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Original Research Article

Correlation of incontinence impact questionnaire score in overactive bladder syndrome cases with urodynamic findings

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ABSTRACT

Background: Overactive bladder syndrome (OAB) is a common condition. The aim of the present study was to correlate the incontinence impact questionnaire (IIQ) score with urodynamic studies in patients of overactive bladder syndrome.

Methods: It was a prospective study performed in a tertiary referral centre on 60 women with symptomatology of OAB. IIQ score was calculated and urodynamic studies were performed in all patients in which detrusor overactivity, maximum flow rate of urine per second (Q_{max}) and voiding time in seconds was calculated in all women.

Results: The mean age was 42.3 ± 9.91 years, mean body mass index was 24.7 ± 2.71 kg/m², mean parity was 2.4 and mean serum creatinine level was 0.84 ± 0.21 mg/dl. Symptoms seen were urgency (100%), frequency (100%), urge incontinence (95.0%) and nocturia (76.6%). IIQ score ranged from 7-20 with mean being 12.27 ± 3.38 . OAB was mild in 36.6%, moderate in 41.66% and severe in 21.66% patients. On urodynamic studies, detrusor overactivity was present in 75% cases being 59% in mild, 80% in moderate and 76.92% in severe OAB. Mean Q_{max} increased with severity of OAB and was 29.55ml/second in mild OAB, 30.36ml/second in moderate OAB and 31.59 ml/second in severe OAB. Mean voiding time decreased with severity of OAB and was 33.44 seconds in mild OAB, 32.14 seconds in moderate OAB and 31.47 seconds in severe OAB.

Conclusions: IIQ score and urodynamic studies are useful in diagnosis and quantification of OAB syndrome.

Keywords: Incontinence impact questionnaire score, Overactive bladder syndrome, Q_{max} , Urge incontinence, Urodynamic studies, Voiding time

INTRODUCTION

Overactive bladder syndrome (OAB) is a symptom complex characterised by urinary urgency, with or without urge incontinence, usually associated with increased day-time frequency and nocturia in absence of any infection or obvious pathology.^{1,2} Overall prevalence of OAB is about 12.8-14.3% in women.^{1,2} It has been shown to have a negative influence on daily activities and health related quality of life especially mental health, work productivity, social relationships and sleep.^{1,2} OAB is usually associated with involuntary contractions of detrusor muscle which may cause urge incontinence depending upon the response of the sphincter. In fact

detrusor overactivity has been reported in about 64% of all patients of OAB on cystometry.³

Major risk factors for OAB include vaginal delivery, old age, menopause, obesity and chronic constipation.^{4,5} Exact pathophysiology of OAB is not known. However myogenic factors, neurogenic factors and urotheliogenic factors may play a role in its etiopathogenesis.^{3,4} Diagnosis is usually made by a careful history taking for urinary symptoms of OAB (urgency, frequency, urge incontinence and nocturia).^{3,4} Voiding diary is a very useful tool to diagnose OAB. A simple three day voiding diary containing the time and volume of each void is very useful in diagnosis. Urodynamic studies are very useful

in diagnosis and quantification of OAB, to find whether detrusor overactivity is present or not, to calculate total urine voided at each micturition (V_{max}) and total voiding time.⁶⁻⁸ Urodynamic studies are also used for prognostication of various treatment outcomes including Mirabegron therapy.⁸ Yoo et al from South Korea studied prevalence of various lower urinary tract symptoms including OAB in population aged 40 years or over.⁹

We present our study on 60 women with overactive bladder syndrome diagnosed on symptoms and correlation of severity of OABs as per their incontinence impact questionnaire (IIQ) score and urodynamic study findings.

METHODS

It was a prospective study conducted in department of Obstetrics and Gynecology and Urology of a tertiary referral centre over 60 women with symptoms of overactive bladder syndrome between January 2017 and November 2018.

Inclusion criteria

Inclusion criteria were women above 18 years of age with clinical history and symptoms of OAB (urgency, frequency, nocturia with or without urge incontinence) with no significant medical problems and patients who were willing to participate in the study.

The study was granted ethical clearance by the Institute Ethical Committee. Informed consent was taken from all the participants.

A detailed clinical history was taken about symptoms of OAB including urgency, urinary frequency, nocturia and urge incontinence, past and present history of any medication including anticholinergics and medical disorder. Detailed general physical, systemic and pelvic examination was performed in all the cases. Baseline investigations (haemogram, blood sugar, renal and hepatic function tests, urine analysis) were performed in all the cases. Incontinence impact questionnaire (IIQ) score was taken as follows.

Table 1: Incontinence impact questionnaire.

Question	Score			
	Not at all	Slightly	Moderately	Greatly
Do you experience, and if so, how much are you bothered by:				
Frequent urination?	0	1	2	3
Urine leakage related to the feeling of urgency?	0	1	2	3
Urine leakage related to physical activity, coughing or sneezing?	0	1	2	3
Small amounts of urine leakage (drops)?	0	1	2	3
Difficult emptying your bladder?	0	1	2	3
Pain or discomfort in lower abdomen/ genital area?	0	1	2	3
Has urine leakage or prolapse affected your:	Not at all	Slightly	Moderately	Greatly
Ability to do household chores?	0	1	2	3
Physical recreation such as walking, swimming, or other exercise?	0	1	2	3
Entertainment activities (movies, concerts, etc.)?	0	1	2	3
Ability to travel by car or bus more than 30 minutes from home?	0	1	2	3
Participation in social activities outside your home?	0	1	2	3
Emotional health (nervousness, depression, etc.)?	0	1	2	3
Feeling frustrated?	0	1	2	3

Sum of score= OAB was classified into mild OAB (IIQ 7-10), moderate OAB (IIQ 11-15) and severe OAB (IIQ 16-20).

After taking informed consent, urodynamic evaluation was done in department of Urology seeing detrusor overactivity, V_{max} (total urine voided at each micturition) and voiding time in seconds were calculated in all the cases.

The findings of urodynamic studies (detrusor overactivity, Q_{max} and voiding time) were correlated with different severity of OAB as per IIQ score to see the effect of severity of OAB on urodynamic parameters.

Statistical analysis

Descriptive statistics such as mean, median, standard deviation and range values were calculated for study characteristics like age, body mass index and duration of symptoms. Continuous variables were tested for normality assumptions using Kolmogorov Smirnov tests, Chi square test or Fisher's exact test was used for frequencies of categorical variations. A two tailed probability level with $p < 0.05$ was considered for statistical significance. All data analysis were carried out using IBM SPSS statistics for windows version 19.0 New York IBM Corp.

RESULTS

The baseline characteristics of 60 women found to have overactive bladder syndrome are depicted in Table 2. The age ranged from 29-68 years with mean being 42.3±9.91 years. Parity ranged from 0 to 5 with mean being 2.4. Body mass index ranged from 20.02 to 32.7 kg/m² with mean being 24.7±2.71 kg/m². Serum creatinine levels ranged from 0.4-1.1 mg/dl with mean being 0.84±0.21 mg/dl.

Table 2: Baseline characteristics and symptomatology of overactive bladder syndrome patients (N=60).

Age (years)				
Range	29-68			
Mean	42.3±9.91			
Parity				
Range	0-5			
Mean	2.4			
Body mass index (kg/m ²)				
Range	20.02 – 32.7			
Mean	24.7 ± 2.71			
Serum creatinine levels (mg/dl)				
Range	0.4-1.1			
Mean	0.84±0.21			
Symptom	No.	Percentage	Duration (months)	
			Range	Mean±SD
Frequency	60	100	2-20	7.45±2.87
Urgency	60	100	2-20	7.38±2.85
Nocturia	46	76.6	0.5-10	3.87±2.58
Urge incontinence	67	95.0	1-18	4.71±2.98

Symptomatology of patients in the study is also shown in Table 2. Thus out of total 60 patients, all 60 (100%) women had urgency of micturition and frequency of micturition which are the two major symptoms of overactive bladder syndrome. Urge incontinence was seen in 57 (95%) patients while nocturia (night time urinary frequency) was seen in 46 (76.6%) of patients.

Table 5: Correlation of severity of OABS as per incontinence impact questionnaire score with detrusor overactivity on urodynamic studies (N=60).

Severity of OAB	IIQ score	No. of patients	Presence of detrusor overactivity on urodynamic studies		P value	Significance	
			Number	Percentage			
Mild OAB	7-10	22	13	59	1 versus 2	0.01	Significant
Moderate OAB	11-15	25	20	80	1 versus 3	0.02	Significant
Severe OAB	16-20	13	10	76.92	2 versus 3	0.58	Not Significant

Table 5 depicts the presence of detrusor overactivity in different types of OAB as per incontinence impact questionnaire (IIQ) score. Detrusor overactivity was

Table 3: Incontinence impact questionnaire score and severity of OABS (N=60).

Range of IIQ score 7 - 20			
Mean score±SD	12.27±3.38		
Severity of OAB as per IIQ score			
Severity of OAB	IIQ score	No.	Percentage
Mild OAB	7-10	22	36.6
Moderate OAB	11-15	25	41.66
Severe OAB	16-20	13	21.66

The findings of incontinence impact questionnaire (IIQ) and severity of OAB as per IIQ score are shown in Table 3. IIQ score ranged from 7-20 with mean being 12.27±3.38. OAB was further classified as per IIQ score as mild OAB with score in 7-10 range in which 22 (33.6%) women were there. A total of 25 (41.66%) women had moderate OAB with IIQ score of 11-15 while 13 (21.66%) women had severe OAB with IIQ score of 16-20.

Table 4: Findings on urodynamic studies overactive bladder syndrome patients (N=60).

Urodynamic parameters		
Detrusor overactivity	No.	Percentage
Present	45	75
Absent	15	25
Q _{max} (maximum flow rate in ml/ second)		
Range	19.3-43.2	
Mean±SD	32.08±6.24	
Voiding time (in seconds)		
Range	24.8-51.0	
Mean±SD	32.41±5.87	

Findings in urodynamic studies in patients of OAB are shown in Table 4. Detrusor overactivity was present in 45 (75%) women while it was absent in 15 (25%) women. Q_{max} (maximum flow rate of urine in ml/second) ranged from 19.3-43.2 ml/second with mean being 32.08±6.24 ml/ second. Total voiding time in seconds ranged from 24.8-51.0 seconds with mean being 32.41±5.87 seconds.

observed in 13 (59%) patients of mild OAB but increased to 20 (80%) in moderate OAB and was seen in 10 (76.92%) patients of severe OAB. There was

significantly higher incidence of detrusor overactivity in moderate and severe OAB as compared to mild OAB (p value 0.01 in 1 versus 2 and 0.02 in 1 versus 3). However

the difference in incidence between moderate and severe (80% versus 76.92%) was not significant (p=0.58).

Table 6: Correlation of severity of OAB as per incontinence impact questionnaire score with Q_{max} (maximum voided volume of urine/second) on urodynamic studies (N=60).

Severity of OAB	IIQ score	No. of patients	Q_{max} (ml/sec)	P value	Significance
Mild OAB	7-10	22	29.55	1 versus 2 0.08	Not Significant
Moderate OAB	11-15	25	30.36	2 versus 3 0.06	Not Significant
Severe OAB	16-20	13	31.59	1 versus 3 0.04	Significant

Table 7: Correlation of severity of OAB as per incontinence impact questionnaire score with voiding time (in seconds) on urodynamic studies (N=60).

Severity of OAB	IIQ score	No. of patients	Mean voiding time (in seconds)	P value	Significance
Mild OAB	7-10	22	33.44	1 versus 2 0.041	Significant
Moderate OAB	11-15	25	32.14	2 versus 3 0.038	Significant
Severe OAB	16-20	13	31.47	1 versus 3 0.027	Significant

Correlation between severity of OAB as per IIQ score with mean maximum voided volume of urine in ml/second (Q_{max}) is shown in Table 6. Thus mean Q_{max} was 29.55 ml/second in mild OAB, which increased to 30.36 ml/second in moderate OAB (p=0.08 not significant) and to 31.59 ml/second in severe OAB (p=0.06 not significant). However the difference between mild and severe OAB was significant (p=0.04).

Table 7 shows correlation of severity of OAB as per IIQ score with mean voiding time on urodynamic studies. Mean voiding time was 33.44 seconds in mild OAB. It decreased to 32.14 seconds in moderate OAB. The difference was statistically significant (p=0.041). Mean voiding time further decreased to 31.47 seconds in severe OAB (p=0.038) and the difference was significant. There was a significant fall in mean voiding time as the severity of OAB increased (mild versus severe 0.027).

Hence as per increase in severity of OAB on IIQ, time to void urine decreased significantly.

DISCUSSION

Overactive bladder syndrome is a common urogynaecological condition associated with significant economic and health related quality of life burden. Various studies have confirmed that women with OAB have significantly lower quality of life with increased anxiety, depression and less likely to be employed.¹⁻⁴

Incontinence impact questionnaire (IIQ) is a clinical tool used to diagnose and quantify overactive bladder syndrome (OAB) and takes into consideration experience and botheration by frequent urination, urgency, urinary leakage, physical activity, smell of urine, difficulty in emptying the bladder and any pain or discomfort in lower abdomen.² It also takes into consideration the effect of

urinary leakage on ability to do household chores, physical activities, entertainment activities, travelling, participation in social activities, emotional issues (nervousness, depression) and feeling of frustration. Each point is quantified whether it is absent, slight, moderate or severe.² In the present study IIQ was calculated for all 60 OAB patients and patients were divided into mild OAB (score 7-10), moderate OAB (score 11-15) and severe OAB (score 16-20) with highest incidence of moderate OAB (41.66%). IIQ has a good correlation with severity of OAB as has been observed by various authors.⁹⁻¹³

In the present study, severity of OABs as per IIQ was correlated with urodynamic findings of detrusor overactivity, Q_{max} (maximum flow rate of urine per second) and voiding time (in seconds). Urodynamic studies are very useful in diagnosis of OAB especially detrusor overactivity (DO) with prevalence of DO being 60-70% in OAB cases. In the present study prevalence of detrusor overactivity was overall 75% in OAB patients being 59% in mild OAB and 80% in moderate and 76.92% in severe OAB. Overall mean Q_{max} (maximum flow of urine per second) was 32.08±6.24 ml/second in OAB patients being 29.55 ml/second in mild OAB, rising to 30.36 ml/second in moderate OAB and 31.59 ml/second in severe OAB. Similarly mean voiding time (in seconds) was 32.41±5.87 seconds being 33.44 seconds in mild OAB, 32.14 seconds in moderate OAB 31.47 seconds in severe OAB (significant decrease). Various studies by different authors have confirmed the utility of Q_{max} and voiding time in OAB.⁶⁻⁸

Overactive bladder syndrome score (OABS) has also been used to diagnose and quantify OAB and is a simple tool taking frequency of urine in day and night, urgency (sudden desire to pass urine and is difficult to defer) and urge incontinence into consideration. Various authors have used OABS for quantification of OAB and to see

efficacy of drugs like solifenacin on OAB.¹⁴⁻¹⁶ Treatment of OAB includes bladder training, decrease fluid intake and pelvic floor muscle training.^{17,18} However, anticholinergic drugs like oxybutinin, tolterodine, solifenacin and darifenacin are mainstay in treatment of OAB and have proven efficacy in management of OAB but have significant side effects in the form of dry mouth, dry eyes and worsening of closed angle glaucoma.^{12,19,20} Their cumulative use can sometimes cause dementia, adverse functional and cognitive outcomes in older patients.²¹⁻²³ Recently Mirabegron, a β_3 adrenergic drug has become available with high efficacy and better tolerance with least side effects but should be used with caution in cardiac patients and hypertensive patients.^{24,25}

Some studies have proven that addition of both Mirabegron and Solifenacin increase the symptomatic relief more than monotherapy with either drug.²⁶⁻²⁸ Kuo et al recommend individualized treatment of overactive bladder syndrome patients.²⁹ In the famous SYMPHONY trial, Abrams et al observed that Mirabegron in combination with Solifenacin or Darifenacin gave better results in treatment of OAB than either drug alone.³⁰

CONCLUSION

Doppler sonography is an indispensable tool in overactive bladder syndrome is a common urogynaecological problem. It can be diagnosed by symptoms and quantified by incontinence impact questionnaire (IIQ) and urodynamic studies. There is a good correlation between severity of OAB on IIQ and urodynamic studies. However, larger multicentric prospective studies are recommended to prove these observations.

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