GEORGIAN MEDICAL NEWS

ISSN 1512-0112

NO 4 (337) Апрель 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 4 (337) 2023

Содержание:

GEORGIAN MEDICAL NEWS
No 4 (337) 2023

LONG-TERM USE OF GLUCOCORTICOID MODULATED PARATHYROID HORMONE LEVELS IN OSTEOPOROSIS PATIENTS

Ayat J. Kadam, Abdulsamie H. Alta'ee*, Adel H. Al-Handawy, Zakariya M. Al-Ghazali, Mufeed J Ewadh.

College of Medicine, University of Babylon, P. Code 51002, Hilla PO Box 473, Iraq.

Abstract.

Glucocorticoids are drugs that are often used in both inpatient and outpatient settings. Their anti-inflammatory action is often utilized to treat a variety of diseases. A range of undesirable outcomes might occur with long-term glucocorticoid use, particularly long-term high-dose applications. This study designs as a case–control study, which was conducted in the Joint Enology Clinic/Al-Hilla Teaching Hospital, Al-Imam Al-Sadiq Hospital, and Merjan Teaching Hospital in Hilla City, Babylon Governorate of Iraq. This study was carried out between December 2022 to March 2023. In this study, the total number of subjects was 100; the patient group consisted of 50 with osteoporosis (19 males and 31 females). Patients and control group's ages were (41-50 years). They were selected as matched in terms of gender and age. The results referred to the increased levels, of parathyroid hormone in osteoporosis patients with highly significant differences ($P \leq 0.0001$) when compared with the control group, while there was a significant decrease in calcium in the patient group ($P \leq 0.0001$) when compared with the control group. In conclusion, the parathyroid hormone has a beneficial association to indicate bone mineralization status. Parathyroid hormone could be used as a prognostic marker in individuals with long-term use of glucocorticoid to predict the development of bone mineral disease.

Key words. Glucocorticoids, parathyroid hormone, osteoporosis, calcium.

Introduction.

Synthetic glucocorticoids, which are structurally and pharmacologically comparable to the natural hormone cortisol, are used to treat the majority of chronic problems, including rheumatologic disorders, autoimmune diseases, and respiratory ailments [1]. Glucocorticoids' anti-inflammatory, immunosuppressive, metabolic, and endocrine effects may help or impede the course of disease [2]. Individuals with chronic inflammatory disorders like rheumatoid arthritis who use glucocorticoids for extended periods of time are at increased risk for developing cardiovascular disease, infections, and osteoporosis [3]. Fluid retention, weight gain, and hyperglycemia are all unwanted side effects of glucocorticoids. Long-term glucocorticoid usage, especially with high-dose doses, has the potential for a variety of unfavourable effects. Some of these negative outcomes include osteoporosis, high blood sugar, insulin resistance, high blood pressure, muscle atrophy, severe infection, Cushing's syndrome, gastric ulcers, and mental health issues [4].

Cortisone (hydrocortisone) is largely used as an alternative medicine for treating endocrine disorders such as adrenal insufficiency. It is equivalent to the internal hormone in terms of biology. High dosages of glucocorticoids are intravenously administered in cases of sepsis, severe asthma, severe drug rashes, and acute nephritis, among other situations. High doses and prolonged usage of glucocorticoids are often linked to their harmful consequences. A 17-fold increase in vertebral fractures and a 7-fold increase in hip fractures are linked to the duration of glucocorticoid therapy. The most frequent cause of secondary osteoporosis is glucocorticoids, sometimes referred to as glucocorticoid-induced osteoporosis [5].

Osteoporosis, which is caused by altered bone microstructure and results in low bone mineral density, ultimately predisposes people to fragility fractures. Increased morbidity, mortality, and disability brought on by osteoporotic fractures considerably reduce the quality of life [6]. An osteoporotic-related fracture will occur in more than 50% of postmenopausal white women. Only 33% of elderly women who have hip fractures will be able to regain their independence. Male hip fracture mortality in the first year is twice that of female hip fracture mortality, and white males have a 20% probability of getting an osteoporotic fracture. Black men and women have lower rates of osteoporosis than white individuals, but those who do still have the same risk of fracture [7,8].

A polypeptide is known as parathyroid hormone (PTH), which is produced and transformed by the parathyroid gland into an active form. Pro-PTH is produced when pre-pro-PTH, a polypeptide with 115 amino acids that form the initial structure, is cleaved. Pro-PTH contains 90 amino acids. The amino-terminal region is the site of a second cleavage, which results in the synthesis of active parathyroid hormone, which comprises 84 amino acids. This hormone is the principal one that the body stores, secretes, and utilizes. It is estimated that the time required for synthesis, cleavage, and storage is under an hour. When low serum calcium is found, active PTH production may start within a few seconds. Exocytosis serves as the method of secretion, releasing the hormone via a membrane vesicle that is transported to the cell membrane and fuses with the outside membrane to release the hormone [9,10].

Blood calcium and phosphate levels are significantly maintained by a functioning parathyroid gland. The parathyroid gland is made up of four tiny glands and is situated directly below the thyroid in the center of the front of the neck. In reaction to low blood calcium levels, the parathyroid gland releases the polypeptide parathyroid hormone (PTH) [11,12].

In terms of calcium and phosphate, PTH is in charge. PTH has effects on the skeleton, the kidneys, and the intestines. In response to a decrease in blood calcium levels, the parathyroid gland increases PTH secretion. When blood calcium levels rise, a negative feedback loop tells the parathyroid glands to stop producing PTH. The PTH system is intricate, and any

disruptions may have serious medical consequences. Knowing your PTH is very important and beneficial [13,14]

This study aims to investigate the role of parathyroid hormone in calcium individuals with long-term use of glucocorticoids and its potential mechanism of inducing osteoporosis.

Materials and methods.

This study designs as a case-control, conducted in Joint-Enology Clinic in Al-Hilla Teaching Hospital, Al-Imam Al-Sadiq Hospital, and Merjan Teaching Hospital. The practical part of the study is carried out in the Department of Chemistry and Biochemistry Laboratory in the College of Medicine at the University of Babylon between December 2022 to March 2023. In this investigation, the total number of subjects was 100. The patient group consisted of 50 persons with long-term use of glucocorticoids (19 males and 31 females). A specialist physician-diagnosed patients when they attended Joint-Enology in hospitals. The control group consisted of 50 healthy individuals (31 females and 19 males). The levels of calcium in serum were determined by the spectrophotometric method. Parathyroid hormone levels were estimated by the sandwich ELISA technique.

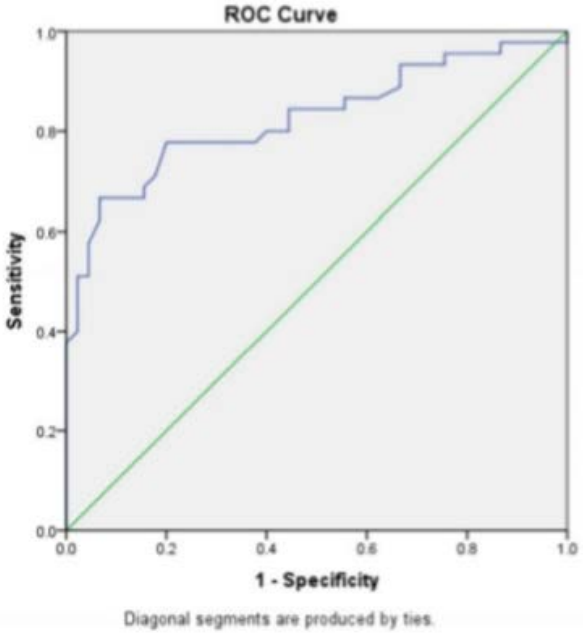

Figure 1. *Criterion values and coordinates of the ROC curve analysis for parathyroid hormone as differentiating patients from a control subject.*

Table 1. *Comparison between patients and control in PTH and Ca.*

Group	(PTH (pg/ml)	Ca (mg/dl)
Patients	858.03 ± 42.62	7.34 ± 0.16
Control	613.84 ± 23.12	8.98 ± 0.08
P-**value**	0.0001	0.0001

Results.

The age of osteoporosis cases was (41-50) years. The mean ± SD levels of parathyroid hormone for osteoporosis patients and control were (858.03± 42.62, 613.84 ± 23.12 ng/mL) respectively, and the p-value was 0.0001, as shown in Table 1. The mean ± SD of calcium levels for patients and control were (7.34±0.16, and 8.98±0.08 mg/dl) respectively and the p-value was 0.0001 as shown in Table 1. Prediction value of parathyroid hormone levels on the effect of long-term use of glucocorticoid on bone and its probable mechanism of inducing osteoporosis in patients when compared to control groups as shown in Figure 1, appear in the ROC curve between patients and controls. The test revealed that the area under the curve (AUC)=0.82, P= 0.00, and the 1Cut-off point was 198.1 pg/ml(the specificity and the sensitivity were 84.4 %, 77 respectively).

Discussion.

The present study revealed that parathyroid hormone highly increased in long-term use of glucocorticoid patients with significant differences (P≤0.001) when compared with the control group. The current study is in agreement with the Carpinteri et al. study which attributed their results to the induction of osteoporosis by glucocorticoid, which represents the one of most common secondary osteoporosis. Glucocorticoid affects fracture risk and bone mineral density [15].

The present study also agrees with the study of Yamamoto and Sugimoto which reported that osteoporosis induced by glucocorticoid is affect bone metabolism by transient enhancement in the resorption of bone and continuous suppression in the formation of bone due to the usage of glucocorticoid [16].

Parathyroid hormone is the hormone that regulates renal calcium reabsorption and vitamin D metabolism [17]. As renal function diminishes in the long-term use of glucocorticoids, circulating PTH concentrations rise [18]. Secondary hyperparathyroidism is a component of the long-term use of glucocorticoid on bone and its mechanism of inducing osteoporosis, and it is associated with rapid bone turnover, ectopic calcification, and higher cardiovascular mortality. The biochemical changes of long-term use of glucocorticoid on bone include raised parathyroid hormone and decreased serum Ca [19].

The result of the present study agreed with the conclusions of the Patschan et al. study [20] that reported the following: Long-term glucocorticoid medication frequently causes clinically significant bone loss. The decline in bone density is brought on by a variety of glucocorticoid-mediated processes, including the following: (i) While D vitamin contributes less to the pathophysiology of steroid-induced osteoporosis, its effects may be more prominent in the presence of glucocorticoids. (ii) The effects of PTH can be more noticeable when glucocorticoids are present. (iii) Glucocorticoids decrease gonadal activity and stop the osteoanabolic effects of sex hormones. (iv) Secondary hyperparathyroidism has been associated with a negative calcium balance, which is caused by increased renal excretion and reduced intestinal absorption of calcium. From a mechanistic perspective, it has long been assumed that only genomic events may mediate the aforementioned effects at the molecular level. Despite this, there is growing data that contradicts this traditional method of action and points to fast glucocorticoid effects. The interactions of glucocorticoids with cellular membranes, whether by binding to membrane receptors or through physicochemical interactions, result in

these rapid effects, also known as nongenomic effects. These effects probably affect the pathophysiology of glucocorticoid-induced osteoporosis, even if it hasn't been shown [20]. Cellular surrounding melliue greatly affected the localized adverse effects profile [21,22] and physicians trying to replace or reduce the dose the corticosteroids using adjuvant anti-inflammatory provided by CNS drugs [23] or biological therapy such as stem cells or cytokines [24,25].

Conclusion.

Our findings suggest that patients with long-term use of glucocorticoid had greater levels of parathyroid hormone. The parathyroid hormone and calcium have a beneficial association to indicate bone mineralization status. Parathyroid hormone could be used as a prognostic marker in individuals with long-term use of glucocorticoid to predict the development of bone mineral disease.

REFERENCES

1. Six M, Morin C, Fardet L. Association between prescription of long-term systemic glucocorticoid therapy associated measures and prescriber's medical specialty. 2019;40:427-432.
2. McNamara KM, Kannai A, Sasano H. Possible roles for glucocorticoid signaling in cancer. Mol Cell Endocrinol. 2018;466:38-50.
3. Doaa N. Wahhab, Abdulsamie H. Alta'ee, Adel H. Al-Handawy. Assessment of circulating estrogen and osteoprotegerin levels in osteoporosis post-menopausal women in Babylon province. Biochem Cell Arch. 2020;20: 4793-4796.
4. Mohamad NV, Ima-Nirwana S, Chin KY. Therapeutic potential of annatto tocotrienol with self-emulsifying drug delivery system in a rat model of postmenopausal bone loss. Biomed. Pharmacother. 2021;137:111368.
5. Mazzantini M, Di Munno O. Glucocorticoid-induced osteoporosis: 2019 update. Reumatismo. 2020;66:144-152.
6. Abdullah E, Merkhan MM, Althanoon ZA. Osteoporosis: Review of Treatment Modalities. International Journal of Research in Medical Sciences and Technology. 2021;12:34-46.
7. Kanis JA, Johansson H, Harvey NC, et al. A brief history of FRAX. Arch Osteoporos. 2018;13:118.
8. Walzak LC, Loken Thornton W. The role of illness burden in theory of mind performance among older adults. Exp Aging Res. 2018;44:427-442.
9. Nalevaiko JZ, Marques JVO, Oliveira M.F, et al. Bone density and quality in patients treated with direct-acting oral anticoagulants versus warfarin. Bone. 2021;150:116000.
10. Hans SK, Levine SN. StatPearls Publishing; Treasure Island (FL): May 22, 2022. Hypoparathyroidism.
11. Al-Dabbagh EH, Alnori MK. Effect of pepsi beverages on urine pH, crystalluria, and urinary calcium excretion. MMSL. 2022;91:191-196.
12. Rudin AV, McKenzie TJ, Wermer RA, et al. Primary Hyperparathyroidism: Redefining Cure. Am Surg. 2019;85:214-218.
13. Sharma S, Hashmi MF, Castro D. StatPearls Publishing; Treasure Island (FL): Sep 12, 2022. Hypophosphatemia.
14. Byrd C, Kashyap S, Kwartowitz G. StatPearls Publishing; Treasure Island (FL): Jul 25, 2022. Parathyroid Cancer.
15. Carpinteri R, Porcelli T, Mejia C, et al. Glucocorticoid-induced osteoporosis, and parathyroid hormone. J Endocrinol Invest. 2010;3:6-21.
16. Yamamoto M, Sugimoto T. Glucocorticoid and Bone. Beneficial effect of teriparatide on fracture risk as well as bone mineral density in patients with glucocorticoid-induced osteoporosis. Clin Calcium. 2014;24:1379-1385.
17. Mohammed A. Khalil, Abdulsamie H., Alta'ee, Hussein A. Al-Sultany, et al. Vitamin D3 level and its receptor of patients with psoriasis: a case control study. Euro Med Biomed J. 2018;13:150-154.
18. Zeng S, Querfeld U, Feger M, et al. Relationship between Osteoporosis, PTH, PTH as well as Klotho in patients with glucocorticoids induce osteoporosis. The FASEB Journal. 2020;34:15269-15281.
19. Ameen ZA, Ali SH. Effects of Aldosterone, Osteoprotegerin, Klotho and Some Biochemical Markers in Chronic Disease Patients among Patients with or without Cardiovascular Events. Iraqi J Pharm Sci. 2018;27:150-158.
20. Patschan D, Loddenkemper K, Buttgereit F. Molecular mechanisms of glucocorticoid-induced osteoporosis. Bone. 2001;29:498-505.
21. Merkhan MM, Shephard MT, Forsyth NR. Physoxia alters human mesenchymal stem cell secretome. Journal of Tissue Engineering. 2021;12:20417314211056132.
22. Shephard MT, Merkhan MM, Forsyth NR. Human Mesenchymal Stem Cell Secretome Driven T Cell Immunomodulation Is IL-10 Dependent. International Journal of Molecular Sciences. 2022;23:13596.
23. Faisal IM, Almukhtar HM, Merkhan MM, et al. Comparative anti-inflammatory effect of risperidone versus olanzapine in schizophrenic patients. Indian Journal of Public Health Research & Development. 2019;10:964.
24. Abdulrazaq OM, AL-Abdaly YZ. The pH of drinking water alters the metabolic and neurobehavioral response of rats exposed to vitamin d3 or prednisolone. MMSL.
25. AlbdeeryAK, Alzamily AA, Alsalman IA. The role of cartilage intermediate layer protein2 (CILP2) in evaluating the effect of treatments (platelet-rich plasma and hyaluronic acid) on patients with early knee osteoarthritis MMSL.