

Natural history of lower urinary tract symptoms: preliminary report from a community-based Indian study

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OBJECTIVE

To describe the results of an analysis of baseline data from subjects included in the community-screening programme for lower urinary tract symptoms (LUTS) in the Anand and Kheda district in the Gujarat state of India.

SUBJECTS AND METHODS

In all, 2406 men aged >40 years were screened in the community in 18 villages. All subjects were given an International Prostate Symptom Score (IPSS) to complete, had a detailed physical examination, uroflowmetry and urine analysis, and were assessed using transabdominal and transrectal

ultrasonography. Spearman's correlation coefficient was used to assess the relationships between quality of life (QoL), age, IPSS, maximum flow rate (Q_{max}) and prostate volume (PV); stepwise multiple regression was also used.

RESULTS

The mean (SD) age of the men was 62.1 (9.5) years. The PV (mean 21.6 mL, SD 10.63) increased linearly with age, while Q_{max} (mean 14.6 mL/s, SD 8.4) decreased linearly. The mean (SD) IPSS was 12.2 (8.6) and did not correlate with age but correlated strongly with QoL (coefficient 0.72). Nocturia was the commonest symptom but correlated least with the IPSS and QoL (0.56 and 0.44). The

correlations between Q_{max} , IPSS and PV were weak to moderate. The subjects had a 56% higher risk of developing moderate to severe symptoms if their PV was >25 mL.

CONCLUSION

These Indian men had smaller prostates with higher symptom scores than reported in the West. The IPSS was the strongest predictor of QoL. Overall, the correlation between Q_{max} , IPSS and PV was weak to moderate.

KEYWORDS

natural history, LUTS, symptom score, community study

INTRODUCTION

BPH is a condition that is intimately related to ageing [1]; although not life-threatening its clinical manifestation as LUTS may reduce a men's quality of life (QoL) [2]. Epidemiological studies of LUTS include either a probability sample from the entire country, an age-stratified random sample, or patients from a hospital population, thereby lacking homogeneity. There are no data available assessing the natural history of LUTS in Indian men. Moreover, as the longevity of Indian men is increasing, it is important to study the natural history of LUTS in this population.

Thus the present study was carried out to determine the prevalence of LUTS in Indian men, to establish the relationship between the IPSS, prostate volume (PV), peak urinary flow rate (Q_{max}) and QoL, and to analyse changes in these variables with age.

SUBJECTS AND METHODS

In all, 2406 men aged >40 years were screened in the community in 18 villages

in Gujarat State, India. The subjects were interviewed by a healthcare coordinator to obtain basic demographic information. All subjects were also assessed by uroflowmetry, using a portable uroflowmeter, and by routine urine analysis. The subjects were given a linguistically validated version of the IPSS in the local language, with assistance provided whenever necessary. On the day of the diagnostic survey the subjects had a physical examination, including a DRE, TRUS and/or transabdominal ultrasonography (5 and 7.5 MHz transducers); those requiring intervention were treated appropriately.

Spearman's rank correlation coefficient was used to assess the correlations between QoL, age, IPSS, Q_{max} and PV, with a two-tailed $P < 0.05$ considered to indicate statistical significance. Multiple regression analysis was also used, with QoL as the dependent variable and the remaining variables as independent. The t -statistics were calculated from the coefficients and their SEMs. Stepwise multiple regression analysis was also applied with QoL as the dependent and all seven symptoms as independent variables. Thresholds were

defined and 2×2 contingency tables constructed to calculate the odds of subjects developing moderate to severe symptoms.

RESULTS

Complete data were available for 2004 subjects (mean age 62.1 years, SD 9.5, range 40–82). The data are shown in Table 1 for each decade of age assessed. The mean (SD, range) body mass index of the men was 24 (4.82, 21–29). The mean PV was 21.6 (10.3) mL and increased linearly with age. The mean IPSS was 12.2 (8.6) but there was no correlation with age, although it correlated closely with the QoL score ($r = 0.72$). Among the seven symptoms in the IPSS, the correlation with the QoL was better with 'weak stream'; (0.52), followed by intermittency (0.51). Nocturia was the commonest symptom, in 1751 (87.4%) of the men. However, of all the symptoms nocturia correlated least well with the IPSS and QoL (0.56 and 0.44, respectively). The mean Q_{max} was 14.6 (8.4) mL/s, and declined with advancing age (Table 1). The Spearman's rank correlation coefficient between Q_{max} and

| Variable | Decade of age | | | |
|-------------------------|---------------|------------|------------|-------------|
| | 5 | 6 | 7 | 8 |
| N (%) | 245 (12.2) | 707 (35.3) | 684 (34.1) | 368 (18.4) |
| Mean (sb) | | | | |
| PV, mL | 18.6 (8.9) | 19.5 (8.4) | 23.4 (11) | 24.3 (11.8) |
| Q _{max} , mL/s | 16.4 (8.8) | 16.3 (9.1) | 13.9 (7.6) | 11.5 (6.9) |
| LUTS, n (%) | | | | |
| Moderate | 119 (48.6) | 278 (39.3) | 295 (43.1) | 167 (45.4) |
| Severe | 55 (22.4) | 131 (18.5) | 138 (20.2) | 98 (26.6) |

TABLE 1
The distribution of the three variables with age of the men

TABLE 2 The relationship of a PV of ≥ 25 mL or QoL ≥ 2 and the risk of developing moderate to severe symptoms

| | Symptom score | | Total |
|---------------|---------------|-----------|-------|
| | 8–19 | ≥ 20 | |
| PV, mL | | | |
| >25 | 29 | 153 | 382 |
| ≥ 25 | 630 | 269 | 899 |
| Total | 859 | 422 | 1281 |
| QoL | | | |
| ≥ 2 | 555 | 402 | 957 |
| <2 | 304 | 20 | 324 |
| Total | 859 | 422 | 1281 |

the IPSS was -0.25 , closer than with PV, at -0.19 , and for PV vs IPSS, at 0.15 .

Multiple regression analysis showed the IPSS to be a significant predictor ($P < 0.001$) of QoL; further stepwise multiple regression analysis against the seven symptoms in the IPSS showed weak stream to be the strongest predictor of QoL ($P < 0.001$). The 2×2 contingency table analysis for comparing moderate to severe symptoms showed that if the PV was >25 mL the odds of developing moderate to severe symptoms was 1.56 (a 56% higher risk). (Table 2); the chance of developing moderate to severe symptoms was 11 times higher if the QoL was >2 .

The data were also analysed after categorising the men depending on their ethnic background and socio-economic status, i.e. into tribal, rural, and semi-urban. There were no statistically significant differences in IPSS, Q_{max} or PV.

DISCUSSION

Berry *et al.* [3] reported the prevalence of BPH based on a review of 10 independent studies

relating age to histological findings in human prostates. The prevalence of pathological BPH was only 8% in the fourth decade, but half of men had pathological BPH in their sixth decade. The mean weight of the prostate with BPH at autopsy was 33 (16) g. Only 4% of men aged >70 years had a PV of >100 mL. That study confirmed that age is intimately related to BPH.

The present subjects had a smaller mean PV than those reported in western studies. In the Japanese population the mean PV was also smaller than in age-matched counterparts elsewhere in the world. Masumori *et al.* comparatively studied the prostate volume in Japanese and American men above 40. The mean prostate volume averaged 20.3 ± 10.6 mL in Japanese and 29.6 ± 13.4 mL in American men [4]; the mean Q_{max} was also higher than in American men [4,5]. The role of ethnicity and migration in determining the prostate size was studied by Jin *et al.* [6], comparing the PV of Chinese migrants in Australia and native Australians with the resident Chinese population. The PV was significantly different between Australian non-Chinese (29.4 mL) and Chinese men residing in China (25.3 mL). The PV of Chinese migrants was similar to Australian non-Chinese men (28.7 mL), thus suggesting the impact of some environmental factors on prostate growth [6]. Recent epidemiological data showed that prostate size is significantly associated with the CAG polymorphism in the androgen receptor gene, a shorter CAG repeat being associated with a larger prostate [7]. The smaller glands in the present study need further genetic evaluation.

The mean IPSS in the present men was higher than those previously reported; in a study in Japan [8], within each decade the median IPSS was higher for Japanese than for men in the USA. In the Olmsted County [9] cohort of men moderate to severe symptoms were present in

13% of those in their fifth decade and 28% in their eighth or greater. The prevalence of LUTS in Europe and the USA is similar. In the Multinational Survey of Aging Males, a large-scale multinational survey conducted in the USA and six European countries, the mean IPSS for the total sample was 6.3 (6.6); 31% of respondents had moderate to severe LUTS (34.2% in the USA and 29% in Europe). There was a strong correlation between bother and the severity of LUTS [10]. The higher symptom score in the present men may be a result of a low tendency to seek treatment or may just reflect the racial differences in IPSS.

There was a closer correlation between Q_{max} and the IPSS than in the previous studies but the correlation between Q_{max} and PV, and PV and IPSS, remains moderate to weak. Girman *et al.* [11] reported a statistically significant correlation between PV and the AUA Symptom Index ($r = 0.185$), PV and Q_{max} ($r = -0.214$) and the AUA index and Q_{max} ($r = -0.35$).

In conclusion, Indian men in this sample had a smaller PV and a higher IPSS than reported for western samples. The correlations among IPSS, Q_{max} and PV were weak to moderate but the IPSS and Q_{max} correlated more closely. A weak stream correlated the best with QoL score, and nocturia was the commonest LUT symptom but correlated least with the IPSS and QoL. PV increased linearly with age and Q_{max} decreased progressively.

CONFLICT OF INTEREST

None declared.

REFERENCES

- 1 Chute CG, Pancer LA, Girman CJ *et al.* The prevalence of prostatism. A population based survey of urinary symptoms. *J Urol* 1993; **150**: 85–9
- 2 Donovan JL, Kahye HE, Peters TJ *et al.* Using the ICS QoL to measure the impact of lower urinary tract symptoms on the quality of life. Evidence from ICS BPH Study International Continence Society – Benign Prostatic Hyperplasia. *Br J Urol* 1997; **80**: 712–21
- 3 Berry SJ, Coffey DS, Walsh PC, Ewing LL. The development of human benign prostatic hyperplasia with age. *J Urol* 1984; **132**: 474–9
- 4 Tsukamoto Y, Kumamoto Y, Masumori N *et al.* Japanese men

- have smaller prostate volumes but comparable urinary flow rates relative to American men: results of community based studies in 2 countries. *J Urol* 1996; **155**: 1324–7
- 5 **Osterling JE, Kumamoto Y, Tsukamoto T et al.** Serum prostate specific antigen in a community based population of healthy Japanese men, lower values than for similarly aged white men. *Br J Urol* 1995; **75**: 347–53
 - 6 **Jin B, Turner L, Zhou Z, Handelson DJ.** Ethnicity and migration as determinants of human prostate size. *J Clin Endocrinol Metab* 1999; **84**: 3613–9
 - 7 **Boyle P, Fang Liu G, Jacobsen S, Ogawa O, Oishi K, O'Rielly P.** Epidemiology and natural history. In Chatelein C, Denis L, Foo KT, Khoury S, Connell L eds, *Benign Prostatic Hyperplasia*, 5th edn, chapter 1. Plymouth: Health Publication Ltd, 2001: 39
 - 8 **Tsukamoto T, Kumamoto Y, Masumori N et al.** Prevalence of prostatism in Japanese men in a community based study with comparison to similar American studies. *J Urol* 1995; **154**: 391–5
 - 9 **Chute CG, Panser LA, Girman CJ et al.** The prevalence of prostatism population based survey of urinary symptoms. *J Urol* 1993; **150**: 85–9
 - 10 **Rosen R, Altwein J, Boyle P et al.** Lower urinary tract symptoms and male sexual dysfunction. The multi-national survey of ageing male (MSAM-7). *Eur Urol* 2003; **44**: 637–49
 - 11 **Girman CJ, Jacobson SJ, Guess HA et al.** Natural history of prostatism. Relationship among symptoms, prostate volume peak urinary flow rate. *J Urol* 1995; **153**: 1510–5

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Abbreviations: PV, prostate volume; Q_{max} , peak urinary flow rate; QoL, quality of life (score).