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Socio-Demographic and Clinical Characteristics of Patients Presenting with Lower Urinary Tract Symptoms Secondary to BPH, in a Tertiary Hospital

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Abstract

Background: Benign prostatic hyperplasia (BPH) is the proliferation of the stromal and epithelial cells of the prostate gland, resulting in an increase in its size. This may result in obstruction of the lower urinary tract causing storage and voiding symptoms. **Methods:** This was a prospective cross-sectional study from August 2020 to July 2021, to evaluate the characteristic of patients presenting to the Tamale Teaching Hospital with lower urinary tract symptoms secondary to BPH. **Results:** The median age at presentation with LUTS secondary to BPH is 68.88 ± 11.10 years with an average prostate volume of 70 g. The average time of presentation to the hospital is 5 months, mostly with moderate to severe symptoms. Correlation between Prostate volume (PV) and age yielded a positive relationship; however, this was not statistically significant, (r = 0.028, p-value = 0.747). There was a significant positive relationship between PV and the IPSS score, (r = 0.334, p-value < 0.001). **Conclusion:** Our patients with symptomatic BPH present at age 60 years and above, with nearly all of them presenting with moderate to severe LUTS.

Keywords

Benign Prostate Hyperplasia, Lower Urinary Tract Symptoms, Sociodemographic Characteristics

1. Introduction

The prostate gland is an accessory male sex organ located at the bladder neck

and surrounds the first part of the male urethra [1]. In the non-diseased state, it measures 3 cm in length, 4 cm in width and 2 cm in depth, with an average volume of 15 - 20 cm^3 in adults [2].

In benign prostatic hyperplasia (BPH) there is proliferation of the stromal and epithelial cells of the prostate gland, resulting in an increase in size of the gland [3]. The increase in prostate size may result in compression of the urethra and subsequent bladder outlet obstruction. The effect of such an obstruction results in urinary voiding symptoms (straining, weak stream, intermittency and incomplete emptying) as well as urinary storage symptoms (frequency, urgency and nocturia). These storage and voiding symptoms are together referred to as lower urinary tract symptoms (LUTS) [4].

BPH is a common condition affecting most men over the age of 40 years worldwide, though not all patients will have symptoms [5]. In a meta-analysis to estimate the global burden of lower urinary tract symptoms secondary to BPH, Lee *et al.* [6] found a median prevalence of symptomatic BPH of 25.2% among 31 studies worldwide. The lowest was 12.0% in a Chinese study and the highest was 42% in a United States-based study [6]. Among West Africans, the prevalence of digital rectal examination (DRE) detected BPH is 62.3% [7]. However, the prevalence of lower urinary tract symptoms secondary to BPH in the West African sub-region has been estimated to be around 20% [7].

The northern part of Ghana is relatively young in medical practice by trained urologist. This study was aimed at evaluating the characteristics of patients presenting to a tertiary hospital with lower urinary tract symptoms secondary to BPH in northern Ghana.

2. Materials and Method

A prospective cross-sectional study using convenience sampling was conducted at the Urology Unit in the Department of Surgery, Tamale Teaching Hospital (TTH). This is the largest and only teaching hospital serving the five regions of northern Ghana (Northern, North-East, Savanna, Upper West and Upper East Regions) with an estimated population of about 6 million [8]. Patients presenting with lower urinary tract symptoms secondary to BPH were recruited using non-probability convenience sampling. Sample size was determined based on the prevalence of BPH at TTH.

Data was entered into Microsoft Excel 2016 version for cleaning, and analyzed using the Statistical Software for Social Sciences (SPSS, IBM) version 23. Spearman's rho correlation was used to assess the relationship between prostate volume and parameters such as age, IPSS and PSA. Statistical significance was considered at a p-value of less than 0.05.

3. Results

A total of 138 participants were recruited for this study. A majority of the participants (65.22%) were from the Northern Region of Ghana with a very large

proportion of them in a low socioeconomic status (83.33%). Also, many participants (59.42%) practiced the Islamic religion. This is illustrated in Table 1

Table 1. Socio-demographic characteristics of participants.

Variable	Frequency (n = 138)	Percentage (%)
Place of Residence (Region)		
Northern	90	65.22
Upper East	32	23.19
North-East	6	4.35
Savannah	5	3.62
Upper West	2	1.45
Oti	2	1.45
Ashanti	1	0.72
Socioeconomic Status		
Low	115	83.33
Middle	21	15.22
High	2	1.45
Religion		
Islam	82	59.42
Christianity	54	39.13
Traditional	2	1.45

3.1. Baseline Clinical Characteristics of the Study Subjects

There were 138 participants in this study with a mean age of 68.88 ± 11.10 years. The mean duration of symptoms before patients presented to the hospital was 4.80 (±1.99) months. The mean body mass index of the study participants was 23.50 (±2.67) kg/m^2 and the mean waist circumference was 91.25 (±5.42) cm. The mean prostate volume of the participants was 68.28 (±15.03) cm^3, and the mean PSA was 2.65 (±0.90) ng/ml. Refer to Table 2.

Table 2. Baseline characteristics of study subjects (n = 138).

Variable (n = 138)	Minimum	Maximum	Mean ± SD
Age (years)	42	100	68.88 ± 11.10
BMI (kg/m^2)	18.50	30.10	23.50 ± 2.67
WC (cm)	82.2	109.3	91.25 ± 5.42
DOS (months)	1	10	4.80 ± 1.99
PSA (ng/ml)	0.25	4.0	2.65 ± 0.90
PV (cm^3)	37.90	106.70	68.28 ± 15.03

The commonest comorbidity among study participants was hypertension

constituting a total of 31.20%, either existing alone or in combination with other comorbidities, such as diabetes mellitus and/or hypercholesterinemia (Figure 1).

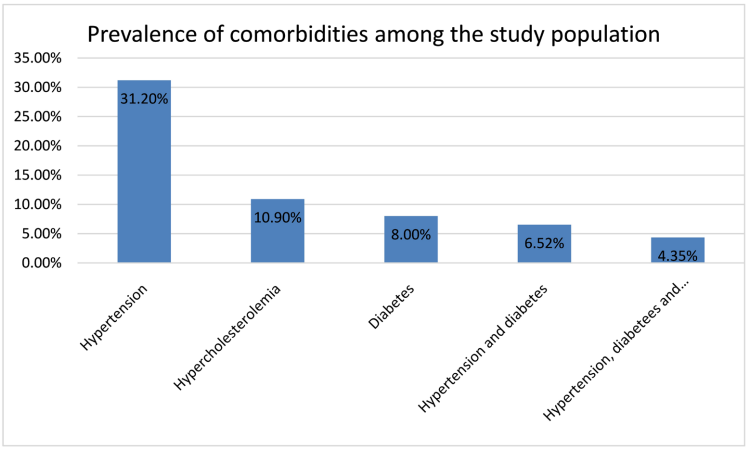

Figure 1. Comorbidities in the study population.

3.2. Categorization of Lower Urinary Tract Symptoms Using the IPSS and QOL Score

Nearly all study participants reported moderate to severe lower urinary tract symptoms using the International Prostate Symptom Score (98.50%). A majority of the participants were unhappy with their symptoms when assessed with a QoL score (65.90%), as shown in Figure 2.

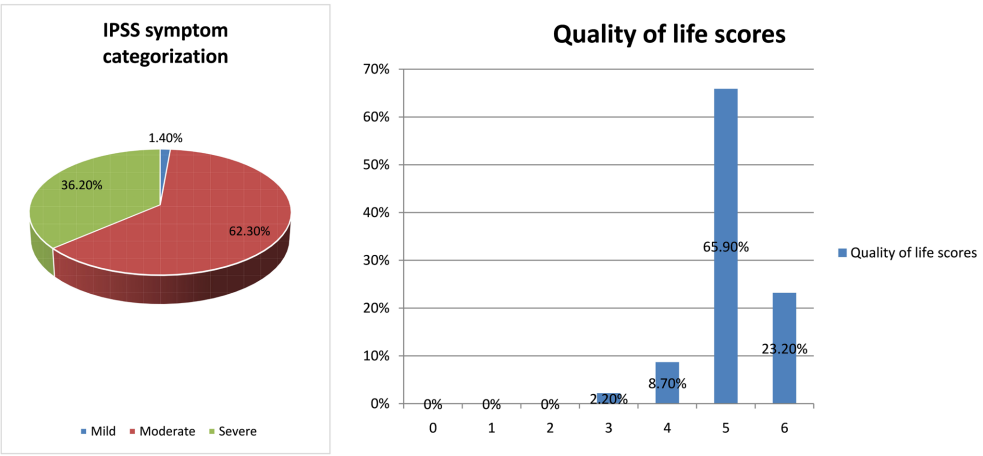

Figure 2. IPSS and QOL categorization among the study population.

Spearman correlation was used to assess the correlation between PV and variables such as age, IPSS and PSA, and this is illustrated in Table 3. Correlation between PV and age yielded a positive relationship; however, this was not statistically significant, ($r = 0.028$, p-value = 0.747). There was a significant positive relationship between PV and the IPSS score, ($r = 0.334$, p-value < 0.001), as well as PV and PSA ($r = 0.383$, p-value < 0.001).

Among those who had severe symptoms using the IPSS score, those within

the ages of 60 to 79 years formed the majority (48.00%). This is shown in Table 4 below.

Table 3. Relationship between PV and Age, IPSS score and PSA.

			Age	IPSS score	PSA
Spearman's Rho	PV	Correlation Coefficient	0.028	0.334	0.383
		p-value	0.747	0.000	0.000
		N	138	138	138

Table 4. Distribution of IPSS according to age groups.

	IPSS GRADE			
Age Category	Mild	Moderate	Severe	Total
40 - 59	1 (50.00%)	9 (10.47%)	15 (30.00%)	25 (18.12%)
60 - 79	1 (50.00%)	60 (69.77%)	24 (48.00%)	85 (61.59%)
80 or more	0 (0.00%)	17 (19.77%)	11 (22.00%)	28 (20.29%)
Total	2 (1.45%)	86 (62.32%)	50 (36.23%)	138 (100.00%)

4. Discussion

In this study, the mean age at presentation was 68.88 ± 11.10 years. In Kumasi, Ghana, Aboah *et al.* found a mean age of 67.96 years among men who presented with lower urinary tract symptoms secondary to BPH [9]. Similar findings were reported by Ojewola and colleagues, in the south-western part of Nigeria [10], and Zhang *et al.* in the Chinese population [11]. Thus patients are more likely to present with symptomatic BPH at age 60 years and above.

Age has been reported as an important risk factor for the development and progression of lower urinary tract symptoms secondary to BPH [12] [13]. We found LUTS secondary to BPH prevalence among those aged 40 to 59 years to be 18.12%, and 61.59% among those aged 60 to 79 years.

A majority of our study participants were from the Northern Region of Ghana (65.22%) where the study site is located making access easier. Also, the Northern Region has a greater population compared to the other regions in the northern part of Ghana, which this hospital serves [14].

The socioeconomic status of the study participants was generally low (83.33%) with a majority of them being uneducated. According to the Ghana Statistical Service in the 2010 Population and Housing Census, the proportions of the population, who have never been to school in the then three northern regions of Ghana ranged from 44.5 to 54.9 percent [14]. On the contrary, Chokkalingram *et al.* noted that about 77% percent of study participants with BPH had at least middle school education in the nation's capital, Accra [5]. In Kumasi, also in southern Ghana, Gyasi-Sarpong *et al.* found that a majority of their study participants (58.67%) attained tertiary-level education, though most of them (57.78%) were pensioners [15].

Again the 2010 Population and Housing Census indicated that, the then three northern regions of Ghana had the highest poverty head count (44.2, 45.9 and 69.4, for the Northern, Upper East and Upper West Regions respectively), hence it is not surprising that the socio-economic level of this study's participants was low [14].

BPH has been noted to be more prevalent in high-income groups [16]; however, Glynn and colleagues noted that patients with low socio-economic status were more likely to have surgery for BPH [17]. Perhaps, the low socio-economic status groups are more likely to present late to hospital hence they are more likely to have severe symptoms and complications such as obstructive uropathy, bladder stones and recurrent urinary tract infection, which are indications for surgery [18]. Those in the high socio-economic groups have better access to health care and are more likely to afford medications for the treatment of BPH compared to those in the low-income groups, hence the higher surgery rate in the low-income groups [19] [20].

Hypertension was the most common comorbidity among the participants in this study (31.20%). Those who had a combination of the components of the metabolic syndrome (diabetes mellitus, hypertension and hypercholesterinemia) formed 4.35%. Hypertension and benign prostatic hyperplasia are both diseases of the elderly and may commonly coexist. In one study, it was stated that approximately 30% of those treated with lower urinary tract symptoms due to BPH had hypertension [21]. Thus this current study is in conformity with what has been noted earlier.

The relationship between components of metabolic syndrome including hypertension diabetes mellitus and hypercholesterinemia has been well established [22]-[24]. A retrospective study in Chinese patients with benign prostatic hyperplasia (BPH), found that BMI, fasting blood sugar, serum lipids and other components of metabolic syndrome had a positive correlation with prostate volume [24]. Similar findings were reported by Ryle *et al.* in Poland and Gacci in Italy [22] [23].

In several studies, prostate volume is positively associated with serum total PSA level [25]-[27]. In 1999, Roehrborn *et al.* found a strong correlation between serum prostate-specific antigen (PSA) levels and prostate volume [25]. Two years later he reported with other colleagues that in the absence of adenocarcinoma of the prostate, the PSA value may be used as a surrogate for prostate volume [26]. Similar report was made by Tsukamoto *et al.* in Japanese men [27]. The Spearman's rho correlation of our study yielded a significant positive relationship between prostate volume and PSA ($r = 0.383$, p-value < 0.001). This agrees with the above findings.

Severe lower urinary tract symptoms were common in the age groups of 60 to 79 years (48.00%). This group had the largest representation in our study and hence may account for this finding. The older age group (80 years and above) in this study was represented by a little over twenty percent. Similarly in a Swedish

study, 1.8% of patients from age 45 to 49 years had severe LUTS, while 9.7% of patients from age 75 to 79 years had severe LUTS [28]. Aging results in detrusor dysfunction and thus elderly men are more prone to developing lower urinary tract symptoms which may be worsened by bladder outlet obstruction due to BPH [29].

There is a lot of controversy surrounding the relationship between prostate volume and the severity of lower urinary tract symptoms in patients with BPH. About three decades ago Roehrborn *et al.* and Simonsen *et al.* reported that prostate volume did not correlate with symptom severity [30] [31]. Also, Ofoha *et al.* found that correlation between prostate volume and IPSS was not statistically significant using Pearson correlation in Nigeria [32].

Recently however a lot more studies are beginning to associate a large prostate volume with worse lower urinary tract symptoms, though most of them report only a weak association. [33]-[35]. However, in a study by Awaisu *et al.* in Nigeria, prostate volume correlated significantly with IPSS and Qmax on uroflowmetry [36]. Similarly, we found a positive correlation between prostate volume and IPSS ($r = 0.334$, p-value < 0.001). Thus, for patients who will develop LUTS secondary to BPH, the size of the prostate is a determinant of the severity of symptoms.

5. Conclusion

Our patients with LUTS secondary to BPH present at age 60 years and above with an average prostate volume of 70 g. The average time to presentation is 5 months mostly with moderate to severe symptoms.

6. Limitation

There was a large number of uneducated participants in this study; hence their understanding of the questionnaire relating to the IPSS may have been impaired.

7. Recommendation

It is recommended that further studies be carried out to ascertain the reasons for the delay in presentation of patients with BPH in our area, and the possible common complications that they develop as a result of the lower urinary tract obstruction.

Ethics Approval and Consent to Participate

The study protocols were submitted to the Komfo Anokye Teaching Hospital Institutional Review Board for review. Ethical approval for the study was gotten from this institution after the review with number KATH-IRB/AP/071/20. We also got permission from the study site Tamale Teaching Hospital.

All participants signed an informed consent before they were included in the study.

Consent for Publication

Participants also consented to publication of this work with assurance that their names and contact details were not going to be part of the publication.

Availability of Data and Material

The collected data is available though it will only be shared without participants' names and contact details.

Funding

The study was self-sponsored.

Authors' Contributions

A.J.M.M	Design of study, data collection, analysis and writing up of manuscript
E.M.T.Y	Design of study and data collection
F.A.A	Revision of the manuscript

Conflicts of Interest

We had no competing interest in the conduct of this study.

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List of Abbreviations

BMI	Body Mass Index
WC	Waist circumference
BPH	Benign Prostatic Hyperplasia
IPSS	International Prostate Symptom Score
LUTS	Lower Urinary Tract Symptoms
QoL	Quality of Life
PSA	Prostate-Specific Antigen
SPSS	Statistical Package for Social Sciences