A Discrete Choice Clinical Survey and a Proposed Health Promotion Framework for Prostate Cancer in Cameroon

Kenneth Yongabi Anchang[1*], Kyeng Mercy Tetuh[2], Christopher Achu Nji[3], Bame Sixtus[4] and Angu Gideon Ndegeh[5]

[1]Phytobiotechnology Research Foundation Institute (PRF), Catholic University of Cameroon, Bamenda, Cameroon

[2]Value Health Africa, Bamenda, Cameroon

[3]Department of Health Economics, Policy and Management, Catholic University of Cameroon (CATUC) Bamenda, Cameroon

[4]Ringland Medical, Bamenda, Cameroon

[5]District Hospital Fontem, Ministry of Public Health, Cameroon

*Corresponding author: Kenneth Y Anchang, Phytobiotechnology Research Foundation Institute (PRF), Catholic University of Cameroon, Bamenda, Cameroon, Tel: +237 675266162; E-mail: yongabika@yahoo.com

Abstract

Background: Due to the dearth of information about the burden of prostate cancer disease in Cameroon, and in respond to the Sustainable Development Goal (SDG#3) to prevent non-communicable diseases, a discrete choice clinical study of prostate cancer with the aim to determine the incidence, the associated risk factors and comparative diagnostic tools among males in the North-West region of Cameroon was undertaken.

Methodology: A cross-sectional simple random sampling was conducted on 231 male volunteers from five health communities in Bamenda, aged ≥ 40 years. A structured questionnaire was issued to participants prior to screening through which demographic and lifestyle information was gotten. Serum free Prostate Specific Antigen (PSA) was analyzed and digital rectal examination (DRE) performed by a license medical doctor during routine consultation at the Phyto-biotechnology Research Foundation (PRF) integrated centre via an exit poll. The diagnostic criteria stated as PSA value greater than 4 ng/ml or if digital rectal examination was suspicious for cancer. Biopsy was not done.

Results: Out of the 231 men who consented via an exit poll, 45 (19.5%) had a PSA value greater than 4 ng/ml and 68 (28.1%) had a suspicious digital rectal examination. There was a statistical significance between PSA and DRE with a p=0.001. Furthermore, 22 (9.5%) of the males had a PSA of greater than 4 ng/ml and a suspicious DRE. A statistical significance was also established between PSA and DRE with age groups with a p=0.007 and a p=0.001 respectively. No statistical significance was seen with family history of cancer, type of underwear, bicycle riding and physical exercise.

Conclusion: The study indicated less than 50% prevalence rate for the men screened, but the 28.1% prevalence level going by DRE may suggest the growing incidence of prostatitis and or benign prostate hyperplasia. Although biopsies are considered the ideal routine observation, this study suggests that PSA marker and DRE determination can be used in combination with clinical features to make appropriate diagnostic decision on prostate cancer in resource limited communities.

Recommendation: A health promotion framework involving individuals and communities in Cameroon on the awareness and risk factors associated with prostate cancer for men above forty in Cameroon are future preventive measures to embark upon.

Introduction

Prostate cancer is one of the most common chronic diseases affecting men in many industrialized nations like the USA and is the second cause of death among the non-communicable diseases affecting men, with 7.6 million deaths (around 13% of all deaths) occurred in 2008 [1]. Statistical figures of prostate cancer cases in developing countries are unreliable. Although prostate cancer can be slow growing, the disease nonetheless accounts for 10% of cancer-related deaths in males and 13% of all deaths [2,3], with thousands of men dying of prostate cancer each year. In Cameroon, the burden is still very high and the result published by WHO in May 2014 shows a death rate of 2,366/100000 males and ranking Cameroon as the 43rd nation with high mortality in the world [4]. Global Burden of cancer (GLOBOCAN) statistics for 2008 reveals that about 169.3 million healthy lives were lost worldwide due to cancers,

including cancer of the prostate which was responsible for over 4.041 million deaths worldwide, increasing mortality rate due to prostate cancer occur in countries like the Republic of Korea with mortality rates of 7.6%, Moldova 6.5%, Trinidad 4.7%. Increasing mortality rate in some of these countries may be attributed to inadequate facilities, late diagnosis and lack of awareness on this disease. However, the largest decrease in mortality rate occur in countries like USA with a mortality rate of 4.3%, Australia 4.0%, Israel 3.7%, Canada 3.1% which could be attributed to the availability of active cancer programs like the Active Cancer Early Detection Programs (ACEDP) in the USA and the ability of detecting this disease early enough where proper interventions could set in. High prevalence of prostate cancer has been reported among African-American men with a prevalence rate of 81.0 in the age bracket 71-80 years and among Americans 85 with age bracket 71-80 years.

The International Agency for Research on Cancer (IARC) sorts out prostate cancer as a growing health problem and the leading cause of mortality amongst cancers affecting men in African countries with a mortality rate of approximately 28,006 deaths/100,000 in 2010 and projects that by 2030, the number will increase to 57,048 [5]. Following a research conducted by Jackson and his coworkers [6] the prevalence of prostate cancer in several African countries increases up to 50 folds. Considering the 2013 report from WHO, Africa had the lowest Growth National Income of 2513 US Dollars with 49.2 Dollars spent on cancer yearly; indicating the burden this disease has on the economy of this continent. This disease becomes of prime importance in Africa due to the scarcity of pathologist with just 1 pathologist/1 million people in most African countries [7].

GLOBOCAN statistics on cancers in Cameroon showed that the rate of death from all cancers is 73.11/100000/person/year [8,9] and statistics from WHO on prostate cancer in Cameroon published in May 2014 showed that Cameroon falls at the 43rd position of 172 countries seriously affected by prostate cancer with death rate of 23.66/100000 which is considered high death rate. Cameroon being in Africa is not exempted from this rising mortality; as Cameroon is now experiencing a double burden of infectious and chronic non-communicable disease, with much emphasis on the burden of infectious diseases including tuberculosis, HIV/AIDS, malaria [10,11] thereby neglecting the non-communicable diseases including cancer of the prostate which is a serious health problem now a day.

Cameroon is not exempted from the African countries facing a serious problem with pathologists as one pathologist is entitled to cover 300,000 people [12], a contributing problem to better health care services. In an attempt to reduce the burden of cancer, a National Committee for Control of Cancer was created in October 24th, 1990, whose overall objective was to reduce cancer related morbidity and mortality rate in Cameroon and to create cancer registries [13]. However, this committee was not fully implemented due to diversity of funds to communicable diseases. Also, this committee was centered only at Yaoundé and Douala leaving out other urban areas like Bamenda and the information on cancer was entirely hospital based which does not give a clear picture on the prevalence of the disease in the country. On the 6th of April 2006, the Ministry of Public Health signed a partnership agreement with the International Network of Cancer Treatment and Research with the objective of initiating a palliative care since it was realized that cancer patients presenting at hospital were already at the end stage of the disease and thought that the best treatment to offer was palliative care.

Therefore, there is need for improvement in awareness, early diagnosis and treatment of prostate cancer in Cameroon. A better understanding of the etiology and underlying biological mechanism to modifiable risk factors of prostate cancer across all populations can potentially improve care of patients with prostate cancer.

Although biopsy is the definitive diagnostic tool for cancer, PSA testing and standard digital rectal examination have also proved their worth as effective screening tools in the early detection of prostate abnormalities It was for this reason that a cross sectional community and clinical based study was conducted in Bamenda to determine the incidence and associated risk factors of prostate cancer among men aged 40 years and above residing in Bamenda and consulting via an exit poll [14].

Materials and Methods

Study setting

This study was carried out in Bamenda Health Districts, in which five health areas were conveniently selected. These includes the following regions.

Nkwen rural IHC

It is located at mile four Nkwen of Bamenda III council. It is about 200 meters from the main road going to Bambili. Nkwen rural area inhabits a population of about 20418. The IHC comprises of a Chief of center, a Medical Doctor, some nurses and medical laboratory technologists. During the screening exercise, 26 men were present on the screening date and all (except one man who refused a blood sample collection as this was against his religion) participated in the study.

Atuakom IHC

It is located at small Mankon of Bamenda II council. It is found approximately 400 meters opposite Azire New Church. Atuakom health area inhabits a population of about 28123 inhabitants. Atuakom IHC is headed by Chief of Center. A total of 36 men were present on the screening date and all participated in the study.

Ntambang IHC

This health center is located in Old Town Bamenda. It is found under Bamenda II Council. It is located about 200 meters from the Bamenda Central Police Station and about 250 meters from commercial avenue. It is located at 7 door

junctions from Savanna street. Ntambang health area inhabits a population of about 16149 inhabitants. A total of 15 men who came in the study all participated.

Saint Mary Soledad IHC

It is located directly opposite sacred heart college, small Mankon. St Mary Soledad health center is found under Alakuma health area, with a population of about 17029 inhabitants. St Mary health center is headed by a Medical Director. It has almost all the units a hospital has with medical specialists. A total of 59 men were present on the screening date and all participated.

Bamendakwe IHC

This health center is located at up station and it is found under Bamenda I council. It is about 2 km from the ministry of transport. It is headed by Chief of Center. Bamendakwe health area is inhabits a population of about 21861 inhabitants. A total of 105 men were present on the screening date and all participated in the study.

Phytobiotechnology research foundation clinic (PRF)

This is a research centre for integrative medicine located in the Bamenda health district. The centre has facilities for medical research and is affiliated to the Catholic University of Cameroon, Bamenda, Cameroon

Study period and study design

This study lasted for a period of one month. This was from May 2nd to June 2nd, 2016. This was a community based cross-sectional study.

Study population

The population constituted all men aged 40 years and above.

Inclusion criteria

Men aged 40 and above who consented to participate in the study men who filled the questionnaires and provided samples for analysis.

Exclusion criteria

Men who filled the structured questionnaires but refused DRE, Men who filled only the structured questionnaires without providing a blood sample or provided sample without filling the questionnaires. History of surgery and treatment with drugs

Sampling and sample size determination

A convenient sampling technique was used to select the participants from the various health centers.

Sample size determination

Sample size was calculated using the Cochran's formula

$$S=Z2pq/d2$$

Where S=minimum sample size, p=prevalence of prostate cancer, q=1-p, d=degree of precision expected to be 0.05, Z=confidence interval estimated to be 1.96.

Study procedure

Prior to sample collection, the public in the study area was sensitized on the relevance of the early screening for prostate cancer. Sensitization campaign was done through radio announcements and announcements given in churches, age groups and traditional social groups. Community mobilizes in each community used mega phones to create more awareness. In each of the selected health centers, forms bearing free screening campaign for prostate cancer and a screening date were deposited for the eligible participants to get registered. Only men who were of age 40 years and above were eligible to participate in the study. These men were directed to nearest health center. A similar activity was performed in each of the health center. In order to achieve the set goals of this project, the following activities were performed.

Health promotion and education framework on prostate cancer

Men were educated on what prostate cancer is all about, its signs and symptoms and its risk factors. Usually signs and symptoms will start manifesting when the cancer has metastasized. To this effect, these men were encouraged to do annual screening even before they start experiencing these signs and symptoms.

Filling of closed ended questionnaires

It was not every man who was able to fill the questionnaire. Those who were not able to fill the questionnaires were aided in the process.

Digital rectal examination

This examination was performed by a trained medical doctor before collection of blood samples, following American Cancer Society guidelines. This procedure involves inserting of lubricated finger into the anus of a man to feel the prostate gland for any irregularity, hardness and size.

A blood sample collection and PSA analysis

The procedure on how the blood sample to be collected was explained to the participants. Approximately 2 ml of fresh venous blood, under aseptic conditions, was collected from these subjects by venipuncture using a 5-ml syringe and carefully dispensed into a dry tube. From the site of collection to the laboratory in which the samples were analyzed, the samples were transported in cool dry ice at 2°C to 8°C where

they were analyzed immediately. The blood samples were mashed to separate serum from red cells. 100 ul (approx. 2 drops) of blood samples were first tested by a semi quantitative technique using cassettes. Only those samples whose PSA was between 4 ng/ml to 10 ng/ml or greater than 10 ng/ml were retested to quantify the amount of PSA in blood using ELISA technique. This was done as follows; the micro plates' wells for each serum reference, control and patient specimen to be assayed in duplicate were formatted. 50 microliters of the appropriate serum reference control or specimen was pipette into the assigned well.0.100 ml (100 ul) of the biotinylated/enzyme labeled antibodies was added to each well. The wells were gently swirled for 20 seconds to 30 seconds to mix and cover. They were incubated for 60 minutes at room temperature. The content of the micro plate was discarded by decantation or aspiration. 300 ul of wash buffer was added into the wells and procedure repeated for additional four times for proper washing. 100 ul of working substrate solution was added to all the wells.

Do not shake the plate after substrate addition. The mixture was incubated at room temperature for 60 minutes. 50 ul of stop solution was added to each well and mix gently for 15 seconds to 30 seconds, reagents in the same order to minimize reaction time differences between wells [11]. The absorbance in each well was read at 450 nm.

Data management and analysis of questionnaire

The filled questionnaires were returned to the researcher for analysis. Information from participants were keyed in a record book and stored in a computer, flash and CDs. This information was kept confidential with a password only available to the researcher. Data entry was performed using Excel and analyzed and recorded with EPI INFO 3.5.1 for windows statistical software. A P-value less than 0.05 was considered statistical significant in this study and the results were displayed on tables and figures.

Ethical issues

Consent was documented and validated by signing. Participants were counseled on the need to participate in the free screening campaign, the benefits of participating, issue surrounding confidentiality, privacy and purpose of the study was also explained. Participants' participation was voluntary and participants' confidentiality highly maintained. An authorization was obtained from the following hierarchies; The regional delegation of public health, The district medical office in the study area.

Results

General characteristics of the study population

A total of 241 questionnaires were administered and out of these, 240 were completely filled and returned giving a response rate of 99.58%. Out of the 240 participants, 25

(10.4%) were males from rural areas and 215 (89.6%) were males from urban communities. The most represented age group was 60-69 years with a total number of participants of 77 and the least represented age group was 90+ with only 1 participant (0.40%). Approximately 114 (47.5%) of these participants were within the active working population of the society (40 to 60 years).

About 37.5% of the participants had attained the primary level of education while 8.7% had not acquired education, according to level of respondent. The majority (94%) of the men who participated in the study were married while a few (1%) for one reason or the other divorced their wives as shown in **Table 1** below.

Table 1 Age stratification and socio-demographic characteristics.

Parameters	Parameters	Percentage
Age Group		
40-49	39	16.30%
50-59	21	8.80%
60-69	55	22.90%
70-79	77	32.10%
80-89	40	16.70%
90+	8	3.30%
Total	240	100%
Marital status		
Single	7	3.00%
Married	226	94.00%
Divorced	2	1%
Divorced	5	2%
Total	240	100%
Level of education		
Non	21	8.70%
Primary	90	37.50%
Secondary	72	30%
Tertiary	57	23.80%
Total	240	240

Out of a total of 240 men who participated in the study, the majority of the participants (32.10%) were in the age group of 60-69 years while the least number of participants were in the age group of 90+ (0.40%).

Based on the level of respondents, some participants had primary, secondary and tertiary level of education, with a percentage of 21.66% and 15.88%, 21.66% and 8.33%, 20.0% both in urban and rural areas as shown in the **Figure 1.**
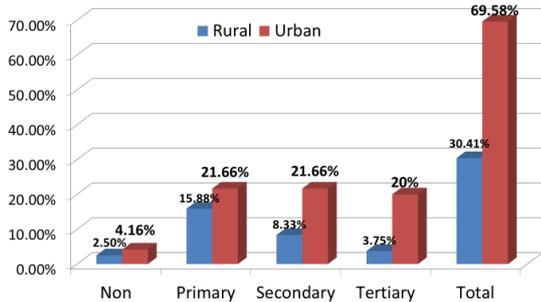
Figure 1 Distribution of study participants based on level of education.

Based on the level of respondents according to marital status, the above figure shows that 94% of the men who participated in this study were married while minority (1%) had divorced their wives.
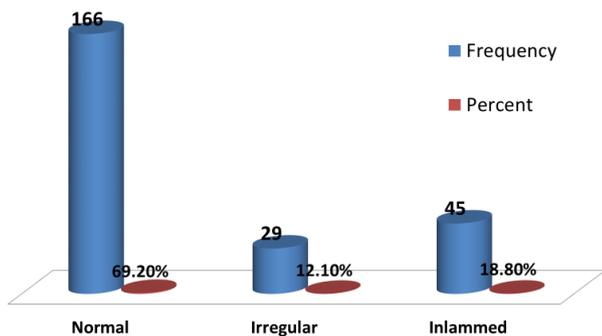

Figure 2 Characteristics of DRE among respondents.

Figure 2 above shows that over 69.20% of the men were detected with no abnormality at the level of DRE, while 12.10% and 18.80% of the participants in this study had irregular and inflamed prostate respectively.

Table 2 Characteristics of DRE and PSA.

Parameter	Types	PSA	
		Present N (%)	**Absent N (%)**
DRE	Normal	24 (47.1)	142 (75.1)
	Irregular	17 (33.3)	12 (6.3)
	Inflamed	10 (19.6)	35 (18.5)

This table demonstrates that 47.1% of the participants who had normal DRE had a PSA value greater than 4 ng/ml and 75.1% of the men with normal DRE had a PSA value less than 4 ng/ml. furthermore, 33.3% of the men whose DRE was characterized as irregular and nodular had a PSA value greater than 4 ng/ml while 6.3% had a PSA value less than 4 ng/ml and 19.6% of men with inflamed DRE had a PSA value greater than

4 ng/ml while 18.5% had a PSA less than 4 ng/ml showed in **Table 2.**

From this study, the overall prevalence of prostate cancer was determined to be 10.4%. The highest prevalence occurred in the age group of 70-79 years. The age groups 60-69 years and 80-89 years had each a prevalence of 14.3 while the age group of 40-49 years and 90+ years had no positive case each.
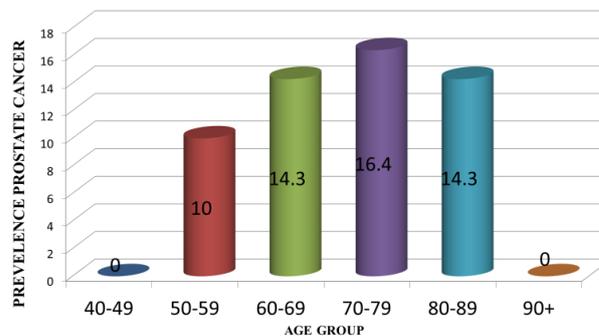

Figure 3 Distribution of prostate cancer Incidence per age group.

Figure 3 above reveals that 87 (36%) of the participants had heard of prostate cancer. Only 45 (18.75%) participants could give a concise definition of what prostate cancer is. 1.5% of the participants said it is a disease that weakens the bladder, a disease that that causes swelling of the gland, a disease that causes painful urination, a disease of the prostate gland. 24% of the participants said a disease that affect the male organ. It is therefore evident that 64% of the participants had no knowledge about prostate cancer before the screening was conducted.

Majority of the participants 153 (64%) were not aware of what prostate cancer is all about, clinical presentations of prostate cancer and risk factors associated with prostate cancer as compared to 67 (36%) who were aware of what prostate cancer is, its clinical representation and associated risk factors of prostate cancer shown in **Figure 4**.
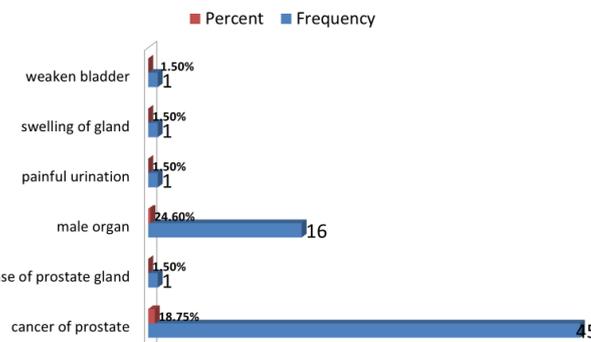

Figure 4 Awareness on the relevance of early screening.

Table 3 shows that family history may not necessarily be associated with prostate cancer as the P-Value is 0.08 which is

greater than 0.05. Most of the participants who said 'NO' to have had any abdominal conditions were instead at a higher risk of developing prostate cancer since their OR is greater than 1 and P-Value is less than 0.05, but when this was adjusted for age, it showed no statistical significant. Bikes as a risk factor was statistically insignificant since the P-Value is greater than 0.05. There is no statistical significance between people living in urban and rural area, suggesting that urban/rural area was not a risk factor in this work. Participants presenting with signs and symptoms were at higher risk of developing prostate cancer as their OD is 3.21 and 95% CI is 1.17-12.83 and p-value 0.002. when this was adjusted for age, it still shows strong correlation as the p-value is less than 0.05, confirming that people presenting with signs and symptoms of the disease may develop prostate cancer. Participants who were on any other medication did not show any statistical significant in developing prostate cancer. Physical exercise was statistically insignificant was the P-value is 0.38. This shows that exercising may not expose one in developing cancer of the prostate.

Participants on any medication were 18.9 times at risk of prostate cancer (AOR=18.9; 95% CI=4.24-84.92, value=0.001) as compared to those on no medication. Men whose DRE detected nodular were at a risk of developing prostate cancer as the OR is 4.96, 95% CI=1.71-14.38. When this was adjusted for age, it still showed a strong correlation as the AOR=18.9784 and 95% CI=1.93-2.84. Participants who had inflamed prostate never demonstrated any statistical significance since it could not be adjusted for age.

Those with medium income were 7.7 times at risk of prostate cancer (AOR=7.7; 95% CI=0.95-62.34, P value =0.05) as compared to those with low income.

Those with high income were 8 times at risk of prostate cancer (AOR=8; 95% CI=1.44-20.49, P value =0.01) as compared to those with low income.

Table 3 Multivariate logistic regression of the factors influencing prostate cancer.

Characteristics	Prostate cancer		OR	95% CI	P-Value	AOR	95% CI	p-value
	Present	Absent						
Family History (yes/no)	18 (13.1)	119 (86.9)	0.62	036-1.06	0.08	-	-	-
Black pants	25 (10.4)	215 (89.6)	0.47	0.15-1.42	0.18	-	-	-
Diagnose of any other medical condition	21(8.8)	219 (91.2)	3.1	1.03-9.38	0.04	0.88	0.17-4.46	0.87
On any medication (yes/no)	15 (6.2)	225 (93.8)	19.53	6.19-61.96	0	18.9784	4.24-84.92	0.0001
Signs/symptoms	105 (43.8)	135 (56.3)	3.21	1.17-12.83	0.002	16.4891	3.42-61.25	0.0011
DRE (nodular/normal)	25 (10.4)	215 (89.6)	4.96	1.71-14.38	0.003	1.62	1.93-2.84	0.004
DRE(inflamed/normal)	-	-	3.37	1.24-9.13	0.01	-	-	-
Ride Bike (Yes/no)	25 (10.4)	215 (89.6)	0.47	0.15-1.42	0.18	-	-	-
Rural/Urban	25 (10.4)	215 (89.6)	1.85	0.66-5.13	0.23	-	-	-
Physical Exercise (monthly/Daily)	25 (10.4)	215 (89.6)	0.62	0.21-3.81	0.38	-	-	-
Income (b/a)	3 (23.1)	10 (76.9)	7.95	1.17-53.78	0.03	7.7	0.95-62.34	0.05
Income (c/a)	9 (22.5)	31 (77.5)	7.69	1.56-37.87	0.01	8	1.44-44.20	0.01
Income (d/a)	3 (21.4)	11 (78.6)	7.22	1.07-48.43	0.04	5.96	0.72-49.49	0.09
Income (e/a)	8 (7)	107 (93)	1.98	0.40-9.64	0.39	1.53	0.27-8.48	0.62
Vegetables/fruits(yes/no)	198 (82.5)	42 (17.5)	3.78	1.31-14.23	0.002	1.12	0.93-2.14	0.06

Discussion

This study was conducted to determine the incidence of prostate cancer and to evaluate the burden of prostate cancer in Bamenda via a comparative PSA and DRE. Over 241 men were recruited in the study, 240 of these participants gave the necessary information needed for the study. This study revealed a prevalence of prostate cancer of 10.4%, which support the hypothesis that there is a relatively high prevalence of prostate cancer in Bamenda, North West Region of Cameroon. This prevalence was similar to the prevalence of a research conducted in Ghana in 2015 with a prevalence of 9.4% [15-21] and that conducted in Dibombari, Cameroon with a prevalence of 8.0% [22]. However, this study revealed a relatively high prevalence of prostate cancer as opposed to previous research work conducted in Ghana with a prevalence of 7.0% [23] which could be as a result of difference in the methodology used. Also, a research conducted in Senegal in 2011 reported a prevalence of 3.8% [24]. The difference in the prevalence values could be as a result of the existence of Active Cancer Screening Program that exists in Senegal. Another research carried out in Accra, Ghana demonstrated a prevalence of 6.6% using a PSA cut-off of 2.5 ng/ml and 5.8% using a 4.0 ng/ml cut-off [25].

The high prevalence of prostate cancer can be confirmed by GLOBOCAN 2030 projection which forecasts a high burden of cancers in both developed and developing countries [26]. Therefore, it could be realized that cancers in general and prostate cancer in particular is not only a problem in the developed countries, but also a serious problem globally and a life-threatening problem in sub Saharan countries including Cameroon. Also, the lack of screening is likely to explain the observation of a higher screen detected prevalence since PSA screening is not a common practice in Bamenda, Cameroon. Cameroon is now experiencing both a high prevalence in communicable diseases and non-communicable diseases, with much emphasis based on communicable diseases including HIV/AIDS, tuberculosis and malaria.

It is for this reason that there is an urgent need for better strategies to be reinforced for the prevention of these non-communicable diseases which does not include only cancers but also chronic kidney disease, since managing complications arising from these diseases have not been shown to be cost effective and sustainable [27].

This study also revealed a high level of unawareness on what prostate cancer is, as only 45 (18.75%) participants could give a concise definition of what prostate cancer is 1.50% of the participants relate prostate cancer as a disease that weakens the bladder, a disease that causes swelling of the gland, a disease that causes painful urination, a disease of the prostate gland. 24% of the participants relate it as disease that affect the male organ. It is therefore evident that 64% of the participants had no knowledge about prostate cancer before the screening was conducted following their response. It is obvious that unawareness will lead to high mortality rate. Ignorantly, a greater number of people suffer and die of the disease without even knowing. It is therefore of great importance to sensitize the community on prostate cancer, as this may go a long way to reduce cancer mortality in Bamenda in particular and Cameroun as a whole. 105 participants were diagnosed with either a PSA value greater than 4 ng/ml or abnormal digital rectal examination but not both. 25 participants were diagnosed with both abnormal digital rectal examination and a PSA value above the cut-off value (4 ng/ml). It is this group of participants (PSA>4 ng/ml and abnormal DRE) that are obviously diagnosed with cancer of the prostate according to America Cancer Society (ACS) and International Agency for Research on Cancer (IARC).

In this study, risk factors were accessed. Some risk factors were statistically significant while others were insignificant. Men presenting with signs/symptoms, DRE with nodular, men on medication, low income earning men were at a risk of developing prostate cancer according to this study as demonstrated from the **Table 2** above. Nonetheless, conclusion cannot be drawn in this single study regarding these risk factors. On the other hand, certain risk factors like riding of bikes, putting on black pants, doing physical exercise, being diagnosed of any other abdominal condition and family history did not show any statistical significant since P-values are all greater than 0.05.

Some behavioral factors like living in urban or rural area did not show any statistical significant. This therefore showed that habitation may not prone someone in developing prostate cancer. Also, people who ate vegetables and fruits did not show any risk of developing this disease. This is similar to a study carried out in Egypt Al-Abdin et al. [28] confirmed higher vegetables/fruits intake as a significant factor for prostate cancer risk reduction. Therefore, men were encouraged to live on fruits and vegetables.

Unlike like some previous studies [28] that made use of biopsies, this study did not include any biopsy and therefore men who had either abnormal DRE or a PSA value greater than 4 ng/ml were excluded in the determination of the incidence of prostate cancer. Also, the study, though was a community based cross-sectional study, which reflect the 'potential' incidence of a disease in a community, participants participation was voluntary and convenient not a random selection.

Conclusion

This community based study reveals the incidence of prostate cancer to be 10.4%. of the 241 men recruited in the study, 240 met and with the objectives. 105 had abnormality at the level of DRE or PSA. 25 men were diagnosed with both abnormalities. Some considered risk factors in this study like family history, putting on black pants, riding of bikes was statistically insignificant demonstrating that such may not lead to development of prostate cancer as earlier presumed, while signs/symptoms, DRE showing nodular, being on medication had most profound impact on the reported prostate cancer prevalence. The study also reveals a high level of unawareness on prostate cancer; hence, sensitization is of paramount importance. Participants were urged to do annual screening

and to live on fruits and vegetables as preventive methods through a health promotion program.

Recommendations

To the government

The government should increase the capacity of health centers and provide more sophisticated equipment's to better improve patients' lives with these non-communicable diseases like prostate cancer.

The government should re-implement the National Cancer Control Committee program to carry out annual cancer screening, to secure drugs at most affordable cost and also to provide cancer registries.

The government should also organize quartile seminars on cancers in general and prostate cancer in particular to create more awareness such that local beliefs of the community regarding cancer as a mere myth will be eradicated.

To non-governmental organizations, research centers and other community actors

Nationwide campaigns to promote physical activity, good nutrition seldom organized. Instead, sporadic activities are often organized around particular events such as the national cancer week that is usually ceremonial and limited to Health Administrative Regions such as Yaoundé and Douala. A shift of such responsibility to the non-governmental organization will help to reduce the burden on the government.

The Cameroon Baptist Convention Health Board runs a cervical prevention and Women's Health Program (WHP) in the private confessional sector. Extension of this program to include other types of cancers like prostate cancer will help to reduce the burden of this disease in the communities.

More research should be done on this field of study to include biopsy so as to confirm this piece of work.

Individuals presenting with lower urinary tract symptoms should urge their consulting physicians to order for prostate cancer test- not only to treat these symptoms. Likewise, doctors should initiate into the minds of these individuals the relevance of prostate cancer test so that they should not keep visiting the hospitals with the same untreated condition.

References

1. Ferlay J, Soerjomataram I, Ervik M (2013) Cancer incidence and mortality worldwide, international agency for research on cancer. Cancer Incidence and Mortality Worldwide, International Agency for Research on Cancer.

2. Bray F, Jemal A, Grey N, Ferlay J, Forman D (2012) Global cancer transitions according to the human development index (2008–2030): A population-based study. Lancet oncol 13: 790-801.

3. Potosky AL, Miller BA, Albertsen PC, Kramer BS (1995) The role of increasing detection in the rising Incidence of prostate cancer. JAMA 273: 548-552.

4. Soos G, Tsakiris I, Szanto J, Haas GP (2005) The prevalence of prostate carcinoma and its precursor in Hungary; an autopsy study. Euro Urol 48: 739-744.

5. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, et al, (2010) GLOBOCAN 2008, cancer incidence and mortality worldwide: IARC CancerBase No. 10 [Internet]. Lyon, France: International Agency for Research on Cancer.

6. Soos G, Tsakiris I, Szanto J, Haas GP (2005) The prevalence of prostate carcinoma and its precursor in Hungary; an autopsy study. Euro Urol 48: 739-744.

7. Adesina A, Chumba D, Nelson AM (2013) Improvement of pathology in sub-saharan Africa. Lancet Oncol 4: e183-e188.

8. Newman DJ, Cragg GM (2007) Natural products as sources of new drugs over the last 25 years. J Nat Prod 70: 461–477.

9. Hostettmann K, Marston A, Ndjoko K, Wolfender JL (2000) The potential of African plants as source of drugs. Curr Org Chem 4: 973-1010.

10. Fezeu L, Fointama E, Ngufor G, Mbeh G, Mbanya JC (2010) Diabetes awareness in general population in Cameroon. Diabetes Res Clin Pract 90: 312-318.

11. Mbeh GN, Edwards R, Ngufor G, Assah F, Fezeu L, et al. (2010) Traditional healers and diabetes: Results from a pilot project to train traditional healers to provide health education and appropriate health care practices for diabetes patients in Cameroon. Glob Health Promot 17: 17-26.

12. Adesina A, Chumba D, Nelson AM, Orem J, Roberts DJ, et al. (2013) Improvement of pathology in sub-Saharan Africa. Lancet Oncol 14: e152-e157.

13. Barnabas B, Jose Edward M, Ma Shang W, Miao Lin, Fan I (2013) Impact of natural resources on cancer treatment and prevention. A perspective of Cameroon. Mol Clin Oncol 4: 610-620.

14. Mohammed El-Imam M, Higazi NZ, Abuidris DO, Idris AA, Khalid KE (2009) Prostate specific antigen versus digital rectal examination as screening for prostate in Sudanese patients. Sudan J Public Health 4: 278-281.

15. General and Systemic Pathology, (4th edn). Underwood JCE (ed), Churchill livingstone publishing, UK. p. 526.

16. Robbins Basic Pathology, (8th edn). Saunders Elsevier, USA.

17. http://www.cancer.gov/types/patints/prostate treatment

18. Ferlay J, Shin HR, Bray F, Forman D, Matters C, Parkin DM (2008) GLOBOCAN 2008 Cancer incidence and mortality worldwide: IARC. Cancer database No 10, Lyon, France.

19. http://www.healthline.com/

20. American Cancer Society (2015) Cancer Facts and Figures. Atlanta, Georgia.

21. Knowledge and perception of prostate cancer among men attending 37 military Hospital, Accra, Ghana.

22. Angwafo FF, Zaher A, Befidi-Mengue R, Wonkam A, Takougang I (2003) High-grade intra-epithelial neoplasia and prostate cancer in Dibombari, Cameroon. Prostate cancer and prostatic diseases 6: 34.

23. Hsing AW, Yeboah E, Biritwum R, Tettey Y, De Marzo AM, et al. (2014) High prevalence of screen detected prostate cancer in West Africans: Implications for racial disparity of prostate cancer. J Urol 192 : 730-735.

24. Niang L, Kouka CN, Jalloh M, Gueye SM (2011) Screening for prostate cancer by digital rectal examination and PSA determination in Senegal. ISRN Oncol 2011: 4.

25. Hsing AW, Yeboah E, Biritwum R, Tettey Y, De Marzo AM, et al. (2014). High prevalence of screen detected prostate cancer in West Africans: Implications for racial disparity of prostate cancer. J Urol 192: 730-735.

26. James TM, Brenda RH, Marcello T (2010) Early recognition and prevention of chronic kidney disease. Lancet 375: 1296-1309.

27. Kamel NM, Tayel ES, El-Abbady AA, Khashab SS (2006) Risk factors of cancer prostate. A case control study. J Egypt Public Health Assoc 81:143-163.

28. Al-Abdin OZ, Rabah DM, Badr G, Kotb A, Aprikian A (2013) Differences in prostate cancer detection between Canadian and Saudi populations. Braz J Med Biol Res 46: 539-545.