The Influence of Oral Health Care on Prevalence of Urinary Symptoms and mean plasma Prostatic Surface Antigen (PSA) concentration in a Population of Nigerian Adult Males

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Abstract

Background/Aims and Objectives: Inflammatory mediators from ongoing oral infection induce intense immune response that could lead to the carcinogenesis as well as progression of pathogenesis of systemic diseases. Development of prostatic carcinoma and presence of urinary symptoms may be linked to the presence of oral problems.

Methodology: This is a community based study with longitudinal study design. The study was done among adult and elderly men in a south western city in Nigeria (Oshogbo). Participants were randomly selected from the community using systematic sampling technique. Their biodata, history of oral and urinary symptoms were recorded. Oral examination was done, blood samples of participants were collected and transported to the laboratory for determination of mean plasma PSA. Oral health education and corresponding treatment of oral lesions present were done. Prostatic Surface Antigen was measured in the laboratory using i-chroma Reader, a fluorescence scanning instrument. Data was analyzed using STATA 16.

Results: Out of the 72 participants that were recruited for the study, only 60 participants completed the study, others were lost to follow up and death. More than half of the participants are in their fifth decade of life. The most prevalent the oral lesions seen was xerostomia, other lesion seen were halitosis, candidiasis and periodontitis. The prevalence oral lesions were significantly reduced after dental intervention. The mean PSA concentration was highest among participants with periodontitis, followed by those with split urinary stream. The mean PSA concentration was also significantly reduced after the dental intervention. Likewise, urinary symptoms were significantly reduced after dental intervention, p= 0.001.

Consclusion: Poor oral hygiene and presence of oral lesions are associated with raised PSA concentration. Oral health education and dental treatment were associated with reduced prevalence of oral and urinary symptoms among males. Mean PSA is highest among patients with periodontitis. Following dental intervention, mean PSA concentration and the prevalence of urinary symptoms were significantly reduced.

Introduction

Prostate cancer is second to lung cancer as the commonest cause of cancer related cause of death among men worldwide and is associated with high economic burden, high morbidity and mortality [1,2]. Prostatic problems present in three major ways: prostate cancer (PC), benign prostate swelling (benign prostatic hyperplasia, BPH) and prostatitis. Prostate cancer patients present with constitutional cancer symptoms as well lower urinary tract obstructive symptoms.

There is no evidence yet on how to prevent production of prostate cancer, but it is possible to reduce the risk by limiting high fat diets, increase vegetables intake, good exercise, encourage healthy lifestyle and good control of oral and general health conditions that may lead to chronic inflammation [3].

Oral health care has been closely linked to prostatic cancer [4]. Chronic inflammation from the oral tissues has been implicated in the initiation, promotion, and malignant transformation, invasion and metaplasia in the pathogenesis of prostate cancer [3,5]. Periodontal disease, an oral problem associated with chronic inflammation of tooth supporting structures affects about half of the population and is more prevalent among elders. The diseases are results from reduced oral health care, presence of poor oral hygiene and influence of local and systemic condition. Several chronic inflammatory mediators are released during the pathogenesis of chronic periodontitis and these compounds can initiate systemic inflammation especially when there is impaired immunity which is not uncommon as age increases [5]. Xerostomia and subjective feeling of oral dryness predispose to chronic mucosa infection because of the lack of anti inflammatory action of saliva. Patients with xerostomia will hence be predisposed to chronic mucosa inflammation, dental caries, oral candidiasis among others; these oral problems release chronic inflammatory products into the system especially when there are underlying medical problems [6]. Halitosis, defined as offensive mouth odour, is usually caused by oral pathology is mostly due to inflammatory processes in the mouth such as gingival abscess, poor OH, mucositis, tonsillitis and so on.

Therefore, treating oral lesions reduces the burden of chronic inflammation, and hence reduce the possibility of initiating the process of carcinogenesis in prostatic glands studies has shown specifically that periodontitis is associated with prostatic cancer.

PSA is a serine protein enzyme produced by columnar epithelium of the prostatic tissue. It is produced by both normal and malignant cells of the prostate glands. The protein is mostly found in semen but a small percentage may be found in blood. The chance of developing cancer goes up as the value goes up. No specific cut off beyond which cancer will be developed, but generally when the values are more than 4ng per ml in the blood, the patients are advised to go for PC screening. PSA is therefore used for screening although it's essentially a pointer to the presence of PC and not affirmative.

Although there are scientific reports linking periodontal disease with PC but there is scarcity of information in African population where the prevalence of PC is on the increase. More so, there is need to explore the association between other oral lesions and PSA so as to discover the possible effects of treating the oral lesions on the PSA concentration. these are the areas this study is designed to critically explore. The rising prevalence of PC, increasing associated morbidity and mortality and lack of information on the roles of oral lesions on PSA concentration calls for this kind of study. Data from this study will provide information that will further intensify the need to educate PC patients on the importance of oral care, needs to be familiar with self help screening indicators so that the population can be educated and our patients progress can be monitored, hence this study.

MATERIALS AND METHODS

Study design: This is a longitudinal study showing the relationship between the serum PSA concentration, urinary symptoms and oral lesions among adult men before and after oral health intervention.

Study location: The study was conducted Ataoja Estate, Oshogbo, Osun state, Nigeria. Oshogbo is the capital of Osun State, Nigeria. The surface area of the city is 47km^2 with a population of 395,500 people. Data analysis was done at Chemical pathology laboratory, Obafemi Awolowo University Teaching Hospitals Complex, Ile Ife, Nigeria.

Subjects: Study participants were adult men volunteers who reside at Ataoja Estate, Oshogbo in Osun state, Nigeria.

Sampling technique: Multistage sampling method was used to select the sample. The first stage was the selection of one Local Government from the two LG Areas in Oshogbo town. The two Local Government (LG) Areas in Oshogbo Township are Oshogbo LG and Olorunda LG, selection was done using by simple random sampling method. A non transparent box that containing two wrapped papers, one marked A (which stands for Oshogbo) and the other marked B (stands for Olorunda) was prepared. One of the two papers was blindly taken out of the box to select the LG, and that was found to be Osogbo Local government (A). The second stage was the selection of streets/estates from the LG. There are six major Street/Estates in Oshogbo Local government. One of the six streets was also selected using simple random method with wrapped papers in a non transparent box, and the selected Street was Ataoja Estate. All consenting adult men in Ataoja Estate, Oshogbo that satisfied inclusion criteria were recruited for this study.

Inclusion criteria

- Adult men > 40 years old

- Apparently healthy men with no sign of prostatic inflammation, prostate cancer or prostate enlargement

- Men who had not ejaculated in the last 24 hours

- Men who have not got involved in rigorous exercise like cycling two days before the testing.

Exclusion criteria

- Presence of debilitating underlying systemic condition such as hypertension, diabetes and prostatic cancer

- Men with enlarged prostatic gland

Ethical Consideration: Permission to carry out the study was sought and obtained from the Ethical Committee of the Institution. Each participant also gave their consent before recruitment into the study. Patients' information was handled with respect and utmost confidentiality.

Clinical Data Collection: Data collection was done using structured questionnaires which were administered by the researcher to the participants after obtaining their consent.

The first part of the questionnaire (Section 1) collects information about participants' biodata such as name, age, gender, address, ethnicity, marital status, and present occupation. In section two, patients' medical and dental history, as well as presence of urinary and oral symptoms was recorded.

Sections 3 records clinical oral findings. Patients were made to sit down comfortably on consulting chair. The presence or the absence of halitosis was assessed by using organoleptic method. Gingival status was assessed using gingival index Loe and Silness [7]. Generally, periodontologist have reported that a tooth is said to have developed periodontitis when there is associated established pocket of more than 3 mm depth. For the purpose of this study, teeth with established pocket more than 3 mm were taken as having periodontitis. Halitosis was diagnosed based on patients' subjective feeling of oral dryness, and any presence of at least one of the following signs: loss of shinning appearance of the oral mucosa, presence of ropy saliva, loss of salivary bubbles at the floor of the mouth and reduced saliva flow following external stimulation of parotid gland.

The Section 4 of the questionnaire records the findings of rectal examination and the serum prostatic surface antigen (PSA). Patients with enlarged prostate glands were excluded from the study. Blood samples were collected using 18 inch gauge hypodermic needle and were transported to the laboratory for storage at -10˚C prior to analysis.

LABORATORY PROCEDURE

PSA assay was done at the Point-of-Care Testing (POCT) facility of at Obafemi Awolowo Teaching Hospitals' Complex, Ile Ife. The PSA in the serum was measured using an i-chroma reader which is a fluorescence scanning instrument, used in conjunction with various ichroma Immunoassay Tests which are based on antigen-antibody reaction and fluorescence technology. The i-chroma Reader employs a semiconductor diode laser as the excitation light source for illuminating the test cartridge membrane (pre-loaded with the clinical specimen, duly processed according to standard procedure

prescribed by the manufacturer-Boditech Med Inc., Germany). The laser triggers fluorescence from the fluorochrome molecules embedded on a membrane. The fluorescent light is collected together with the scattered laser light. Pure fluorescence is filtered from the mixture of the scattered and fluoresced light. Intensity of the fluorescence is scanned and converted into an electric signal which is proportional to the intensity of fluorescence produced on the test cartridge membrane.

The assay was performed using manufacturer's instruction as reported by Luisa et al [8]. 75microgram of serum was mixed with the supplied pre-measured volume of detector buffer solution containing fluorescence labeled anti PSA monoclonal antibody and anti rabit IgG. Thereafter, 75microgram of the resulting mixture was then loaded into the sample well of a test strip in the machine and cartridge was incubated at room temperature for 15 minutes. The concentration of PSA in the sample is directly correlated to the intensity of the scanned fluoresce reaction which is converted electric into signal that can be read on the screen of the reader in nanogram per litre.

Treatment interventions

Health Education: After oral examinations, all patients were given oral health education and motivation. They were taught tooth brushing techniques, use of dental floss, diets for maintaining good oral health, and general skills on how to recognize and provide home care for common oral problems.

Scaling and Polishing: All participants were conveyed to the dental clinic of Obafemi Awolowo University, Ile Ife where scaling and polishing was done for each of them using Ultrasonic Scaler.

Treatment of Specific Oral Problems: Specific treatment were also given to those with oral problems Xerostomia was treated with, frequent oral sips of water; regular oral sips of water and regular lime water oral rinse Halitosis- Scaling and polishing, warm saline mouth bath and referral to periodontologist Candidiasis- Nystatin lozenges (pastilles) three times daily.

Gingivitis- Scaling and polishing, WSMS and Chlorhexidine mouth wash

Review: Daily contacts were made via telephone calls about the symptoms. Patients were reviewed 4 weeks in the clinic after the first contact during which oral and urinary symptoms were re evaluated as well as serum PSA.

Data Analysis: Data were analyzed using STATA 16 statistical software (StataCorp, College Station, Texas). Percentages and proportion were used to describe qualitative variables such as the distribution of participants with specific oral and dental problem, sex, ethnicity, occupation and marital status. For continuous variables such as age and PSA concentration measures of central variables like mean, median, mode, and range were used for analysis. Comparison of mean PSA before and after intervention was done after subjecting the variable to normality tests, since the PSA was not normally distributed, Mann–Whitney rank sum test and Kruskal-Wallis test were used for to determine the relationship between mean PSA before and after intervention, and at various age groups. Statistical significance will be set at $p < 0.05$.

Results

A total of 72 adult males were recruited for the study, 10 participants were lost due to follow up as a results of relocation and inability to continue to participate due to impaired health condition. Also, we lost 2 participants to death during the study period. So, complete data of only 60 participants were obtained for data analysis.

Sociodemographic of Respondents

Participants were all adult and elderly males. About half were in their fifth decade of life. Majority were married with only 1 (2%) widowed. None was completely dependent and the commonest occupation was self-employed (21, 42%) (Table 1).

Oral Symptoms among study Participants before and after Intervention

The most frequent oral lesion seen among study participants before intervention was xerostomia. Xerostomia was present in one out of every four participants. Other frequent oral lesions/symptoms seen before intervention were periodontitis (68%), gum swelling (32%) and toothache (20%). After dental intervention, the proportion of participants with xerostomia, periodontitis, gum swelling and toothache was significantly reduced to 11%, 6.7%, 10% and 40% respectively Table 2a.

Table 1: Sociodemographic of Respondents.

Characteristics	Frequency	Percentage (%)
Age Group		
41-50	9	15
51-60	25	42
61-70	16	27
>70	10	17
Marital status		
Single	0	0
Married	49	98
Divorced	0	0
Widow	1	2
Occupation		
Civil Servant	13	22
Self employed	26	43
Retired	20	33
Clergy	1	2

Table 2a: Oral Symptoms among study Participants before and after Intervention.

	Before intervention	After intervention	P value
Symptoms	**Frequency/%**	**Frequency/%**	
Xerostomia			
Present	25(42)	7 (11)	0.001*
Absent	35 (58)	53 (89)	
Halitosis			
Present	24 (40)	4 (6.7)	0.002*
Absent	36 (60)	56 (93.3)	
Periodontitis			
Present	19 (32%)	10 (17)	0.0001*
Absent	41 (68%)	50 (83)	
Gum swelling			
Present	19 (32)	6 (10)	0.001*
Absent	41(68)	54 (90)	
Taste impairment			0.133
Present	8 (13%)	1 (2)	
Absent	52 (87%)	59 (98)	
Toothache			
Present	12 (20%)	24 (40)	0.001*
Absent	38 (80%)	36 (60)	

T test* statistically significant

Mean Plasma Prostatic Surface Antigen (PSA) concentration of study Participants before and after Intervention

Mean plasma PSA of participants was significantly higher among patients with oral lesions when compared to those without oral lesions. The highest value was seen among participants with periodontitis and lowest among patients with halitosis. Statistically significant reduction was seen in the mean plasma PSA concentration after dental intervention (Table 2b).

Oral Hygiene status and mean PSA of participants before and after the intervention

Before dental intervention, more than three out of four participants presented with either fair oral or poor hygiene status. After the intervention, the proportion of those with good oral hygiene increased to 83%% while those with poor oral hygiene significantly reduced to 1.7%. The lowest mean PSA before intervention was found among those with good oral hygiene and the highest was found among those with poor oral hygiene. After the treatment, those with good oral hygiene still have the lowest PSA while the highest value was found among those with fair oral hygiene (Table 3).

Urinary symptoms among respondents before and after intervention

Hesitancy (23, 38%) was the most frequent urinary symptom observed among the participants before intervention, followed by frequency (19, 38), Dysuria and weak urinary stream (9, 15). Splitting of urinary stream was the lowest urinary symptom, present in 7 (14%) participants. After intervention, significant reduction of urinary symptoms was observed (Table 4a).

Mean PSA of participants with Urinary symptoms before and after intervention

Participants with split urinary symptoms have the highest mean PSA, followed by those with hesitancy and weak urinary stream. After the intervention, the mean PSA was significantly reduced in patients with all the reported urinary symptoms (Table 4b).

Table 2b: Mean Plasma Prostatic Surface Antigen (PSA) concentration of study Participants before and after Intervention.

Symptoms	Before treatment Mean PSA/SD	After treatment Mean PSA/SD	P value
Xerostomia Present Absent	8.9(25.4) 4.4 (9.1)	5.6 (17.8) 2.2 (4.4)	0.001*
Halitosis Present Absent	9.3 (25.6 4.3 (9.4)	5.4 (17) 2.5 (5.6)	0.002*
Periodontitis Present Absent	13.2 (33.4) 4.7 (10.7)	9 (25.1) 2.4 (5.7)	0.0001*
Gum swelling Present Absent	12.1(28.3) 9.6(9.0)	7.3(19.3 1.9(5.3)	0.001*
Taste impairment Present Absent	12.1(28.3) 5.6(17.9)	7.3(19.3) 1.9(5.2)	0.133
Toothache Present Absent	13.3(37.6) 4.9(10.5)	9.6(26.6) 2.5(5.5)	0.001*

T test* statistically significant

Relationship between Age, Marital status, Occupation and mean PSA of participants

Mean PSA is highest among participants older than 70 years and is lowest among those in their seventh decade of life. The differences of mean PSA among age group is statistically significant, p=0.0001. Single participants have the highest mean PSA followed by widowed participants. The differences were statistically significant, p=0.004. Mean PSA was highest among retired participants, and lowest among clergy, the differences were not statistically significant, p=0.0128 Table 5.

Table 3: Oral Hygiene status and mean PSA of participants before and after the intervention.

Symptoms	Before Frequency/%	Treatment Mean PSA/SD	After Frequency/%	Treatment Mean PSA/SD	P value
Oral Hygiene Good Fair Poor	22 (36.7) 29 (48.3) 9 (16.7)	1.3(1.4) 8.9(23.7) 10.0(15.4)	50 (83.0) 9 (15.0) 1 (1.67)	1.2(0.9) 5.6(16.9) 3.3(6.4)	0.252 Df=2. F=1.41

ANOVA

Table 4a: Urinary symptoms among respondents.

Urinary Symptoms	Before Intervention Freq/ %	After Intervention Freq/ %	P value
Hesitancy Present Absent	23 (38) 37 (62)	20 (33) 40 (67)	0.001*
Frequency Present Absent	21 (35) 39 (65)	17(28) 43 (72)	0.345
Splitting of urinary stream Present Absent	4 (6) 56 (94)	3 (5) 56 (94)	0.001*
Weak urinary stream Present Absent	9 (15) 51 (85)	6 (10) 54 (90)	0.001*
Dysuria Present Absent	13 47	3 (5) 57 (95)	0.001*

Table 4b: Mean PSA of participants with Urinary symptoms before and after intervention.

Symptoms	Before Intervention Mean PSA/SD	After intervention Mean PSA/SD	P value
Hesitancy Present Absent	10.3(10.1) 7.6 (21.1)	2.1(6.1) 4.2 (14.3)	0.001*
Frequency Present Absent	4.3 (6.6) 7.3 (21.5)	2.2 (3.9) 4.4 (14.3)	0.345
Splitting of urinary stream Present Absent	19.1 (23.1) 5.4 (17.2)	29.7 (11.3) 3.2 (11.6)	0.001*
Weak urinary stream Present Absent	9.6 (16.7) 5.7 (18.1)	3.5 (6.3) 3.6 (12.6)	0.001*
Dysuria Present Absent	4.8 (13.8) 6.7 (18.8)	3.0 (8.1) 3.8 (12.7)	0.001*

Table 5: Relationship between Age, marital status and mean PSA.

P value	Mean plasma PSA conc. ng/L	SD	P value
Age group			
41-50	2.8	3.1	
51-60	1.1	1.0	0.0001*
61-70	10.0	30.5	
>70	13.2	20.0	
Marital status			
Single	9.3	12.2	
Married	6.4	18.3	0.004*, df=2
Widowed	0.8	0.5	
Occupation			
Civil servants	7.3	14.3	
Self employed	3.7	9.8	0.0128, df=3
Retired	9.2	26.5	F=0.038
Clergy	1.8		

ANOVA, *statistically significant

Discussion

This study was conducted among male Nigerian population to explore the relatioship between oral health and the mean plasma PSA concentrations, and to show the effects of dental intervention on prevalence of oral lesions, urinary symptoms and mean PSA concentration. The most frequent oral lesion seen in this study was xerostomia, present in 35% of partcipants. This finding is in agreement with a Swedish study by Anna Adolfsson et al [9]. Nederfors et al also reported 28.4% that reported prevalence of 35.2% and 28.4% respectively among male respondents [10]. A lower prevalence of (11.1%), however, was reported in Iraq [11]. In additioon to gender, the prevalence of xerostomia also varies with age, medication use and the presence of underlying medical problems [10]. Xerostomia has been attributed to loss of connective tissue cells, acinar cells reduction, influence of drugs and chronic stress [12,13]. In addition, men are largely exposed to stress as they struggle to meet their daily family needs, chronic strann is an idicator of xerostomia. Stress is a common feature associated with men in African population as it was obvious in our study Participants [14]. Halitosis is another frequent oral lesion which was present in 24 (40%) of the partcipants. Halitosis is attributable to high prevalence of xerostimia, poor oral hygiene and loss of mucular control for effective tooth brushing which were seen among the partcipants [15]. Inflammation of periodontal tissues (periodontitis) is another frequrnt findings among our parctpants. This is due to often neglected oral care, poor oral gygiuens and effects of underlying systemic problrms. The presence of periodontitis has been associated with incraedd PSA, predisposing the patients to developing PC.

The mean PSA among unmarried men in this study was 9.4ng/mL which is significantlly higher than the value for the married (6.3ng/mL). This finding is consistent with the report of Khan S et al and Siegel et al [16,17]. Lower values of mean PSA among the married may be due to the positive effects of sexual exposure on the health of prostate gland, and due to the vast social support received from their spouses [16]. Unlike the singles, widows and divorcee, married men are known to show reduced chance of developing PC and low incidence of resulting complications [16].

Chronic oral infections have been reported to be closely associated with increased risk of deveping PC [4]. In this study, partcipants with good oral hygiene has the lowest mean PSA before dental intervention, and after the dental intervention, the value further reduces by 100%. Plaque produces bacteria and fungi infections which has been reported to shows bi directional relationship wiuth propstatic cancer. The resulting chronic inflammation tends to increase the PSA production, and subsequently developing of PC, although the mechanism of cation is still largely unclear [18]. The fact that significant reduction of mean PSA was observed after dental intervention is an indication that the presence of dental plaque may serve as source of irritation that may produce immune response that may trigger carcinigenesis. Those with poor oral hygiene has the lowest PSA, even lower than those with poor oral hygiene, at the peak of inflammatory response ,in addition; periodontopathogenic insult may not produce additional increase in PSA.

Recent studies have explored the correlation between periodontitis and PSA levels. Huang et.al revealed that serum PSA levels in men with periodontitis were not higher after accounting for age and other factors in a middle-aged and older population in America. However, Joshi et.al found that PSA levels were higher in individual in individual with CAL $\geq$ 2.7mm and moderate/severe prostatitis than in patients with neither condition. If mean PSA levels increase with the severity of periodontitis or if periodontal treatment reduces PSA, we would infer a positive correlation between periodontitis and PC risk. This is similar to the findings in our study which showed that PSA levels in individuals with periodontitis were significantly higher than those in men without periodontitis but did not correlate significantly with the severity of periodontitits, though in varaition with another study by Michaud et al. that in PSA-based PC screening in a US population, periodontitis did not correlate with PC risk. Overall, the mechanism of periodontitis and elevated PSA level remains unclear. In the presence of inflammation, the integrity of the prostate epithelium might be compromised causing more PSA to leak into the blood. Morote et al.showed that another non-prostatic source of PSA, such as periodontium, might increase its levels.

Presence of xerostimia also showed significant association with mean PSA is xerostomia. Mean PSA of patients with xerostomia reported in this study is 8.9ng/mL, this is above the threshold level of developing PC [18]. Presence of xerostomia are has linked with proliferaton of oral infection due to the absence of the antiinammatory functions of saliva. Saliva contains immune subtances that can reduce inflammaory response and stabilise the rate of proliferation of chronic iunfection. Some of the chronmic infection that can result from xerostomia are periodontitis, mucositis, toimsilitis, dental cares, candidiasis e.t.c [13]. These are oral infections which can be assoiated with intense immune response, and that can lead to carcinogenesis. As shown in this study, treatment of xerostomia leads to significant reduction of mean PSA. Good oral health care has been reported to reduce the risk of developing PC [18].

Generally, the prevalence of lower urinary symptoms increases with increasing age [19]. Common lower urinary symprms seen in this study include hesitances, frequency, splitting of urinary stream, dysuria and difficulty in passing urine. Hesitances was the lower urinary symptoms, seen in 35% of partciicpants, followed by frequency (36%) and dysuria (15%). According to Serlin *et al*, benign prostatic enlargement is the commonest cause of obstructive urinary symtpoms among adult males, resposnible for 58% of the cases [20].

The significant reduction of the prevalence of urinary symptoms after dental treatmemt observed in this study. This finding is in agreement with Oyetola et al that reported positive relationship between good oral health and renal sytmpoms in an African population [21]. Oral pathogens induce chronic inflammation which play vital roles in the pathogenesis of the urinary diseases and formation of PSA. As reported in this study, mean PSA was seen to be highest among those with hesitancy (10.3ng/mL) and frequency (4.4ng/L). The values were also significantly reduced after the dental intervention in agreement with the findings by Mao et all that showed significant reduction in mean PSA in patients without periodontis compared to those with periodontitis [18].

The presense of oral chronic inflammatory diseases such as chronic periodontitis has been repoeted to be associated with high plasma PSA concentration and to exhibit potential roles in pathogenesis of carcinigenssis [18]. Therefore, as reccomemdened from earlier studies [21,22], routine dental consultations and accompanied dental interventions will not only relieve the oral symptoms, but are also advantageous in the management of adult man that are at risk of developing prostatic carcinoma. This becomes necessary in developing countries where there are limited resouces to manage prostatic cancers and the associated complications.

Conclusion

This results of this study showed that the presence of poor oral hygiene, presence of oral lesions (such as periodontitis, halitosis and xerostomia), and presence of urinary symptoms (such as splitting urinary symptoms, dysuria and frequency) are associated with significantly raised PSA concentration. We also conclude that prompt oral health education, routing scaling and polishing and prompt treatment of oral lesions tends to reduce the mean PSA as well as the prevalence of urinary symptoms among adult males. Mean PSA is highest among patients with periodontitis. Following dental intervention, mean PSA concentration and the prevalence of urinary symptoms were significantly reduced.

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