THE INFLUENCE OF IMPORTANT RISK FACTORS ON THE INCIDENCE OF BENIGN PROSTATIC HYPERPLASIA. IN THE POPULATION OF KAZAKHSTAN

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Abstract

Relevance. Over the past decades, increasingly used tools to measure the life quality of BPH patients.

Aim. This study evaluated some risk factors of the Kazakh population for the analysis of benign prostatic hyperplasia in Semey, East-Kazakhstan region. Three types of risk factors such as prostate volume, glomerular filtration rate, age have been studied.

Materials and methods. 812 benign prostatic hyperplasia patients were carried out. These patients were recruited from clinical Kidney Centre. The study subjects were divided on the basis of Age groups, PV groups and GFR groups. To determine the normal distribution of statistical data, we used the Shapiro-Wilk Test. The confidence interval was calculated using the Wald method.

Results. The average age of patients with BPH was 68.4 ± 15.7 years. Also in our study, we found that the mean PV for all patients was 45.4 ml. This was in accordance with that of Kazakh population. Mean prostate volume of BPH patients in Glomerular filtration rate groups was found to be 45.4±9.38 ml/min (p=0.003). PV was found to be higher in group with reduced glomerular filtration rate.

Conclusion. Prostate gland volume of patients increased significantly with increasing age. Lower Glomerular Filtration Rate is dependent risk factor for prostatic growth.

Keywords: benign prostatic hyperplasia, Kazakhstan, mortality, epidemiology.

Резюме

ВЛИЯНИЕ ВАЖНЫХ ФАКТОРОВ РИСКА НА ЗАБОЛЕВАЕМОСТЬ ДОБРОКАЧЕСТВЕННОЙ ГИПЕРПЛАЗИЕЙ ПРЕДСТАТЕЛЬНОЙ ЖЕЛЕЗЫ У НАСЕЛЕНИЯ КАЗАХСТАНА

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Актуальность. За последние десятилетия все чаще используются научные методы для изучения качества жизни больных с доброкачественной гиперплазией предстательной железы.

Цель. В данном исследовании оценивались факторы риска развития доброкачественной гиперплазии предстательной железы у мужчин, проживающих в г. Семей Восточно-Казахстанской области. Изучались три типа факторов риска: объем предстательной железы, скорость клубочковой фильтрации и возраст.

Материалы и методы. Обследовано 812 больных с доброкачественной гиперплазией предстательной железы. Исследование проводилось в медицинском учреждении «Почечный центр» г. Семей. Объекты исследования были разделены на группы на основе возраста, объема предстательной железы и скорости клубочковой фильтрации. Для определения нормального распределения статистических данных мы использовали Критерий Шапиро-Уилка. Доверительный интервал рассчитывался с использованием метода Вальда.

Результаты. Средний возраст больных ДГПЖ составил 68,4 ± 15,7 года. Также в нашем исследовании мы обнаружили, что средний объем предстательной железы для всех пациентов составил 45,4см^3. Это соответствовало казахскому населению. Средний объем предстательной железы у больных ДГПЖ в группах со скоростью клубочковой фильтрации составил 45,4±9,38 мл/мин (p=0,003). Установлено, что объем предстательной железы выше в группе со сниженной скоростью клубочковой фильтрации.

Заключение. Объем предстательной железы больных значительно коррелирует с возрастом. Низкая скорость клубочковой фильтрации является зависимым фактором риска роста объема предстательной железы.

Ключевые слова: доброкачественная гиперплазия предстательной железы, Казахстан, смертность, эпидемиология.

Түйіндеме

ҚАЗАҚСТАН ХАЛҚЫНЫҢ ҚУЫҚ АСТЫ БЕЗІНІҢ ҚАТЕРСІЗ ГИПЕРПЛАЗИЯСЫ АУРУШАҢДЫҒЫНА ӘСЕР ЕТЕТІН ҚАУІП ҚАТЕР ФАКТОРЛАРЫ

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Өзектілігі. Соңғы онжылдықтарда қуық асты безінің қатерсіз гиперплазиясы бар науқастардың өмір сүру сапасын зерттеу үшін ғылыми әдістер көбірек қолданыла бастады.

Мақсат. Бұл зерттеуде Шығыс Қазақстан облысының Семей қаласында тұратын ер адамдарда қуық асты безінің қатерсіз гиперплазиясының даму қаупі факторлары бағаланды. Қауіп факторларының үш түрі зерттелді: жасы ,қуықасты безінің көлемі, шумақтық фильтрация жылдамдығы.

Материалдар мен әдістері. Қуық асты безінің қатерсіз гиперплазиясы бар 812 науқас тексерілді. Зерттеу Семей қаласындағы «Бүйрек орталығы» емдеу мекемесінде жүргізілді. Зерттеу субъектілері жасына, қуық асты безі көлеміне және шумақтық фильтрация жылдамдығына байланысты топтарға бөлінді. Статистикалық мәліметтердің қалыпты таралуын анықтау үшін біз Шапиро-Вилк тестін қолдандық. Сенімділік интервалы Валд әдісімен есептелді.

Нәтижелер. ВРН бар науқастардың орташа жасы 68,4 ± 15,7 жасты құрады. Сондай-ақ біздің зерттеуімізде біз барлық пациенттер үшін қуық асты безінің орташа көлемі 45,4 см3 екенін анықтадық. Бұл қазақ халқына сәйкес келді. Гломерулярлық фильтрация жылдамдығы бар топтарда ВРН бар науқастарда қуық асты безінің орташа

көлемі 45,4±9,38 мл/мин (p=0,003) құрады. Гломерулярлық фильтрация жылдамдығы төмендеген топта қуық асты безінің көлемі жоғары екені анықталды.

Қорытынды. Науқастардың қуық асты безінің көлемі жасына байланысты айтарлықтай корреляцияланады. Төмен гломерулярлық фильтрация жылдамдығы қуық асты безі көлемінің өсуіне тәуелді факторы болып табылады.

Негізгі сөздер: қуық асты безінің қатерсіз гиперплазиясы, Қазақстан, өлім-жітім, эпидемиология.

Introduction

Benign prostatic hyperplasia – common, socially significant disease associated with age and common cause of urinary disorders[14]. At the same time, not all patients with clinical BPH have the same problems. The clinical course of prostatic hyperplasia largely depends not only on the epidemiology, but also on the patients themselves: malnutrition, smoking, alcohol consumption, neglect of health.

Recently, there has been a trend towards innovative clinical research aimed at developing new methods for treatment and rehabilitation of BPH. At the same time, studies devoted to the epidemiology of various types BPH were less frequent.

However, without understanding the sickness rate of BPH, it is impossible to build a quality program aimed to rehabilitation of BPH patients and reducing mortality in the population. In addition, creation of such programs is closely related with patient's satisfaction.

More than 40.0% of all diseases in men over 50 years fall at the share of the benign prostatic hyperplasia (BPH) that brings this disease into line of primary medical and social problems. Moreover, according toWHO's demographic researches the population of the planet grows old, thus rate of incidence of this pathology is predicted [2, 25].White and African-American men have a similar tendency towards the prevalence of prostate diseases. In fact, several factors contribute to the progression of BPH in African-American people: higher testosterone in the blood, enhanced growth factor, high sensitivity of androgen receptors [7,19]. The Urological communities of different countries have conducted epidemiological studies and have shown that the prevalence of BPH in hospitals is higher (from 30 to 50%) [11,20]. According to the results of the correlation analysis of scientists data from Europe, the USA and Asia have been published showing that older age remains a major risk factor for BPH [11,13,20]. In the United States, a multicenter study was conducted to study tumors of various organs and systems, including prostate cancer, and it was shown that belonging to a particular race is not statistically significant. However, other studies have shown that this factor is lower in people of Asian descent than in whites[18,24].

The genetic component of BPH has a strong influence. Observational studies of patients under the age of 64 who have undergone surgery to remove prostatic adenoma have shown that their relatives have a 4-6 times higher risk of this disease[4,10,16].The researchers also estimate that 50% of men under the age of 60 had a hereditary form of BPH. The natural history of BPH depends on the lifestyle factors.

Worldwide, the incidence of BPH increases among men less than 60 years.

The main goal of this study is to analyze the influence of risk factors on the incidence of BPH among the male population in Semey, East-Kazakhstan region.

Materials and Methods

This was a study of retrospective analysis, conducted from January 2015 to December 2019, which enrolled all BPH patients registered at the health-care facilities of Semey. All patients were treated at the Semey Kidney Center. Generally, the clinical Kidney Centre is located in Medical Organizations with the educational aim, where the faculty members work together with stuff of Medical Organization.

From the case history, we extracted information on all BPH patients aged 40 years and older: age, PV, BMI.

Target population. BPH patients aged 40 years and above. Subjects were grouped into 4, age starting from 40 years with a difference of 10 years. Subjects were grouped into 3 according to BMI (>18 to 25) as normal weight, overweight (>26 to 29), obesity (>30). The classification of these subgroups was based on WHO Criteria for Asians.

The design of the study is retrospective analysis.

Inclusion criteria: BPH patients aged 40 years and above. *Exclusion criteria:* Known case of prostatic carcinoma.

Statistical analysis: The data analysis was performed using IBM SPSS Statistics 20 software. Before all statistical tests, we used the Shapiro-Wilk test to define to normal

data distribution. The 95% confidence interval was calculated using Wald method.

The basic descriptive statistics were conducted on sociodemographic characteristics of BPH patients. At the second stage of data analysis, descriptive PV tests were performed in patients with BPH. At the third stage, we performed correlation analysis to identify various risk factors of these patients. For all data analyses conducted, $p \leq 0.05$ were considered statistically significant.

Approval of the Ethics Committee of Semey Medical University was obtained before the start of the study (Protocol №2, 2018/10/25).

Results

In our study, the average age of patients with BPH was 68.4 ± 15.7 years. The minimum and maximum age was 47 years and 86 years respectively. The mean of prostate volume was found to be 40.8 ± 14.7 ml. Main characteristics of subjects in Table1.

Table 1.

Anthropometric parameters of patients in Kazakh population.

Criteria	Mean,SD
Age (years)	68.4 ± 15.7
BMI	15.6 ± 8.3
PV	40.8 ± 14.5

Distribution of BPH patients according to Age.The patient in this part of study was divided into 5 groups, from 40 to 87 years respectively.

Frequency distribution is shown in Figure 1. This diagram shows maximum number of BPH patients in age group 80 years above.
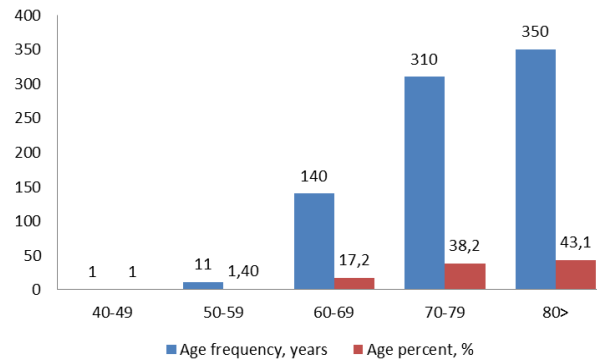

Figure 1. Distribution of BPH patients according to age groups.

Prostate volume.At the same time, all patients were divided on the basis of Prostate Volume into 3 grades. Grade 1 had subjects with PV between 25-30 ml, Grade 2 between 31-50 ml, Grade 3 with PV between 51-90 ml. (Table 2).

Table 2.

Proportion of patients with BPH by PV groups.

Gradingof PV, ml	Frequency, n	Percent, %
G 1 – 25-30	262	32.3
G 2 – 31-50	189	23.3
G3 – 51-90	360	44.3
Total	812	100

Prostate volume increased with a mean age of 68.4 ± 15.7 years (p=0.004). Highest volume was observed in age group 80 > years. (Table 3) (Figure 2).

Table 3.

Association of PV with age of BPH patients.

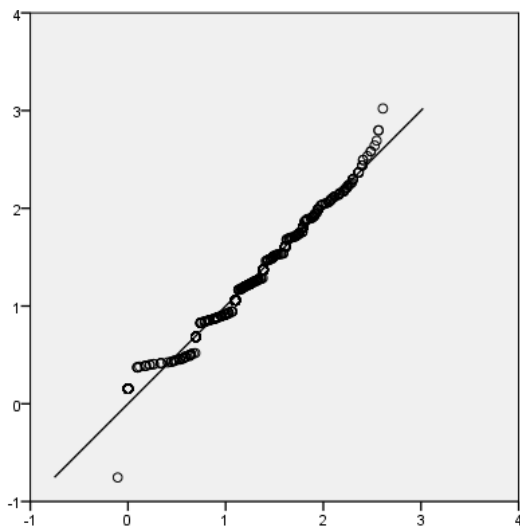| Group	1 (40-49)	2 (50-59)	3 (60-69)	4 (70-79)	5 (80 above)	Total
N	1	11	140	310	350	812
PV	28.7±1.1	39.4±9.2	48.3±10.7	52.5±12.4	58.3±13.5	p=0.004

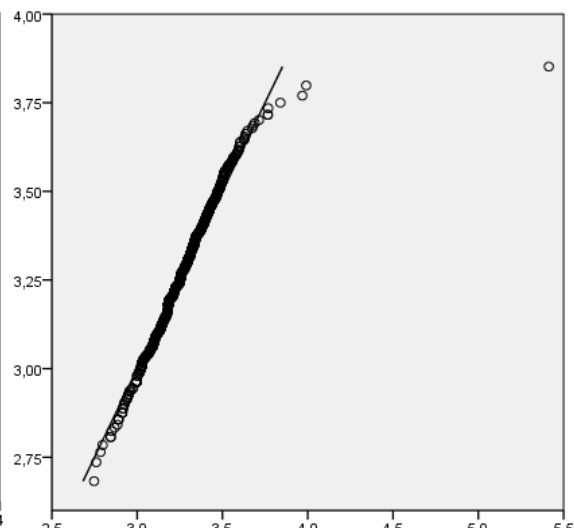**Figure 2. Graphically represents between PV and Age of BPH patients.**

Figure 3. Graphically represents between BMI and Age of BPH patients.

We divided BMI into 3 groups: normal, overweight, obesity. There was no correlation found between prostate volume of BPH patients and BMI. (Table 4)

Mean prostate volume of BPH patients in Glomerular filtration rate groups was found to be 45.4±9.38 ml/min (p=0.003). PV was found to be higher in group with reduced glomerular filtration rate (Table 4).
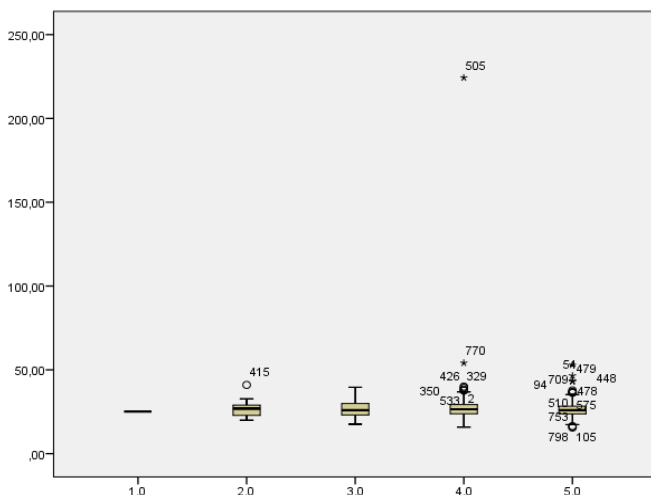
Figure 4. Graphically represents between BMI and Age of BPH patients.

Discussion. All patients in our study were between 40-87 years of age (Table 1). In their fifth decade was the maximum number of BPH patients (43.1%). Interesting study done on Europeans focusing with age ranging between 40-80 years and a mean age of 63.5 years were comparable to mean age in our study of BPH patients (68.4 ± 15.7) [5,8].

In our study, the mean PV of all patients was 45.4 ml. This was in accordance with that of Kazakh population. But mean PV in Africans, Americans was higher than in our population [21]. There are number of causes such as smoking, alcohol and aging, and at the same time metabolic syndrome such as obesity and cardiovascular diseases associated with BPH [3]. However, PV is reported to be lower than in big countries like India and China [15].

Table 4.

Association of PV with GFR of BPH patients.

PV groups	G1 – 25-30	G2 – 31-50	G3 – 51-90	Total	p
N	=262	=189	=360	=812	
GFR ml/min	27.04±1.8	27.46±0.68	26.54±0.40		0.004

Important reason could be that Chinese and Indians males are basically of a small physical body compared to other population males [23]. We have determined that there is a statistical significance between prostate volume and patient age [1]. Human genotype and environment affect a person's height and reflect their body weight. Genotype and environment reflect mainly due to the ethnicity of the person [9].

In our study was 812 patients, 452 patients had PV less than 50 ml and 360 patients with more than 50 ml. The lowest PV in our study was 25.25 ml and the maximum was 88.9 ml.

Collins H., Parsons J.K. et al. in their study showed that the maximum patients having a PV ranging between 20 to 50 ml. [18] Another Indian study reported over 75% of BPH patients with prostate volume 20-50 ml. Equally important research by *Ochiai A., Fritsche H.A., Babaian R.J. et al* [17] showed that only 35% of BPH patients had PV more than 50 ml and lower than 65% had between 25-50 ml.

The assessment of prostate hyperplasia varies in different studies. This classification according to M. Vary have a 3 levels: the 1-st grade - <50 ml; the 2-nd – between 50-80 ml, the 3-rd - >80 ml.

Our grading was according to Aguirre et al classification where 3 levels also considering the next factors (body weight, aging), but no similar the M. Vary:

Grade 1 – less than 30 ml
Grade 2 – 30-50 ml
Grade 3 – over 50 ml

The results of PV in our study are similar to those of M. Habes and J.Bahr possibly due to the overlap of several factors that influence PV [6]. Basically, the size of prostate helps urologist decide if a patients needs a prostatectomy. Mostly patients with PV more than 75ml require suprapubic prostatectomy.

Mean PV in our patients was found to be 28.7; 39.4; 48.3; 52.5 in the age groups respectively (Table3). The highest PV 58.3ml was found in the 5-th age group (70 years onwards). The results of the current study have a positive correlation between PV and Glomerular Filtration Rate (p=0.004).

Also in our study we could not find positive association of BMI in hyperplasia patients (Figure 3). There are researches which show positive relationship between BMI and PV, but depends on ethnicity. Thus, we could not find a positive association.

While correlating PV and GFR with BPH patients as shown in Table 4, we found strongest correlation (p=0.004). These results were similar to a study conducted in Professionals males (over 25000), in our current study the men with the lowest GFR in the 3-rd PV grade.

Another European study showed that GFR is an independent risk factor for benign prostatic hyperplasia. The NHANES II study concluded that obese men with decreased GFR were more associated with BPH surgery.

Rohrmann et al concluded that men with lower GFR (<26.4) are more likely to have larger glands [22].

This is the demographic study done on Kazakh population that showed evidence that PV is strongly correlated with GFR of BPH patients. Obesity and alcohol more than other factors are associated with increased PV in a number of research studies. The main reason that obesity contributes to the development of BPH is still not understood. One of the possible variants of pathogenesis may be an increase conversion of testosterone to the hormone estrogen, leading to prostate adenoma.

Other studies suggest that insulin promotes prostatic growth also. Therefore, all patients with obesity and diabetes have a predisposition of higher PV [12].

Conclusion. Prostate gland volume of patients increased significantly with increasing age. Lower Glomerular Filtration Rate is dependent risk factor for prostatic growth. Obesity is the most important factor influencing prostate gland volume in BPH patients.

Contribution of the authors: *All authors equally participated in the search, analysis of literary sources and writing sections of the article.*

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