DOI: https://doi.org/10.54393/pjhs.v3i03.66

PAKISTAN JOURNAL OF HEALTH SCIENCES

https://thejas.com.pk/index.php/pjhs

Volume 3, Issue 3 (August 2022)

Original Article

Hypogonadism in Benign Prostate Hyperplasia: A Cross Sectional Study

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ARTICLE INFO

Key Words:
Hypogonadism, Benign Prostate Hyperplasia

How to Cite:
Khan, I. ., Aftab Younus, M. ., Shoaib, M. ., Haris, M. ., Ullah Wazir, N. ., Jehangir Khan, M. ., Haris, S., & Deeba, F. . (2022). Hypogonadism in Benign Prostate Hyperplasia: A Cross Sectional Study: Hypogonadism in Benign Prostate Hyperplasia. Pakistan Journal of Health Sciences, 3(03). https://doi.org/10.54393/pjhs.v3i03.66

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Received Date: 12th August, 2022
Acceptance Date: 21st August, 2022
Published Date: 31st August, 2022

ABSTRACT

Benign prostatic hyperplasia is a common health problem affecting men older than 50 years. It is estimated that 30 million men have benign prostatic hyperplasia related clinical features **Objective:** The objective of this study was to find out the relationship between hypogonadism in patients presenting with benign prostate hyperplasia at tertiary care center. **Methods:** A descriptive cross-sectional study conducted at Urology Department Lady Reading Hospital Peshawar for a period of one year from June 2019 to May 2020. A total of 361 patients with benign prostate hyperplasia were studied. The sampling technique was consecutive non probability sampling and WHO sample size calculator was used for sample size determination. Serum testosterone level was done all patients as per inclusion criteria. All the data was analyzed in SPSS version 20.0. **Results:** The mean age, height weight, BMI and testosterone level of qualitative variables were 56.42±10.05, 167.54±9.97, 64.96±12.92, 23.07±4.96 and 15.36±6.36 respectively. The testosterone level decreased with ageing in different age groups. 29.6% patients of our study were 50-59 years old. The hypertensive and diabetic patients with BPH were 31.3% and 22.4% respectively. Out of 361 patients 67 were hypo gonadal men making 18.6%. The hypogonadism had statistically significant mean values of serum testosterone level ($p<0.001$). **Conclusions:** This study concluded on the analytical findings that hypogonadism is significantly associated with benign prostate hyperplasia. The testosterone levels decrease with the increase of age and thus patients with low testosterones are more prone to develop benign prostate hyperplasia.

INTRODUCTION

Benign prostatic hyperplasia is a common health problem affecting men older than 50 years. It is estimated that 30 million men have benign prostatic hyperplasia related clinical features [1]. The prostatic hyperplasia is associated with the age related hormonal changes and changes in the prostatic epithelial and stromal compartments with ageing. The testosterone level is decreased with the age and the risk of BPH development increases [2]. Other factors associated with the development of BPH are hyperinsulinemia, metabolic syndrome and insulin like growth factors [3]. It is suggested that hyperinsulinemia is related to the BPH due to the fact that patients with BPH has higher levels of insulin early morning shown by different studies. This high insulin level is also related to the metabolic syndrome as well [4]. Hypogonadism is associated with benign prostate hyperplasia. Different studies have shown that patients with benign prostate hyperplasia have more frequency of hypogonadism than those who have normal prostate. The prevalence of hypocorism in normal population ranges from 2 to 12.8 % [5]. while the prevalence of hypogonadism in patients with benign prostate hyperplasia is 16.2% [6]. The effect of testosterone on prostate and its size is still unknown. The dihydro testosterone, an active metabolite

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of the testosterone in the prostate is responsible for the activation of an androgen receptor results in the enlargement of prostate. The is enzymes 5 reductase type 1 and type 2 help in the conversion of testosterone in the prostate to the dihydro testosterone [7]. The drugs finasteride and dutasteride are 5 reductase inhibitors block the 5 reductase and thus reduce the prostate volume by 25% in enlarged prostate and help in the reduction of lower urinary tracts symptoms. It is also a well known that decreasing the testosterone level in patients with prostate carcinoma will decrease the size of the prostate i.e. castration in the prostate carcinoma will decrease the size of the prostate [8,9]. The FDA warned all the manufacturing companies of testosterone saying that patient with BPH should not be treated with testosterone therapy for hypogonadism because it "increases the risk of worsening signs and symptoms of BPH" [10]. The risk of BPH increases with the use of testosterone therapy for hypogonadism in men and therefore such treatment is contraindicated in patients with benign prostate hyperplasia [11]. The controversies about the testosterone therapy still exist and no convincing data is available suggesting the risk of Ca prostate by using testosterone therapy [12]. In a study by Wang C et al showed that there is no affect of testosterone therapy on the prostate size and volume [13]. Keeping in mind all the controversies about the testosterone and benign prostatic hyperplasia it pushed me to study the association of testosterone level in patients with begin prostate hyperplasia. The hypogonadism in patients with benign prostate hyperplasia will lead us to know its prevalence and thus will help us the management of hypogonadism related to the BPH.

METHODS

This descriptive cross sectional study was conducted at Department of Urology, PGMI Lady Reading Hospital Peshawar, Pakistan from June 2019 to May 2020 for duration of one year. The sample size was 361, keeping 16.2% proportion of hypogonadism among patients with benign prostate hyperplasia, 99% confidence interval, 5% margin error using WHO sample size calculator. The sampling technique was consecutive non probability sampling. All the patients presenting with benign prostate hyperplasia diagnosed on the basis of digital rectal examination and ultrasonography with age 30 to 90 years, included in the study and patients with known case of Ca prostate, known case of hypogonadism, history of hernia, varicocele or using testosterone therapy were excluded. Exclusion criteria were strictly followed to control the confounders and to exclude bias in the study results. After permission from hospital ethical committee and taking consent from patients included in the study, 3 ml of blood was taken from all the patients presented with benign prostate hyperplasia and was sent to hospital laboratory for the detection of testosterone levels. All the investigations were done in same laboratory by a technician having experience of more than five years. All the data like age, height weight, BMI, duration of BPH, hypogonadism, testosterone levels, diabetes and hypertension were recorded in a pre-designed proforma. All the data was analyzed in SPSS version 20. Mean and standard deviation was calculated for numerical variables and frequencies and percentages were calculated for qualitative variables. Independent t test for continuous variables was applied with p value of < 0.05 as significant.

RESULTS

The mean and standard deviation of age, height, weight and BMI were 56.42±10.05, 167.54±9.97, 64.96±12.92, 23.07±4.96 respectively. The mean and standard deviation of testosterone levels was 15.36±6.36 (Table 1).

Variables	N	Mean ± SD
Age (Years)	361	56.42±10.05
Height (cm)	361	167.54±9.97
Weight (Kg)	361	64.96±12.92
BMI (Kg/m2)	361	23.07±4.96
Duration of BPH (Days)	361	5.24±3.34
Testosterone level (nmol/l)	361	15.36±6.36

Table 1: Mean and standard deviation of quantitative variables of patients with BPH

The testosterone level was analyzed in different age groups in patients with BPH. Out of 361 patients with BPH, 107 patients with the age group of 50-59 years had mean ± standard deviation of testosterone15.61±5.61 making 29.6% of all the patients included in the study (Table 2).

Age Group	Mean±SD	N(%)
< 40 years	20.76±5.713	37(10.2%)
40-49 years	19.84±5.348	68(18.8%)
50-59 years	15.61±5.614	107(29.6%)
60-69 years	13.50±4.905	69(19.1%)
70-80 years	10.92±5.035	56(15.5%)
>80 years	8.96±3.884	24(6.6%)
Total	15.36±6.364	361(100.0%)

Table 2: The mean, standard deviation and percentage of age group of Testosterone level (nmol/l) in BPH

Out of 361 patients presented with BPH, 113 patients were hypertensive making 31.3% of all the patients presented with BPH. 81(22.4%) patients were diabetic among all 361 patients with BPH and rests of the 280 were non diabetic. Out of 361 patients presenting with BPH, 67 patients (18.6%) patients had hypogonadism (serum testosterone <12nmol/l) (Table 3).

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Comorbidities in patients with BPH	Frequency(%)
Hypertension absent	248(68.7%)
Hypertension present	113(31.3%)
Diabetes absent	280(77.6%)
Diabetes present	81(22.4%)
Hypogonadism absent (serum testosterone >12nmol/l)	294(81.4%)
Hypogonadism present (serum testosterone >12nmol/l)	67(18.6%)
Total	361(100.0%)

Table 3: Frequency and percentage of Diabetic, Non Diabetic and hypertensive and normotensive and

Hypogonadism in patients with BPH

Patients with hypogonadism had statistically significant mean values of serum testosterone level i.e. 9.58 3.52 (p<0.001)(Table 4).

Hypogonadism	N	Testosterone level (nmol/l)Mean± SD	sig
Hypogonadism absent (serum Testosterone >12nmol/l)	294	16.68±6.13	0.001
Hypogonadism present (serum Testosterone ≤12nmol/l)	67	9.58±3.52	

Table 4: Comparison of Hypogonadism in BPH with serum testosterone(nmol/l)

DISCUSSION

Androgens are believed to be the cause of benign prostate hyperplasia and lower urinary tract symptoms [14,15]. The pathogenesis of benign prostate hyperplasia is still unknown but different studies show different factors involved in the pathogenesis of BPH. Griffiths K et al believe that orchiectomy or suppression of pituitary –testicular axis results in decrease in the prostate volume. Finasteride and Dutaseride are the 5 reductase inhibitors suppress the testosterone levels and thus causing the decrease in the prostate volume [16,17].The androgens are important for the prostate growth so the androgens contribute to the development of lower urinary tract symptoms secondary to the benign prostate hyperplasia [18]. Other studies showed that two main factors involved in the benign prostate hyperplasia are ageing and androgen deficiency. The androgens are essential for the structural and functional integrity of the prostate and any disturbance in the androgen levels in the body results in enlargement of the prostate [19]. With ageing the testosterone level is decreased and the estrogen level is increased. A study by Ho CK et al showed that estrogen is responsible for the development of BPH [20]. The association of testosterone level and benign prostate hyperplasia was studied by many authors. Few authors suggested that increased testosterone level are associated with the enlargement of prostate while other suggested that low testosterone level are the cause of BPH. Joseph et al showed high testosterone level causes the prostate enlargement in African-American population but Meikle et al were of the opinion that there is inverse correlation between the testosterone and BPH saying that low testosterone level in men causes benign prostate hyperplasia [21,22]. Similarly, in the data analysis of this study shows that hypogonadism is significantly associated with benign prostate hyperplasia as shown in the study. Patients with hypogonadism had statistically significant mean values of serum testosterone level i.e. 9.58 3.52 (p<0.001). This study also shows that the testosterone levels are decreasing among the age groups as shown. Obesity and BPH1 are associated with each other reported by different epidemiological studies [23,25]. High BMI is associated with lower urinary tract symptoms and BPH shown in meta analysis while few studies show no relationship of high BMI and BPH [24,26]. In our study the mean BMI was 23.07±4.96 kg/m2 Table 1 showing no significantly positive association with BPH in data analysis. The diabetes and BPH1 reported to be associated with each other in different studies [27,29]. The controversies about BPH remain unsolved as few other studies showed the relationship of hyper insulimnmeia with prostate enlargement [28]. Patients with diabetes have more risk of developing lower urinary tract symptoms. Nandeesha et al showed that insulin level as independent predictor of BPH [30]. In our study 22.4 % patients with BPH were diabetic Table 3 showing no significant relationship between BPH and Diabetes. Hypertension and BPH1 were reported to have positive relationship with each other [31]. The interesting thing between their relationship is both the hypertension and BPH can be treated with 1-adrenoceptor antagonists [32]. Our study showed that 31.3% patients were hypertensive Table 3. As both the BPH and Hypertension are old age diseases so the relationship between them were not analyzed for their correlation. Different studies reported differently about the association of hypogonadism and benign prostate hyperplasia. Our studies focused on the testosterone level in old age and its effects on the prostate. We found that the prevalence of hypogonadism in benign prostate hyperplasia was 18.6% while in a study by Wichendu PN et al the prevalence of hypogonadism in BPH was 16.2% [6].

CONCLUSIONS

Our study concluded on the analytical findings that hypogonadism is significantly associated with benign prostate hyperplasia. The testosterone levels decrease with the increase of age and thus patients with low testosterones are more prone to develop benign prostate hyperplasia.

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