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Original Article

Magnitude and associated risk factors of benign prostatic hyperplasia among patients admitted to the surgical department of urology ward in Hawassa University Comprehensive Specialized Hospital, Sidama region, Ethiopia

Amanuel Anegagregn[1], Ayantu Melke[2*], Zinabua Alemayehu[1], Shemelis Aynalem[1], Michael Teshale[1], Samrawit Eshetu[1], Mehretu Belayneh[2]

[1]School of Medicine, College of Medicine and Health Sciences, Hawassa University, Hawassa, Ethiopia; [2]School of Public Health, College of Medicine and Health Sciences, Hawassa University, Hawassa, Ethiopia

*Correspondence: Ayantu Melke Shibru; E-mail: ayantumelke@gmail.com.

Abstract

Introduction: Benign prostatic hyperplasia (BPH) is a noncancerous enlargement of the prostate gland as a result of increased number of stromal and epithelial cells. The absolute burden of benign prostatic hyperplasia is rising at an alarming rate in most of the world, particularly in low-income and middle-income countries. Studies have identified some modifiable risk variables, such as metabolic syndrome, cardiovascular disease, obesity, diabetes, physical exercise, and inflammation that present new prospects for treatment and prevention. However, the number of studies undertaken in Ethiopian context is limited. Thus, this study aimed to determine the magnitude of benign prostatic hyperplasia, and to identify risk factors among patients admitted to the surgical department of urology ward in Hawassa University Comprehensive Specialized Hospital, Sidama Ethiopia.

Method: This was a retrospective study including 271 male patients admitted to surgical department of the urology ward at Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia, from December 2019 to December 2020. The data were collected from the patients' records. Extracted information from the patients' records were entered, cleaned, and analyzed using the statistical package IBM SPSS version 24. Descriptive statistics, bivariable and multivariable logistic regression analyses were employed. Adjusted odds ratio (AOR) with 95% confidence interval (CI) at P value <0.05 were considered as statistical significant.

Results: The magnitude of benign prostatic hyperplasia among patients admitted to the surgical department of urology ward was about 48% (131 out of 271). A one-year increase in age increased the odds of benign prostatic hyperplasia by 2% (AOR= 1.02, 95% CI: 1.004, 1.05). Patients who had family history of benign prostatic hyperplasia had 8 times more odds to have BPH (AOR=7.6, 95% CI: 3.2, 18.2). In addition, patients who had

history of diabetes had 2.2 times more odds of BPH (AOR=2.2, 95% CI: 1.1, 4.3).

Conclusion: The identified risk factors for benign prostatic hyperplasia were increase in age, diabetes mellitus, and family history of benign prostatic hyperplasia. Thus, prevention and management of diabetes mellitus could reduce the risk of benign prostatic hyperplasia. Moreover, we recommend further studies on reduction strategies of benign prostatic hyperplasia among older age group and who had family history of benign prostatic hyperplasia.

Key words: benign prostatic hyperplasia, urology, magnitude, risk factors, Ethiopia

Introduction

Benign prostatic hyperplasia (BPH) is noncancerous enlargement of the prostate gland as a result of increased number of stromal and epithelial cells (1). Sometimes, it is also called benign prostatic enlargement or benign prostatic obstruction. BPH is one of most common conditions affecting the elderly males, and most common cause of lower urinary tract symptoms (2). Lower urinary tract symptoms (LUTS) such as urgency (the inability to delay urination), frequency (urinating eight or more times a day), nocturia (frequent urination during periods of sleep), incomplete bladder emptying, trouble starting a urine stream, a weak or an interrupted urine stream and dribbling at the end of urination are all signs of BPH, which is caused by a benign overgrowth of prostatic tissue surrounding the urethra that eventually constricts the urethral opening (3). The initial symptoms of benign prostatic hyperplasia include difficulties starting to urinate and a sense of incomplete urination. As the prostate gland enlarges, it presses against the urethra, narrows it, and blocks the flow of urine (4). BPH is a condition with no recognized cause and it has an increased risk of developing prostate cancer (5).

The absolute burden of benign prostatic hyperplasia is rising at an alarming rate in most of the world, particularly in low-income and middle-income countries. Globally, there were 94 million (95% CI 73·2 to 118) prevalent cases of benign prostatic hyperplasia in 2019, compared with 51·1 million (43·1 to 69·3) cases in 2000 (6). Ethiopia is one of the top ten African countries with the highest prevalence of BPH, with a prevalence range of 6.1-33.4% (7).

Recent studies have identified some modifiable risk variables, such as steroid hormones, metabolic syndrome, cardiovascular disease, obesity, diabetes, physical exercise, and inflammation that present new prospects for treatment and prevention. Understanding the epidemiology of the disease and contributing factors of the disease is a superior method for preventing and delaying the beginning and progression of clinical BPH (8). However, a limited number of studies have been conducted in Ethiopia. Thus, this study is aimed to determine the magnitude of benign prostatic hyperplasia, and identify its risk factors among male patients admitted to the surgical department of the urology ward in Hawassa University Comprehensive Specialized Hospital, Sidama region, Ethiopia.

Methods and materials

Study Area, Design, and Period

A retrospective study was carried out from December 2019 to December 2020 in Hawassa University Comprehensive Specialized Hospital, Sidama region, Ethiopia. Hawassa is located in the Sidama National Regional State which is 273 km south of Addis Ababa. Hawassa serves as the capital of Sidama region, and has an area of 157.2 square kilometers which is divided in to 8 sub-cities and 32 Kebeles. There is one referral hospital, one general hospital, two primary hospitals, three private hospitals, seven health

centers, 15 health posts, 51 private clinics, 46 drug stores, 2 diagnostic laboratories, and 55 pharmacies in the city administration. Hawassa University Comprehensive Specialized Hospital is a teaching Hospital in Hawassa under the College of Medicine and Health Sciences which started providing services since 2005. It was built to accommodate more than 300 beds. It has Out Patient Department (OPD), Intensive Care Unit (ICU), medical, gynecology and obstetrics, pediatrics, surgical, orthopedics, neurologic, ophthalmologic and other wards.

Sample size and sampling

The sample size was estimated based on the single population proportion formula considering the following assumption: 95% level of confidence, proportion of 50% for BPH, margin of error 5%. With the aforementioned assumptions, a sample of 384 was obtained, and after using finite population correction formula the sample size was 271. We employed systematic random sampling technique to extract data from medical records.

Data collection tool and procedure

Data were collected using the checklist developed for extracting data from patients' cards, progress notes, and date of discharge and death summary. The medical records that had incomplete information were excluded.

Measurement and operational definition

The dependent variable was benign prostatic hyperplasia (yes/ no). It was evaluated using patients' medical records for diagnosis of BPH. The independent variables included were socio-demographic variables such as age, education, religion, marital status; clinical factors such as frequent urination, urgency, urge incontinence, difficulty to start urination; associated symptoms, and risk factors such as cigarette smoking, radiation therapy, family history of BPH, history of diabetes and hypertension were assessed.

Data processing and analysis

The extracted data were entered, cleaned and analyzed using statistical package IBM SPSS version 24. Descriptive statistics like frequency, proportion, mean, and standard deviation were computed to describe the study variables. Multivariable logistic regression model was used to identify factors associated with BPH. The variables under bivariable analysis with *p* value < 0.25 were entered in multivariable logistic regression to identify the predictor variables. Hosmer and Lemeshow's goodness-of-fit test was used to assess the goodness-of-fit of the model. Crude odds ratio (COR) and adjusted odds ratio (AOR) were used to measure the strength of association. Finally, AORs with 95% confidence interval (CI) at *p* value <0.05 were considered as statistically significant.

Results

Socio-demographic characteristics of the respondents

Among the total of 271 study participants, more than half (57%) of the participants were in the age group of 40-60 years, and about 87% were married. Regarding their religion, one hundred nine (40%) of the participants were Protestant Christians, and seventy three (27%) had attended secondary education and above (Table 1).

Magnitude and associated clinical symptoms of BPH patients

Out of the total 271 patients, nearly half of the total patients 131 out of 271 (48%) were confirmed to have BPH. About 37% (98 of 271) patients had history of previous admission for any other condition. Clinical symptoms such as feeling of incomplete voiding, difficulty to start urination (hesitancy), urinary frequency, and

poor flow were manifested among more than 90% of the patients. More than half of patients with BPH complained of having easy fatigability (53%) and suprapubic pain (53%). Sixty three (48%) had hypertension, and majority (78%) had got medical treatment (Table 2).

Factors associated with BPH

In the bivariate logistic regression analysis, age, family history of BPH, history of diabetes mellitus (DM) , history of hypertension (HTN) and educational status were found to have p value <0.25.

In the multivarible logistic regression analysis age, family history of BPH and family history of DM were found to be significantly associated with BPH. An increment in age was found to pose 1.02 times higher risk to develop BPH (AOR=1.02, 95% CI: 1.004, 1.05). In addition, patients with family history of BPH were 7.6 times more likely to develop BPH compared to those who had no family history (AOR=7.64, 95% CI: 3.20, 18.24). Similarly, those patients who had history of DM were 2.2 times more likely to develop BPH than those who had no history of DM (AOR=2.19, 95% CI, 1.12, 4.29) (Table 3).

Table 1: Socio-demographic charcateristics of BPH patients admitted to Urology Department of HUCSH, Hawassa, Sidama, Ethiopia from December 2019 to December 2020.

Variables		Frequency	Percentage
Age	40-60	153	56.5
	>60	118	43.5
Marital status	Single	4	1.5)
	Married	236	87.1
	Divorced	11	4.1
	Widowed	20	7.4
Residency (region)	Sidama	130	48
	Oromia	82	30.3
	Hadiya	32	11.8
	Wolayta	21	7.74
	Others	6	2.2
Religion	Orthodox	64	23.6
	Protestant	109	40.2
	Catholic	25	9.2
	Muslim	65	24
	Others	8	3
Level of education	Illiterate	114	42.1
	Primary school	60	22.1
	High school	24	8.9
	College/University	73	26.9
	Farmer	123	45.4
Occupation	Government employee	66	24.4
	Merchant	62	22.9
	Soldier	3	1.1
	Retired	14	5.2
	Other	3	1.1

Table 2: Clinical characteristics of BPH patients admitted to Urology Department of HUCSH, Hawassa, Sidama, Ethiopia from December 2019 to December 2020.

Clinical presentations	Diagnosis of BPH		Total
	Yes [n (%)]	No [n (%)]	
Hesitancy	132 (48.7)	139(51.3)	271
Frequency	130(48)	141(52)	271
Urgency	78(28.8)	193(71.2)	271
Urge incontinence	51(18.8)	220(81.2)	271
Post micturition dribbling	102(37.6)	169(62.4)	271
Intermittency	102(37.6)	169(62.4)	271
Poor flow	124(45.8)	147(54)	271
Nocturia	66(24.4)	205(75.6)	271

Discussion

The magnitude of BPH among male surgical patients was 48% (95 % CI 42, 54) in our study. This was lower than a study conducted in Nigeria, Lagos University Teaching Hospital 70.9 % (9). This might be due to majority of the participants at Nigeria Hospital were older (in the age group 60- 69 years). Regarding the risk factors of BPH, patients with family history of BPH were 5.8 times more likely to develop BPH compared to their counterparts. This is in line with the population based study where men with a family history were also 1.3 times as likely to have an impaired peak urinary flow rate (10). A possible explanation could be genetic mode of inheritance for benign prostatic hyperplasia or a familial association working through environmental factors due to an interaction between exogenous (e.g., diet), endogenous (e.g., hormonal), and genetic variables as risk factors for benign prostatic hyperplasia (11).A study conducted in Johns Hopkins Hospital had also identified family history of BPH as a risk factor for clinical BPH and suggest the presence of a predisposing gene in patients with early onset BPH. The optimal model suggested mendelian dominant inheritance of a gene associated with early age at onset of BPH. Autosomal dominant inheritance of genes are involved in the pathogenesis of BPH and putative tumor suppressor genes would be expected to be inherited via autosomal dominant patterns (12). In addition, those patients who had history of DM were 2.5 times more likely to develop BPH than those who had no history of DM. This is similar with a cross sectional study conducted in Sweden, where physician-diagnosed diabetes was significantly associated with increased prostate size (13, 14). Thus, men with diabetes had a larger prostate size than men without diabetes. A possible explanation could be obesity which has been implicated in the etiology of BPH because of its influence on metabolic and endocrine changes. Follow-up study, a prostate cancer prevention trial, and a case-control study of Italian men showed a positive association between obesity and BPH (15). Another study conducted on the impact of diabetes mellitus on lower urinary tract symptoms (LUTS) in benign prostatic hyperplasia patients (16), has investigated LUTS in BPH patients is increased in patients with diabetes mellitus compared with controls. This might be because hyperglycemia can cause an increase of free calcium ions in smooth muscle and neuronal cell solute and increase sympathetic nerve activity, thus enhancing the contractile activity of prostate smooth muscle (17). In addition, diabetes can inactivate nerve growth factor (NGF) transported by the axon of the afferent bladder detrusor pathway, and hyperglycemia can cause excess

Table 3: Factors associated BPH among patients admitted to Urology Department of HUCSH, Hawassa, Sidama, Ethiopia from December 2019 to December 2020

Variables	BPH		COR (95% CI)	AOR (95% CI)
	Yes	No		
Age	*Continuous*		1.04 (1.02, 1.06)	1.02 (1.004, 1.05)
Family history of BPH				
Yes	40(14.8)	7(2.6)	8.3(3.58,19.4)	7.6(3.2, 18.2)
No	91(33.6)	133(49.1)	1	1
History of DM				
Yes	43(15.9)	21(7.7)	2.76(1.5, 4.9)	2.19(1.12,4.2)
No	119(43.9)	88(32.5)	1	1
History of HTN				
Yes	63(23.2)	52(19.2)	1.6(0.9, 2.5)	1.2(0.7,2.15)
No	68(25.1)	88(32.5)	1	1
Education				
Formal education	66(24.4)	91(33.6)	1.8(1.12, 2.9)	1.34(0.7, 2.4)
No formal education	65(24)	49(18.8)	1	1

BPH, benign prostatic hyperplasia; CI, confidence interval; COR, crude odds ratio; AOR, adjusted odds ratio; DM, diabetes mellitus; HTN, hypertension

oxygen-free radicals which damage the detrusor (18). These factors may lead to aggravation of LUTS. Further, age of the respondents has been significantly associated with risk of BPH. This is in line with a study conducted in Indonesia among male patients with BPH, both prostate volume and prostate specific antigen increased with ageing. Prostate volume was significantly correlated with prostate specific antigen PSA (19). Similarly, in a community based study conducted to assess risk factor for BPH, the prevalence of clinical BPH at follow-up increased significantly with age, from 4% among men aged 40–49 years at study entry to 8% among men aged 60–70. The prevalence of severe clinical benign prostatic hyperplasia also increased significantly with age (20). This is in line with the findings from the Krimpen and Baltimore longitudinal study of aging, which suggests that older men's prostates grow at a rate of 2.0% to 2.5% per year; this may be because the prostate's volume grows with age (21, 22). Another study in Sahlgrenska University Hospital, Sweden has also confirmed that prostate volume and serum PSA concentration are significantly correlated and increase with advanced age (23). Further, currently, it is widely accepted that testosterone levels decrease with age, and literatures show that lack of testosterone remains a pivotal risk factor for LUTS and BPH (24). Furthermore, it is reported that the aged sustain higher prevalence of metabolic diseases such as metabolic syndrome (25) worse metabolic status will lead to higher odds of LUTS/BPH.

The present study has some limitations. First, we used secondary data and there might be missed information or incomplete medical records. Moreover, we reviewed only one year data that might lack representation adequacy. In addition, it is a facility-based study which cannot be generalized at community level. Furthermore, sample size may not be adequate for subgroup analysis.

Conclusion

In this study, nearly half of the participants had BPH. Age, family history of BPH and self-history of diabetes were predicting factors for

prevalence of benign prostatic hyperplasia. The researchers recommend further studies on reduction strategies of benign prostatic hyperplasia among older age group and among those who had family history of benign prostatic hyperplasia.

Ethical considerations

Ethical approval was obtained from Hawassa University College of Medicine and Health Sciences, Institutional Review Board (IRB). Support letter was obtained from HUCSH Urology Department.

Data availability statement

Readers who wish to gain access to the data can write to the corresponding author Ayantu Melke at ayantumelke@gmail.com.

Competing interest

The authors declare that they have no competing interests.

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