

Senegalese PSA results and correlation with testosterone



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Introduction

- Prostate cancer has the highest prevalence and incidence of all cancers and is the second most common male cancer after lung cancer (**IARC 2004**)
- Despite lack of specificity and sensitivity, the use of PSA has consistently increased the incidence of prostate cancer worldwide (**IARC 2004, SEER 2007**)
- The use of PSA arouse controversies regarding its relevance in mass screening and the resulting ethical and economic issues

Estimated New Cases

Estimated Deaths

Males

Prostate	234,460	33%
Lung and Bronchus	92,700	13%
Colon and Rectum	72,800	10%
Urinary Bladder	44,690	6%
Melanoma of the Skin	34,260	5%
Non-Hodgkin Lymphoma	30,680	4%
Kidney and Renal Pelvis	24,650	3%
Oral Cavity and Pharynx	20,180	3%
Leukemia	20,000	3%
Pancreas	17,150	2%
All Sites	720,280	100%



Lung and Bronchus	90,330	31%
Colon and Rectum	27,870	10%
Prostate	27,350	9%
Pancreas	16,090	6%
Leukemia	12,470	4%
Liver and Intrahepatic Bile Duct	10,840	4%
Esophagus	10,730	4%
Non-Hodgkin Lymphoma	10,000	3%
Urinary Bladder	8,990	3%
Kidney and Renal Pelvis	8,130	3%
All Sites	291,270	100%

Prostate Cancer

<u>Year</u>	<u>Incidence</u>	<u>Prevalence</u>	<u>Mortality</u>
2006	234,460	?	27,350
2003	220,900	?	28,900
2001	198,100	?	31,500
1999	179,300	?	37,000
1996	317,000	?	41,400
1994	200,000	?	38,000
1990	106,000	?	30,000
1985	86,000	?	24,000
1976	64,000	?	20,000

Background of PSA in Senegal 1

- **Gueye et al (Urol 2003)** published a descriptive and comparative study of diagnosed prostate cancer cases among Senegalese, African American and American Caucasian men
- The Senegalese men of that study had a higher median PSA: 37ng/ml (n= 121; Range: 6;578.9) compared to the other study groups

Background of PSA in Senegal 2

- More recently another study (**Zeigler Johnson et al, Can J Urol 2008**) comparing clinical characteristics of prostate cancer among Senegalese, African American, American caucasian and Indian men was published
- This study again showed a high Median PSA in Senegalese men: 56.6ng/ml (n=72; Range:0.5;6190)

Background of PSA in Senegal 3

- We conducted a descriptive study about PSA in an unselected population of Senegalese men (**Jalloh et al, Can J Urol 2008**)
- The study included 113 men who filled a questionnaire, underwent a DRE and provided a blood sample for PSA test
- We described the characteristic of PSA across age groups and PSA with DRE results

- Only 5% of the men knew about PSA and 3% had ever been tested for PSA
- Median PSA value overall was 1.28 ng/ml (range, 0.14 ng/ml-50.16 ng/ml)
- Median PSA increased accross age groups and a high PSA was more frequent among patients having abnormal Digital Rectal Examination (DRE)

Comparison of PSA values among 113 Senegalese men

Groups	Median PSA in ng/ml	PSA \geq 4.0 ng/ml (%)
Age quartile		
< 55 (n = 25)	1.0	4%
55-64 (n = 29)	1.3	7%
65-72 (n = 29)	2.3	28%
72 (n = 30)	1.3	23%
	p = 0.012	p = 0.034
Abnormal DRE		
No (n = 101)	1.3	13%
Yes (n = 12)	1.8	42%
	p=0.229	p=0.023
Cigarette smoking		
No (n = 60)	1.4	20%
Yes (n = 53)	1.1	11%
	p=0.022	p=0.208

Methodology of our study: *Senegalese PSA results and correlation with testosterone*

- We examined 575 men at the Hopital General de Grand Yoff during a community outreach programme
- All patients were assessed for prostate related symptoms, underwent a DRE, and provided a blood sample for serum PSA testing
- In addition, Serum Testosterone level was measured in 340 men of the study group

- In the case of abnormal DRE and/or $\text{PSA} \geq 4 \text{ ng/ml}$, a prostate biopsy was performed to distinguish prostate cancer (cases) from non cancer (controls)

Data analysis

- Continuous variables: we computed median values with the range and used Mann-Whitney Tests to calculate p-values for median comparisons between the groups
- Chi-square tests were used to evaluate proportions for each of the categorical variables
- Spearman Correlation testing : to determine the association between PSA and testosterone levels

RESULTS

- 101 of 575 (18%) men were eligible to undergo prostate biopsies
- Of these, 31 were performed by the time of data analysis
- The number of participants involved in these analyses was 500 controls and 13 confirmed cases

Results: PSA

- Median age was 57 years (range: 36-82) for controls and 68 years (range: 52-83) for cases ($p < 0.001$)
- Median PSA was lower in controls: 1.16 ng/ml (range 0.07-31.00) compared to cases 30.45 (range 1.42-1815.00) ($p \leq 0.001$)

- Median PSA increased with age among controls with 0.92 ng/ml, 0.98 ng/ml, 1.44 ng/ml and 1.58 ng/ml respectively in the age groups ≤ 49 years, 50-59 years, 60-69 years and ≥ 70 years ($p < 0.001$)
- Among cases, we did not find any relation between Median PSA and age Groups ($p = 0.173$)

Median serum PSA by specific age groups

Age groups (Years)	Median PSA in ng/ml among Controls	Median PSA in ng/ml among Cases
≤49	0,92	--
50-59	0.98	33.2
60-69	1.44	19.4
≥70	1.58	54.0
	p<0.001	p=0.173

Results: DRE and Prostate related symptoms

- In the control group, the percentage of prostates suspicious of cancer at DRE increased in men aged \geq years compared to younger age groups ($p < 0.001$)
- Prostate-related symptoms increased with age ($p < 0.001$) in controls but not in cases

- DRE showed more normal prostates and a BPH feature in controls compared to cases (52% vs. 23% and 45% vs. 31%, respectively, $p < 0.001$)
- The 13 patients diagnosed with prostate cancer had either a high PSA and/or abnormal DRE

Results: Testosterone

- Median Testosterone was 4.69ng/ml (range: 0.100-34.3) in controls and 3.45ng/ml (range: 2.25-8.41) in cases (p=0.365)
- The Median Serum Testosterone did not significantly differ among the different age groups

- We found no significant difference in Median Serum Testosterone between cases and controls ($p=0.36$)
- We found no correlation between serum PSA and serum Testosterone level in our study group

Serum Testosterone level among specific age groups

Age groups (Years)	Median Testosterone in ng/ml in Controls	Median Testosterone in ng/ml in Cases
≤49	4.79	---
50-59	4.73	---
60-69	4.47	2,3
≥70	5.35	4,6
	p<0.137	p=0.655

Spearman correlation testing between Testosterone and PSA levels

Age groups (Years)	Correlation in Controls (n=336)	Correlation in Cases (n=4)
All	0.052 (P=0.343)	-0.400 (P=0,600)
≤49	0,360 (P=0.005)	---
50-59	0,026 (P=0.748)	---
60-69	0.043 (P=0.675)	-1.000
≥70	0.199 (P=0.321)	---

Discussion: PSA

- There is a lack of awareness about PSA and Prostate cancer
- Serum PSA level is high among patients diagnosed with prostate cancer (**Gueye, Urol 2003; Ziegler-Johson, Can J Urol 2008**)

- In our outreach campaigns, Median PSA increases with age
- This finding is consistent with that of other authors: **Lee (Urology 2000)** in Corea , **Kobayashi (Int J Urol 2005)** in Japon
- The increase of PSA value with age could also explain the age specific cut off for PSA suggested by **Oesterling et al (Urol Clin North Am 1993)**

- *The true place of PSA and DRE as early detection tools for prostate cancer in Senegal could be better determined if all patients underwent a prostate biopsy and repeated prostate biopsies where appropriate*

Discussion: PSA and Testosterone

- PSA is androgen regulated. At puberty, the rise in PSA associated with prostate growth closely parallels the rise in serum testosterone
- In our study we found no correlation between PSA and Testosterone which is consistent with the findings of **Marks et al (J Urol, 2008)**

- Relation between PSA and Testosterone is of interest to many researchers
- **Ross et al (J Natl Cancer Inst 1986)** found that the level of serum testosterone was higher in black men compared to caucasian men
- **Grober (Int J Impot Res 2008)** who evaluated Hypogonadic and Eugonadic men found no relation between PSA and Testosterone

- Relation between PSA and Testosterone is also used to evaluate risk of prostate cancer
- **Rhoden et al (J Urol 2007)** found that a low Ratio Testosterone/PSA is an independent predictor of prostate cancer in hypogonadic men

Conclusion

- Median PSA is lower in controls compared with prostate cancer cases
- Median PSA increases with age among the Senegalese men of this study
- There is no relation between Median Testosterone levels and age
- We found no correlation between serum PSA and serum Testosterone

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