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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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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.

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STUDY THE RELATIONSHIP BETWEEN OSTEOPROTEGERIN AND KIDNEY INJURY MOLECULE-1 AND SOME BIOCHEMICAL VARIABLES IN PATIENTS WITH KIDNEY STONES

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Abstract.

Kidney stones are a common disorder that affects men and women. Stones are hard, abnormal deposits that form inside the kidneys. They are also known as kidney stones or urinary stones. The incidence of kidney stones has increased significantly, and their prevalence is increasing worldwide. Osteoprotegerin (OPG) is a biochemical variable that plays an important regulatory role in predicting various kidney diseases. KIM-1 also known as HAVcr-1, and TIM-1 is a sensitive and specific biomarker for kidney injury due to its great importance. United States of America, Food and Drug Administration, and European Medicines Agency have adopted KIM-1 as a biomarker in urine to detect kidney injuries.

Key words. Kidney Stone, OPG, KIM-1, TIM-1, HAVcr-1.

Introduction.

Kidney diseases are among the most important causes of death in many countries, and kidney stone diseases (KSD) are among the most widespread diseases and are considered one of the most common diseases and disorders of urinary system, which occurs in males and females, but is more common in males, and affects about 1-5% of world's population. number of cases of this disease is estimated at 240,000-720,000 people in United States annually [1]. Kidney stones can occur as a result of a wide range of different causes, including diet, dehydration, metabolic disorders, obesity, family history, digestive disorders, aging, and other diseases [2]. In general, kidney stones are composed of minerals or salts or a combination of them, which are often found in urine naturally in certain proportions. When levels of these salts and minerals rise to higher levels than their normal rates and their concentration in urine increases, they become susceptible to kidney stones, which may occur due to a lack of excretion of these elements or due to excessive amounts of them entering the body, as these salts and minerals precipitate and crystallize in urine. Kidney stones arise from small crystals inside the kidney called nuclei and form additional layers of materials that can begin to grow to form solid bodies that form inside the tubes in the kidneys of different sizes, which are stones. There is a significant link between kidney stones and type of food, environment, and variety of medications taken, as well as genetic conditions and the effect of level of electrolytes on formation of stones [3].

Kidney stones lead to kidney damage and as condition progresses and worsens, the internal structure of the kidney becomes increasingly damaged and these changes cause damage to the microvascular networks in the kidney [4]. Knowing the level of osteoprotegerin (OPG) and Kidney Injury Molecule-1 (KIM-1) is very important to maintain the normal functioning of the kidneys and to know health status of the kidney. They are sensitive and specific signs of injury in addition to predicting outcomes [5]. KIM-1 is an early predictive molecule and a useful biomarker for kidney injury in preclinical trials and in patients. It is used to detect and monitor kidney injury as it shows the extent of injury to the renal tubules and predicts histopathological changes in the proximal tubules in response to many pathophysiological conditions or toxic substances that affect the kidney [6]. It is one of the most important and accurate ways to know the glomerular filtration rate and to evaluate the efficiency of the kidneys [7].

Materials and Methods.

Study design: The current study included collection of 180 samples divided into 100 samples for patients with kidney stones and 80 samples represented (control group), who were diagnosed and confirmed by specialist doctors and based on laboratory tests and ranging in age between (20-65 years) for both groups. Samples were collected from Tikrit Teaching Hospital and Private medical clinics in Salah al-Din Governorate from November 2022 to August 2023.

Estimation levels of OPG and KIM-1 and some biochemical parameters: Osteoprotegerin (OPG), kim-1, Parathyroid Hormone, Calcitonin Hormone, were determined by using ELISA Sandwich and competitive inhibition technique, where diagnostic kit provided by sunlong/china for determination of OPG and Calcitonin Hormone, while the kit from Bioassay Technology Lab/china for determination of kim-1 and kit Bio ChecK Crop /USA was used to estimate Parathyroid Hormone. Oxalates and citrates were estimated using colorimetric methods using kit prepared by company Bioassay Technology Lab/china.

Statistical Analysis: The results of the current research study were analyzed using the variance analysis program (IBM SPSS Statistics for Windows, Version 23.0., NY: IBM Corp.), and t-test and chi-square test were used to analyze the variance between two groups at the probability level ($P < 0.05$), and the correlation coefficient was found using (Pearsons Correlation Coefficient) to find the relationship between OPG, Kim-1 in this research, and the graphs and tables were drawn using (Excel 2016) program.

Results.

Level of Osteoprotegerin in Blood: Concentration of osteoprotegrin was estimated in blood of patients with kidney stones compared to control group. results of the current study showed that level of osteoprotegrin reached (382.66 ± 39.18 pg/ml) in blood of patients, while it reached (54.23 ± 17.52 pg/ml) in blood of control group, and the results showed that there was a significant increase at probability level ($P < 0.001$) in blood of patients compared to control group (Table 1).

Table 1. *Measured biochemical variables in blood of patients Compared to control group.*

Parameter	Kidney Stone Patients (n=100)	Control (n=80)	p value
Osteoprotegerin, pg/ml	382.66 ± 39.18	54.23 ± 17.52	< 0.001
Parathyroid Hormone, pg/ml	72.61 ± 26.35	36.22 ± 18.50	< 0.01
Calcitonin Hormone, pg/ml	4.92 ± 3.14	5.26 ± 2.45	0.16
KIM-1, ng/ml	7.63 ± 1.58	1.25 ± 0.82	< 0.01
Oxalate, mg/day	114.65 ± 47.30	38.54 ± 12.33	< 0.001
Citrate, mg/day	241.16 ± 186.75	674.63 ± 205.28	< 0.01
BMI(kg/m^2)	38.18±4.25	27.34±5.63	< 0.05
Data expressed as mean±SD. P value significant at <0.05 using Two sample t-test			

Level of Parathyroid Hormone in Blood: Concentration of parathyroid hormone was estimated in blood of patients with kidney stones compared to control group. results of the current study showed that level of parathyroid hormone reached (72.61 ± pg/ml 26.35) in blood of patients, while it reached (36.22 ± 18.50) pg/ml) in blood of control group, and the results showed that there was a significant increase at probability level (P < 0.01) in blood of patients compared to control group (Table 1).

Level of Calcitonin Hormone in Blood: Concentration of hormone calcitonin was estimated in blood of patients with kidney stones compared to control group. results of the current study showed that level of hormone calcitonin reached (4.92 ± 3.14 pg/ml) in blood of patients, while it reached (5.26 ± 2.45 pg/ml) in blood of control group, and results showed that there was no significant difference at probability level (0.16) in blood of patients compared to control group (Table 1).

Level of KIM-1 in Urine: Concentration of KIM-1 was estimated in urine of patients with kidney stones compared to control group results of the current study showed that level of KIM-1 reached (7.63 ± 1.58 ng/ml) in urine of patients, while it reached (1.25 ± 0.82). ng/ml) in urine of control group, and the results showed that there was a significant increase at the probability level (P < 0.01) in urine of patients compared to control group (Table 1).

Level of Oxalate in Urine: Concentration of oxalate was estimated in urine of patients with kidney stones compared to control group, and the results of the current study showed that level of oxalate reached (114.65 ± 47.30 mg/day) in urine of patients, while it reached (38.54 ± 12.33 mg/day). In urine of control group, the results showed that there was a significant increase at the probability level (P < 0.001) in urine of patients compared to control group (Table 1).

Level of Citrate in Urine: Concentration of citrate was estimated in urine of patients with kidney stones compared to healthy people, and the results of the current study showed that citrate level reached (241.16 ± 186.75 mg/day) in urine of patients, while it reached (674.63 ± 205.28 mg/day) in control group, and the results showed a significant decrease at the probability level (P<0.01) in patients' urine flow compared to control group (Table 1).

Body Mass Index: Effect of body mass index (BMI) was studied for two groups of patients with kidney stones and control group, and results of the current study showed that there was a significant increase in the level of body mass index (BMI) at probability level (P < 0.05), and its level was 38.18±4.25 (kg/m2). In patients with kidney stones, body mass index was (27.34±5.63kg/m2) in the control group, and percentage (Table 1).

Correlation.

The correlation values r between the biochemical variables measured in the blood and urine were studied (Tables 2 and 3). The correlation values between the biochemical variables in the blood and urine show several relationships that indicate the influence of these variables on each other. A positive sign indicates the existence of a non-inverse relationship, and a negative sign indicates an inverse relationship between biochemical variables.

Correlation between Osteoprotegerin and KIM-1:

Correlation relationship between biochemical variable osteoprotegrin and kidney injury molecule Kim-1 was studied, and through the influence of these variables on each other, it was revealed that there is a positive direct correlation (+ve) between them, with values (r = 0.58, P = 0.001) (Figure 1).

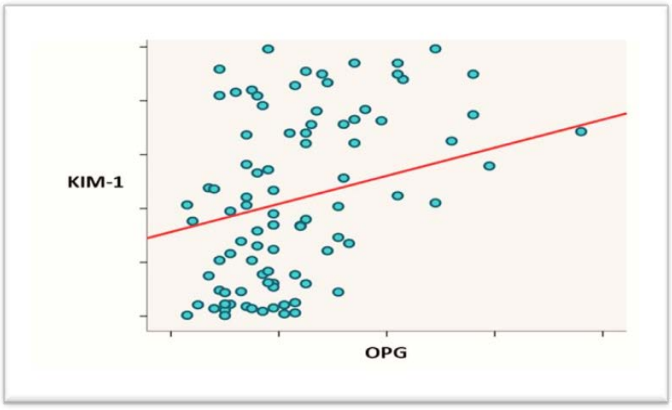

Figure 1. *Correlation of OPG with KIM-1 in patients.*

Discussion.

Results included statistical values of measurement OPG, parathyroid hormone, calcitonin hormone in blood and measurement of KIM-1, oxalate, citrate in urine of patients with kidney stone compared with control group for both sexes, significant differences were found in this study. In this study mean ± SD of OPG, KIM-1, parathyroid hormone, calcitonin hormone, oxalate, and citrate.

Osteoprotegrin is one of proteins that plays an important role in regulating balance of minerals in the body [8]. It has an indirect role in maintaining level of calcium and oxalates within normal levels in the blood, but in event of an imbalance, it leads to formation of stones, and there is a relationship between increasing level of osteoprotegrin and formation of Stones inside the kidneys, as high levels of OPG and PTH indicate body's attempt to regulate balance of calcium and oxalates, and these complex interactions lead to an increase in concentration of calcium and oxalates in the urine, which increases risk of stone formation [9].

Table 2. *Correlation between OPG and biochemical variables.*

Parameter		OPG	PTH	Calcitonin	Kim-1	Oxalate	Citrate	BMI
OPG	r	.	0.08	0.13	0.58	0.37	- 0.34	0.65
	P value	.	0.46	0.28	0.001	0.01	0.02	0.001

Table 3. *Correlation between KIM-1 and biochemical variables.*

Parameter		Kim-1	PTH	Calcitonin	OPG	Oxalate	Citrate	BMI
Kim-1	r	.	0.08	0.13	0.58	0.37	- 0.34	0.65
	P value	.	0.46	0.28	0.001	0.01	0.02	0.001

The reason for increase is that parathyroid hormone increases reabsorption of calcium in the kidneys and leads to an increase in the concentration of calcium in urine, which promotes formation of calcium oxalate stones [10]. A high level of parathyroid hormone can increase amount of calcium that the kidneys need to filter, which increases It reduces the risk of stone formation, and also increases the absorption of calcium in the intestine by stimulating the production of active vitamin D [11]. Studies have indicated that people who suffer from hyperparathyroidism have high levels of parathyroid hormone and are more susceptible to stone formation due to increased calcium excretion in the urine [12].

The reason for lack of a significant difference in patients with kidney stones and control group is due to fact that calcitonin may not have a significant direct effect on formation of kidney stones in this sample of patients [13], and that effect of calcitonin on formation of stones may be complex and depend on factors. Multiple factors include the balance of calcium in the body, which means that there is no strong and direct relationship between calcitonin and stone formation [14].

The reason for increase is that there is damage or injury to the kidneys, and that stones lead to infections, wounds, or blockages in the kidneys, which leads to injury to the renal tissue, as an increase in KIM-1 in the urine can be a result of the injury resulting from the stones and As a result, its level rises above normal limit [15], and may indicate the presence of kidney injury or damage caused by stones. This is consistent with use of KIM-1 as a biomarker to detect kidney injuries, which is consistent with many studies that were mentioned. KIM-1 is a sensitive biomarker for detecting kidney injury [16,17].

The reason for increase is due to the fact that calcium oxalate molecules are the main causes of the formation of kidney stones. Therefore, oxalates that are not used by body must be removed through the urinary system [18]. When the level of water in the kidneys decreases with increase in level of oxalates, they begin to bind with calcium to form crystals in urine and develop to increase. their size and become stones, as calcium oxalate stones are one of the most common types of kidney stones and are formed in the kidneys due to a high level of calcium or oxalate with a low level of water [19].

Citrate is a weak acid that is synthesized during Krebs cycle. Urinary citrate is a major inhibitor of kidney stone formation due to binding of calcium to urine [20]. Low levels of citrate in urine are considered a risk factor for formation of kidney stones. Low levels of citrate in urine promote formation and growth of kidney stones. Decreased urinary citrate excretion is a common feature in patients with kidney stones, especially those with oxalate stones [21].

Results of the current study indicate that increasing BMI is directly proportional to formation of kidney stones, as obesity and excess body weight play a major role and increase risk of kidney stone formation. Excess weight negatively affects kidney function and promotes formation of stones [22]. This is because excess weight causes an increase in number of cells and an increase in cellular metabolism and metabolism in the body, and thus leads to an increase in by-products and harmful compounds in the body, which include products such as Uric acid and calcium play a major role in formation of kidney stones [23]. Increased metabolism is also associated with increased production of free radicals, which are unstable molecules that can cause damage to cells and tissues, including kidneys. Free radicals can lead to a decrease in levels of antioxidant concentrations. It plays a major role in the pathophysiological processes of kidney disease, causing damage to renal cells and occurrence of acute and chronic kidney failure, which increases possibility of mineral deposition and stone formation. Increased production of these metabolic products means that kidneys must work harder to filter them harmful substances from body, which increases pressure on kidneys [24].

Direct relationship between OPG and KIM-1 levels means that increasing OPG levels leads to an increase in KIM-1, that is, they directly affect each other in stone formation, and the results of the current study confirmed this through presence of an increase in levels of both OPG and KIM-1 [25,26]. as OPG has a role in regulating mineral balance and has an indirect role in increasing concentration of minerals through reabsorption of calcium and phosphate in the kidneys, which increases concentration of these minerals in urine and promotes formation of stones [25], and Kim-1 also It is an accurate indicator and its level increases when a kidney injury occurs due to presence of stones causing wounds or blockages. Therefore, it rises above normal limit in patients with stones [26-28].

Conclusion.

The results of this study showed a significant increase in levels of Osteoprotegerin, parathyroid hormone in blood, as well as a significant increase in levels of each of Kim-1 and oxalate in urine of people with kidney stones compared to control group. There was also a significant increase in body mass index (BMI) in people with kidney stones compared to control group, and it was found that incidence of stones increases with increasing weight at the probability level ($p<0.05$). The study showed a significant decrease in level of citrate in urine of patients, and no significant difference in level of calcitonin in blood, at the probability level ($p<0.05$) in people with kidney compared to

control group. Correlations between Osteoprotegerin and KIM-1 variables under study were studied and it was found that there is a positive correlation between (Osteoprotegerin and KIM-1).

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