multiparity (parity of > 4) as a risk factor in causing OAB symptoms, and that multiparous women were 1.5 times more at risk than the nulliparous, or those with only 1 pregnancy [8]. Even so, in this current study, there was no evidence of parity being significant in OAB ( $p = 0.229$ ), though it was found that there is a trend increase with a parity increase (OR nulliparous versus a parity of 1 to 4 = 1.362, and OR parity of 1 to 4 versus multiparous women = 1.8). It is said that childbearing and childbirth may damage the peripheral nerves in the pelvis, resulting in a hyperactive bladder [33,34]. However, subjects were randomly approached in this study, with 198 female respondents. Of those, 69 were positive for OAB. Among those who were positive, only 5 were multiparous (7.25%). Thus, the majority of female subjects were either considered nulliparous, 32/69 (46.38%), or with parity < 5, also 32/69 (46.38%). This has a significant impact on the aforementioned factor and, therefore, may not be applicable in its validity.

The impact of OAB in daily life has been emphasized in several studies. Wagner et al. reported a significant association between OAB and urinary tract infection, fall injuries, and frequent visits to physicians [13]. In the NOBEL study, Stewart WF et al. found that OAB has a significant impact on the quality of life, quality of sleep, and mental health in both men and women [5]. In this study, the impact on sleep, intimate relationships with spouses, workplace performance, travel, personal hygiene, social life, and self-esteem in OAB patients was brought to attention. Most patients complained that sleep disturbance had the most troublesome impact (43.5%). This was consistent with the aforementioned nocturia symptoms as the most bothersome among OAB patients. The impact on ADL was followed by a change in workplace performance and personal hygiene, which equaled 22.6% for both. In regards to the impact of the remaining factors: intimate relationships with spouse were 19%, travelling hindrance was 17.3%, social life was 16.7%, and, lastly, self-esteem was 13.1%.

Other factors that have not been analyzed in this study are the volumetric fluid intake, as well as dietary issues. An increased fluid intake will result in increased urine production. This will cause frequency, as well as nocturia. Besides that, certain drinks, such as alcohol and caffeine, have diuretic effects that will result in OAB symptoms, such as frequency and nocturia. Indeed, it has been shown that the reduction of fluid input by

25% produces a significant improvement in urgency, frequency, and nocturia [36].

## CONCLUSION

The study has shown that the prevalence of OAB is relatively high in the Malaysian community, especially among males and those with a positive family history. This has warranted closer attention to the issue. Preemptive measures should be taken by the health care givers, the government, and the community to raise awareness of OAB among society. Among the effective measures proposed are the incorporation of OAB knowledge in curricular education, better coverage by the mass media, improvement in health care policy, and better education of the public by health care workers. Meanwhile, more studies should be done to further prove risk factors associated with the occurrence of OAB in Malaysia.

## REFERENCES

1. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The standardization of terminology of lower urinary tract function: report from the Standardization Sub-committee of the International Continence Society. *Neurourol Urodyn*. 2002;21(2):167-178. [PubMed](#) ; [CrossRef](#)
2. Corcos J, Schick E. Prevalence of overactive bladder and incontinence in Canada. *Canadian J Urol*. 2004;11(3):2278-2284. [PubMed](#)
3. Homma Y, Yamaguchi O, Hayashi K, Neurogenic Bladder Society Committee. An epidemiological survey of overactive bladder symptoms in Japan. *Br J Urol*. 2005;96(9):1314-1318. [PubMed](#) ; [CrossRef](#)
4. Milsom I, Abrams P, Cardozo L, Roberts RG, Thüroff J, Wein AJ. How widespread are the symptoms of an overactive bladder and how are they managed? A population-based prevalence study. *Br J Urol*. 2001;87(9):760-766. [PubMed](#)
5. Stewart WF, Van Rooyen JB, Cundiff GW, Abrams P, Herzog AR, Corey R, et al. Prevalence and burden of overactive bladder in the United States. *World J Urol*. 2003;20(6):327-336. [PubMed](#)
6. Temml C, Heidler S, Ponholzer A, Madersbacher S. Prevalence of the overactive bladder syndrome by applying the International Continence Society definition. *Eur Urol*. 2005;48(4):622-627. [PubMed](#) ; [CrossRef](#)



7. Moorthy P, Lapitan MC, Quek PL, Lim PH. Prevalence of Overactive Bladder in Asian Men: An Epidemiological Survey. *BJU Int.* 2004;93(4):528-531. [PubMed](#) ; [CrossRef](#)
8. Lapitan MC, Chye PL, Asia-Pacific Continence Advisory Board. The Epidemiology of Overactive Bladder among Females in Asia: A Questionnaire Survey. *Int Urogynecol J Pelvic Floor Dysfunct.* 2001;12(4):226-231. [PubMed](#) ; [CrossRef](#)
9. Masuda H, Hayashi Y, Chancellor MB, Kihara K, de Groat WC, de Miguel F, et al. Roles of peripheral and central nicotine receptors in micturition reflex in rats. *J Urol.* 2006;176(1):374-379. [PubMed](#) ; [CrossRef](#)
10. Milsom I, Stewart W, Thüroff JW. The prevalence of overactive bladder. *Am J Manag Care.* 2000;6(suppl 11):S565-573. [PubMed](#)
11. Liberman JN, Hunt TL, Stewart WF, Wein A, Zhou Z, Herzog AR, et al. Health related quality of life among adults with symptoms of overactive bladder: results from a US community-based survey. *Urology.* 2001;57(6):1044-1050. [PubMed](#) ; [CrossRef](#)
12. Coyne KS, Payne C, Bhattacharyya SK, Revicki DA, Thompson C, Corey R, et al. The impact of urinary urgency and frequency on health related quality of life in overactive bladder: results from a national community survey. *Value Health.* 2004;7(4):455-463. [PubMed](#) ; [CrossRef](#)
13. Wagner TH, Hu TW, Bentkover J, LeBlanc K, Stewart W, Corey R, et al. Health related consequences of overactive bladder. *Am J Manag Care.* 2002;8(suppl 19):S598-607. [PubMed](#)
14. Ricci JA, Baggish JS, Hunt TL, Stewart WF, Wein A, Herzog AR, et al. Coping strategies and health care seeking behavior in US National sample of adults with symptoms suggestive of overactive bladder. *Clin Ther.* 2001;23(8):1245-1259. [PubMed](#) ; [CrossRef](#)
15. Irwin DE, Milsom I, Kopp Z, Abrams P, EPIC Study Group. Symptom bother and health care seeking behavior among individuals with overactive bladder. *Eur Urol.* 2008;53(5):1029-1037. [PubMed](#) ; [CrossRef](#)
16. Payne CK. Epidemiology, pathophysiology, and evaluation of urinary incontinence and overactive bladder. *Urology.* 1998;51(suppl 2A):3-10. [PubMed](#) ; [CrossRef](#)
17. Chu FM, Dmochowski R. Pathophysiology of Overactive Bladder. *Am J Med.* 2006;119(3, suppl 1):3-8. [PubMed](#) ; [CrossRef](#)
18. Wein AJ. Overactive bladder: Defining the disease. *Am J Manag Care.* 2000;6(suppl 11):S559-564. [PubMed](#)
19. Hempel C, Wienhold D, Benken N, Eggersmann C, Thüroff JW. Definition of overactive bladder and epidemiology of urinary incontinence. *Urology.* 1997;50(suppl 6A):4-14. [PubMed](#) ; [CrossRef](#)
20. Herbison P, Hay-Smith J, Ellis G, Moore K. Effectiveness of anticholinergic drugs compared with placebo in the treatment of OAB: systematic review. *BMJ.* 2003;326(7394):841-844. [PubMed](#) ; [CrossRef](#)
21. Coyne KS, Zyczynski T, Margolis MK, Elinoff V, Roberts RG. Validation of an overactive bladder awareness tool for use in a primary care setting. *Adv Ther.* 2005;22(4):381-394. [PubMed](#) ; [CrossRef](#)
22. Irwin D, Milsom I, Hunskaar S, Reilly K, Kopp Z, Herschorn S, et al. Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. *Eur Urol.* 2006;50(6):1306-1314. [PubMed](#) ; [CrossRef](#)
23. Cheung WW, Khan NH, Choi KK, Bluth MH, Vincent MT. Prevalence, evaluation and management of overactive bladder in primary care. *BMC Fam Pract.* 2009;10:8. [PubMed](#) ; [CrossRef](#)
24. Dávila HA, López V, Nieves L, Colantuono A, Guaiquirián L, Sánchez P, et al. [Demographic distribution and prevalence of overactive bladder in Venezuela]. *Actas Urol Esp.* 2010;34(2):176-180. [PubMed](#)
25. Moorthy P, Lapitan MC, Quek PL, Lim PH. Prevalence of overactive bladder in Asian men: an epidemiological survey. *BJU Int.* 2004;93(4):528-531. [PubMed](#) ; [CrossRef](#)
26. Morris AR, Mullan G, Roscioli T, Buckley MF, Moore KH. A Genetic Linkage Study of Detrusor Overactivity. *Neurourol Urodyn.* 2003;22(5):460-461.
27. Morrow M, Barraclough S. Tobacco Control and Gender in South-east Asia. Part II: Singapore and Vietnam. *Health Promot Int.* 2003;18(4):373-380. [PubMed](#) ; [CrossRef](#)

28. Zullo MA, Mancini N, Angioli R, Muzil L, Panici PB. Vesical Dysfunctions After Radical Hysterectomy for Cervical Cancer: A Critical Review. *Crit Rev Oncol Hematol*. 2003;48(3):287-293. [PubMed](#) ; [CrossRef](#)
29. de Boer TA, Kluivers KB, Withagen MI, Milani AL, Vierhout ME. Predictive Factors for Overactive Bladder Symptoms After Pelvic Organ Prolapse Surgery. *Int Urogynecol J*. 2010;21(9):1143-1149. [PubMed](#) ; [CrossRef](#)
30. Coyne KS, Cash B, Kopp Z, Gelhorn H, Milsom I, Berriman S, et al. The Prevalence of Chronic Constipation and Faecal Incontinence Among Men and Women With Symptoms of Overactive Bladder. *BJU Int*. 2011;107(2):254-261. [PubMed](#) ; [CrossRef](#)
31. Abrams P, Freeman R, Anderström C, Mattiasson A. Tolterodine, A New Antimuscarinic Agent: As Effective but Better Tolerated Than Oxybutynin in Patients with an Overactive Bladder. *Br J Urol*. 1998;81(6):801-810. [PubMed](#) ; [CrossRef](#)
32. Wyman JF, Burgio KL, Newman DK. Practical Aspects of Lifestyle Modifications and Behavioural Interventions in the Treatment of Overactive Bladder and Urgency Incontinence. *Int J Clin Pract*. 2009;63(8):1177-1191. [PubMed](#) ; [CrossRef](#)
33. Allen RE, Hosker GL, Smith ARB, Warrell DW. Pelvic Floor Damage and Childbirth: A Neurophysiological Study. *Br J Obstet Gynaecol*. 1990;97(9):770-779. [CrossRef](#)
34. Snooks SJ, Swash M, Setchell M, Henry MM. Injury to Innervation of Pelvic Floor Sphincter Musculature in Childbirth. *Lancet*. 1984;324(8402):546-550. [CrossRef](#)
35. Rackley R, DeBlieux PMC, Firoozi F, et al. Urinary incontinence. <http://emedicine.medscape.com/article/452289-overview#aw2aab6b2b4>. Updated June, 2011. Accessed June 24, 2011.
36. Hashim H, Abrams P. How should patients with an overactive bladder manipulate their fluid intake? *BJU Int*. 2008;102(1):62-66. [PubMed](#) ; [CrossRef](#)