

Knowledge about male pelvis anatomy and prostate cancer in men

Abstract

Educational actions are recommended to stimulate behavioural changes based on healthy lifestyle habits about prostate cancer. The educational actions require methodologies that evaluate scientific knowledge and behaviours related to health. The aims of this study were to propose standards of evaluation to theoretical and practical knowledge about male anatomy, preventive attitudes, and cancer screening methods we applied questionnaires to verify knowledge about pelvic anatomy and prostate cancer issues. We use an anatomical model to analyse practical knowledge. Our results show that part of the men does not know important male anatomy concepts. We found that 68% was unaware of the relationship between the prostate and the urethra and 74% was unaware of prostate and rectum correlation. However men who had satisfactory theoretical anatomical knowledge were 1.3 times more likely to have satisfactory knowledge about prostate cancer. Our study suggests that educational investments in interventions are necessary to promote the dissemination of anatomical knowledge regarding the male pelvis which will both raise awareness and ensure men of their autonomy. These interventions will allow men to be more active in their health-illness process, in their early diagnosis, and in their disease prevention.

Keywords: pelvis, anatomy; prostate cancer, education, knowledge

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Abbreviations: PCa, prostate cancer; INCA, national institute of cancer; UFOP, Federal University of Ouro Preto; DRE, digital rectal examination; PSA, prostate specific antigen; PR, prevalence ratio

Introduction

Prostate cancer (PCa) is the second-leading cause of death for Brazilian men after non-melanoma skin cancer.¹ PCa has a high incidence and is more prevalent in men over 50.² This fact has constituted a special concern in regard to the health of the gradually ageing Brazilian male population.³ In the biennium of 2018 through 2019, over 68,000 new cases of PCa are estimated in Brazil, which represents a risk of 66.12 new cases per 100,000 inhabitants.¹ According to the Brazilian Ministry of Health and National Institute of Cancer (INCA), it is necessary to encourage the early detection of PCa along with raising awareness in the male population about its risk factors and associated symptoms.⁴ However, there are difficulties in the approach to PCa prevention mainly due to a set of sociocultural values regarding masculinity as well as beliefs related to the disease, its prognosis, and its screening tests.^{5,6} Those aspects negatively affect good health maintenance by men, which is then reflected in the high prevalence of PCa in more advanced stages with negative prognoses. Therefore, the introduction of educational actions and campaigns is recommended to stimulate behavioural changes based on healthy lifestyle habits.⁷⁻⁹ Health education places society in contemporaneity because the scientific progress is incorporated into the public domain.¹⁰ Additionally, some studies showed that human anatomy education related to the health context positively impacts the preventive practices of patients or risk groups.^{11,12} Scientific literacy provides to the public a knowledge for understanding exams and treatments; the confidence to speak with health professionals; an improvement in adherence to preventive treatments and campaigns; and a better understanding of signs and symptoms.¹⁰

The planning of educational actions, campaigns, and practices requires methodologies that evaluate scientific knowledge, attitudes,

and behaviours related to people's health. The evaluation of the level of scientific and anatomical comprehension in men regarding PCa would help in the development, application, and evaluation of the impact of educational methods and campaigns. The confirmation of male scientific knowledge would contribute to the elaboration of specific methodologies which aim to clarify the most unknown issues. The aims of this study were to propose standards of evaluation to theoretical and practical knowledge about male pelvic anatomy, preventive attitudes, and PCa screening methods; to correlate lifestyle, education, and anatomical knowledge with the practise of preventive attitudes and screening.

Methods

Sample

A cross-sectional study (men, n=50), with a simple random sample (selected by convenience), was composed of management technicians from the Federal University of Ouro Preto (UFOP). The participants were all over 18 years old, regardless of previous history of PCa. The project was approved by the UFOP Research Ethics Committee, CAAE protocol number: 68312317.0.0000.5128. The volunteers were invited by email and by presentational convocation in all UFOP departments.

Questionnaire application

The interviewers were properly trained for the use and application of questionnaires. The volunteers read and signed the consent form before their interviews. They were always interviewed in a quiet environment, accompanied by the interviewer. First, two questionnaires were applied – one involving socio-demographics and the other PCa behaviours.¹³ The questionnaires consisted of open and closed questions which covered socioeconomic and demographic variables; urological complaints history; family and personal PCa history; and knowledge, attitudes, and practices related to prostate examination. We considered as 'satisfactory knowledge' about PCa

those men who knew anything about the screening methods, the digital rectal examination (DRE), or the prostate specific antigen test (PSA). For ‘satisfactory attitudes’ about cancer it was those men who considered annual cancer screening examinations to be very important. Finally, men over 45 years of age with family history and those over 50 without family history who underwent a DRE or PSA test less than a year ago were considered as ‘satisfactory practices’. Their anatomy knowledge was verified through a closed 10-question questionnaire. It focused on the location and fundamental functions of male reproductive system organs such as the testis, epididymis, ductus deferens, seminal glands, ejaculatory duct, prostate and urethra. Moreover, the questionnaire contained statements about prostate size, the prostate occurrence in both genders, and symptomatology of prostate alterations. We considered as ‘satisfactory theoretical anatomical knowledge’ those men whose hit rate was higher than 60% (≥ 4 correctly answered questions).

After that, an evaluation was made to measure the anatomical identification of the male pelvic organs and structures by using a 3D synthetic male pelvis anatomical model in sagittal section (*3B Scientific*) from the UFOP Department of Biological Sciences (DECBI) Human Anatomy Lab (Figure 1). In anatomical identification, each respondent had to identify the following reproductive organs or ones from the urinary male system: testis, epididymis, ductus deferens, seminal gland, prostate, and urethra. The correct identification – by pointing – of each anatomical structure was considered as a right answer. After identification, they were asked about its basic function. To measure their knowledge, we developed a ‘satisfactory answers list’ about anatomical structures function based on human anatomy reference books.^{14,15} We considered as ‘satisfactory practical anatomical knowledge’ those men whose hit rate was higher than 60% (≥ 4 correctly answered questions).

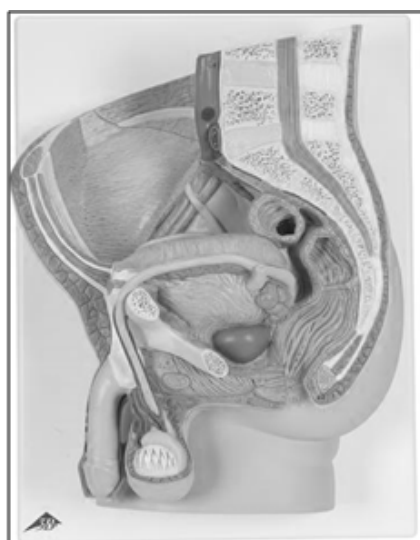


Figure 1 3D Anatomical model of the male pelvis (*3B Scientific*) from de Human Anatomy Lab of Federal University of Ouro Preto.

Results

This study included 50 men, all of whom were management technicians from the UFOP with 17 of them being over 45 years old. In terms of education and lifestyle habits, 68% had college degree, 10% had incomplete under graduation, 12% had college degree,

68% had never smoked, 82% had related alcohol consumption, and 58% regularly practised physical exercise. The sample data analysis regarding male pelvic anatomy theoretical and practical knowledge showed that 56% had satisfactory knowledge and 84% were capable enough to identify structures in an anatomical model. Furthermore, 54% were incapable to correctly describe the organ and structure functions (Figure 2). The analysing of theoretical questions about anatomical associations with PCa symptoms revealed that 68% of the respondents said that the ‘urethra is not involved by prostate’; 14% disagreed that ‘prostate is present only in men’; 74% disagreed that the ‘prostate is located near the rectum’; 72% agreed that ‘decreased urinary flow may be a symptom of PCa’; and 82% agreed that ‘increased urinary frequency may also be a symptom of the disease’. The anatomical practical knowledge of identifying anatomical structures in the anatomical model was analysed. These data showed that only 20% identified the seminal glands correctly; 26% identified the epididymis and ductus deferens properly; and 70% correctly pointed at the prostate. The following organs presented the highest rate of correct identification: rectum (72%), urethra (76%), urinary bladder (78%), testis (94%) and penis (100%) (Figure 3).

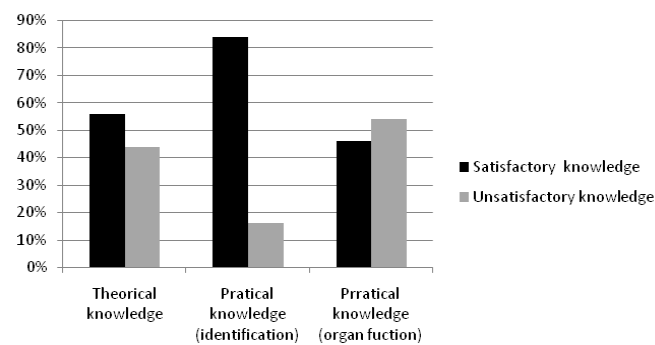


Figure 2 Male pelvis anatomy theoretical and practical knowledge (anatomical structure identification and function). Satisfactory anatomical knowledge (black columns) represents a hit rate $\geq 60\%$; Unsatisfactory anatomical knowledge (grey columns) represents a hit rate $<60\%$ (n=50).

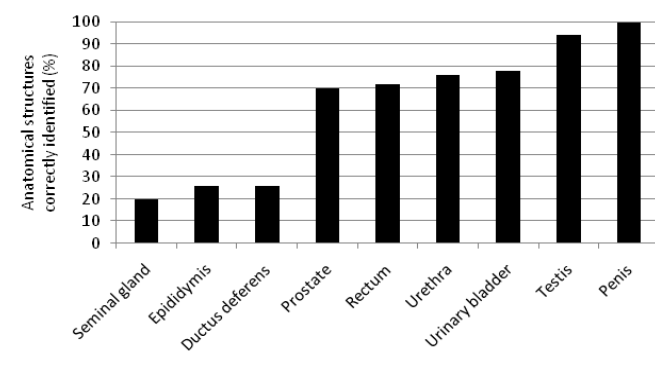


Figure 3 Percentage (%) of correct identification of anatomical organs of the male pelvis (n=50). The evaluation was performed using a synthetic anatomical model of the male pelvis.

We also measured the PCa attitudes and practices knowledge. At least one screening test (DRE or PSA) was mentioned by 82% of the men and 88% said that the ‘screening is very important for men’s health’. However, only 70% believe that ‘screening tests should be performed yearly on men aged 50 and over’. The PCa preventive

practices investigation, which only considered participants aged 50 years or older (n=17), established that 76.5% of them had already undergone a DRE. Of those DREs, 58.8% had been done more than a year ago and then 94.1% of them reported having a PSA screening at least once in their lives. Nevertheless, 53% reported having a PSA screening for the last time more than a year ago. Therefore, we measured the correlation between satisfactory ($\geq 60\%$ correct) and unsatisfactory ($< 60\%$ correct) theoretical and practical male pelvic anatomy knowledge along with PCa attitudes and practices knowledge such as screening tests and their level of importance to human health. The first correlation showed that, among individuals with satisfactory theoretical anatomical knowledge, 27 knew about the screening tests and only one reported not knowing about them. On the other hand, in the ‘unsatisfactory anatomical knowledge’ group, only 18 knew of the tests and three reported not knowing them.

Moreover, the practical anatomical knowledge measured by the identification of the structures in a synthetic male pelvis model showed that in the ‘satisfactory structures identification’ group, 35 knew about the exams and seven did not. In contrast, in the ‘unsatisfactory structures identification’ group, only six knew about the screening tests and two did not. Finally, the correlation between anatomical function satisfactory knowledge and screening test knowledge showed that, in the satisfactory knowledge group, 19 knew the exams while five did not know them. Yet, for the sample with ‘unsatisfactory knowledge’, 24 said they knew the screening tests, while four did not know them (Table 1). Secondly, we analysed the relationship between theoretical and practical satisfactory and unsatisfactory knowledge and the importance of exams classification. In this evaluation, we realised that in the satisfactory theoretical anatomical knowledge group, 26 classified the exams as ‘important for men’s health’ and two as ‘less important for health’. In the sample with ‘unsatisfactory theoretical anatomical knowledge’, 17 classified them as ‘important for health’ and four classified them as ‘less important for health’. Accordingly, there was a prevalence ratio (PR) of 1.1 between theoretical anatomical knowledge and male health prevention classification of importance.

The practical knowledge analysis was divided into identification and functional descriptions of anatomical structures inside the synthetic

anatomical model. In the first practical parameter (identification), in the satisfactory results sample, 36 judged screening tests as important for health and only six considered them ‘less important’. In this same parameter, in the unsatisfactory results sample, eight considered screening tests as important for health. The prevalence ratio between satisfactory practical result (identification) and the screening tests classification of importance was 0.9. Considering the second practical parameter (anatomical function description), in the satisfactory results group, 22 rated the screening tests as ‘important’ and only two considered them less important. In contrast, in the unsatisfactory results group, 22 considered screening tests as important, while four rated them as less important for health. The prevalence ratio between satisfactory practical knowledge (function) and the health preventive practices classification of importance was 1.1 (Table 2).

Furthermore, this study evaluated the correlation between the correct answers scored in the PCa questionnaire and the theoretical and practical anatomical knowledge (structures identification and functional description).

We observed that, in the satisfactory theoretical anatomical knowledge group, 23 obtained a correct answer score of > 5 in the PCa questionnaire and only five individuals had the score < 5 . Otherwise, in the unsatisfactory theoretical anatomical knowledge group, only 13 had a score > 5 and eight men had a score of < 5 . Consequently, the prevalence ratio between theoretical anatomical knowledge and correct answer score in the PCa questionnaire was 1.3. Regarding the practical knowledge, considering the first parameter (identification), in the ‘satisfactory practical result’ group, 30 people scored > 5 for PCa knowledge, while 10 presented < 5 . However, in the ‘unsatisfactory practical result’ group, only five had a score of > 5 and three had < 5 . Thus, the prevalence ratio between practical structure identification knowledge and the PCa knowledge score was 1.2. In the second practical parameter (anatomical structure function), in the ‘satisfactory results’ group, 19 men had a PCa correct answers score of > 5 , while only five presented < 5 . In the unsatisfactory results sample, 18 had a score of > 5 , while eight had < 5 . The prevalence ratio between the structural function description and the correct answers score in the PCa questionnaire was 1.1 (Table 3).

Table 1 Prevalence ration between anatomical function satisfactory knowledge and screeaning test knowledge

	Knows about screening tests	Does not know about screening tests	Total	PR
Satisfactory anatomical theoretical knowledge	27	1	28	1.1
Unsatisfactory anatomical theoretical knowledge	18	3	21	
Satisfactory anatomical structure identification	35	7	42	1.1
Unsatisfactory anatomical structure identification	6	2	8	
Satisfactory functional description of anatomical identified structures	19	5	24	0.9
Unsatisfactory functional description of anatomical identified structures	24	4	28	

PR – prevalence ratio

Table 2 Prevalence ratio between satisfactory practical knowledge (function) and the health preventive practices classification

	Important for health	Less importante for health	Total	PR
Satisfactory anatomical theoretical knowledge	26	2	28	1.1
Unsatisfactory anatomical theoretical knowledge	17	4	21	
Satisfactory anatomical structure identification	36	6	42	0.9
Unsatisfactory anatomical structure identification	8	0	8	
Satisfactory functional description of anatomical identified structures	22	2	24	1.1
Unsatisfactory functional description of anatomical identified structures	22	4	26	

Table 3 Prevalence ratio between the structural function description and the correct answers score in the PCa questionnaire

	Score >5	Score <5	Total	PR
Satisfactory anatomical theoretical knowledge	23	5	28	1.3
Unsatisfactory anatomical theoretical knowledge	13	8	21	
Satisfactory anatomical structure identification	30	10	40	1.2
Unsatisfactory anatomical structure identification	5	3	8	
Satisfactory functional description of anatomical identified structures	19	5	24	1.1
Unsatisfactory functional description of anatomical identified structures	18	8	26	

Discussion

Considering anatomical knowledge as a way to understand the prostate cancer symptomatology, we observed that part of the sample does not know important male anatomy concepts. We found that 68% was unaware of the relationship between the prostate and the urethra and 74% was unaware of prostate and rectum correlation. Furthermore, the male reproductive system organs functional and theoretical knowledge was unsatisfactory for most of the sample. However, those men who had satisfactory theoretical anatomical knowledge were 1.3 times more likely to have satisfactory knowledge about prostate cancer. This lack of anatomical knowledge was also observed in another study that showed that patients with specific organ disorders could not demonstrate their anatomical location.⁷ Additionally, some studies indicate that anatomical teaching fills a knowledge gap which facilitates health literacy, especially for the general public.^{16,17} This anatomical understanding also improves the targeting and success of health campaigns.¹⁶ The general public's lack of anatomical knowledge may negatively reflect in their understanding of their first contact with health professionals, such as the comprehension of exams and treatments.¹⁶ Moreover, anatomical terminology is widely used in clinical situations and it reflects in the communication between professionals and their patients. Occasionally, health professionals overestimate their patients' level of knowledge which creates a communication barrier. These barriers can

interfere with treatment effectiveness.¹⁸ Thus, the present study data suggests that the male reproductive system anatomical terminology may not be widely understood by the male public.

The data sample analysis showed low male reproductive system organs anatomical knowledge (anatomical model identification), especially about the location of seminal glands, epididymis, and ductus deferens. Most of the general public's anatomical knowledge is acquired through the media from sources such as TV news and the Internet.¹⁶ Accordingly, we believe that the most discussed parts of the body in the media are the prostate, bladder, urethra, and rectum because of their strict relation with symptomatology, treatment, and routine examinations. On the other hand, the seminal glands, ductus deferens, and epididymis are rarely explored in the media, and therefore they are unknown terms to most of the public. Still, it is very important that the discussions concerning these structures are conducted with the male general public because it leads to a better understanding of the male reproductive system. This is especially true about the structures directly involved in ejaculate production and common surgical procedures such as a vasectomy. The preventive attitudes and PCa screening knowledge were observed in the sample. Even if it was satisfactory, these actions were not fully executed by those men with more susceptibility to PCa. This dialectic was confirmed by the fact that 70% of the sample stated that men should undergo annual screening tests after the age of 50. However, in the group that answered 'yearly' to the question, 'How often should men

aged 50 or older submit themselves to screening?' Accordingly, 76.5% reported having already undergone a DRE, but 58.8% went through it more than one year ago. Regarding the PSA, the same discrepancy occurs with 94.1% having already being subjected to the exam, but 53% being screened more than one year ago.

It is recognised that PCa screening (DRE and PSA) is controversial and there are conflicting discussions in the medical literature, especially regarding potential harm versus impact on mortality.^{19,20} The PSA is the marker for the diagnosis of PCa, yet it has low specificity. Moreover, the large-scale usage of the PSA would lead to the overdiagnosis and risk of false-positive results of PCa.¹⁹ PSA-isolated measurement does not provide sufficient data to measure the tumor's degree of aggressiveness. Based on this information, it is recommended that men aged 55 to 69 seek medical advice to discuss the possible benefits as well as harms of screening, and then individually decide either to undergo periodic screening via the PSA or not.¹⁹ The medical screening examination discussion needs to include factors such as family history of cancer, ethnicity, medical conditions, and comorbidities.¹⁹ Our data indicate that men with satisfactory anatomical structures knowledge (theoretical and practical) also had PCa screening tests knowledge. Beyond that, men with satisfactory anatomical theoretical and practical knowledge considered having medical examinations and tests performed on them as important for their health. These results show that a population with a better anatomical understanding may have better health behaviours and experiences. A study with hypertensive and diabetic patients showed that health education improved patients' conditions to control and monitor disease.¹⁸

The developing need of the male population for health education strategies is reinforced by the correlation between satisfactory and unsatisfactory anatomical theoretical and practical knowledge results and by the correct PCa score. This interrelation shows that the sample with satisfactory theoretical and practical knowledge has a higher number of individuals with correct scores of >5. Thus, it proves that the relation between male pelvic anatomy knowledge and male pelvic organs relations is essential for individuals to understand how PCa occurs and its pathophysiological changes, which trigger its symptomatology. This insight allows for early PCa signs and symptoms identification based on how the disease anatomically changes the structures, which increases the search for prevention and reduces the morbidity and mortality of PCa. It is evident that a large part of the sample has a relatively high level of education, which allows for good perception about the urinary and male reproductive systems. Even so, there is a lack of access to more complete information about organ anatomy and physiology related to PCa symptomatology. There is also a proportional relationship between anatomical knowledge and PCa knowledge, which shows the anatomical elucidation effectiveness in recognising changes caused by the disease. Thus, there is a need to promote male health education with the aim to increase the attitudes and preventive practices of the targeted individuals through knowledge.

Conclusion

Educational investments in interventions are necessary to promote the dissemination of anatomical knowledge regarding the male pelvis and genitourinary system which will both raise awareness and ensure men of their autonomy. These interventions will allow men to be more

active in their health-illness process, in their early diagnosis, and in their disease prevention. However, more studies are needed to prove the impacts of these health education actions on the decrease of PCa and its prevention. This is because this study presents a limitation: the interviewed men are management technicians at UFOP, which implies they have a greater level of education, and consequently, greater access to anatomical and PCa information.

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Conflicts of interest

There are no conflicts of interest.

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