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Age as a risk factor for prostate diseases: A 6-year selective prospective study among males in the Brong Ahafo region of Ghana

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Abstract

Introduction: There are many contributing factors to the onset of prostate diseases. Major factors include age, race, hormonal, genetic influence and lifestyle. Diseases of the prostate are generally regarded as the diseases of elderly men. Despite the general attribution of prostate diseases to old age, some school of thought have propounded a polar view to this assertion. **Objective:** This study seeks to assess age as a risk-factor for prostate diseases among men in the Brong Ahafo Region of Ghana. **Method:** A selective prospective study was employed to review prostate cases from 2009 to 2014. Subjects were selectively recruited for the study using the reference age of the study location (40 yrs) – men from 40 years and above were eligible for testing. Patients were routinely screened for prostate lesions using positive family history, serum prostate specific antigen (PSA) test, digital rectal examination and ultrasound scan. Age, diagnosis and grading of carcinomas were also recorded for this study. **Results:** The age range of participants was 42-101 years with a mean± SD of 70.94 ±10.008 and a higher incidence occurring in the year 2010. A higher number of prostatic lesions were recorded between the ages 60-89 with a modal prevalence at 70-89 years. About 51.78% of study participants were diagnosed with benign prostate hyperplasia, 40.07% with adenocarcinomas, 0.85% with chronic prostatitis and 7.3% for both prostatitis and benign prostate hyperplasia. Out of the 589 benign and malignant prostate lesions reviewed, well differentiated adenocarcinoma were prominent among men aged 60-79 years and absent among 40-59 year old's and ≥ 80 years. Moderately differentiated adenocarcinoma was prevalent among individuals 40-99 years but absent among men older than 100 years. Contrary finding is the presence of poor differentiation from 100 years and above. **Conclusion:** Ghanaian men between the ages of 50 and 89 are highly predisposed to prostate diseases compared to those <50 years and >89 years. This observation may provide a rational for effective medical or preventive interventions especially among Ghanaian Adults.

Keywords: Prostate Disease, Age, Diagnosis, Grading.

INTRODUCTION

Diseases of the prostate is a major public health challenge globally, most especially in developing countries. Prostate lesions can be neoplastic or non-neoplastic. Studies have shown higher incidence of the latter than former. Non-neoplastic lesions include benign prostate hyperplasia (BPH), prostatitis, intraepithelial neoplasia with neoplastic lesions including prostate carcinomas [1, 2].

There are many contributing factors to the onset of prostate diseases. However, major factors with significant influence include age, race, hormonal and genetic influence, and lifestyle. A family with prostatic lesion history among men predisposes the subsequent generation of males to prostate diseases. Diverse findings on lifestyle such as smoking and early intercourse have been linked to prostate diseases. It is also known that men of black descent are at higher risk than whites and Asians [3, 4, 5].

Diseases of the prostate are generally regarded as the diseases of elderly men. Studies have shown higher prevalence among men at latter stage of life irrespective of race. It has been shown to have peak incidence among men between the ages of 40 and 70. However, some studies account for incidence below 40 years and also beyond 70 years [2, 5, 6, 7].

Despite the general attribution of prostate diseases to old age, some school of thought have propounded a polar view to this assertion. They asseverated that age has no influence on the pathophysiology of prostate disease but instead provide the timeframe needed for factors such as lifestyle and genetic influence to have impact on the prostate [1, 3].

Prostate diseases, especially carcinoma, remain the biggest threat to male health in Ghana and Africa at large. It is estimated to be the highest reported cancer case and second leading cause of death behind

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liver cancer in Africa [8]. Globally, it is the second most common cancer among males and sixth leading cause of death [9]. This study is aimed at identifying the correlation between age and prostate diseases among men in the Brong Ahafo Region of Ghana. Understanding the risks of developing the disease and the associations or links with other variables is important to develop risk reduction strategies and interventions tailored towards a particularly need. This is done with the purpose of understanding best practices for disease prevention and control and to influence policy decisions in Ghana

METHODOLOGY

This is a 6-year (2009 to 2014) prospective study of reported prostate cases at the Brong Ahafo Regional Hospital, Sunyani-Ghana. The Brong Ahafo Regional Hospital is one of the major hospitals in Ghana serving the region. The hospital has many infrastructures and serves as a referral centre. The geographical location of the hospital, the road network of the country and the commercial and metropolitan nature of the region make the hospital accessible to all the areas that share boundaries with the Region and others that are further away. Subjects were selectively recruited in the study using the reference age of study site – men from 40 years and above were eligible for testing. Patients were routinely screened for prostate lesions using positive family history, serum prostate specific antigen (PSA) test, digital rectal examination and ultrasound scan.

Confirmatory biopsy examination was conducted for those with positive family history, serum PSA $\geq$4 ng/ml and suspicion of malignant lesions via ultrasound scan and digital rectal examination. EDAN DUS-3 with biopsy gun magnum was used for the ultrasound-guided biopsy

Age, diagnosis and grading of carcinomas and were also recorded for the purposes of this study. Age was stratified into ranges as seen in Table 1. Histological findings were taken directly from reports issued by Pathologists. Prostate lesions were grouped into benign and malignant lesions. Benign lesions were chronic prostatitis (CP) and benign prostatic hyperplasia (BPH) whiles malignant lesions were solely adenocarcinoma. The cancerous lesions were further graded into well, moderately and poorly differentiated based on Gleason score. The Gleason score range were "2-4", "5-7" and "8-10" for well, moderately and poorly differentiation respectively [1]. The data was transferred to excel spreadsheet and then thoroughly cleaned for analysis.

DATA ANALYSIS

Data analyses was done using SPSS (Version 20.0; SPSS Inc, Chicago, IL). To account for the underlying sampling frame and to provide representative population prevalence estimates, the sample population was stratified into seven age groups. The incidence of prostate diseases for each age range and year across the 6 years were each determined. The prevalence for each cause and for the various histological presentations were also determined. The relationship between age and prostate cases were also determined

Ethical Clearance

Ethical approval was sought from the Committee on Human Research and Publication Ethics from our institution and was approved before the commencement of this project.(REF: 21/3/BRH.1)

RESULTS

A total of 589 benign and malignant prostate lesions were recorded in this study. The minimum and maximum age of participants were 42 and 101 years respectively with a mean age of 70.94 ($\pm$10.008). Approximately 2.38% (14) of patients had missing or inaccurate age information. The modal age group with prostatic lesions was between 70 to 79 years with 223 cases, closely followed by 60 to 69. The least prevalent age groups were 40 to 49 and above 100 years accounting for 10 and 2 cases respectively. Those within the ages 80-89 presented with a higher number of prostatic lesions than those between 50-59 years (Table 1).

Table 1: Age distribution of annual incidence of prostate diseases

YEAR	p-value	AGE								TOTAL (%)
		40-49	50-59	60-69	70-79	80-89	90-99	100 and Above	Unknown	
2009	0.048	2	6	7	9	6	1			31 (5.26)
2010			12	32	64	16	7		5	136 (23.09)
2011			7	37	37	16	1	1		99 (16.81)
2012		2	16	28	38	20	3		4	111 (18.85)
2013		3	16	27	43	19	2	1		111 (18.85)
2014		3	10	30	32	19	2		5	101 (17.14)
TOTAL		10	67	161	223	96	16	2	14	589

Most prostatic lesions were recorded in 2010 among 136 men. Equal incidence of the anomalies were recorded in 2012 and 2013 with 111 cases each. The year 2014 closely followed with 101 prostate lesions whiles that of 2011 and 2009 were 99 and 31 respectively. The age and year demographics showed highest prevalence among 64 men from 70 to 79 years, recorded in 2010 (Table 1).

Table 2: Diagnosis and age demographics of prostate diseases

DIAGNOSIS	p-value	AGE								TOTAL (%)
		40-49	50-59	60-69	70-79	80-89	90-99	100 and Above	Unknown	
BPH	0.035	7	38	84	121	44	4		7	305 (51.78)
AC		2	24	64	83	44	11	2	6	236 (40.07)
BPH + CP		1	5	11	18	8				43 (7.3)
CP				2	1		1		1	5 (0.85)
TOTAL		10	67	161	223	96	16	2	14	589

BPH = Benign Prostate Hyperplasia
AC = Adenocarcinoma
CP = Chronic Prostatitis

Benign prostate hyperplasia (BPH), adenocarcinoma and chronic prostatitis, in the descending order of prevalence, were the only prostate lesions reported via histology (biopsy). More than 50% of men in the study had benign prostate hyperplasia. Approximately 7.3% of men presented with both prostatitis and benign prostate hyperplasia. Most of these lesions were diagnosed among men from 60 to 89 years with modal prevalence occurring at 70-79 years. Also Chronic prostatitis had a modal prevalence at age 60-69 years (Table 2).

Table 3: Adenocarcinoma grading and age demographics of prostate diseases

GRADING	p-value	AGE								TOTAL (%)
		40-49	50-59	60-69	70-79	80-89	90-99	100 and Above	Unknown	
WD	0.045			1	2					**3 (1.3)**
MD		2	15	42	50	29	7			**145 (62.2)**
PD			8	21	30	15	4	2	5	**85 (36.5)**
TOTAL		**2**	**23**	**64**	**82**	**44**	**11**	**2**	**5**	**233**

WD = Well Differentiated Adenocarcinoma
MD = Moderately Differentiated Adenocarcinoma
PD = Poorly Differentiated Adenocarcinoma

Out of 236 adenocarcinoma cases, 3 were not graded, leaving a total of 233 cases as seen in table 3. Moderately differentiated adenocarcinoma (grade 2) was the dominant form of carcinoma presented to our institution. Only 1.3% of histology reports showed well differentiated adenocarcinoma (grade 1) whiles 36.5% were poorly differentiated (grade 3).

DISCUSSION

Age as a risk factor for prostate diseases has received much attention than any other risk factor. Findings from different continents affirm this assertion. Age as a risk factor is well established despite contrasting views shared by some researchers. According to Jalloh *et al*., [10] Elderly men (>59 years) are more predisposed (13.7%) to prostate disease than young adult between the ages of 39 and 59 years (2.2%). Men below age 40 are least predisposed to prostate diseases (0.005%). Similar sentiments was recorded in this present study, documenting 65.2% (384/589) prevalence among men aged 60 to 79 years with a peak incidence at age 70. A higher number of men in their 90s presented with prostate diseases than those in their 40s. Studies conducted in Nigeria by Adeloye *et al* (2016) agreed with our findings. However, Nigerian men in their 40s accounted for 12.9% which was antipodal to our study (1.2%). Polar findings were documented by Laryea *et al*., [11] in Kumasi (Ghana) showing 25.7% apex incidence among men in their 50s, followed by those aged 70 and above (17.2%). It is evident that Ghanaian men aged 50 to 89 years are commonly diagnosed of prostate disease than those below 50 years. The higher incidence among men in their 40s than those in their 100s can be attributed to the low-life expectancy of men in Ghana. Hence it was not surprising that very low values were obtained in our study. The higher prevalence among men ≥ 90 yrs can also be attributed to late diagnosis either due to financial constraints or ignorance. It could also be attributed to the changes in life-style of most Ghanaian men during old-age which delays the onset of prostate diseases.

There was a sharp increase within the first two years whiles a steady decrease was observed in the last two years. A steady decline in prevalence was observed in the last 3 years (2012-2014) except for those in their 40s and 60s. This deviation from the declination is an issue that must be looked at by initiating public health programs and interventions to educate young men to adopt healthy lifestyle and routine screening.

Benign prostate hyperplasia was the modal disease in this study. Approximately 51.78% men had an increased size of the prostate. This confirms findings by Gyamfi *et al*., [1] which documented 50.6% Ghanaian men with prostate enlargement. They further indicated that about 39.0% had prostate cancer and which is in harmony with our study (40.07%). Chronic prostatitis (inflammation of prostate) was diagnosed among 0.85% men whiles 7.3% men presented with both benign prostate hyperplasia and chronic prostatitis. The prevalence rate of prostatitis in this present study agrees with the 1.8 to 6.3% prevalence rate in recorded in the U.S.A. [12].

Age group with peak incidence of prostate diseases was 70-79 years, followed by 60-69 years. Approximately 9 in 10 men with prostate defect were within the ages of 50 and 89 years. This implies that most Ghanaian men are highly predisposed from 50 years onwards. Those in their 40s as recorded from this study are at a lower risk from developing the disease.

Ageing had a significant correlation with the extent of differentiation of prostate adenocarcinoma. The tumors were predominantly moderately differentiated, followed by poor and well differentiated respectively. This concord with findings of most studies [1, 11]. Contrasting reports were documented from studies in Sudan and Uganda [13] with poorly differentiated adenocarcinoma as the dominant grade [10]. There was steady increase from age 40 to 79 years and a decline from 80 to 100 years. The trend explains the timeframe required for cell differentiation and the difficulty in diagnosis. Moderately differentiated adenocarcinoma are easily recognized by pathologists than well differentiated. Well differentiated cells are sometimes down- or upgraded resulting in its low prevalence [1]. Well differentiated adenocarcinoma were prominent from 60 to 79 years and absent from 40-59 and 80 years onwards. Moderately differentiated adenocarcinoma was from 40 to 99 years but absent among those from 100 years onwards. Contrary finding is the presence of poor differentiation from 100 years and above. This shows that tumor cells are completely transformed to poor differentiation at the very late stage of life. Poorly differentiated adenocarcinoma is known to have a high mortality rate [1], therefore about 36.5% of men in our study were at risk of mortality.

CONCLUSION

This study agrees with the majority of studies acknowledging age as a major factor to prostate disease onset. Ghanaian men between the ages of 50 and 89 are highly predisposed to prostate diseases compared to those below 50 and above 89 years. The presence of these lesions in men below 50 years calls for immediate health interventions. This will ensure early diagnoses and management of lesions to avoid the transformation of diseases into a more lethal grade. Ghanaian men beyond 35 years must also be compelled to adopt periodic and routine screening for prostate disease.

Conflict of Interest

Authors declare no conflict of interest

Authors Contribution

EAK and PSO conceived the study, QE, ADE and JT compiled and analysed the data, EAK, PSO, ADE, QE and JT wrote the manuscript, EAK and PSO edited the manuscript. All authors read and approved the final manuscript

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