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# Factors Influencing the Acceptance of Transrectal Ultrasound-Guided Prostate Biopsies

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**Purpose:** This study aimed to improve prostate biopsy compliance by analyzing the factors that influence the acceptance of prostate biopsy by patients to whom transrectal ultrasound (TRUS)-guided prostate biopsy is recommended for suspected prostate cancer.

**Materials and Methods:** The subjects of this study were 268 patients to whom TRUS-guided prostate biopsy was recommended from January to June 2011 and who completed a questionnaire. Patients who showed a prostate-specific antigen (PSA) increase to more than 4.0 ng/mL or abnormal findings on a digital rectal examination and TRUS were recommended to undergo prostate biopsy. The questionnaire consisted of 9 questions about the subjects' demographic characteristics and 15 questions that assessed their knowledge of prostate disease. Fisher exact probability test was conducted to assess the influence of the demographic characteristics and levels of knowledge of prostate disease on acceptance of prostate biopsy.

**Results:** The mean age of the subjects was 66.2 years (range, 43–83 years). Of the cohort, 188 patients (70.7%) agreed to the prostate biopsy and 78 patients (29.3%) refused. In terms of demographic characteristics, the patients' acceptance of prostate biopsy was associated only with education level. Patients with relatively lower education levels had a higher acceptance rate for prostate biopsy (80.0% vs. 65.9%, p=0.018). Other demographic factors, as well as the degree of knowledge of prostate disease, had no significant effect on the acceptance rate.

**Conclusions:** The patients' acceptance of prostate biopsy can be influenced by demographic characteristics, especially education level. Therefore, when prostate biopsy is recommended to patients, their demographic characteristics should be taken into consideration.

**Keywords:** *Compliance; Demography; Prostatic neoplasms*

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## INTRODUCTION

Recently, as the proportion of the elderly in the South Korean population has increased, and as dietary life has been progressively westernized, the incidence of prostate cancer has increased. According to the annual report of the Korean Central Cancer Registry in 2009, prostate cancer was the seventh most common cancer and the fifth most common among males [1]. It was approximated that 3 out of 100 men will be diagnosed with prostate cancer during their lifetime. Moreover, the incidence of prostate cancer in the population as a whole has been increasing by 14% each year.

Serum prostate-specific antigen (PSA) and digital rectal examination (DRE) are usually recommended for prostate cancer screening, and any abnormal finding on these two diagnostic tools should prompt a clinician to recommend prostate biopsy to the patient. Currently, prostate needle biopsy is the only standardized method for diagnosis of prostate cancer. However, the positive predictive value of

prostate biopsy is very low, at about 24% [2]. In addition, because it can cause severe complications such as pain, infection, bleeding, and urinary symptoms after the procedure, some patients are reluctant to undergo this invasive procedure.

Thus, when a physician recommends prostate biopsy, the patient's decision may differ depending on his socioeconomic and individual health status. Furthermore, if the PSA level continues to increase or if a new lesion on DRE is palpated after a negative result of a previous prostate needle biopsy, the physician should recommend a repeat biopsy. At this point, both the physician and the patient may have difficulty in deciding to undergo a repeat biopsy not only because of the burden of an invasive prostate needle biopsy, but also because of economic factors and the somewhat low negative predictive value [3].

According to Rai et al. [4], patient education about PSA levels before screening tests affects compliance with additional study and initial treatment. Hu et al. [5] insisted that the income level of patients affects the rejection of the prostate cancer screening procedure. Thus, to increase patients' compliance with prostate biopsy and to clarify the decision-making process, in the present study we prospectively analyzed the socioeconomic and individual health status of patients who were candidates for prostate needle biopsy.

## MATERIALS AND METHODS

The study included 268 male patients who visited Hallym Sacred Heart Hospital from January 2011 to June 2011. All 266 patients were over 40 years old and had PSA levels higher than 4.0 ng/mL or were recommended to undergo prostate biopsy under transrectal ultrasound (TRUS) following abnormalities during the initial DRE or during TRUS for the first time.

All participants recommended for prostate biopsy were given a survey before they decided. The significance of increased PSA levels and abnormal DRE and TRUS findings was explained to the patient. Information related to the actual biopsy procedure was also given. It was explained that prostate biopsies would be performed under TRUS on 6 to 12 routine locations on the rectal wall by needle biopsy and that any additional needle biopsies would be needed only when abnormalities were found in TRUS. Frequent side effects and suggested precautions following prostate biopsy were also explained.

The survey was composed of 9 questions about demographic characteristics and 15 questions regarding the patient's general understanding of prostate disease. The nine demographic characteristics were selected on the basis of factors proven by previous reports to affect acceptance of prostate biopsy and prostate cancer screening, including patient's age, marital status, income level, body mass index, education level, occupation status, past medical disease history, other cancer history, and operation history. The questions on general understanding covered areas

such as prostate anatomy, function, prostate cancer screening, and symptoms of prostate cancer [4-11].

Univariate analyses were performed by using Fisher exact probability test to determine the factors affecting the acceptance of prostate biopsy; p-values less than 0.05 were considered statistically significant.

## RESULTS

The mean age of the patients in the study was 66.2 years (range, 43–83 years), and 35 patients were unmarried, divorced, or widowed (13.1%). Patients who currently had a job numbered 135 (53.1%), and 125 patients (48.4%), and 133 patients (51.6%) had a monthly income less than one million south Korean Won (KRW) and more than one million KRW, respectively. A total of 173 patients had a high school education or higher (65.7%). Patients with pre-

TABLE 1. Demographic characteristics of the participants (n=268)

| Characteristic | Value |
|---|---|
| Age (y), mean (range) | 66.2 (43-83) |
| Marital status | |
| Married | 233 (86.9) |
| Unmarried | 5 (1.9) |
| Divorced | 8 (3.0) |
| Bereaved | 22 (8.2) |
| Body mass index (kg/m$^2$) | |
| <23.0 | 91 (38.7) |
| ≥23.0 | 144 (61.3) |
| Education level | |
| No education | 10 (3.8) |
| Elementary school graduate | 39 (14.8) |
| Middle school graduate | 41 (15.6) |
| High school graduate | 94 (35.7) |
| College graduate | 69 (26.2) |
| Graduate school | 10 (3.8) |
| Employment state | |
| Yes | 135 (53.1) |
| No | 119 (46.9) |
| Income (KRW) | |
| No income | 72 (27.9) |
| 0–1,000,000 | 53 (20.5) |
| 1,000,000–2,000,000 | 42 (16.3) |
| 2,000,000–3,000,000 | 46 (17.8) |
| 3,000,000–4,000,000 | 23 (8.9) |
| >4,000,000 | 22 (8.5) |
| Past medical disease | |
| Yes | 106 (40.2) |
| No | 158 (59.8) |
| Other cancer history | |
| Yes | 23 (8.6) |
| No | 243 (91.4) |
| Surgical procedure history | |
| Yes | 136 (51.7) |
| No | 127 (48.3) |

Values are presented as number (%) unless otherwise indicated. KRW, Korean Won (the currency of South Korea).

viously diagnosed medical disease, including hypertension and diabetes, numbered 106 (40.2%), and 23 patients (8.6%) had a history of other cancer (i.e., other than prostate cancer). Patients who had previously experienced surgical treatment numbered 136 (51.7%). These findings are presented in Table 1.

Among the 268 patients who were recommended to undergo prostate biopsy after increased PSA levels and abnormal findings in DRE, 190 patients (70.9%) agreed to undergo the procedure, whereas 78 (29.1%) refused. In the demographic characteristics category, patients with education levels lower than or equal to junior high school had an acceptance rate of 80.0%, compared with 65.9% for patients with at least a high school diploma, a difference that was statistically significant (p=0.018). No other factors showed statistical significance (Table 2). Although patients with no previous medical history (p=0.051) and patients groups younger than 65 years (p=0.069) both showed higher acceptance rates, these findings were not statistically significant.

In the general knowledge of prostate disease category, patients were divided into two groups, with one group having more than nine correct answers and the other group having nine or fewer. The group with more than nine correct answers showed an acceptance rate of 65.3% compared with the other group, which had an acceptance rate of 75.2%; however, the results were not statistically significant (p=0.079).

## DISCUSSION

This study was a prospective study of the factors that affect the acceptance rate of prostate biopsy among patients with suspected prostate cancer. Although there are similar studies on the subject, this study is the first to target Korean male patients.

Prostate cancer is the most common form of cancer among males in North America and Europe. Recently, the incidence of prostate cancer has been increasing in Korea owing to factors such as a rapid increase in the elderly population, a progressively westernized diet, and expansion of prostate cancer screening. According to the National Health Insurance Corporation, 20,495 patients were treated for prostate cancer in Korea in 2008, which is 4.2 times higher than the 2002 level of 4,843. Prostate cancer also had the fastest growing number of patients from 2001 to 2008, making it the most prevalent cancer among male cancers worldwide [1]. The spread of PSA screening, DRE, and the number of prostate cancer diagnoses has resulted in an increase in prostate biopsies. However, the prostate cancer diagnosis rate for prostate biopsy is 24%, which is not exceptional [2].

The results of the present study showed that patients with an education level lower than junior high school had an acceptance rate of 80.0%, compared with 65.9% of patients with at least a high school diploma. It may be that groups with lower education levels tend to be more dependent on professional counsel. Although previous studies have shown that older, more educated and knowledgeable patients display more cooperation with doctors, there are many cultural and geographical differences to consider when comparing these results [7].

Although not statistically significant, groups with no prior medical history and groups younger than 65 years showed increased rates of acceptance of prostate biopsy. This can be explained by the fact that older patients tend to have underlying conditions and also tend to be economically unstable, resulting in poor acceptance rates.

However, owing to the fact that prostate cancer has a higher prevalence among the elderly, and the elderly are the ones with an increased interest in cancer, the doctor's counsel can have a profound effect on the patient's decision [10]. The doctor must provide a thorough explanation of the disease, because the elderly are often insufficiently in-

**TABLE 2.** Associations of demographic variables and prostate information with prostate biopsy decision-making preferences according to the univariate analysis

| Variable | Agree to prostate biopsy | Disagree to prostate biopsy | p-value |
|---|---|---|---|
| Age (y) | | | 0.069 |
| <65 | 71 (73.2) | 26 (26.8) | |
| ≥65 | 119 (69.6) | 52 (30.4) | |
| Marital status | | | 0.997 |
| No partner | 27 (77.1) | 8 (22.9) | |
| Partner | 163 (70.0) | 70 (30.0) | |
| Body mass index (kg/m$^2$) | | | 0.896 |
| <23.0 | 62 (68.1) | 29 (31.9) | |
| ≥23.0 | 102 (70.8) | 42 (29.2) | |
| Education level | | | 0.018* |
| Middle school or less | 72 (80.0) | 18 (20.0) | |
| High school or more | 114 (65.9) | 59 (34.1) | |
| Employment status | | | 0.608 |
| Retired | 82 (68.9) | 37 (31.1) | |
| Working | 97 (71.8) | 38 (28.2) | |
| Income (KRW) | | | 0.083 |
| ≤1,000,000 | 95 (76.0) | 30 (24.0) | |
| >1,000,000 | 88 (66.2) | 45 (33.8) | |
| Past medical disease | | | 0.051 |
| No | 119 (75.3) | 39 (24.7) | |
| Yes | 68 (64.2) | 38 (35.8) | |
| Other cancer history | | | 0.124 |
| No | 175 (72.0) | 68 (28.0) | |
| Yes | 13 (56.5) | 10 (43.5) | |
| Surgical procedure history | | | 0.472 |
| No | 92 (72.4) | 35 (27.6) | |
| Yes | 93 (68.4) | 43 (31.6) | |
| Information for prostate | | | 0.079 |
| ≤8 | 109 (75.2) | 36 (24.8) | |
| ≥9 | 79 (65.3) | 42 (34.7) | |

Values are presented as number (%) unless otherwise indicated.
KRW, Korean Won (the currency of South Korea).
*p<0.05, significant, Fisher exact probability test.

formed, before recommending prostate biopsy.

In males, spouses help to achieve a lower incidence of disease and extend life expectancy, and females affect their spouses' decision making processes concerning health [12]. According to Meiser et al. [13], spouses have an effect on the patients' acceptance of prostate cancer screening. The present study showed that there was no correlation between marital status and the acceptance rate. However, it is true that prostate biopsies are more frequent among married men.

Previous studies have stated that patients with lower income levels tend to rely on subjective information from acquaintances rather than objective data and education when it comes to health and disease [14]. Patients with a lower income level may be more resistant to biopsy owing to costs; however, they are more likely to be influenced into acceptance by the doctor's recommendation [15]. Income levels, occupation status, and education levels are all interactive factors; thus, further research in their correlation is desirable.

Some previous studies have emphasized the relationship between prostate cancer screening and the patient's general knowledge about the prostate, although the reason given was not clear [9]. Nijs et al. [6] stated that the lesser the patient's knowledge about the prostate, the lower the acceptance of prostate cancer screening. Watson et al. [16] stated that the patient's knowledge of PSA levels affects screening acceptance. In contrast, Yasunaga et al. [17] reported that acceptance of prostate cancer screening is correlated with income, age, and past admission history, whereas the level of knowledge about the disease is not relevant. In the present study, patients with lesser knowledge about the prostate showed higher biopsy acceptance, although this finding was not statistically significant.

According to Nijs et al. [6], among patients who refused prostate cancer screening, 57% did not show urological symptoms, indicating that the presence of symptoms plays a crucial role in patient acceptance. In addition, 25% of the patients who accepted prostate cancer screening cited urological symptoms as the main factor determining acceptance. Other reports from Avery et al. [11] stated that whereas urological symptoms and PSA levels are weakly related to prostate cancer screening, they show a strong correlation with prostate biopsy. It was explained that because patients tend to associate urological symptoms with cancer symptoms, the presence of such symptoms greatly increases the acceptance rate of prostate biopsy.

For future studies, the precise effect of PSA levels and urological symptoms on the patient acceptance rate should be further explored. In addition, further analysis should be conducted concerning acceptance when, for example, significantly increased PSA levels or severe pain possibly associated with metastatic prostate cancer are present. In such cases, there may be issues with the doctor's subjectivity and differences in characteristics during counsel on prostate biopsy. The present survey lacked authentication beforehand, and more thorough analysis of the inter-

action between factors would be desirable.

The correlation between each factor affecting prostate biopsy should be analyzed and compared with key demographic factors and level of knowledge about the prostate to increase patient acceptance of prostate biopsy.

## CONCLUSIONS

The results of this study showed that the lower the patient's education level, the higher the acceptance level of prostate biopsy. Because the demographic characteristics of the patient may affect the acceptance of prostate biopsy, these characteristics must be explored when explaining the procedure to the patient, thereby increasing the acceptance rate of the procedure.

## CONFLICTS OF INTEREST
The authors have nothing to disclose.

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