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ORIGINAL ARTICLE

Age-Related Histopathological Changes in the Prostate: An Autopsy Study

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ABSTRACT

Background: The prostate gland is a vital male reproductive organ, and its diseases, particularly benign prostatic hyperplasia (BPH), prostatitis, and carcinoma, are common with advancing age. Autopsy-based studies provide valuable insights into latent and subclinical prostatic pathology.

Aim: To evaluate histopathological changes in the prostate with respect to age and to determine the prevalence of BPH, prostatitis, and carcinoma in autopsy cases.

Materials and Methods: This prospective study was conducted on 200 male autopsy cases above 35 years of age at Government Medical College & Rajindra Hospital, Patiala. Prostate specimens were retrieved, examined grossly, and subjected to histopathological analysis. Data were analyzed with respect to age, residence, and associated lesions.

Results: The majority of cases were in the 36–45 years age group (53.5%). BPH was the most common lesion, observed in 84.5% of cases, with increasing prevalence with age. BPH with prostatitis was found in 5.5% of cases. No cases of carcinoma were detected. No significant rural–urban difference was observed.

Conclusion: BPH is highly prevalent in males above 35 years and increases with age. Prostatitis is less common and often associated with BPH. Autopsy studies are valuable in detecting subclinical prostatic changes

KEYWORDS

• Benign prostatic hyperplasia • Prostatitis • Autopsy study • Histopathology • Age-related changes • Prostate gland

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INTRODUCTION

The prostate is a compact male accessory gland that surrounds the proximal urethra and secretes fluids essential for sustaining sperm viability and promoting motilitybenign.[1] It is structurally divided into peripheral, central, transitional, and anterior fibromuscular zones. Hyperplastic changes are predominantly seen in the transitional zone, whereas malignant lesions most frequently arise from the peripheral zone.[2] Diseases affecting the prostate primarily include benign prostatic hyperplasia (BPH), prostatitis, and carcinoma. Prostate cancer ranks among the most commonly diagnosed malignancies in men worldwide and represents a major cause of cancer-related mortality, particularly in advancing age groups.[3] In the Indian population as well, it constitutes a significant proportion of male cancers.[4]

BPH is an extremely common condition in ageing men and is often associated with lower urinary tract symptoms such as increased frequency, urgency, nocturia, and decreased urinary stream.[5-7] Several risk factors have been implicated in the development of prostatic carcinoma, including increasing age, genetic predisposition, and modifiable lifestyle factors such as diet and physical inactivity.[8] Emerging evidence suggests that chronic inflammation may contribute to the development and progression of BPH by influencing cellular proliferation and apoptosis.[9-11]

The present study aims to evaluate prostatic enlargement in relation to age. Additionally, histopathological examination is undertaken to identify any latent pathological conditions, including carcinoma, in autopsy specimens.

MATERIALS & METHODS

This prospective study was conducted in the mortuary of Government Medical College and Rajindra Hospital, Patiala. A total of 200 autopsies were studied. After obtaining consent, details of each case were recorded as per the proforma. Autopsy was performed, and the prostate was retrieved through the urinary bladder; gross findings were recorded, and the prostate was preserved in 10% formalin for histopathological examination.

Inclusion criteria: Male deceased above the age of 35 years, as per the inquest report, were included in this study.

Exclusion criteria: Male deceased below the age of 35 years, as per the inquest report, were excluded from the study.

Histopathological examination of the prostate specimens was carried out in the Pathology Department. The histopathological changes in the prostate were studied according to age of the deceased, location of lesion (if any), and grading according to Gleason's system. All data were recorded, compiled, and analysed statistically.

RESULTS AND DISCUSSION

Prostatic enlargement is strongly associated with advancing age, with a progressive rise in incidence observed in older individuals. This study was undertaken to evaluate the various histological lesions in prostatic specimens in relation to age. A total of 200 cases were included in this study, who were brought to the mortuary for post-mortem examination. All cases were observed in individuals above 35 years of age. The maximum number of cases (n = 107, 53.5%) were in the age group of 36–45 years (Table 1). The minimum age was 36 years and the maximum was 90 years, with a mean age of 46.9 years. Out of the total 200 cases, 195 (97.5%) cases were married. Five (2.5%) cases were unidentified; therefore, marital status was not known (Table 2). In view of this, no inference in relation to marital status could be made.

Table 1: Showing the age ranges taken and the number of cases studied

Age Range (years)	No. of cases	Percentage
36-45	107	53.5%
46-55	57	28.5%
56-65	24	12.0%
66-75	8	4.0%
76-85	3	1.5%
86-95	1	0.5%
Total	**200**	**100.0%**

Table 2: Showing the marital status of the cases studied

Age Range (Years)	No. of cases	Marital Status		
		Married	Unmarried	Unknown
36–45	107	104	0	3
46–55	57	56	0	1
56–65	24	24	0	0
66–75	8	7	0	1
76–85	3	3	0	0
86-95	1	1	0	0
Total	**200**	**195**	**0**	**5**

Most of the cases (45%) were matriculate to senior secondary qualified, followed by illiterates (30%), graduates (12.5%), and pre-matriculates (10%); 2.5% cases were unknown (Table 3). Most of the cases were farmers 58 (29%), followed by unemployed 51 (25.5%), businesspersons 31 (15.5%), labourers 25 (12.5%), government jobs 18 (9%), private jobs 12 (6%), and unknown 5 (2.5%) (Table 4). A total of 126 cases were from rural areas, 69 cases were from urban areas, and the area of residence was unknown in 5 cases. (Table 5). Punjab is an agrarian society with predominantly rural habitation; therefore, the number of cases available is also a reflection of this. History regarding certain risk factors was taken from the relatives of the deceased; blinding could not be ensured at this stage. There may have been a possibility of selection bias. BPH was found in 169 (84.5%) cases out of a total of 200 cases (Table 6). From 126 rural cases, BPH was found in 107 (84.9%) cases, and from 69 urban cases, BPH was found in 58 (84.1%) cases. From 5 unknown cases, BPH was found in 4 cases. There was no statistically significant difference in the prevalence of benign prostatic hyperplasia (BPH) between urban and rural populations.

Table 3: Showing educational distribution of the cases studied in different age groups

Age Range (Years)	No. of cases	Education				
		Pre-matric	Matric to Sr. Secondary	Graduate	Illiterate	Unknown
36–45	107	5	61	15	23	3
46–55	57	10	21	8	17	1
56–65	24	4	6	2	12	0
66–75	8	1	2	0	4	1
76–85	3	0	0	0	3	0
86-95	1	0	0	0	1	0
Total	200	20	90	25	60	5

Table 4: Showing occupational status of the cases studied in different age groups

Age Range (Years)	No. of cases	Occupation						
		Business	Farmer	Govt. job	Labourer	Pvt. job	Unemployed	Unknown
36–45	107	22	25	8	19	9	21	3
46–55	57	8	22	9	6	3	8	1
56–65	24	1	10	1	0	0	12	0
66–75	8	0	1	0	0	0	6	1
76–85	3	0	0	0	0	0	3	0
86-95	1	0	0	0	0	0	1	0
Total	200	31	58	18	25	12	51	5

Table 5: Showing the area of residence of cases studied in different age groups

Age Range (Years)	No. of cases	Place		
		Rural	Urban	Unknown
36–45	107	62	42	3
46–55	57	39	17	1
56–65	24	18	6	0
66–75	8	5	2	1
76–85	3	1	2	0
86-95	1	1	0	0
Total	200	126	69	5

Table 6: Showing age ranges and the number of cases detected with BPH histopathologically

Age Range (years)	No. of cases	BPH Rural (126)		BPH Urban (69)		Unknown	BPH Total	
		n	%	n	%	n	n	%
36-45	107	46	74.2%	34	81.0%	2	82	76.6%
46-55	57	36	92.3%	15	88.2%	1	52	91.2%
56-65	24	18	100.0%	5	83.3%	0	23	95.8%

Age Range (years)	No. of cases	BPH Rural (126)		BPH Urban (69)		Unknown	BPH Total	
		n	%	n	%	n	n	%
66-75	8	5	100.0%	2	100.0%	1	8	100.0%
76-85	3	1	100.0%	2	100.0%	0	3	100.0%
86-95	1	1	100.0%	0	0.0%	0	1	100.0%
Total	**200**	**107**	**84.9%**	**58**	**84.1%**	**4**	**169**	**84.5%**

Table 7: Showing cases of BPH with Prostatitis amongst different age groups as per area of residence

Age Range (years)	No. of Total cases	No. of BPH cases	BPH and Prostatitis				
			Rural	Urban	Total		
			N	N	N	% out of total cases	% out of BPH cases
36-45	107	82	-	4	4	3.7%	4.9%
46-55	57	52	2	1	3	5.3%	5.8%
56-65	24	23	1	1	2	8.3%	8.7%
66-75	8	8	1	-	1	12.5%	12.5%
76-85	3	3	-	-	0	0.0%	0.0%
86-95	1	1	1	-	1	100.0%	100.0%
Total	**200**	**169**	**5**	**6**	**11**	**5.5%**	**6.5%**

Table 8: Showing the BPH with prostatitis cases along with the total BPH cases

Age Range (years)	BPH	BPH and prostatitis	Percentage
36-45	82	4	4.9%
46-55	52	3	5.8%
56-65	23	2	8.7%
66-75	8	1	12.5%
76-85	3	0	0.0%
86-95	1	1	100.0%
Total	**169**	**11**	**6.5%**

Table 9: Showing the overall histopathological findings of all the cases

Age Range (years)	Total cases		BPH without Prostatitis		BPH and Prostatitis		Ca	Normal		Autolysis	
	N	%	N	%	N	%	N	N	%	N	%
36-45	107	53.5%	78	72.9%	4	3.7%	0	24	22.4%	1	0.9%
46-55	57	28.5%	49	86.0%	3	5.3%	0	5	8.8%	0	0.0%
56-65	24	12.0%	21	87.5%	2	8.3%	0	1	4.2%	0	0.0%
66-75	8	4.0%	7	87.5%	1	12.5%	0	0	0.0%	0	0.0%
76-85	3	1.5%	3	100.0%	0	0.0%	0	0	0.0%	0	0.0%
86-95	1	0.5%	0	0.0%	1	100.0%	0	0	0.0%	0	0.0%
Total	**200**	**100.0%**	**158**	**79.0%**	**11**	**5.5%**	**0**	**30**	**15.0%**	**1**	**0.5%**

A study from China reported a pooled prevalence of BPH of 41.5% in urban areas and 38.6% in rural areas, with no statistically significant difference between the two populations.[12] Earlier studies had suggested that men residing in urban areas were at a higher risk of developing BPH compared to those in rural areas.[13,14] However, with rapid economic development and increasing urbanisation of rural regions, the disparity in BPH prevalence between urban and rural populations has gradually narrowed, and the previously higher prevalence observed in urban populations has recently diminished.[15]

Several factors may account for this trend. One possible explanation is the influence of lifestyle factors, particularly dietary habits, on the development of BPH. Increased consumption of total calories, fats, and animal proteins, along with reduced intake of vegetables and whole grains, has become increasingly common in rural populations as well.[16–18] Another contributing factor may be greater awareness and improved screening for chronic age-related diseases, which could partly explain the rising prevalence of BPH reported in rural areas.[19]

The maximum percentage of BPH was found in higher age groups and the minimum percentage in lower age groups. Two major histopathological lesions of the prostate are benign prostatic hyperplasia and prostatic carcinoma. These conditions lead to enlargement of the prostate gland, resulting in urethral compression and various urinary symptoms. These findings were similar to studies conducted in Pakistan, Oman, India, China, and Saudi Arabia.[20-23] However, the occurrence rates of BPH reported in epidemiological studies were considerably different among different countries. The most common prostatic lesion found in our study was benign prostatic hyperplasia, 169 (84.5%), which was frequently found in ages above 65 years. A study in India showed a similar frequency of BPH (87%) and also the same age group being affected.[22]

Studies from Nigeria and Saudi Arabia reported a somewhat lower frequency of BPH (82%), although the peak age incidence was comparable to that observed in our study.[23,24] Another study from Nigeria[25] demonstrated differences in BPH prevalence between rural (31%) and urban (49%) populations. Similar findings were also reported in a study from South Korea.[26] In the present study, the frequency of hyperplasia was found to increase progressively with age from the fifth to the seventh decade, suggesting that hyperplastic changes may represent a physiological response associated with ageing. The pathogenesis of hyperplasia is believed to involve reduced apoptosis, leading to the accumulation of ageing cells within prostatic tissue.

Dihydrotestosterone-mediated growth signalling is believed to promote stromal proliferation while decreasing epithelial cell turnover. Histologically, benign prostatic hyperplasia (BPH) is defined by the presence of nodular hyperplasia, characterized by proliferation of both glandular and stromal elements within the prostate. In the early stages, the nodules are predominantly stromal, whereas with disease progression, glandular (epithelial) components become increasingly prominent.[27–29] A study from Nigeria reported that the incidence of BPH declines after 70 years of age. According to the Robbins and Cotran Pathologic Basis of Disease textbook, approximately 70% of men develop BPH in their sixties, and nearly 90% are affected by the age of 90.[24,27]

BPH associated with prostatitis was identified in 11 (5.5%) out of the total 200 cases studied. Of these, 5 cases belonged to the rural population and 6 cases to the urban population. The occurrence of BPH with prostatitis was more common in the higher age groups and least frequent in the younger age groups. Similar observations have been reported in previous studies. A study conducted in Saudi Arabia reported chronic prostatitis in 95.1% of biopsies and acute prostatitis in 49.7%, while both acute and chronic prostatitis coexisted in 49.2% of cases, with no significant age-related variation.[29] Prostatitis was reported in 13.3% of cases in a Jaipur-based study.[30] Another study from California demonstrated that nearly 10–20% of patients with BPH also experience symptoms of chronic prostatitis/chronic pelvic pain syndrome.[31] The prevalence of prostatitis among men ranges between 3–9%, contributing substantially to impaired quality of life and increased healthcare burden. A multicentric study further noted that approximately 20% of sexually active men with lower urinary tract

symptoms suggestive of BPH complained of prostatitis-like pain and discomfort.[32] Histological prostatitis was observed in 61% of BPH patients in a South African study,[33] whereas a US autopsy study involving 167 Caucasian men found chronic inflammation in 75% of prostates with BPH compared to 50% of prostates without BPH.[34]

In the present study, BPH, either alone or associated with prostatitis, was the most frequently encountered prostatic lesion and was observed in 169 (84.5%) cases (Table 8 and 9). Among these, BPH associated with prostatitis accounted for 11 (5.5%) cases. No carcinoma was detected in any of the 200 cases studied, while no pathological abnormality was identified in 30 (15%) cases. The findings of the present study indicate that BPH predominantly affected individuals above 35 years of age, even in the absence of any significant prior clinical history.

SUMMARY AND CONCLUSIONS

In conclusion our findings support many such studies and a brief of the findings is as follows.

- BPH is observed in a substantial proportion of males above 35 years and shows a steady increase with advancing age, approaching near-universal prevalence in later decades of life.
- The overall incidence of BPH is about 84.5% with no significant rural or urban difference.
- Prostatitis is found in about 5.5% of the male population.
- Amongst the BPH cases, prostatitis is found in 6.5% cases.
- Prostatitis increases from about 5% at third decade to about 13% at sixth decade.
- No case of latent prostatic carcinoma was detected in the present study.

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