Correlation between prostate volume and lower urinary tract symptoms in Sudanese patients with benign prostatic hyperplasia

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Accepted 29 April, 2015

Abstract

Background: Benign prostatic hyperplasia (BPH) is now recognized as one of the principal medical problems facing the male population in Sudan. Assessment of patients with prostatic enlargement still remains a challenge for doctors. Objective: The aim of this study was to correlate the prostate volume with international prostate symptom score (IPSS) and age in patients with benign prostatic hyperplasia (BPH). Materials and Methods: This is retrospective observational case-detection hospital based study. Eighty eight consecutive patients presented with lower urinary tract symptoms attending the urology clinic at University Teaching Hospital were enrolled. All patients were interviewed using standardized questionnaires for International Prostate Symptom Score. Trans-abdominal ultrasonogram was used to assess the prostatic volume. Results: The mean age was 63.36 years with minimum of 27 and a maximum of 90. The mean volume of prostate was 42.38 cm³. Most of the patients had severe symptoms with a mean IPSS of 10.52. The correlation between the prostate volume and age was statistically significant in contrast to the correlation between prostate volume and IPSS which was not significant. Similarly, correlation between IPSS score and age was not significant. Conclusion: We concluded that prostate volume had a correlation with age, and no correlation with symptoms score, and there was no correlation between age and the symptoms score.

Keywords: Serum prostate specific antigen; prostate volume; benign prostatic hyperplasia

INTRODUCTION

Benign prostatic hyperplasia (BPH), diagnosed by the presence of benign prostate enlargement and lower urinary tract symptoms (LUTS), has been considered to be a chronic and progressive disease (Alawad et al., 2014). Because baseline prostate volume (PV) has been linked to the progression of BPH (e.g., acute urinary retention and surgery for BPH), PV has been included as a useful tool in treatment guidelines. Therefore, it is clear that knowledge of individual PV would be beneficial for everyday management of patients presenting to physicians. This undertaking has some problems, most notably fact that digital rectal examination is relatively inaccurate in measuring the correct prostate size when measured by either transrectal ultrasound (TRUS) or other imaging modalities, such as computerized tomography or magnetic resonance imaging (Kwon et al., 2012). Because imaging modalities accompany financial burden and limited reproducibility, it is reasonable to...
search for alternative parameters that could be used instead of PV. Lower urinary tract symptoms (LUTS) are the most common presentation of patients with prostate disease (Yeh et al., 2012). Early detection is still a problem worldwide. For a long time international prostate symptoms score (IPSS) is thought to be a good measure of the extent of prostatic disease however many studies opposed this direction in contrast to others supported this theory (Franciosi et al., 2007; Hassanzadeh et al., 2010; Hedelin et al., 2005; Isikay et al., 2007; Vesely et al., 2003). However, most studies of the relationship between lower urinary tract symptoms (LUTS) and PV have originated from developed countries, and few studies have been conducted in Africa. Thus, we performed a study to determine the predictive power of LUTS for prostate volume in Sudanese patients with biopsy proven benign prostatic hyperplasia.

**MATERIALS AND METHODS**

This is retrospective observational case-detection hospital based study. Eighty eight medical records of patients with an enlarged prostate attending the urology clinic at University Teaching Hospital were enrolled from September 2012 through September 2013. This research was conducted in University Charity Teaching Hospital, Khartoum, Sudan.

Demographic details, clinical presentation, international prostate symptoms score (IPSS) and assessment of prostate volume (PV) of all patients were entered into our study proforma. PV was measured with transabdominal ultrasound and PV was defined by measuring the height (H), width (W), and length (L) of the prostate from two selected orthogonal views and calculating the volume (V) as that of the corresponding ellipsoid formula: $V=0.52\times W\times H\times L$ (Choi et al., 2013).

Exclusion criteria were patients with a history of receiving 5-alpha reductase inhibitor therapy and those with a history of invasive surgical treatment of benign prostatic hyperplasia (BPH), such as transurethral resection or laser prostatectomy. Patients with a history of acute prostatitis, with a history of urinary retention within the past month, or lacking data on any of the aforementioned parameters were excluded. Prostate cancer patients with results confirmed by subsequent TRUS-guided prostate biopsy were excluded. Only patients proven to have benign results by the prostate biopsy were included in this study. Patients with PSA above 20 ng/ mL were also omitted to decrease the possibility of occult prostate cancer. After all exclusions, 80 men were enrolled in this study.

All summary statistics are stated with 95% confidence limits. A method appropriate for small samples was applied to the percentages and odds ratios were derived using logistic regression methods (SPSS version 17). P-value of less than 0.05 was considered statistically significant.

**RESULTS**

The mean age of patients was 63.36 years and the age ranged from 27 to 90 years. Sixty three (78.7%) patients were married and 25 (21.2%) were unmarried. Geographically, 24 (25%) patients were from the rural area and 64 (75%) from urban area. Descriptive characteristics of age, IPSS and prostate volume are shown in Table 1.

When the patients were classified according to the volume of the prostate it was found that 33 (41.2%) of them were found to have a prostate size (20-40g). Whereas, 30 (37.5%) were found to have a prostate size of (41-61 g).

Table 2 represents, graphically, the relationship between

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**Table 1. Showing descriptive statistics of age, PV and IPSS**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Range</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>88</td>
<td>63</td>
<td>27</td>
<td>90</td>
<td>63.36</td>
<td>12.379</td>
</tr>
<tr>
<td>IPSS</td>
<td>88</td>
<td>29</td>
<td>1</td>
<td>30</td>
<td>10.52</td>
<td>7.311</td>
</tr>
<tr>
<td>Prostate volume</td>
<td>88</td>
<td>79</td>
<td>21</td>
<td>100</td>
<td>42.38</td>
<td>15.497</td>
</tr>
</tbody>
</table>

**Table 2. Showing correlation between Age and Prostate Volume**

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Prostate volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation Coefficient</td>
<td>1.000</td>
<td>0.254</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.</td>
<td>.017</td>
</tr>
<tr>
<td>N</td>
<td>88</td>
<td>88</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).
Table 3. Showing correlation between IPSS and Prostate Volume

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>IPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate volume</td>
<td>1.000</td>
<td>.073</td>
</tr>
<tr>
<td>Spearman's rho</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td>.073</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.500</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>88</td>
<td>88</td>
</tr>
</tbody>
</table>

Age and prostate volume. Looking into the chart one could notice there is linear relationship between the two variables (P =0.001). A positive weak correlation was also found between PV and age of the patient.

Table 3 represents, graphically, the relationship between IPSS and prostate volume. P value is more than 0.05 which means that there is no significant correlation between Prostate Volume and IPSS.

**DISCUSSION**

Prostate volume (PV) is perhaps the most extensively studied risk factor for BPH progression. Men with a PV of ≥30 mL are more likely to have moderate-to-severe symptoms (3.5-fold increase), decreased flow rates (2.5-fold increase), and urine retention (three- to four-fold increase) than are men with a PV < 30 mL. So, PV information has become more and more important because the PV strongly predicts BPH-related morbidity such as acute urinary retention and the need for surgery (Overland et al., 2001).

Generally, the typical method of measuring PV is transrectal ultrasound (TRUS). But, TRUS is relatively painful. Moreover, TRUS is also not cost-effective and routine evaluation of patients with BPH (Ahmed et al., 2015). In our setting, TRUS is not available. Additionally, DRE is simple to perform and practical for estimating the PV, but it has been revealed that DRE underestimates the real prostate size.

In Sudan there is a heavy burden of prostatic disease (Khalid et al., 2011). Doctors use IPSS as a main indicator of the severity of BPH. A study was conducted in Gezira, Sudan concerning the relationship between prostate volume and age of patients. It was a triggering publication for further studies in Sudan (Abdrabo et al., 2011). This study showed that Knowledge of prostate volume is a useful tool to aid physicians and decision makers in predicting the risk of BPH-related outcomes.

In our study there was a correlation between age and prostate volume. This agrees with the local study done here in Sudan by Mohamed Nasr El Din Mohamed et al. showing that (Abdrabo et al., 2011). The incidence rate of LUTS/BPH increases linearly with age and reaches its maximum at the age of 79 years and the study done in china by Shi-Jun Zhang, indicating a positive correlation between prostate size and age.

Correlation between prostate volume and lower urinary tract symptoms and there was no correlation. This agrees with the studies that were done in Netherlands by Eckhardt et al. that showed that there is no relationship between prostate size and lower urinary tract symptoms and the study that was done in Japan by Tsukamoto et al. (2001) that also showed no relationship between prostate size and IPSS score (Tanaka et al., 2001). Also, a study done by Vesely et al. (2003) in Norway showed that no relationship between symptoms and objective measures of BPE and the study done by Agrawal et al. in showing no correlation with age, symptom score (Tatar et al., 2014). Ezz el Din et al. stated that the correlation between objective non-invasive parameters of lower urinary tract dysfunction and LUTS is weak (Kwon et al., 2012).

In contrast to the studies that were done in USA by Griman et al. (1995) referred to a relationship between prostate size and symptoms caused by the prostate pathology, 2003 by Curtis et al. showed that there is direct relationship between development of acute urinary retention and prostate size (Bosch et al., 1995). Overland Bet al. stated that there is positive modest correlation (r = 0.176) between IPSS and prostate volume. And the study in Japan by Tsukamoto et al (2001). in 2007 Apr in Japan showed that a change in IPSS was associated with a change in PV (Tanaka et al., 2001). Lastly in our there was no correlation between age and lower urinary tract symptoms. This agrees with the study done by Agrawl et al. showing the same result that there is no correlation between age and symptoms score (Fowke et al., 2013).

**CONCLUSION**

There is association between age and prostate volume with a linear regression value which is an R square value of 0.70 meaning that with every increase in age of 1 year there will be a 70 mg increase in the prostate volume and there is no association between prostate volume and LUTS and between age and LUTS.
REFERENCES


