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Individual Factors Associated With The Risk Of Developing Prostate Cancer Among Men Seeking Screening Services In A Faith-Based Referral Hospital In Nairobi County, Kenya.

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Abstract
Prostate cancer remains a significant health issue globally. The purpose of this study was to determine the individual factors associated with the risk of developing prostate cancer. The specific objectives were to determine the risk of developing prostate cancer and individual
A descriptive cross-sectional design was employed, targeting men seeking services at private referral hospital. Simple random sampling was used to select respondents. Data accuracy was entered in SPSS and correlation analysis via crosstabs determined relationships, with statistical significance set at $p<0.05$. Results were presented using frequency distribution tables, graphs, and charts.
The study found that 17.2% of participants had PSA levels above 4ng/ml, indicating a high risk of prostate cancer. However, no individual factors were significantly associated with prostate cancer.
In conclusion elevated PSA levels, recurrent inflammation, and insufficient physical exercise are significant factors associated with an increased risk of developing prostate cancer. various factors are linked to prostate cancer risk, further in-depth analysis is needed to bridge information gaps. Increased support and encouragement for at-risk patients to undergo screening are essential.
Key Words: *Benign Prostatic Hyperplasia, Hormonal Influence, Screening, Prostate Specific Antigen, Recurrent Inflammation.*

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I. Introduction

According to CDC (2018), prostate cancer is one of the most concerning types of cancer that is common that affects men around the world. Prostate cancer can be described as a type of cancer that mostly affects the prostate (A small walnut-shaped gland) which is located below the male's bladder. The main cause of the cancer is currently unknown but the risk of developing the disease is associated with various factors such as age, family history, ethnicity, lifestyle factors, diet among others. The WHO (2020) notes that more than 1.1 million men are diagnosed with prostate cancer annually thus accounting for 15% of cancers diagnosed among men. Desai *et al*. (2022) also noted that the incidence of prostate cancer was significantly increasing especially in relation to the race and different age groups. An estimate of 375,305 people died in 2020 globally as a result of prostate cancer (Wang *et al*., 2022). The burden of prostate cancer is also expected to rise exponentially to an estimated 2.3 million cases with at least 740,000 deaths by 2040 (Culp *et al*., 2020).

The risk of prostate cancer in Africa is highly concerning especially considering the already high burden associated with the management of communicable diseases. Currently, the prevalence of prostate cancer in sub-Saharan Africa is estimated to be below 40% but this data is not a clear reflection of the disease (Cassell et al., 2019). Seraphin *et al*. (2021) notes that the highest risk for prostate cancer is rapidly increasing with the highest cumulative risk recorded in Seychelles and Zimbabwe where 1 in 9 and 1 in 10 people respectively are at high risk of developing prostate cancer by the age of 74 years.

In Kenya, prostate cancer is accounts for at least 17.3% of cancers associated with men and 10.2% for other cancers in the country. The age standardized rate (ASR) for prostate cancer is 40.6/100,000 (Mutua *et al*., 2017). According to IARC (2020), at least 3412 new cases of prostate cancer were reported in 2020 translating to an incidence rate of 39.9 men per 100,000 who were affected with prostate cancer. Additionally, there has been low uptake of prostate cancer screening services which can be attributed to a combination of factors, including a lack of awareness and the fear associated with diagnosis. furthermore, the landscape of prostate cancer research is marked by limited and often skewed data, leaving a gap in understanding the disease's prevalence and individual risk factors. Therefore, this study aimed at exploring the individual factors associated with the risk of developing prostate cancer among men seeking screening services in a faith-based referral hospital in Nairobi County, Kenya.

Research Question

What individual factors are associated with the risk of developing prostate cancer among men seeking screening services in a faith-based referral hospital in Nairobi County, Kenya?

II. Materials And Methods

Research Design

A descriptive cross-sectional design was adopted for this study, capturing data from participants at a single point in time. This method is considered quick, cost-effective, feasible, and has practical applications.

Study Population

The study population comprised of 130 men who sought screening services at Mater Hospital. Inclusion criteria included all male patients aged 18 years and above who consented to participate. Exclusion criteria were patients who were too sick or unwilling to participate in the study.

Sampling Design

Respondents were selected using simple random sampling. After being incorporated into the hospital system, participants were directed to a designated research area within the facility. From this group of patients seeking prostate cancer screening services, respondents were randomly chosen until the desired sample size was reached.

Sample Size Calculation

The Cochran formula was used in the calculation of the sample size

$$ss = \frac{z^2 \times (p) \times (1-p)}{c^2}$$

Where :

Z=the standard normal deviate that provides a 95% confidence interval of (1.96)

(p)= incidence (50% (0.5) was used due to the limitation of data.)

c=absolute precision (error bound) (0.05)

SS=Population

$$ss = \frac{1.92^2 \times (0.5) \times (1-0.5)}{0.05^2} = 384.16$$

Since the population size is less than 10,000 the final sample estimate (n*f*) was calculated using the following formula:

$$nf = \frac{n}{1 + (\frac{n}{N})}$$

Where:

(n*f)* = the desired sample size (when the population is less than 10,000)

(n) = the desired sample size (when the population is more than 10,000)

N = population of patients 130 male participants

Hence:

$$nf = \frac{384}{1 + (\frac{384}{130})} = 98$$

To cater for any extra damages and loss of questionnaires a 10% attrition rate was implemented i.e., 98+9= 107 respondents.

Validity and Reliability

The questionnaire was subdivided according to variables and objectives to ensure comprehensive and representative content. Referencing other research studies helped identify similar challenges in similar contexts. Supervisors provided suggestions, which were incorporated into the final document. Reliability was tested using the Lee Cronbach alpha test on the pilot study questionnaires, with a threshold of 0.7 considered appropriate. The study achieved a Cronbach alpha of 0.741, indicating acceptable reliability.

Data Collection

A semi-structured questionnaire was used in the collection of data and it was divided with the objectives captured in the study. The questionnaire entailed sections such as socio-demographic factors, lifestyle factors, health history, and screening results. The questionnaires were distributed when the patients reported to the facility to undergo the screening services. Once the participants were in the facility, their data was recorded in the facility records and later they were directed to the research study area within the health facility. Here, the selected

participants were incorporated into the research through the research assistants who were helped in the collection of the data after consent from the patients. The questionnaires were then picked at the last station of the camp which was the consultation room.

Data Analysis

Accuracy was ensured by checking the completed questionnaires before they are entered into SPSS v26 software. SPSS was used for analysis. Correlation analysis through crosstabulation was used to determine the relationships between the variables. Bivariate analysis was conducted to capture the independent variables that were associated with prostate cancer. Additionally, logistic regression was also conducted to capture the strength and direction of the associations captured in the study. The level of statistical significance was set at $p<0.05$. Data was then presented by the use of frequency distribution tables, graphs, and charts. In-depth explanation

Ethical Considerations

Before conducting the research, approval was sought from the Institutional Research and Ethics Committee chairperson from the University of Eastern Africa Baraton through an introduction letter. Thereafter, a research permit was acquired from the National Commission for Science, Technology & Innovation (NACOSTI) before initiating the study. Permission was also sought from Mater Hospital to get authorization to conduct the study. The participants were also required to consent and were assured of their confidentiality and no form of identification was used required in the study. Participation in the study was voluntary and all respondents had the ability to withdraw from the study at any given time.

III. Results

Response Rate

The study targeted a total of 107 respondents of which 100 were captured thus translating to a response rate of 93.5%.

$RR = \frac{100}{107} \times 100 = 93.5\%$

Socio-demographic Factors

Table 1 provides the socio-demographic factors of the respondents with the majority weighed 71-80(n=8, 44.4%), height below 5'8" (n=10, 71.4%), aged 58-67 (n=34, 35.8%), married (monogamy) (n=83, 83.8%), 0-5 family members (n=55, 59.1%), Kikuyu ethnicity (n=40, 40.4%), protestants, (n=55, 55.6%). A majority had tertiary education (n=65, 65.7%), technicians/managers (n=30, 30 %), and health insurance (n=42, 55.3%).

The Risk of Developing Prostate Cancer

Figure 1 presents the findings on the risk of prostate cancer which shows that 17.2% of the patients were at high risk of developing prostate cancer.

Individual Risk Factors For Developing Prostate Cancer

Factors Associated with PSA

The Table 2 presents the chi-square and odds ratio (OR) for the correlation between PSA levels and various individual factors related to the risk of developing prostate cancer in men. The chi-square tests for age groups, marital status, family size, ethnicity, religious affiliation, education level, current occupation, and health insurance status showed no statistically significant associations with elevated PSA levels (p-values were all above 0.05). Specifically, chi-square values were 0.362 for age groups, 0.813 for marital status, 0.469 for family size, 0.069 for ethnicity, 0.177 for religious affiliation, 0.572 for education level, 0.808 for occupation, and 0.957 for health insurance. The odds ratio for health insurance was 1.071 (95% CI: 0.089-12.831), suggesting no significant effect. Overall, the individual factors studied did not show significant correlations with the risk of elevated PSA levels and potential prostate cancer.

Factors associated with BPH

The Table 3 shows the chi-square values and odds ratios (OR) for various factors related to benign prostatic hyperplasia (BPH) and its correlation with individual factors. Age groups did not show a significant association with BPH (chi-square = 0.202), and the odds ratio was not calculated (n.c). Marital status also had no significant association (chi-square = 0.812), with no calculated odds ratio. Family size showed no significant relationship with BPH (chi-square = 0.717), and no odds ratio was calculated. Ethnicity had a chi-square value of 0.140, indicating no significant association, and the odds ratio was not calculated. Religious affiliation (chi-square = 0.194) and education level (chi-square = 0.477) also did not show significant associations with BPH, and the odds ratios were not calculated. Current occupation had a chi-square value of 0.808, indicating no significant correlation with BPH, with no odds ratio calculated. Health insurance status had a chi-square value of 0.773 and

an odds ratio of 1.250 (95% CI: 0.274-5.705), suggesting no significant impact on BPH risk. Overall, the factors studied did not show significant associations with BPH.

IV. Discussion

Individual Characteristics Related For Developing Prostate Cancer

Factors Associated with PSA

Age is typically considered a significant risk factor for elevated PSA levels and prostate cancer. However, this study found no statistically significant association between age groups and PSA levels (chi-square = 0.362, $p > 0.05$). This contradicts well-established research, such as the study by Loeb and Catalona (2007), which reported that PSA levels increase with age, even in the absence of prostate cancer. The finding of no significant association between ethnicity and PSA levels (chi-square = 0.069, $p > 0.05$) contrasts with numerous studies, including the work of Moul et al. (1995), which found that African American men tend to have higher PSA levels than Caucasian men of the same age. Education level showed no significant correlation with PSA levels (chi-square = 0.572, $p > 0.05$). This aligns with some studies but contradicts others. For instance, Poppell et al. (2011) found that men with higher education levels were more likely to undergo PSA testing, potentially leading to more frequent detection of elevated PSA levels. The current study's findings suggest that education level may not directly influence PSA levels themselves.

The lack of association between occupation and PSA levels (chi-square = 0.808, $p > 0.05$) is consistent with some research but contradicts others. For example, Sass-Kortsak et al. (2007) found an association between certain occupations (particularly those with exposure to certain chemicals) and increased risk of prostate cancer, which often correlates with elevated PSA levels. Health insurance status showed no significant impact on PSA levels (chi-square = 0.957, OR = 1.071, 95% CI: 0.089-12.831). This differs from studies such as Fedewa et al. (2010), which found that uninsured men were less likely to receive PSA screening, potentially leading to later detection of elevated PSA levels. Furthermore, the absence of a significant relationship between marital status and PSA levels (chi-square = 0.813, $p > 0.05$) contrasts with some previous findings. For instance, Abdollah et al. (2011) reported that married men were more likely to undergo PSA screening, which could lead to earlier detection of elevated PSA levels.

While this study found no significant associations between various demographic and socioeconomic factors and PSA levels, the existing literature presents a more complex picture. Additionally, PSA levels can be influenced by numerous factors beyond those examined in this study, including prostate volume, inflammation, and certain medications (Catalona, 1994).

Factors Associated with BPH

The findings from this study suggest that individual factors, including age, marital status, family size, ethnicity, religious affiliation, education level, occupation, and health insurance status, do not have significant associations with benign prostatic hyperplasia (BPH). These results contrast with some previous research but align with others, highlighting the complex nature of BPH aetiology. Age is often considered a primary risk factor for BPH, with prevalence increasing in older men. For instance, Parsons (2010) reported that BPH affects about 50% of men by age 60 and up to 90% by age 85. However, the current study found no significant association between age groups and BPH (chi-square = 0.202). This unexpected result may be due to the specific age distribution in the study population or other methodological factors.

Regarding ethnicity, the lack of significant association (chi-square = 0.140) contradicts some previous findings. Platz et al. (2000) observed that African American men had a higher risk of BPH compared to Caucasian men. The discrepancy could be due to differences in study populations or definitions of BPH used across studies. The absence of a significant relationship between education level and BPH (chi-square = 0.477) aligns with some studies but contradicts others. For example, Fowke et al. (2011) found that higher education levels were associated with increased BPH risk, possibly due to health-seeking behaviors leading to more frequent diagnoses.

The current study's finding of no significant association between occupation and BPH (chi-square = 0.808) is consistent with some research but contradicts others. Laven et al. (2008) reported an increased risk of BPH among men in sedentary occupations, which was not observed in the present study. Health insurance status showed no significant impact on BPH risk (chi-square = 0.773, OR = 1.250, 95% CI: 0.274-5.705). This finding differs from Choi et al. (2019), which found that men with health insurance were more likely to be diagnosed with BPH, possibly due to increased access to healthcare and screening. Furthermore, the lack of association between marital status and BPH (chi-square = 0.812) is consistent with some studies but contradicts others. For instance, Yoo et al. (2016) found that married men had a higher prevalence of BPH compared to unmarried men, which they attributed to potential lifestyle differences.

General Association

The study found no statistically significant associations between factors such as age, ethnicity, education level, occupation, health insurance status, and marital status with either elevated PSA levels or BPH. These findings often contradict previous research, which has typically shown associations between these factors and prostate cancer risk. For instance, age and ethnicity are usually considered significant risk factors, however, this study found no such correlations.

V. Conclusion

While various individual factors have been traditionally associated with prostate cancer risk, this particular study found no statistically significant correlations between these factors and elevated PSA levels or benign prostatic hyperplasia (BPH). The lack of significant associations with factors such as age, ethnicity, education level, occupation, health insurance status, and marital status contradicts much of the existing literature, highlighting the complex nature of prostate cancer aetiology. These unexpected results underscore the need for further research to bridge information gaps and clarify the relationships between individual factors and prostate cancer risk.

VI. Recommendation

Given the contradictions between this study and previous research, it is recommended that future studies employ larger sample sizes, diverse populations, and more comprehensive methodologies to better understand these associations. Additionally, healthcare providers should continue to encourage prostate cancer screening for at-risk patients, regardless of individual factors, as early detection remains crucial for effective treatment.

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