The Prevalence of Prostate Cancer Screening in Thai Elderly

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Abstract

Problem : Prostate cancer is the most common cancer in elderly men in Western countries, In the future, it may be an important problem in Thailand. At present, there is no evidence about the prevalence and the outcome of screening in this disease.

Objectives : To determine the prevalence of prostate cancer in elderly Thai men and to identify the most appropriate screening method for detection of prostate cancer in Thailand.

Material and Method : 928 elderly men from communities around Siriraj Hospital were evaluated for prostate cancer by Digital Rectal Examination (DRE) and/or Prostate Specific Antigen (PSA). Transrectal ultrasound guided biopsy (TRUS-Bx) which is the gold standard for definitive diagnosis was performed in cases with an abnormal DRE and/or PSA. If biopsy could not be performed, intermittent follow-up with DRE and/or PSA were recommended.

Result : The prevalence of prostate cancer in Thai elderly men in the urban community was more than 0.75 per cent and the prevalence of abnormal DRE and PSA was 8.7 and 17.3 per cent respectively. The Positive Predictive Value (PPV) of both tests was 60 per cent and higher than the PPV of an individual test. A screening program for prostate cancer starting with DRE may be more cost effective.

Conclusion : The prevalence of prostate cancer, abnormal DRE and abnormal PSA in Thai elderly men were more than 0.75, 8.7 and 17.3 per cent respectively which are comparable to the prevalence in Western countries. It is important that we take an interest in this disease.

Key word : Prostate Cancer, PSA, DRE, Screening

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Although the incidence of prostate cancer in Thailand is only 3.8/100,000[1] and is quite low compared with Western countries, prostate cancer might become an important problem of Thailand in the future. Most of the patients present to the hospital at an advanced stage and only 8.6 per cent were in an early or curable stage[2]. Theoretically, cancer at an early stage can be cured and the survival probabilities for patients should be better than patients with late stage disease. Screening for prostate cancer in elderly men is still controversial because research has not yet determined whether systematic, early screening for prostate cancer prolongs lives[3]. Hence, each patient, in consultation with his physician, must use his own values and evidence to weigh the potential benefits of screening against the risks and consequences. Digital Rectal Examination (DRE), the traditional means of evaluating the prostate gland for the presence of malignant disease is still recommended by the American Cancer Society as an annual check up procedure[4]. Prostate Specific Antigen (PSA) determination is valuable in diagnosing prostate cancer and is the only objective method available. Integration of DRE and PSA may enhance the detection of early, potentially curable prostate cancer beyond the capabilities of each approach individually[5]. In order to obtain information about prostate cancer screening in our situation, the authors conducted a community based study to determine the prevalence of prostate cancer, abnormal DRE and/or abnormal PSA and the cost-effectiveness of a screening program in elderly Thai men in the communities around Siriraj Hospital.

MATERIAL AND METHOD

From 1998 to 1999, elderly men aged 60 years old or more living in communities, 10 kilometers around Siriraj Hospital were given appointments to see the research team for prostate cancer screening in their communities. The number of elderly men needed to be recruited or the sample size was calculated by using the prevalence estimated from the authors' pilot project and the prevalence obtained from a literature review. The expected prevalence was about 1.2 per cent and the allowable error was 1 per cent. By the formula, $n = (Z\alpha/2)^2 P(1-P)/d^2$, the sample size or screening population was 730 men.

DRE was performed by 1 of 2 urologists in the team as a screening test and 10ml of blood was taken from each individual for PSA. The DRE findings were divided into two groups : those in whom prostate cancer was suspected and those in whom there was no suspicion of prostate cancer. The criteria for abnormal DRE were induration, nodules, asymmetry or a nodular hard gland. BPH or "normal" palpation were considered "normal".

The serum total PSA level was determined by an immunological-ELISA technique, using a Cobas Care automated ELISA machine (Roche Diagnostic, Switzerland). A total serum PSA of more than 4 ng/ml was considered abnormal.

Subjects who had an abnormal DRE and/or PSA were referred to Siriraj Hospital for further investigation. The final diagnosis was made by TRUS-biopsy or follow-up DRE and PSA. TRUS-biopsy was done by the six sextant technique. A pathological diagnosis of prostate cancer was considered as the gold standard. In men who refused TRUS biopsy, the PSA and DRE were repeated. If both the follow-up PSA and DRE were normal, these patients were considered to be normal (no prostate cancer present) and they were followed-up at 6 months and 1 year after the original referal.

RESULT

928 elderly men in 49 communities around Siriraj Hospital were recruited in the first round of screening. In some communities, DRE could not be performed because of limitation of space. So DRE was performed in only 816 men and blood for PSA was taken in only 492 men. The rest of the men refused to have a blood test. The results are shown in Table 1.

Out of 142 men with abnormal DRE and/or PSA, only 78 men or 54.9 per cent obtained a final diagnosis, 53 men by biopsy and 25 men by follow-up. Biopsy was performed in 53 men or 37.3 per cent of those with abnormal test and in this group, prostate cancer was found in 7 men. Twenty five of 78 men who were followed-up for 1 year, both DRE and PSA returned to normal and were considered as normal without prostate cancer. So in the community study, the authors found at least 7 patients with prostate cancer from a population of 928 elderly men and the prevalence of prostate cancer in an elderly Thai community was at least 0.75 per cent with a 95 per cent confidence interval of 0.2-1.3 per cent. These results are shown in Fig. 1.

Of the 78 men with abnormal DRE and/or PSA who obtained a final diagnosis, the authors calculated the Positive Predictive Value (PPV) or the chance of having prostate cancer if the DRE and/or PSA were positive as shown in Table 2.

From the prevalence of abnormal DRE and PPV of DRE, the prevalence of prostate cancer (if only DRE was done in the screening) was as calculated 1.68 per cent. In the same way, if only PSA was done for prostate cancer screening, the detection rate or prevalence was 1.98 per cent

When the cost effectiveness of the screening program is considered, the authors performed 816 DRE which cost 6,528 baht and 492 PSA which cost 49,200 baht. There were 142 men who had an abnormal DRE±PSA and TRUS biopsy or PSA+ DRE follow-up was needed. Only 53 of 78 men had final diagnosis by TRUS biopsy and 25 of the 78 had final diagnosis made by repeat DRE±PSA follow-up. The material costs of DRE, PSA and TRUS biopsy were 8, 100 and 160 baht respectively. So the total cost of this program were 64,208 baht. In the program 7 patients were detected with prostate cancer. So the "cost effectiveness" of this program was 9,173 baht per case of prostate cancer detected. There were 46 men who underwent "unnecessary" biopsy. If another approach to the screening program was considered, by starting with DRE alone and performing PSA only when the DRE is abnormal. A TRUS biopsy would be done when both the DRE and PSA were abnormal. If when this approach was applied to the present study the authors found that 816 DRE's and 52 PSA's were done. There were 14 men with an abnormal DRE and an abnormal PSA who needed TRUS biopsy. TRUS-biopsy was performed on 10 subjects and 6 patients with prostate cancer were detected. The total cost of the screening program by DRE followed by PSA if abnormal was 13,328 baht and the cost per prostate cancer detected was 2,221 baht. There were only 4 men in whom unnecessary biopsy was performed and 1 prostate cancer was missed.

Table 1. Abnormal digital rectal examination (DRE) and/or prostate specific antigen (PSA) in elderly men in the community.

Test/Result	Number of patients (N)	Number of patients with abnormal test	Prevalence of abnormal test	
			%	95% CI
DRE	816	71	8.7	6.9-10.6
PSA >4.0	492	85	17.3	13.9-20.6
PSA 4.1-10.0	492	68	13.8	10.8-16.9
10.1-20.0	492	10	2.0	0.8-3.3
>20.0	492	7	1.4	0.4-2.5
DRE and/or PSA	928	142		
DRE ⊖ PSA ⊕	380	60	15.8	12.1-19.5
DRE ⊕ PSA ⊖	380	38	10.0	7.0-13.0
DRE ⊕ PSA ⊕	380	14	3.7	1.8-5.6

Table 2. Positive predictive value (PPV) of digital rectal examination (DRE) and/or prostate specific antigen (PSA).

Test/Result	Number of patients with abnormal test	Number of patients with prostate cancer	PPV	
			%	95% CI
Both tests were done				
DRE ⊖ PSA ⊕	42	0	-	-
DRE ⊕ PSA ⊖	26	1	3.8	-3.6-11.2
DRE ⊕ PSA ⊕	10	6	60	29.6-90.4
Only one test was done				
DRE ⊕	36	7	19.4	6.5-32.4
PSA ⊕	52	6	11.5	2.9-20.2

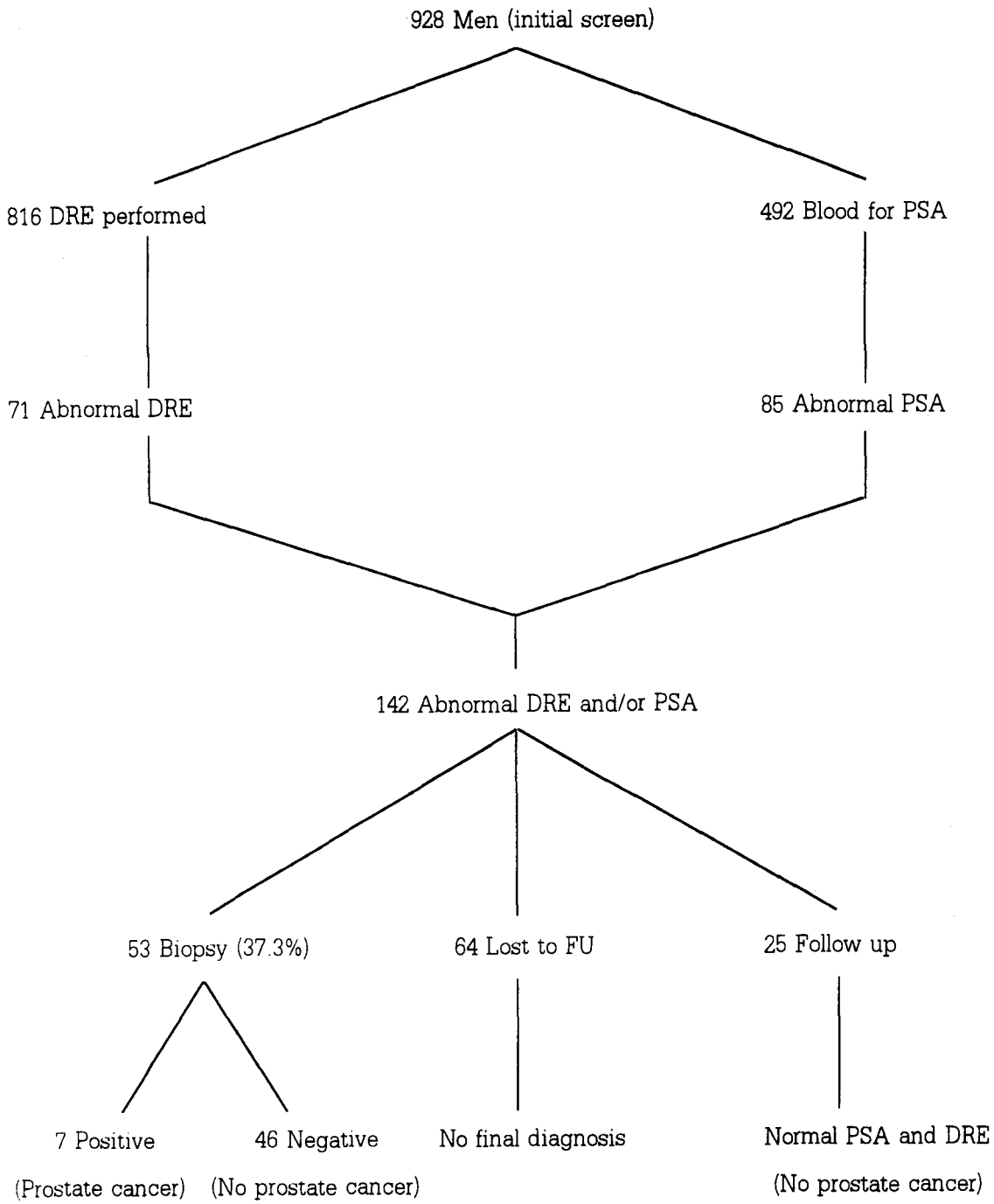

Fig. 1. A flow chart demonstrates tract of patients and results of screening.

DISCUSSION

The prevalence of abnormal DRE and PSA, PPV of DRE and PSA and the detection rate of prostate cancer screening by DRE only and PSA only in other studies was comparable to this study[1] as shown in Table 3.

The results of prostate cancer screening using the combination of DRE and PSA in this study are comparable to the results of the ERSPC[6] as shown in Table 4.

Although a final diagnosis was obtained in only 54.9 per cent of men with an abnormal screening test, and only 37.3 per cent were biopsied, this rate is relevant for community or population based screening of prostate cancer because most of them were asymptomatic and not really willing to be screened. The biopsy rate in the present study was also comparable to the study of Imal and Chadwick as shown in Table 3.

The prevalence of prostate cancer or the detection rate in a population based screening varied from 1-3 per cent (Table 3) and depended on the screening method and ethnic group. In elderly Japanese men, the detection rate was 0.7-1 per cent which is quite similar to the present study. The 95 per cent CI of prevalence in this study was narrow, it was between 0.2-1.3 per cent. So the authors believe that the prevalence of prostate cancer in Thai elderly men in the community obtained from this study is relevant and can represent the burden of this disease in Thailand.

The PPV in this study had a wide range of 95 per cent CI because the number of abnormal tests was low. The authors are collecting data from

Table 3. Prevalence of abnormal test, positive predictive value (PPV) and detection rate for digital rectal examination (DRE) and prostate specific antigen (PSA) as an individual screening test.

Author	Method	Population	Number	Age	Detection %	Prevalence	PPV	Biopsy Rate
Chadwick, 1991	DRE	British	407	55-69	0.2	3.2	8	46.4
	PSA	British	437	55-69	1.5	13.0	11	
Faul, 1982	DRE	German	1.5 M	>45	0.1		9	
Gustafsson, 1992	DRE	Swedish	1,788	55-70	2.4	11.0	22	100
	PSA	Swedish	1,788	55-70	3.6	17.0	17	
	TRUS	Swedish	1,788	55-70	3.3			
Imal, 1988	DRE	Japanese	5,302	>60	1.0	10.4	27	36.7
Pederson, 1990	DRE	Swedish	1,163	50-69	1.1		30	
Muschemheim, 1991	PSA		565		3.5	10.4		58
Watanabe, 1991	TRUS	Japanese	7,235	>55	0.7			
This study, 1998	DRE	Thai	816	>60	1.68	8.7	19.4	37.3
	PSA	Thai	492	>60	1.98	17.3	11.5	

Note: TRUS = Transrectal ultrasound

Table 4. Prevalence and positive predictive value (PPV) of abnormal prostate specific antigen (PSA) and/or digital rectal examination (DRE). Data from the European Randomized Study of screening for prostate cancer (ERSPC) and this study.

Result of tests	Number ERSPC	Prevalence ERSPC	Prevalence This study	PPV	PPV ERSPC
PSA ≥4	499 / 3,963	12.6	17.3	27.7	11.5
DRE +	364 / 3,963	9.2	8.7	22.3	19.4
PSA + DRE -	405 / 3,963	10.2	15.8	19.5	0
PSA + DRE +	94 / 3,963	2.4	3.7	62.8	60.0
PSA - DRE +	270 / 3,963	6.8	10.0	8.1	3.8
PSA - DRE -	3,194 / 3,963	80.6	70.5	0.4	-

patients who will undergo a TRUS-biopsy because of abnormal DRE and/or PSA. If there are enough patients, the PPV from the new data will be more reliable and will be useful in decision making about prostate cancer screening.

In determination of the cost-effectiveness of the screening program, the parallel test of both DRE and PSA which was performed in this study cost 9,173 baht per case detected and was more expensive than serial tests of DRE followed by PSA if DRE positive which is the second approach that was postulated. A screening program starting with DRE and performing PSA if DRE abnormal, might be suitable in Thailand because the prevalence of prostate cancer is not high and DRE is cheap and available all over the country.

SUMMARY

The prevalence of prostate cancer in elderly Thai men in a community was at least 0.75 per cent (95% CI 0.2-1.3). The combination of both tests of DRE and PSA had a high PPV but a screening program starting with DRE seems to be more cost effective.

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ความชุกของมะเร็งต่อมลูกหมากจากการตรวจกรองในชายไทยสูงอายุ

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ปัญหา : มะเร็งต่อมลูกหมากเป็นมะเร็งที่พบบ่อยมากที่สุดในชายสูงอายุในประเทศทางตะวันตก โรคนี้จะเป็นปัญหาสำคัญของประเทศไทยในอนาคต แต่เรายังขาดข้อมูลความชุกและการตรวจกรองโรคนี้ที่เชื่อถือได้

วัตถุประสงค์ : เพื่อหาความชุกและวิธีตรวจวินิจฉัยมะเร็งต่อมลูกหมากที่เหมาะสมสำหรับประเทศไทย

วัสดุและวิธีการ : ผู้สูงอายุ 928 คน ในชุมชนรอบโรงพยาบาลศิริราช ได้รับการตรวจคลำต่อมลูกหมากผ่านทางทวารหนัก และ/หรือ ตรวจเลือดหาสารจำเพาะของต่อมลูกหมาก (พีเอสเอ) การวินิจฉัยที่แน่นอนได้จากการตรวจชิ้นเนื้อตัวอย่างของต่อมลูกหมากด้วยกล้องจุลทรรศน์โดยอาศัยอุลตร้าซาวน์เป็นตัวบอกตำแหน่งในการตัดชิ้นเนื้อ ในรายที่ไม่ได้ตัดชิ้นเนื้อตรวจจะได้รับการตรวจติดตามด้วยการตรวจคลำ และ/หรือ ตรวจเลือดเป็นระยะ

ผล : ความชุกของมะเร็งต่อมลูกหมากในชายไทยสูงอายุในชุมชนเมืองมีมากกว่าร้อยละ 0.75 ความชุกของความผิดปกติในการตรวจคลำต่อมลูกหมากและการตรวจเลือดหาสารจำเพาะของต่อมลูกหมากเท่ากับ ร้อยละ 8.7 และ 17.3 ตามลำดับ หากผลตรวจทั้งสองผิดปกติจะมีโอกาสเป็นมะเร็งต่อมลูกหมากมากกว่าผลตรวจอย่างใดอย่างหนึ่งผิดปกติ การตรวจกรองที่เหมาะสมและคุ้มค่าในกลุ่มคนจำนวนมาก ควรเริ่มต้นด้วยการตรวจคลำต่อมลูกหมากทางทวารหนักก่อน

สรุป : ความชุกของมะเร็งต่อมลูกหมาก ความผิดปกติของผลตรวจคลำต่อมลูกหมาก และผลตรวจเลือด พีเอสเอในคนไทยใกล้เคียงกับประเทศตะวันตก เราจึงควรให้ความสำคัญกับโรคนี้มากขึ้น

คำสำคัญ : มะเร็งต่อมลูกหมาก, ความชุก, การตรวจกรอง

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