GEORGIAN MEDICAL NEWS

ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

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.

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.**

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 რეზიუმების (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. მიკროფოტო-სურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი,ანათლების შედებისა 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 უცხო-ური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიდრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამული, 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 სიდრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანე-ლის 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 შეასწორორს სტატია. ტექსტზე მუშაობა და შე-ჯერება 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.

Содержание:

INVESTIGATION OF IRON DEFICIENCY IN POSTMENOPAUSAL WOMEN BASED ON LABORATORY TESTING: A UNI-CENTRE STUDY

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Abstract.

Objectives: Postmenopausal women (PMW) undergo a physiological phase of lack or insufficient female sex hormones resulting in some consequences including hematological deficits. The present study aimed to investigate the detection of anemia in PMW using easy laboratory tools.

Methods: In this retrospective analysis of patient data collected during the period between 2014-2022. Data retrieved from PMW records were collected over 4 years and analyzed.

Results: In comparison to normal ranges, data of PMW has shown reduced levels of hemoglobin, packed cell volume, mean corpuscular volume, and mean corpuscular hemoglobin. PMW has also shown elevated levels of red cell distribution width and levels of serum iron. Compared to normal ranges, no changes have been seen regarding red blood cell count, Mean corpuscular hemoglobin concentration, unsaturated or total iron binding capacity, transferrin saturation, serum ferritin, white blood cells count, and platelets. To provide in-depth investigation, we divide our participants into three groups according to their ages: 45-55 years, 56-65 years, and 66-80 years. The older the age, the more parameters are altered.

Conclusion: The study highlighted the potential impact of postmenopausal hormone alteration on hematological parameters and the routine laboratory tools could be used to assess such alteration in blood parameters.

Key words. Anemia, hemoglobin, hematocrit, postmenopause, female sex hormones, ageing.

Introduction.

Anemia could be defined as a low level of hematocrit and hemoglobin in the blood. The levels are physiologically different in women compared to men. In women, anemia is considered at the hematocrit level lower than (36%) or hemoglobin lower than (12%), while in men anemia is considered at the hematocrit level lower than (41%) or hemoglobin lower than (13.5%) [1]. Alongside sex variation, ageing also has an impact on the variations in the levels of hematocrit and hemoglobin, the elderly are usually more prone to anemia than the younger [2,3]. These reports attributed a decline in hematological parameters to ageing and/or reduced nutritional intake [2,3]. Moreover, postmenopausal women (PMW) might have an additional factor which does contribute to hematological changes due to hormonal changes [4].

At child-bearing age, women produce different hormones in high levels, including follicle-stimulating hormone, luteinizing hormone, estrogen, and progesterone, which altogether have a great impact on reproduction and menstruation on their first instance alongside that on circulation components, such as immune cells and red blood cells. At menopausal age, these hormones physiologically decline which will ultimately have impacts on these aforementioned physiological processes [5-8].

It has been reported that menopause could be responsible for the modulation of platelet count and blood hypercoagulability increasing the chance of atherosclerosis propensity [9-12]. The explanation of this variation in hematological abnormalities has been uncertain. Some studies have related that to normal ageing processes [5-8] while other linked them to nutritional status [2,3], and other has linked it to a decline in marrow functions due to postmenopausal (PM) hormonal cessation [13]. In the present study, the PMWs were investigated for possible hematological abnormalities using easy laboratory tools for diagnosis.

Materials and Methods.

Study Design and Laboratory Parameters: This retrospective study conducted over 7 years (from 2014 to 2021) utilized the medical files at private clinics of previously recorded postmenopausal women with anemia at ages 58 ± 10 year. out of 1000 record checked only 68 patients met criteria of being postmenopausal and having a full records of measured iron related parameters.

Statistical analysis: Data expressed as mean $\pm$ standard deviation and compared to reference ranges to determine the differences.

Results.

The results of the laboratory analysis of routinely analyzed blood samples collected over 4 years have revealed that the PM status has led to certain changes, including reduced Hb, PCV, MCV, and MCH to lower than the standard normal range. While RDW and serum iron were elevated to more than the normal range. Nonetheless, many parameters were within the normal ranges, including RBCs, MHCH, platelets, WBCs, UIBC, TIBC, transferrin saturation, and serum ferritin (Table 1).

When results are sub-grouped into different age groups it is revealed that older (56-80 years) have higher hematological parameters alterations than younger (45-55 years) (Table 2).

Discussion.

The present study has strongly confirmed that blood parameters in general were modulated in postmenopausal women; with most often being reduced compared to the normal range, moreover, older age group postmenopausal women were more affected than younger age groups. In general, most of the blood parameters in postmenopausal women were decreased in the present study, this could be potentially related to ageing processes which is resulting in reduced bone mineral density as a consequence of hormonal decline [13,14].

The hemoglobin level and PCV were reduced to a lower-than-normal range in PMW, especially at age ranges 45-55 years compared to older age groups (56-80 years). This outcome has been further confirmed by other anemia parameters including

Table 1. *Hematological parameters of the studied sample.*

Measured parameters	Female at postmenopause age (58± 10) (n=68)	Reference range
Hb (g/dl)	10.8±2.5	12-15.5
PCV(%)	33.8±6.23	36-46
RBC(*10¹²/L)	4.4±0.8	3.8-4.8
MCV(fl)	78.3±11.6	80-100
MCH(pg)	25.2±5.4	27-32
MHCH(g/dL)	31.8±2.8	31-37
RDW(%)	15.8±3.9	11.6-14
S Iron (*µmol/L*)	54±35.4	10.74 -30.43
UIBC (*µg/dL*)	280±106	*131 - 425*
TIBC (*µg/dL*)	334±85	240-450
Transferrin saturation (%)	18.6±14	15-50%
Serum ferritin (ng/ml)	190±28	24 -307
WBCs(x10⁹/L)	7.3±2.5	4-11
Platelets(x10³/L)	284±111	150-450

Table 2. *Hematological parameters of the studied sample according to age ranges.*

Measured parameters	Female at postmenopausal age (n=68)			Reference range
	45-55 years (49.5±3)	56-65 years (60±3.3)	66-80 years (73±5.5)	
Hb (g/dl)	10.3±2.6	11.5±2.7*	11.1±2.2*	12-15.5
PCV(%)	33±6	35±6.9*	33.9±5.5	36-46
RBC(*10¹²/L)	4.5±0.8	4.3±1	4.3±0.75	3.8-4.8
MCV(fl)	75±12.4	83±11*	80±8.7*	80-100
MCH(pg)	23.5±5.5	25±5.5*	26.2±4*	27-32
MHCH(g/dL)	31±2.7	33±3*	32.7±1.9	31-37
RDW(%)	16±2.9*	15.4±6	15.1±3	11.6-14
S Iron (*µmol/L*)	41.5±28	72±36*#	65.1±38.5*	10.74 -30.43
UIBC (*µg/dL*)	334±99*	227.5±89	218.7±79.1	*131 - 425*
TIBC (*µg/dL*)	376±84*	300±64*#	283.9±63.7	240-450
Transferrin saturation (%)	12±9.8	26±14*	24±15*	15-50%
Serum ferritin (ng/ml)	78±13	249±24*	377.8±44*#	24 -307
WBCs(x10⁹/L)	7.1±2.1	7.1±2.5	7.9±3.2*	4-11
Platelets(x10³/L)	291±9.9*	290±14*	265.1±130	150-450
*#p<0.05				

MCV, MCH, and MHCH, which were reduced in parallel to Hb, and PCV, moreover, RDW was reciprocally elevated. Nonetheless, RBCs were within normal range showing no significant modulation in all age groups under assessment. These easy laboratory tools could be potentially used as a diagnostic tool for anemia. These results were in agreement with Qamar et al. (2015), who have reported that PMW diagnosed with iron deficiency anemia through measured anemia parameters (Hb, PCV, MCV, MCH, MHCH, ferritin, and RDW) and these parameters were not corrected via ferrous sulfate tablet administration, hence the study has attributed the anemia to iron malabsorption through the gastrointestinal system [15]. Moreover, in a case-control study involving using tibolone as a hormone replacement therapy (HRT), the patient developed polycythemia which further validates our finding that sex hormones could potentially impact the blood parameters [16]. In contrast to these aforementioned findings, a study conducted in Saudia Arabia by Al Khamees et al. (2023) reported that anemia is reported in premenopausal women rather than

PMW, nonetheless, the sample of participants was patients with breast cancer, hence, the outcome could not be related to the findings of the present study due to the impact of cancer itself on the body responses to normal physiological function including hematopoiesis [17]. Shah et al. (2022), reported that aging is detrimental in developing iron deficiency anemia [18]. Moreover, this variation could be potentially related to the role of estradiol in the mutation of genes which do involved in hematopoiesis [19]. Additionally, erythropoiesis associated with Monge's disease (chronic mountain sickness) has been shown to be more prevalent in males compared to females, and estrogen administration reduced erythropoiesis associated with Monge's disease [20]. In addition to that, Lewerin et al. (2014), reported that estradiol levels reciprocally associated with Hb concentration confirming the great role of declining estradiol in PMW in inducing alterations in hematological parameters [21].

The levels of iron in the present study confirmed that PMW has a higher iron concentration than the acceptable normal range, furthermore, ageing has its impact because it seems that the

older (56-80 years) age groups have significantly higher plasma iron concentration than the normal range. These findings are in agreement with in vivo studies conducted in ovariectomized rats as a PM model for osteoporosis, these studies reported a significantly higher iron plasma concentration compared to control groups [22,23], with reciprocal lower Hb concentration in ovariectomized rats compared to control [24], moreover, PMW has investigated for iron plasma concentration and the outcome confirmed significantly higher plasma iron concentration in PMW than premenopause [25]. Despite reported changes in iron, there were no changes in serum ferritin, transferrin, TIBC, and UIBC in PMW, however, different age groups have shown variations but all within the normal ranges regarding iron binding indices (TIBC and UIBC). Transferrin saturation in the younger (45-55 years) group is lower than that of older (56-65 and 66-80 years) groups with later groups being within normal ranges of transferrin saturation. Serum ferritin in the older (66-80 years) age group is higher than the upper limit of normal ranges and higher than that of other groups (45-55 and 56-65 years). Therefore, postmenopause and ageing coincidently lead to such variation. Using estrogen-containing contraceptives in mice has been shown to increase transferrin and reduce ferritin [26].

The WBCs have shown no changes in PMW and fall within the normal ranges at different age groups confirming that changes in estrogen levels in PMW have no impact on WBCs. A similar outcome has been reported by Sendag et al. (2005) with no changes in WBCs being shown in PMW even after hormone-replacement therapy apart from increased activation of T cell subsets upon hormonal replacements [27]. Similarly, using estrogen in women at childbearing age has shown no changes in the blood lymphocyte count, however, a subpopulation of T cell differentiation and activation were partially affected by estrogen administration [28]. Similar impacts have been found in neutrophils where estrogen has no impact on neutrophil count but activates the cells [29]. Nonetheless, WBCs has been reduced significantly in PMW compared to the control group (childbearing age group) indicating that PM has an impact on WBCs, however, when this study stratified their patients into different age group, the outcome revealed that the lowest WBCs were reported with older ages (51-80 years) than youngers (41-50 years), this differences in the result compared to our study ought to the preexisting immune disease in such patients included in the study [4]. Kamada et al. (2000), have reported that T cells were non-significantly reduced in postmenopause compared to the control group, however, after starting with hormone replacement therapy, the T cell counts significantly elevated compared to the control group, and no significant changes were reported regarding subsets of T cells or their activations [30]. In contrast, Abildgaard et al. (2020), have reported that postmenopausal women have shown higher WBC counts in PMW than premenopause, the variation in relation to the present study could be due to the age of included subjects was lower than 60 years [31]. Postmenopause has no impact on platelet levels and increasing the age of postmenopause has a slight impact on platelets showing a reduced level with ageing. In a study conducted by Okoroiwu et al. (2021), they reported increased platelet count in women taking contraceptive hormones, however, these women were of childbearing age compared to PMW in the present study [32]. In contrast, Grau (2018) found that platelet counts were lowest in male than female (on/off) contraceptives, moreover, females without hormonal contraceptives have shown higher platelet counts than females with hormonal contraceptives [33].

The limitations of the present study include a small sample size and the conduction of the study being unicentric in private clinics and blood analysis laboratories, moreover, no control groups were included apart from using population-based normal ranges for comparisons.

Conclusion.

The present study delved into the hematological changes associated with PMW. Exploring such connections could lead to uncovering priceless insight for easier diagnosis and follow-up strategies for anemia treatment. Moreover, it could give an idea about the target ages of anemia in PMW. Ageing served as an important parallel cofactor together with reduced female sex hormones as a detrimental association with anemia.

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