Prevalence, Cognitive and Socio-Demographic Determinants of Prostate Cancer Screening

Mehdi Mirzaei-Alavijeh, Touraj Ahmadi-Jouybari, Masoumeh Vaezi, Farzad Jalilian

Abstract

Screening may be effective for reducing deaths due to prostate cancer. The aim of this study was determine the prevalence and determinants influencing prostate cancer early detection behaviors based on the theory planned behavior (TPB). In this cross-sectional study, conducted in the west of Iran, a total of 250 men aged 50 to 70 years old were randomly selected to participate. Of these, 200 (80%) signed the consent form and voluntarily agreed to take part. A structured questionnaire based on TPB constructs was applied for collecting data by interview. Analyses were conducted with SPSS version 16 using bivariate correlations, and logistic and linear regression. Some 26.5% of the participants demonstrated prostate cancer early detection behavior. Age higher than 60 (OR: 5.969), academic education (OR: 2.904), number of family members more than four (OR: 3.144), and knowledge about prostate cancer (OR: 3.693) were the most influential predictive factors for early detection behavior. Furthermore, among the TPB constructs, attitude (OR=1.090) and subjective norms (OR=1.280) were the most influential predictors. Attitude, subjective norms, and perceived behavioral control accounted for 43% of the variation in the outcome measure of the intention to screen for prostate cancer (adjusted R squared= 0.43, F= 49.270 and P < 0.001). Designing and implementation programs to increase positive attitudes and encourage subjective norms towards prostate cancer screening behavior may be useful for promotion of early detection.

Keywords: Early detection of cancer- life style- health education

Introduction

Prostate cancer is one of the most common and commonly reported men’s health problems (Drudge-Coates and Turner, 2012). Prostate cancer is recognized as the most commonly diagnosed non-skin cancer and the second leading cause of cancer death in the United States (Brawley, 2012). Prostate cancer is the second most frequently diagnosed cancer in men world-wide (Qian et al., 2017). The long-term side effects of the treatment such as urinary incontinence, impotence, and irradiation-induced rectal inflammation have very adverse effects on the quality of life of patients with prostate cancer (Grubb 3rd and Kibel, 2007). Existing studies show that there is 40% risk of developing latent prostate cancer among 50-year-old men over the course of their lives, which is 9.5% for clinically obvious prostate cancer and 2.9% for resulting death (Stangelberger et al., 2008). In other hand, it is predicted that by 2025, the incidence of cancer raises 45% in developing countries (Pakzad et al., 2016). High body mass indexes, obesity, physical inactivity, dietary factors, smoking are strongly associated with increased risk of prostate cancer (Peisch et al., 2017). It has also been shown that the risk level varies with the level of familial relationship and the age of the disease manifestation (Albright et al., 2017). There is clear evidence that early diagnosis of cancer is one of the most effective solutions to reduce the incidence of cancer deaths (Katz et al., 2008). Prostate-Specific Antigen (PSA) and Digital Rectal Examination (DRE) can help detect prostate cancer before the onset of clinical symptoms and these methods are used for screening detect prostate cancer (Smeenge et al., 2012). Furthermore, prostate-Specific Antigen (PSA) testing for prostate cancer has been reported to avert one prostate cancer death per 27 additional cases detected during 13 years (Mamawala et al., 2017). Several characteristics of these methods such as easy to use, low price and availability, and extraordinary results in reducing the incidence of cancer and reducing the severity of cancer during the diagnosis phase show the importance of these examinations (Shafii et al., 2013). These facts clarify the necessity of intervention for at risk group to improve prostate cancer screening behaviors; on the other hand,
health planning programs needs to identify the effective and predictive determinants of behavior (Steinmetz et al., 2016; Mirzaei-Alavijeh et al., 2016a; Jalilian et al, 2016; Mirzaei-Alavijeh et al 2016b).

In cancer screening behavior promotion research, it would be beneficial to know how perceptual related factors, such as attitude, subjective norms, self-efficacy, or perceived behavior control are responsible to predict intention and consequently behavior (McClenahan et al., 2006; Iyigun et al., 2016). The objective of this study was to determine the determinants related to undergoing prostate cancer early detection behaviors among sample of Iranian men middle age and young elderly based on the TPB.

Material and Methods

Participants and procedure

The study was a part of a project conducted among male in the Paveh city, Kermanshah Province in the western of Iran, during 2016, with the goal of providing knowledge for the promotion of prostate cancer early detection behaviors.

To enroll the participants and collect data the following stages were done. A simple random sampling method was used to select participants by referring to health records of each household and the interviewer later referred to the home of the eligible subjects to collect their required information. Data was collected by interview. Research subjects were explained regarding the study procedure and confidentiality of information as well as the purpose of this study and all of them were enrolled in the study based on their consent.

The sample size was calculated at 95% significant level according to the results of a pilot study and a sample of 250 was estimated. Of the population of 250, 200 (80%) signed the consent form and voluntarily agreed to participate in the study, which has been approved by the Institutional Review Board at the Abadan University of Medical Sciences. Inclusion criteria were including willingness to participate in the study, age 50 and higher than 50 years, and no history of prostate cancer. However, exclusion criteria were unwillingness to participate in this study and lack of consent knowingly during any time of the study. This study has been approved by the institutional review board at the Abadan school of medical sciences, Abadan, Iran (IR.ABADANUMS.REC.1395.70).

Measures

Prior to conducting the main project, a pilot study was conducted to assess the utility of the instrumentation. The pilot study participants were 30 male, similar to those who participated in the main study. The pilot study was conducted to obtain feedback about the clarity, length, comprehensiveness, and completion time of the various instruments, as well as collecting data to estimate the internal consistency of the measures.

Demographics determinants

Background data collected were: age (years), level of education (elementary, secondary, high school, or university), marital status (single or married), economic status (very weak, weak, average, good, very good), number of family (number), have a health insurance (yes, no), family history of prostate cancer (yes, no), and knowledge about prostate cancer (yes, no).

Prostate cancer early detection behaviors

To assess whether or not the participant’s prostate cancer early detection behaviors, we used their responses 3 questions about the type of prostate cancer early detection behaviors which included “have you ever doing sonography for detection prostate cancer”? , “have you ever doing rectal examination for detection prostate cancer”? , and “have you ever doing PSA test for detection prostate cancer”? For which the response category was yes or no.

TPB Theoretical Variables

The items which assessed constructs of the TPB were derived from the scales of prostate cancer early detection behaviors related intention to the doing prostate cancer early detection behaviors (McClenahan et al., 2006; Iyigun et al., 2016). There were 15 items which measured the four constructs of 1) attitude, 2) subjective norms, 3) perceived behavioral control, and 4) behavioral intention. Specifically, five items measured attitudes towards the doing prostate cancer early detection behaviors (e.g., doing prostate cancer early detection behaviors for me is useful). Four were four items which measured the subjective norms towards the doing prostate cancer early detection behaviors (e.g., if I doing prostate cancer early detection behaviors, my family will confirm it). Four items measured the perceived behavioral control to doing prostate cancer early detection behaviors (e.g., I am confident that I can talk with others about doing prostate cancer early detection behaviors). The behavioral intention to doing prostate cancer early detection behaviors was measured by two items (e.g., I intend doing prostate cancer early detection behaviors in the next year). A five-point Likert type scaling, ranging from 1 (strongly disagree) to 5 (strongly agree), was used. The reliability coefficients for the abovementioned constructs were as follows: attitude ($\alpha = 0.89$); subjective norms ($\alpha = 0.85$), perceived behavior control ($\alpha = 0.80$), and behavioral intention ($\alpha = 0.63$), attesting to the internal consistency of the measures.

Analysis plan

The statistical package for the social sciences (SPSS) version 16 was used for the purpose of data entry, manipulation, and analysis. Quantitative variables were expressed as means with SDs, and qualitative/categorical ones as frequencies and percentages. Bivariate correlations were computed to ascertain the magnitude and direction of the associations between the TPB variables. Multivariable logistic regression models were performed to predict TPB variables and socio-demographic variables on prostate cancer early detection behaviors. In addition, liner regression analysis was performed to explain the variation of behavioral intention on the basis of 1) attitude, 2) subjective norms, and 3) perceived behavioral
Determinants of Prostate Cancer Screening

predictive factors for doing prostate cancer early detection behaviors. Table 1.

Table 2 shows the bivariate associations among the predictor variables, which were all statistically significant at either .05 or .01 level. For example, intention towards the doing prostate cancer early detection behaviors was associated with the positive attitudes towards the doing prostate cancer early detection behaviors (r = 0.226), subjective norms (r = 0.528), and perceived behavioral control (r = 0.540). Additionally, perceived behavioural control to doing prostate cancer early detection behaviors was significantly related to the positive attitudes towards the doing prostate cancer early detection behaviors (r = 0.171), and subjective norms (r = 0.352). In addition, positive attitudes towards the doing prostate cancer early detection behaviors was associated with the subjective norms (r = 0.177).

A Backward step-wise model building procedure was conducted and finally on the 3rd step the procedure was stopped and the best model was selected. Among the TPB constructs: attitude (OR = 1.090) and subjective norms (OR = 1.280) were the more influential predictors on prostate cancer early detection behaviors Table 3.

As can be seen in Table 4, TPB variables were statistically significant for predicting prostate cancer early detection behaviors intention, which they were accounted for 43% of the variation in intention to the prostate cancer early detection behaviors (Adjusted R squared = 0.43, F = 49.270 and P < 0.001).

| Variables | Crude OR (95% CI) | P value | Adjusted OR (95% CI) | P value |
|-----------|------------------|---------|----------------------|---------|
| Age       |                  |         |                      |         |
| 50 -55 Years Old | 1     | -       | 1                    | -       |
| 56- 60 Years Old | 2.111 (0.881 – 5.059) | 0.094   | 1.116 (0.417 – 2.983) | 0.827   |
| 61-69 Years Old | 4.798 (2.002 – 11.501) | < 0.001 | 5.969 (2.082 – 17.115) | 0.001   |
| Education  |                  |         |                      |         |
| Under Diploma | 1     | -       | 1                    | -       |
| Diploma    | 0.391 (0.169 – 0.907) | 0.029   | 0.695 (0.251 – 1.923) | 0.484   |
| Academic   | 1.320 (0.631 – 2.760) | 0.461   | 2.904 (1.133 – 7.441) | 0.026   |
| Number of Family |        |         |                      |         |
| 1-4 n      | 1.976 (1.042 – 3.747) | 0.037   | 3.144 (1.448 – 6.827) | 0.004   |
| Knowledge about Prostate Cancer |     |         |                      |         |
| No         | 2.829 (1.483 – 5.396) | 0.002   | 3.693 (1.777 – 7.675) | < 0.001 |
| Yes        |                  |         |                      |         |

Table 2. Correlation Between Different Components of TPB

| Component                  | Mean (SD) | Range | X1   | X2   | X3   |
|----------------------------|-----------|-------|------|------|------|
| X1. Attitude               | 17.45 (4.35) | 5 - 25 | 1    |      |      |
| X2. Subjective norms       | 12.13 (3.24) | 4-20  | 0.177* | 1    |
| X3. Perceived behavioural control | 12.82 (2.95) | 4-20  | 0.171* | 0.352** | 1    |
| X4. Intention              | 7.18 (1.61) | 2-10  | 0.226** | 0.528** | 0.540** |

* Correlation is significant at the 0.05 level (2-Tailed); ** Correlation is significant at the 0.01 level (2-Tailed)
Table 3. Logistic Regression Analysis for TPB Variables Related to Prostate Cancer Early Detection Behaviors

| Variables               | B    | S.E.  | Odds Ratio | 95% Confidence Intervals | P-value |
|-------------------------|------|-------|------------|--------------------------|---------|
| Final Model, Step 3     |      |       |            |                          |         |
| Attitude                | 0.086| 0.041 | 1.090      | 1.005 - 1.182             | 0.037   |
| Subjective norms        | 0.247| 0.059 | 1.280      | 1.140 - 1.437             | <0.001  |

Table 4. Predictors of the Attitude, Subjective Norms and Perceived Behavioral Control in Prostate Cancer Early Detection Behaviors Behavioural Intention Based on Linear Regression Analysis

| Variable                      | B     | S.E. B | Beta  | T    | P-value |
|-------------------------------|-------|--------|-------|------|---------|
| Attitude                      | 0.034 | 0.020  | 0.093 | 1.686| 0.093   |
| Subjective norms              | 0.186 | 0.029  | 0.373 | 6.430| <0.001  |
| Perceived behavioral control  | 0.214 | 0.032  | 0.392 | 6.763| <0.001  |

SE, Standard Error; Adjusted R squared, 0.43; F, 49.270 ; P < 0.001

Discussion

According to the results, 26.5% of the participants underwent prostate cancer early detection behaviors. Javadzade et al carried out a research on men in Isfahan, Iran and reported that 30% of the participants had PSA (Javadzade et al., 2012). Also, Sargazi et al., (2014) reported that 21% of the subjects in their study doing prostate cancer early detection behaviors. Furthermore, Balajadia et al., (2008) stated that 20.3% of men in Island had taken PSA. Our findings indicated cancer screening behavior among Iranian men low. These finding can be warning to health policy makers in Iran; and should be the focus of special attention.

One of the findings of the study was that subjects aged over 60 were more likely to perform prostate cancer screening behaviors. Several studies point to the fact that younger people tend to be slightly vulnerable to the dangers of their own surroundings; in other words, they assume themselves immune against dangers and health threats and do not need to adopt preventive behaviors (Mirzaei Alavijeh et al., 2015). In fact, the term “immortality” or “non-vulnerability” describes one’s perception of the fact that I am at lower risk than complications compared with others and this kind of belief undermines the adoption of any preventive behavior. Given that 50-year-old men are recommended to perform prostate cancer screening, it is essential to provide educational programs in the early sixties.

Another finding from the present study is the increased chance of performing prostate cancer screening behaviors among participants with a higher education and having knowledge about prostate cancer. Sargazi et al., (2014) showed that level of education, income and occupations with low social value directed affected non-compliance with screening tests. In their review study of the relationship between socioeconomic status and the use of cancer screening tests Pruitt et al., (2009) also reported that 58.3% of the studies showed a positive statistical relationship in this regard so that patients showed more tendency to perform cancer screening examinations with an increase in social and economic indicators. Concerning the relationship between education level and screening behaviors, Cavdar et al., (2007) stated in their study that lack of information is one of the factors affecting neglecting screening behaviors. In general, higher education levels are predictors of the probability of performing screening behaviors more frequently (Secginli and Nahcivan, 2006). According to these findings, it seems that particular attention must be paid to people with lower education level while designing educational programs.

Also, more crowded households is another factor affecting frequency of the prostate cancer screening behaviors in the present study so that households with more than four people had a higher chance of performing prostate cancer screening behaviors. Many studies have pointed to the effective role of family support in carrying out health-related behaviors (Noohi et al., 2016); and patient-family interaction is a promising route towards receiving health-care service of high quality and ultimately improving health status at the societal level (Carman et al., 2013). Therefore, it is recommended to consider ways to attract family support in educational programs to increase frequency of screening behaviors.

However, studies have referred to high costs and lack of easy access as reasons for failure to implement health promotion behaviors in adults (Albert et al., 2004). Also, mental disability is a major obstacle to performing health promotion behaviors in the elderly, because people forget when they should come to the clinic or they cannot implement health recommendations based on instructions due to their mental problems (Scarinci et al., 2003). Therefore, it is recommended to carry out more accurate studies in the future using behavioral analysis theories in this regard.

The main aim of this study was to determine factors related to doing prostate cancer early detection behaviors among men aged 50 to 69 years old based on the TPB. The results of the present study indicated that attitude and subjective norms were the most influential predictors on doing prostate cancer early detection behaviors. Furthermore, our finding indicated TPB variables were accounted for 43% of the variation in intention to prostate cancer early detection behaviors. Several studies have reported TPB variables’ predictability to explain behavioral health screening such as prostate cancer screening (McClanahan et al., 2006; Lechner et al., 2002). In this regards, Lechner et al., (2002) reported a significant relationship between social norm, and self-efficacy with prostate cancer early detection behaviors intention among Dutch adolescent in Netherlands. In addition, McClanahan et al., (2006) carried out a research on 195 undergraduates aged 18–39 years and indicated TPB variables explained 50% of the variance in intention testicular self-examination. Our results show Iranian men to doing prostate cancer early detection behaviors are
influenced by other people (subjective norms) such as their friends, wife, health workers and doctors, so educational programs for health care providers is necessary to encourage men to doing prostate cancer early detection behaviors.

Considering the high prevalence of this cancer among the age group examined, this issue seems to affect quality of life of remaining years of life and must be considered as a potential health issue. Considering the positive attitude towards prostate cancer screening behaviors and the importance of subjective norms in performing these behaviors, it is recommended to design and implement educational interventions based on these cognitive constructs.

Limitations
The findings reported in this study have certain limitations. First, the information is based on self-reporting, which always faces the risk of recall bias and we do not know how it could have affected the results. Second, the high rejection rate is another limitation of our study. Third, the internal consistency the questionnaire was relatively low ($\alpha= 0.63$) for assessing behavioral intention.

In conclusion, our findings indicated prostate cancer early detection behaviors were low among Iranian men. In addition, subjective norms, and attitude were strong predictors for prostate cancer early detection behaviors.

Author’s Contributions
Mehdi Mirzaei-Alavijeh and Farzad Jalilian developed the original idea, the protocol study, study design and data analyzed. Touraj Ahmadi-Jouybari and Masoumeh Vaezi participated in writing manuscript. All authors provided comments and approved the final manuscript.

Conflict of interest statement
The authors declare that they have no conflict of interest.

Statement of Human Rights
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional. This study has been approved by the institutional review board at the Abadan school of medical sciences, Abadan, Iran (IR.ABADANUMS. REC.1395.70).

Informed consent
Research subjects were explained regarding the study procedure and confidentiality of information as well as the purpose of this study and all of them were enrolled in the study based on their consent.

Acknowledgements
It is a part of a research confirmed by Student Research Committee, Abadan University of Medical Sciences, Abadan, Iran. Hereby, the researchers appreciate the committee and all the men participated in the study.

References
Albert SM, Harlap S, Caplan L (2004). Cancer screening among older women in a culturally insular community. Prev Med, 39, 649-56.
Albright FS, Stephenson RA, Agarwal N, et al (2017). Relative risks for lethal prostate cancer based on complete family history of prostate cancer death. Prostate, 77, 41-8.
Carman KL, Dardess P, Maurer M, et al (2013). Patient and family engagement: a framework for understanding the elements and developing interventions and policies. Health Aff, 32, 223-31.
Cavdar L, Akyoculu N, Ozbas A, et al (2007). Determining female physicians’ and nurses’ practices and attitudes toward breast self-examination in Istanbul, Turkey. Oncol Nurs Forum, 34, 1218-21.
Balajadia RG, Wenzel L, Huh J, et al (2008). Cancer-related knowledge, attitudes, and behaviors among Chamorros on Guam. Cancer Detect Prev, 32, 4-15.
Brawley OW (2012). Prostate cancer epidemiology in the United States. World J Urol, 30, 195-200.
Drudge-Coates L, Turner B (2012). Prostate cancer overview. Part 2: metastatic prostate cancer. Br J Nurs, 21, 23-8.
Iyigun E, Tastan S, Ayhan H, et al (2016). Validity and reliability analysis of the planned behavior theory scale related to the testicular self-examination in a Turkish context. Postgrad Med, 128, 496-501.
Jalilian F, Joulaei H, Mirzaei-Alavijeh M, et al (2016). Cognitive factors related to cigarettes smoking among college students: an application of theory of planned behavior. Soc Sci, 11, 1189-93.
Javadzade SH, Sharifirad G, Radiati F, et al (2012). Relationship between health literacy, health status, and healthy behaviors among older adults in Isfahan, Iran. J Educ Health Promot, 1, 31-5.
Grubb 3rd RL, Kibel AS (2007). Prostate cancer: screening, diagnosis and management in 2007. Mol Med, 104, 408-13.
Katz RV, Claudio C, Kressin NR, et al (2008). Willingness to participate in cancer screenings: blacks vs whites vs puerto rican hispanics. Cancer Control, 15, 334-43.
Lechner L, Oenema A, and de Nooder J (2002). Testicular self-examination (TSE) among Dutch young men aged 15–19: determinants of the intention to practice TSE. Health Educ Res, 17, 73-84.
Mamawala MM, Rao K, Landis P, et al (2017). Risk prediction tool for grade reclassification in men with favourable risk prostate cancer on active surveillance. BJU Int, 120, 25-31.
McClanahan C, Shevlin M, Adamson G, et al (2006). Testicular self-examination: a test of the health belief model and the theory of planned behaviour. Health Educ Res, 22, 272-84.
Mirzaei-Alavijeh M, Karami-Matin B, Jalilian F, et al (2016a). Relapse preventative intervention among Iranian addicts based on theory of planned behavior results. Res J Appl Sci, 11, 138-43.
Mirzaei-Alavijeh M, Kok G, Niknami S, et al (2016b). Family-based cognitive factors effective on preventing the onset of substance use in Iranian society’s children: applying the intervention mapping protocol. Acta Medica Mediterranea, 32, 1015-20.
Mirzaei-Alavijeh M, Mahboubi M, Jalilian F, et al (2015). Factors related to self-breast examination based on health belief model among Iranian women. Res J Med Sci, 9, 105-8.
Nooei E, Peyrovi H, Goghary ZI, et al (2016). Perception of social support among family caregivers of vegetative patients: A qualitative study. Conscious Cogn, 41, 150-8.
Pakzad R, Rafiemaneshe H, Ghoncheh M, et al (2016). Prostate cancer in Iran: trends in incidence and morphological and
epidemiological characteristics. *Asian Pac J Cancer Prev*, 17, 839-43.

Peisch SF, Van Blarigan EL, Chan JM, et al (2017). Prostate cancer progression and mortality: a review of diet and lifestyle factors. *World J Urol*, 35, 867-874.

Pruitt SL, Shim MJ, Mullen PD, et al (2009). Association of area socioeconomic status and breast, cervical, and colorectal cancer screening: a systematic review. *Cancer Epidemiol Biomarkers Prev*, 18, 2579-99.

Qian B, Yao Y, Liu C, et al (2017). SU6668 modulates prostate cancer progression by down regulating MTDH/AKT signaling pathway. *Int J Oncol*, 50, 1601-11.

Sargazi M, Salehi S, Sargazi V (2014). Status screening examinations of elderly people admitted to hospital in Zahedan. *J Holist Nurs*, 24, 20-6.

Scarinci IC, Beech BM, Kovach KW, et al (2003). An examination of socio-cultural factors associated with cervical cancer screening among low-income Latina immigrants of reproductive age. *J Immigr Health*, 5, 119-28.

Secginli S, Nahcivan NO (2006). Factors associated with breast cancer screening behaviours in a sample of Turkish women: a questionnaire survey. *Int J Nurs Stud*, 43, 161-71.

Shafi H, Mooudi E, Abolfazli M, et al (2013). Screening of Prostate Cancer in Individuals Older than 40 Years of Age with Positive Heredity. *J Mazandaran Uni Med Sci*, 22, 159-64.

Smeenge M, de la Rosette JJ, Wijkstra H (2012). Current status of transrectal ultrasound techniques in prostate cancer. *Curr Opin Urol*, 22, 297-302.

Stangelberger A, Waldert M, Djavan B (2008). Prostate cancer in elderly men. *Rev Urol*, 10, 111-19.

Steinmetz H, Knappstein M, Ajzen I, et al (2016). How effective are behavior change interventions based on the theory of planned behavior?. *Z Psychol*, 224, 216-33.

This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.