GEORGIAN MEDICAL NEWS

ISSN 1512-0112

NO 7-8 (340-341) Июль-Август 2023

ТБИЛИСИ - NEW YORK

ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press. Published since 1994. Distributed in NIS, EU and USA.

GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

GEORGIAN MEDICAL NEWS
No 7 (340) 2023

Содержание:

GEORGIAN MEDICAL NEWS
No 7 (340) 2023

TESTOSTERONE AND SERUM ZINC LEVELS IN MEN WITH BENIGN PROSTATIC HYPERPLASIA

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Abstract.

Background and objectives: Benign prostatic hyperplasia (BPH) is a common benign tumour of the prostate that becomes more common as men age. The purpose of this study is to investigate the relationships between serum zinc and testosterone in BPH patients in Iraq.

Methods: This case-control study entailed gathering 90 subjects which were separated into two groups, group A consisted of 60 patients with benign prostatic hyperplasia, while group B consisted of 30 healthy males. Diagnosis revealed patient's prostate volumes (PV) were equal to or more than 25 millilitres. Both groups had their serum zinc and serum testosterone levels.

Results: The study showed that the mean prostate size was elevated significantly in the BPH group (54.0±8.4cc) as compared with the control group (19.66±2.88cc) (P:0.01). There is a significant reduction in the serum testosterone concentration of benign prostatic hyperplasia patients, (4.05±3.1 ng/ml), as compared with control subjects, (11.37 ± 2.87; p≤0.01). There is a significant reduction in the serum zinc concentration of benign prostatic hyperplasia patients, (70.4±9.63 ng/ml), as compared with control subjects, (99.3±10.5; p≤0.01). The higher percentage of benign prostatic hyperplasia is in patients above 66 years, and the lowest is in the age group 45-55 years.

Conclusion: Serum testosterone and zinc are significantly lower in benign prostatic hyperplasia patients than in age-matched healthy controls. All benign prostatic hyperplasia patients have larger prostates than normal healthy control participants of the same BMI. All BMI groups of benign prostatic hyperplasia patients had lower serum testosterone and zinc than normal healthy control persons of the same BMI.

Key words. Benign prostatic hyperplasia, Serum zinc, Serum testosterone.

Introduction.

Benign Prostate Hyperplasia, often known as BPH, is an enlargement of the prostate tissue that does not result in cancer and is a common reason why men experience symptoms related to their lower urinary tract (LUTS) [1]. Histological BPH is more prevalent in older men, where it affects approximately 40% of men in their 50s and 60s and 90% of men over the age of 80. This condition is more prevalent in countries with a Western lifestyle [2,3].

The periurethral gland (PUG) is the first site of enlargement (hyperplasia) in individuals with BPH. This occurs in the fourth decade of life. The enlargement then extends to the transition zone (TZ), which is the primary site of BPH [4]. Benign prostatic hyperplasia develops in the transition zone of the prostate gland. If the adenoma grows to a significant size, it may constrict or compress the prostatic urethra, which can result in bladder outflow obstruction (BOO) [5]. A typical description of TZ describes it as having three lobes: two lateral lobes and a median lobe, all of which have the potential to cause symptoms of lower urinary tract syndrome (LUTS) [4].

Compression of the urethra, which can be caused by hyperplasia, can lead to cumulative obstruction of the flow of urine, insufficient emptying, or failure to void. Additionally, hyperplasia can induce persistent dribbling of urine. If you never empty your bladder, the pee that is left behind will get stagnant and ionized, which will lead to infection. The accumulation of urine in the bladder can lead to the creation of stones, which forces the bladder muscle to become more robust to pass through the obstruction. In severe situations, benign prostatic hyperplasia (BPH) can lead to sepsis, irreversible bladder damage, kidney failure, and even death. If urine begins to back up in the kidney, increasing damage may ensue, which can lead to renal impairment and subsequent uremia (the toxic symptoms of kidney failure) [6,7].

zinc is considered to be one of the key trace elements that are responsible for maintaining optimal homeostasis within the body. Because the body is unable to store this component, it must be obtained through the consumption of food. It is essential for the proper functioning of the lining of the male reproductive organs, as well as spermatogenesis, capacitation, acrosome response, and hormonal balancing [8].

Zinc content in human bodies in concentrations ranging from (1.4-2.3 g). The zinc content of the body is distributed as follows: 60% is found in the muscles, 30% is found in the bones, and 10% is found in other organs such as the brain, skin, prostate, and mammary glands. Zinc intake of approximately 15-20 mg per day is recommended for adults [9].

Zinc can be found at the highest concentration in the prostate compared to any other organ. The immediate environs of prostate epithelial cells are where the highest concentrations of zinc are found. Zinc is present in the tissues of the prostate at a level of 150 g/g, which is three times more than the quantity found in other soft tissues. The amount of it found in the prostate is one hundred times larger than the amount found in plasma [10,11].

To produce and secrete significant quantities of citrate, the prostate stores a lot of zinc in the specialized acinar epithelial cells of the peripheral zone. These cells are located in the periphery. In the prostatic gland, there is a connection between the metabolism of citrate and zinc levels. Zinc in the mitochondria inhibits the enzyme known as M-aconitase, which is responsible for catalysing the first phase of the Krebs cycle, which is the conversion of citrate to isocitrate. Because zinc has an inhibiting effect, citrate accumulates in the mitochondria before it is transferred to the cytosol [12].

Testosterone is a steroid hormone that is responsible for the development of typical male sexual traits and function, as well as the preservation of homeostasis throughout life in many organ systems. Testosterone is the main androgen present in males. Leydig cells in the testes create almost 95%, with the

remaining 5% coming from the adrenal gland and then being disseminated throughout the body [13]. Over 97% of the circulating testosterone is protein-bound, with equal quantities to albumin and the structurally related specific sex hormone binding globulin (SHBG), also known as androgen-binding protein (ABP) [14].

The testis produces approximately 6-7 milligrams of testosterone every day [15]. The testis has a significant excess of (free) testosterone because testosterone concentrations are 200 times higher than those of SHBG/ABP. Testicular testosterone levels are roughly 80-fold higher than peripheral blood levels [16].

The growth of the sperm cell is the main reproductive function of testosterone in males. Testosterone triggers a nuclear activation process in the Sertoli cells of the testicles, which accelerates and catalyzes the maturation and production of sperm during the process of spermatogenesis [17]. If the male is to be fertile, it is crucial and necessary to maintain testosterone levels in the Sertoli cells for the growth of sufficient numbers of mature, viable sperm. Additionally, testosterone helps the male accessory sex glands (prostate, seminal vesicles, and epididymides) grow and function properly, which promotes sperm generation and function as well as copulation [18]. The secondary sex traits of males, such as the usual deeper male voice, greater body hair, penile growth, desire, and more aggressive behaviour patterns, are also related to the influence of testosterone [19].

Patients and Methods.

The case-control study lasted three months, from mid-November to the end of February, at Al-Kindi Teaching Hospital and Ghazy Al-Hariri Hospital in Baghdad Governorate, Iraq. It entailed gathering 90 blood samples, which were separated into two groups. The first group (A) consisted of 60 patients with benign prostatic hyperplasia ranging in age from 45 to 80 years, while the second group (B) consisted of 30 healthy males aged 45 to 80 years. All participants in this study provided approved permission with a questioner.

Exclusion criteria

1. Prostate Cancer
2. Prostatitis
3. Hormonal Therapy
4. Chronic Renal Failure.
5. Surgical Operation (Prostate, Hypothalamus, Testis, Pituitary).
6. prostate volume less than 28 cc

Data collection form: After getting the participants' permission to participate in the study. collecting their personal information, including their names, ages, weights, lengths, and prostate sizes; each individual was assigned a unique serial number and provided information about themselves. Patients diagnosed with Benigni prostate hyperplasia had an international prostate symptom score of 18 or higher; the patient's prostate volumes (PV) were equal to or more than 25 millilitres. Radiologists with competence in the department used transabdominal ultrasound equipment manufactured in Germany by Siemens to figure out how big the prostate gland is. Based on research that had already been done, the IPSS was made for all patients. Patients submitted complete IPSS forms before their evaluations. Mild symptoms are defined as a score of seven or less, moderate as eighteen or more, and severe as twenty or more. Neither the American Urological Association (AUA) index nor the International Prostate Symptom Score (IPSS) questionnaire is specific for benign prostatic hyperplasia, urinary flow rate, postvoid residual volume, or bladder outlet obstruction (BOO); Both are reliable and sensitive enough for use in assessing symptoms.

Determine Zinc by ELISA: The assay of zinc is based on that the zinc binds to a ligand with the development of absorbance at 560nm. It can be used with biological samples such as serum, plasma, CSF, or urine.

Determination of Total Testosterone

- 1st incubation: 12 µL of samples are incubated with a biotinylated monoclonal testosterone-specific antibody. The binding sites of the labelled antibody become occupied by the sample analyte (depending on its concentration).
- 2nd incubation: After the addition of streptavidin-coated microparticles and a testosterone derivate labelled with a ruthenium complex, the complex becomes bound to the solid phase via the interaction of biotin and streptavidin.
- The reaction mixture is aspirated into the measuring cell, where the microparticles are magnetically captured onto the surface of the electrode. Unbound substances are then removed with ProCell M. Application of a voltage to the electrode then induces chemiluminescent emission, which is measured by a photomultiplier.
- Results are determined via a calibration curve which is an instrument specifically generated by 2-point calibration and a master curve provided via the reagent barcode or e-barcode.

Statistical analysis: All patients signed an informed consent to take part in the study, and the study was approved by the ethical committee of Tikrit University, College of Medicine. All data were presented as mean and standard deviation (SD), Statistical analysis was implemented with correlation Analysis and t-test, and a P value of less than 0.05 was regarded significant. Analysis was performed by IBM SPSS Statistics for Windows version 23.0.

Results.

Prostate size: There was a significant enlargement in the size of the prostate in patients (54.0±8.4 cc), as compared with control subjects (19.66±2.88cc) (Table 1).

Serum zinc: There was a significant reduction in the serum zinc concentration of benign prostatic hyperplasia patients (70.4±9.63 ng/ml), as compared with control subjects (99.3 ± 10.5; $p \leq 0.01$) (Table 1).

Serum testosterone: There was a significant reduction in the serum testosterone concentration of benign prostatic hyperplasia patients (4.05±3.1ng/ml), as compared with control subjects (11.37±2.87ng/ml; $p \leq 0.01$) (Table 1).

There is a significant increase in the size of the prostate in all age groups of BPH patients as compared with normal healthy control subjects counterparts of the same age group, ($p \leq 0.01$). However, there is no significant differences regarding the size of the prostate between the age groups of BPH patients.

Table 1. *The prostate size in benign prostatic hyperplasia patients and control subjects.*

Studied groups	BPH (n=60)	Control group (n=30)	p-value
Size Prostate (cc)	54.0±8.4	19.66±2.88	0.01
Zinc (ng/mL)	70.4±9.63	99.3±10.5	0.01
Testosterone (ng/mL)	4.05±3.1	11.37±2.87	0.01

Table 2. *Impact of age on size of prostate, serum zinc, and serum testosterone in BPH patients.*

Studied groups	Age groups (Years)	Size Prostate (CC)	Zinc (ng/ml)	Testosterone (ng/ml)
BPH (n=60)	45-55	52.0 a±8.4	67.52 a ±8.05	3.42c±1.34
	56-65	59.67a±7.72	70.29 a±7.81	3.80 c±1.45
	> 66	62.59a ±8.4	70.75 a±9.66	3.73c±1.88
Control Group (n=30)	45-55	18.37b±2.63	96.46b±8.47	12.3a±2.13
	56-65	21.26b±2.12	107.87b±9.96	9.61b±1.02
	> 66	22.62b±0.67	99.93b±5.31	9.95b±1.74
P. value		0.01	0.01	0.01
The different letter means significant differences ($p<0.05$) between groups.				

Table 3. *Relation of Size Prostate with the BMI of benign prostatic hyperplasia.*

Studied groups	BMI Group (kg/m^2)	Size Prostate (CC)	Zinc (ng/ml)	Testosterone (ng/ml)
BPH (n=60)	18.9-23.9 (n= 4)	47.50a±10.21	68.65b±9.58	1.97b±0.30
	24-28.9 (n=24)	56.60a±16.91	69.71b±8.92	4.73b±3.94
	> 29 (n=32)	52.94a±12.57	71.13b±8.27	3.79b±2.40
Control Group (n=30)	18.9-23.9 (n= 4)	17.83b±2.61	95.02a±6.09	9.78a±0.62
	24-28.9 (n=5)	20.26b±3.43	102.71a±2.07	12.64a±5.10
	> 29 (n=21)	19.87b±2.79	99.33a±7.08	11.37a±2.40
p-value		0.01	0.01	0.01

There is a significant reduction in serum zinc in all age groups of BPH patients as compared with normal healthy control subjects counterparts of the same age group, ($p\leq0.01$). However, there is no significant differences regarding serum zinc between age groups of benign prostatic hyperplasia patients.

There is a significant reduction in serum testosterone in all age groups of benign prostatic hyperplasia patients as compared with normal healthy control subjects counterparts of the same age group, ($p\leq0.01$). However, there is no significant differences regarding serum testosterone between age groups of benign prostatic hyperplasia patients (Table 2).

There is a significant increase in prostate size in all BMI groups of benign prostatic hyperplasia patients as compared with normal healthy control subjects' counterparts of the same BMI group, ($p\leq0.01$). There are significant differences regarding prostate size between groups of benign prostatic hyperplasia patients. There is a significant reduction in serum zinc in all age groups of benign prostatic hyperplasia patients as compared with normal healthy control subjects counterparts of the same BMI group, ($p\leq0.01$). However, there is no significant difference regarding serum zinc between BMI groups of benign prostatic hyperplasia patients. There is a significant reduction in serum testosterone in all BMI groups of benign prostatic hyperplasia patients as compared with normal healthy control subjects counterparts of the same BMI group, ($p\leq0.01$). However, there is no significant difference regarding serum testosterone between groups of benign prostatic hyperplasia patients (Table 3).

Discussion.

The present study found a there is a significant enlargement in the size of the prostate in patients agreeing with previous findings that benign Prostate Hyperplasia is a non-cancerous growth or enlargement of the prostate tissue that is a frequent cause of lower urinary tract symptoms (LUTS) in men [1].

According to the findings of this study, the content of zinc in the serum of men with BPH is significantly lower than that of normal healthy controls. A lot of studies mentioned the importance of zinc in prostate physiopathology, showing its favourable action in modulating some enzymatic systems (5-alpha- reductase, aconitase, phosphomonoesterase), in testicular androgen metabolism, and spermatogenesis [20-22].

The findings of the current study are consistent with those of earlier studies, which discovered a significant drop in serum zinc levels in BPH patients [22-24]. Christudoss et al. concluded that "BPH or prostate carcinoma may be associated with a reduction in the levels of tissue zinc, plasma zinc, and an increase in urine zinc/creatinine [24]. In this study, there was a big drop in the blood testosterone levels of the control subjects. This result agrees with several past ones [25-27].

Testosterone and estrogens play important roles in prostate growth and function, and many scientists have hypothesized that the slow decline in serum testosterone levels or the decreasing ratio of testosterone to estrogen that begins in midlife are factors in BPH pathogenesis [28]. A previous study found that both high serum testosterone levels and the ratio of testosterone to 17b-diol-glucuronide were associated with reduced BPH risk [29,30].

Previous studies found that higher concentrations of testosterone relative to 17b-diol-glucuronide (measuring indirectly the conversion of testosterone to dihydrotestosterone in the prostate), as well as testosterone and estradiol, were associated with reduced risk of BPH [28].

In terms of physiology, in contrast to most other organs, the prostate continues to enlarge throughout a man's adult life. There has been a significant number of research done in the past that investigated the function that testosterone plays in the enlargement of the prostate. However, what makes this association between testosterone and BPH so intriguing is the fact that as one gets older, their levels of the hormone drop, creating what seems to be a contradictory link between the two. Dihydrotestosterone, often known as DHT, is a metabolite of the hormone testosterone. According to one idea, this metabolite should be taken into consideration since it can connect with androgen receptors with a higher affinity than testosterone does

[31]. van der Sluis and colleagues observed that DHT activity is substantially present in the prostate with BPH. In research studying the effects of hormone replacement treatment (HRT) using testosterone, they observed that the hormone greatly increases prostate volume and PSA values [32].

The distribution of subjects according to age groups, (45-55, 56-65 years and above 66 years) revealed a higher percentage of benign prostatic hyperplasia is in patients above 66 years, (38 patients), and the lowest is in the age group 45-55 years, (4 patients).

The findings of the current study are consistent with those of earlier studies, which found benign prostatic hyperplasia (BPH) is one of the most common medical conditions in older men [31,33,34]. According to the findings of this study, patients with BPH across all age ranges showed a significant drop in their serum zinc levels, (45-55, 56-65 and above 66 years). The current outcome is consistent with the findings of several earlier investigations, Sauer et al. [12] and Rawaa et al. [35].

Due to the role of zinc in apoptosis and truncation of the Krebs cycle (citrate buildup), high amounts of zinc are necessary for sustaining prostate health and function. While the high amounts of citrate released in the prostatic fluid, a main component of semen, are guaranteed by this particular metabolic process in prostate cells, it adversely impacts the process of energy production. It follows that when prostate cells experience BPH and lose their capacity to store zinc, the Krebs cycle continues to release energy, making the proliferation of malignant cells in the prostate more energy-efficient for the cells. Indeed, zinc levels are reduced by more than 50% in prostatic tissue generated from BPH .guys with BPH already had much higher zinc excretion in their urine than guys with a healthy prostate [12].

According to the findings of the study, there was a considerable drop in the serum testosterone in all age groups of BPH patients, (45-55, 56-65 and above 66 years). The present result agrees with several previous studies where high serum testosterone levels were associated with lower BPH risk, Khaleel FM et al. [36] and Duarsa GWK et al. [31] and Yassin A et al. [37].

The testicles contain cells called Leydig cells, which are responsible for producing nearly 95% of the body's testosterone. The human testis has a considerable decline in function as a natural consequence of ageing. A direct decline in the function and/or amount of Leydig cells is likely the cause of a decrease in testosterone production that occurs naturally with increasing age [38]. The present result agrees with previous works stating that a significant linear relationship was ascertained between BMI and the risk of larger PV ($p < 0.001$). Previous research concluded, that there was a significant linear association between BMI and the risk of larger prostate volume in BPH patients [39,40].

On the other hand, these findings were in contrast with another recent Nigeria study with no significant difference between PV and BMI [41].

The sample size could have been the reason for this discrepant outcome. While larger studies more frequently demonstrate a link between these two features, smaller studies are more likely to indicate no association between BMI and PV.

Benign prostatic hyperplasia (BPH) is a prevalent clinical manifestation of prostate pathology in males, which is strongly correlated with ageing. Genetic predisposition, eating habits, lifestyle choices, and environmental exposures are additional risk factors. In addition to being epidemiologically linked to BPH and prostate cancer, obesity is also linked to low-grade prostatitis and subclinical LUTS. Endocrine alterations (decreased testosterone and progesterone with increased oestrogen and DHT) and chronic inflammation associated with obesity as well as hypogonadism have been identified as important mechanisms in the development of prostate pathology [42].

The present study found a significant reduction in the serum zinc in all groups of BMI in BPH patients as compared with control healthy subjects of the same BMI. The present result agrees with several previous studies, Rawaa et al. [35] and Sauer AK.et al. [12].

The findings of the current study are in line with those of earlier research about the connection between BMI and serum testosterone [27,36,37].

There is a connection between being overweight and hypogonadism that goes in both directions. Excess body fat is the single most major contributor to low testosterone levels, especially in men. Similarly, testosterone insufficiency can cause BPH. A lack of testosterone is linked to dysfunctional visceral fat, which can then lead to chronic inflammation, insulin resistance, and low levels of sex hormone-binding globulin (SHBG) [43].

Conclusion.

Considering the findings of this study, we may draw the following conclusions: The highest mean of prostate volume was recorded in the BPH group, and the lowest mean was in the control group. Low levels of testosterone were recorded in benign prostatic hyperplasia patients compared with healthy individuals. There is a significant reduction in the concentration of serum zinc in BPH patients, as compared with normal healthy control men. Positive correlation between prostate size and progress age. can be explained by benign prostatic hyperplasia (BPH) is one of the most common medical conditions in older men.

REFERENCES

1. Alchalaby LA, Zainal AA, Mahmood MD. Stimulation of Beta-3 Adrenergic Receptors Modulated Sperm Motility and Morphology in Rat. Tropical Journal of Natural Product Research. 2022;6.

2. Thanun AA, Alnasiri US. Bladder and prostate sonomorphology as non invasive method for assessing the lower urinary tract in patient with symptomatic bladder outlet obstruction due to benign prostate enlargement. Iraqi Postgraduate Medical Journal. 2021;20.

3. McCormick BJ, Raynor MC. The prostate and benign prostatic hyperplasia. In: Isaacson AJ, Bagla S, Raynor MC, Yu H, editors. Prostatic artery embolization. Cham: Springer International Publishing; 2020:1-9.

4. Guneyli S, Ward E, Thomas S, et al. Magnetic resonance imaging of benign prostatic hyperplasia. Diagnostic and Interventional Radiology. 2016;22:215.

5. Tawfeq MT, Sarhat ER. Metformin effects on neuregulin-1 in polycystic ovarian women. Georgian medical news.2023;4:56-62.

6. Sarhata ER, Al-Anzy MM, Ahmed TS. Study of oxidant-antioxidant status in cerebrospinal fluid of children with meningitis. Eurasian Chemical Communications. 2022;4:863-869.
7. Zbaar SA, Sarhat ER, Khalaf SJ. Association of C-Reactive Protein with Risk of Complications of diabetic nephropathy. Egyptian Journal of Chemistry. 2022;65:3-4.
8. Dianová L, Tirpák F, Halo M, et al. Effects of Selected Metal Nanoparticles (Ag, ZnO, TiO2) on the Structure and Function of Reproductive Organs. Toxics. 2022;10:459.
9. Sarhat ER, Rmaid ZJ, Jabir TH. Changes of salivary interleukine17, Apelin, Omentin and Vaspin levels in normal subjects and diabetic patients with chronic periodontitis. Ann Trop Med & Pub Health. 2020;23:S404.
10. Zhao J, Wu Q, Hu X, et al. Comparative study of serum zinc concentrations in benign and malignant prostate disease: A Systematic Review and Meta-Analysis. Scientific reports. 2016;6:1-9.
11. Sarhat ER, Mohammed Saeed HS, Wadi SA. Altered Serum Markers of Omentin and Chemerinin Chronic Renal Failure Patients on Hemodialysis. Research J. Pharm and Tech. 2018;11.
12. Sauer AK, Vela H, Vela G, et al. Zinc deficiency in men over 50 and its implications in prostate disorders. Frontiers in Oncology. 2020:1293.
13. Schiffer L, Arlt W, Storbeck K-H. Intracrine androgen biosynthesis, metabolism and action revisited. Molecular and Cellular Endocrinology. 2018;465:4-26.
14. Church D, Semple R. biochemical endocrinology. Medical Biochemistry E-Book. 2018:368.
15. Nieschlag E, Behre HM, Nieschlag S. Testosterone: Action, deficiency, substitution: Cambridge University Press; 2012.
16. Sarhat ER, Abid IM, Kamel NA, et al. Changes of serum Interleukin and Chemerin levels in patients with Polycystic Ovary syndrome. J Adv Pharm Educ Res. 2021;11:11-14.
17. Zhou R, Wu J, Liu B, et al. The roles and mechanisms of Leydig cells and myoid cells in regulating spermatogenesis. Cellular and molecular life sciences. 2019;76:2681-2695.
18. Adelakun SA, Akintunde OW, Ogunlade B. Fluoride-induced testicular degeneration and sperm quality deteriorations: Salutary role of cyperus esculentus tubers (tiger nut) extract in animal model. Revista Internacional de Andrología. 2021;19:201-212.
19. Mahmood DA, Sarhat ER, Sulaiman YA, et al. Evaluation of liver function tests in patients with psoriasis. Revista Latinoamericana de Hipertension. 2022;17.
20. Chughtai B, Lee R, Te A, et al. Role of inflammation in benign prostatic hyperplasia. Reviews in Urology. 2011;13:147.
21. Bostanci Y, Kazzazi A, Momtahen S, et al. Correlation between benign prostatic hyperplasia and inflammation. Current opinion in urology. 2013;23:5-10.
22. Yan M, Hardin K, Ho E. Differential response to zinc-induced apoptosis in benign prostate hyperplasia and prostate cancer cells. The Journal of nutritional biochemistry. 2010;21:687-694.
23. Younis HY, Thanoon IA, Fadhil NN, et al. Effect of zinc as an add-on to metformin therapy on glycemic control, serum insulin, and c-peptide levels and insulin resistance in type 2 diabetes mellitus patient. Research Journal of Pharmacy and Technology. 2022;15:1184-8.
24. Christudoss P, Selvakumar R, Fleming JJ, et al. Zinc status of patients with benign prostatic hyperplasia and prostate carcinoma. Indian journal of urology: IJU: journal of the Urological Society of India. 2011;27:14.
25. Rastrelli G, Vignozzi L, Corona G, et al. Testosterone and benign prostatic hyperplasia. Sexual medicine reviews. 2019;7:259-71.
26. Al-Barzinj RM. Estimation levels of prostate-specific antigen, interleukin-8, oxidative stress, and some inflammatory markers in sera of benign prostatic hyperplasia patients who have smoking habits as a risk factor. Cellular and Molecular Biology. 2020;66:124-30.
27. Althanoon ZA, Merkhan MM. Effects of zinc supplementation on metabolic status in patients with metabolic syndrome. Acta Poloniae Pharmaceutica. 2021;78:521-526.
28. Roberts RO, Jacobson DJ, Rhodes T, et al. Serum sex hormones and measures of benign prostatic hyperplasia. The Prostate. 2004;61:124-31.
29. Joseph MA, Wei JT, Harlow SD, et al. Relationship of serum sex-steroid hormones and prostate volume in African American men. The Prostate. 2002;53:322-9.
30. Litman HJ, Bhasin S, O'Leary MP, et al. An investigation of the relationship between sex-steroid levels and urological symptoms: Results from the boston area community health survey. BJU international. 2007;100:321-6.
31. Duarsa GWK, Sari YA, Oka AAG, et al. Serum testosterone and prostate-specific antigen levels are major risk factors for prostatic volume increase among benign prostatic hyperplasia patients. Asian Journal of Urology. 2021;8:289-97.
32. van der Sluis TM, Meuleman EJ, van Moorselaar RJ, et al. Intraprostatic testosterone and dihydrotestosterone. Part II: concentrations after androgen hormonal manipulation in men with benign prostatic hyperplasia and prostate cancer. BJU international. 2012;109:183-8.
33. Catalano A, Martino G, Bellone F, et al. Neuropsychological assessment in elderly men with benign prostatic hyperplasia treated with dutasteride. Clinical drug investigation. 2019;39:97-102.
34. Mlynarčíková Alžbeta B, Soňa S. Evaluation of cytotoxic effects of five bisphenol analogs (A, AF, B, F, S) in prostate cell lines LNCaP AND PC3. MMSL. 2022;91:14.
35. Rawaa A, Dania O, Basma K, et al. The correlation between several biochemical parameters and utis with progression of bph.
36. Khaleel FM, AL-Shammri IA, Nour A-HG. Estimation of testosterone, estradiol and some markers in sera of iraqi patients with benign prostatic hyperplasia. Baghdad Science Journal. 2013;10:1162-71.
37. Yassin A, Alwani M, Al-Zoubi RM, et al. Voiding function improves under long-term testosterone treatment (TTh) in hypogonadal men, independent of prostate size. International Urology and Nephrology. 2023:1.
38. Mularoni V, Esposito V, Di Persio S, et al. Age-related changes in human Leydig cell status. Human Reproduction. 2020;35:2663-76.
39. Li B-H, Deng T, Huang Q, et al. Body mass index and risk of prostate volume, international prostate symptom score, maximum urinary flow rate, and post-void residual in benign prostatic hyperplasia patients. American Journal of Men's Health. 2019;13:1557988319870382.

40. Batai K, Phung M, Bell R, et al. Correlation between body mass index and prostate volume in benign prostatic hyperplasia patients undergoing holmium enucleation of the prostate surgery. BMC urology. 2021;21:88.
41. Aigbe E, Ogbetere FE. Relationship between prostate volume, age and body mass index among patients with benign prostatic hyperplasia in the Niger Delta region, Nigeria. African Urology. 2022;2:32-34.
42. Leisegang K, Henkel R, Agarwal A. Obesity, and metabolic syndrome associated with systemic inflammation and the impact on the male reproductive system. American journal of reproductive immunology. 2019;82:e13178.
43. Fernandez CJ, Chacko EC, Pappachan JM. Male obesity-related secondary hypogonadism–pathophysiology, clinical implications, and management. European Endocrinology. 2019;15:83.