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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.

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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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REMEDIAL INTERVENTION OF FERTILITY AGENT AND GENE 35 ON INDUCED CYSTIC OVARY IN RATS

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Abstract.

Infertility is a condition with a negative health state and cystic ovary disorder is one of it is causes. PCOS is a prevalent derange till now. Therefore, current study is designed to estimate the role of Gene 35 and fertility supplements (composed from chasteberry, green tea extracts and L-arginine along with some elements),as alternative therapy for induced cystic ovary with letrozole in rats. Thirty female rats were divided erratically into four groups: G1 negative control, G2 positive group, G3 fertility group, G4 Gene 35 group and G5 combination of both Gene 35 with fertility. Vaginal smear examination was done to ensure the occurrence of PCOS. Blood samples were obtained, and sera were separated for hormonal evaluation of luteinizing hormone (LH), testosterone (T), anti mullerian hormone (AMH), follicle-stimulating hormone (FSH), prolactin (PRL) as well as insulin and ovary samples were obtained for histopathological study. Current study reveals a significant ($p<0.05$) increase in serum AMH, FT, LH, PRL as well as insulin and significant ($p<0.05$) decrease in serum FSH in PCOS groups when compared to treated groups. However, treated groups experienced significant ($p<0.05$) decrease in serum AMH, FT, LH, PRL with insulin and significant ($p<0.05$) increase in in serum FSH in comparison to positive control. Histopathological study showed marked reduction of cystic follicle along with corpora lutea predominance that reflect a good response as compared to PCOS group. From the current result, there is a noticeable improvement in number of ovarian cysts and hormones levels. Therefore, it is recommended that Gene 35 and fertility supplement can be used in the treatment of PCOS patients as supporting and treatment.

Key words. Infertility, AMH, PCOS, fertility supplement, letrozole.

Introduction.

Polycystic ovary syndrome (PCOS) is a derangement of endocrine system, and it is knowing the sort of disruptive, unpleasant signs, which cause irregular menstrual cycle and acne to hair loss or excessive hair growth [1]. PCOS usually caused by higher androgen level, and it is the leading cause of infertility. Previous studies mentioned that hormonal variation such as hyperandrogenemia, increase in LH, insulin resistance and hyperinsulinemia might be playing a priority role [2].

Insulin resistance, cardiovascular disease risk, diabetes and other metabolic disorder are in a relation with PCOS, in addition, autonomic and central nervous systems play a pivotal function in controlling ovarian physiology and may have an interference in pathogenesis [3]. Changes in lifestyle as well as anxiety magnitude are consider a contributing agent in PCOS development [4].

PCOS characterized by irregular ovulation, infrequent menstrual cycle and infertility as reproductive features, along with higher concentration of male testosterone hormones, which is the leading cause of excess body or facial hair growth as well as acne [5].

Several research investigated the therapeutic potential of fertility component alone [6,7]. L-arginine reported to enhance reproductive characteristic, ovulation and pregnancy in PCOS women [8] as a consequent to normal nitric oxide level maintenance with L-arginine, which is significantly lower in women with cystic ovary [9,10].

Catechins is a robust antioxidant present in green tea extract with larger amount owing to their fertility function [11]. Reduced body weight, insulin resistance and diabetic effect related to green tea thereby PCOS metabolic alleviation [12].

The fruit Vitex used for treatment of gynecological disorder especially PCOS through controlling of prolactin hormone [13]. Vitex exert therapeutic potential with their apigenin, luteolin and casticin by interaction with dopaminergic receptor owing to suppress prolactin level, prevention of cyst formation and treatment of PCOS [14,15].

Shahnazi et al., [16] reported that 70 PCOS women treated with Vitex encountered a significant decrease in DHEA-S and normalization of menstrual cycle 60% without hormonal picture changes.

Ethinylestradiol and cyproterone acetate are component of Gene 35 drug, frequently administer in PCOS treatment fertility related to anti-androgenic effect, which inhibit the effects of androgens on the corresponding target organs, and anti-gonadotropic enhancement. They have a definite effect on reducing androgen secretion, but the effect of individual treatment is poor and needs to administer with other therapy to augment their efficacy thus sex hormones enhancement [17,18].

This study aimed to assess the efficacy of Gene 35 drug along with fertility agent that consisting from L-arginine, green tea (Camellia sinensis) extract, chasteberry (Vitex agnus-castus) extract along with some minerals in female rat with induced PCOS by letrozole.

Materials and Methods.

Animals: Thirty mature female rats weighing 200-210gm with regular estrus cycle for 10 days. These animals are maintained in a controlled environmental conditions such as temperature of 24℃, light cycle every 12 hours and provided with water ad libtum. All rats were acclimatized before the beginning of treatment and processed depending on the standard ethics of the Ethical Committee of College of Pharmacy, University of Basrah, number :(EC24).

Reagents: Jene-35 EDTM was obtained from Eris Pharmaceuticals (Australia), Fertility drug (consisting from L-arginine, green tea (Camellia sinensis) extract, chasteberry (Vitex agnus-castus) extract and some minerals) was purchased from Weliness Company/USA and Letrozole provided from Accord Healthcare Limited, Pharmaceuticals (United Kingdom).

Estrus period determination of female rats: The estrus cycle was monitored for 10 days before the beginning of the study through making vaginal smear to maintain a normal cycle state. Vaginal fluids were obtained by using a cotton-tipped swabs immersed in saline. Three types of cells can be recognized including (proestrus phase) round and nucleated ones which were epithelial cells, (estrus phase) irregular ones without nucleus which were cornfield cells and (met and diestrus phase) the little round ones which were leukocytes [19,20].

PCOS Experimental design: The study involved 30 female rats divided into five groups as **G1** negative control (Cont N), **G2** positive group (Cont P), **G3** fertility group (Fert.), **G4** Gene 35 (Gene 35) and **G5** combination of both Gene 35 with fertility group (Gene 35+Fert). All groups except negative control treated with Letrozole 1mg/kg/day, through oral gavage for 21 days to induced PCOS [1]. After induction of PCOS the positive control group G2 were sacrificed and blood sample were collected from vena cava and ovary preserved in 10% formalin, however, the reminder groups treated as follows: G3 treated with fertility 750mg/kg daily by oral gavage for 21days. G4 treated with Gene 35 (1.33mg/kg of cyproterone and 23.3µg/kg of ethinylestradiol) daily by oral gavage for 21days. The last group G5 treated with combination of fertility 750mg/kg combine with Gene 35 (1.33mg/kg of cyproterone and 23.3µg/kg of ethinylestradiol) daily by oral gavage for 21days.

Study parameters: After the end of treatment periods, all rats were sacrificed and blood samples were obtained from vena cava for hormonal measurement with Mindray CL-900 as well as ovary sample were preserved in 10% formalin for histopathological processing and examined with Genex light microscope.

Statistical analysis:

ANOVA were used to analyzed data and presented as mean ± standard Deviation. The significant differences determined with LSD with SPSS version 11.

Results.

Hormonal analysis:

Table (1) illustrated that there is a significant ($p<0.05$) increase in serum Testosterone, AMH and insulin concentration in the rats treated with letrozole compared with other experiment groups. However, there is a significant ($p<0.05$) decreased in serum Testosterone, AMH and insulin level in groups treated with Gene 35and fertility in comparison to other groups, although, serum insulin level does not affected as like testosterone and AMH levels by fertility drug. The level of these parameters presented with positive response in fertility and combination groups.

Table (2) reveals a significant ($p<0.05$) increase in serum LH and PRL hormonal level in rats with PCOS. In contrast, there is a significant ($p<0.05$) decrease in serum FSH in PCOS group compared with other study groups. On the other hand, the treated groups especially combination and fertility experienced an opposite result to that of PCOS group; there is a significant ($p<0.05$) increase in serum level of FSH hormone and a significant ($p<0.05$) decrease in both LH and PRL hormonal levels.

Table 1. *Effects of letrozole, Gene 35 and fertility on testosterone, AMH and insulin concentrations.*

Parameters/ Groups	Testosterone (ng/ml)	AMH (ng/ml)	Insulin (µlÚ/ml)
Cont N	0.61 ± 0.02^{c}	2.07 ± 0.30^{d}	3.15 ± 0.98^{c}
Cont P	3.96 ± 0.20^{a}	7.96 ± 0.84^{a}	5.78 ± 1.07^{a}
Fert.	0.58 ± 0.04^{c}	3.69 ± 0.35^{c}	4.67 ± 1.15^{b}
Gen35	0.99 ± 0.05^{b}	4.67 ± 0.39^{b}	3.18 ± 1.04^{c}
Gen35+Fert.	0.45 ± 0.04^{d}	2.04 ± 0.38^{d}	3.02 ± 0.56^{c}
P-value	**0.05**	**0.05**	**0.05**

Table 2. *Effects of letrozole, Gene 35 and fertility on serum level of FSH, LH and PRL hormones.*

Parameters/ Groups	FSH (ng/ml)	LH (ng/ml)	PRL (ng/ml)
Cont N	4.48 ± 0.18^{a}	3.37 ± 0.17^{c}	2.89 ± 0.55^{b}
Cont P	3.52 ± 0.20^{c}	7.44 ± 0.13^{a}	3.34 ± 0.07^{a}
Fert.	4.10 ± 0.05^{b}	3.87 ± 0.23^{c}	2.74 ± 0.05^{c}
Gen35	4.17 ± 0.05^{b}	4.52 ± 0.21^{b}	3.52 ± 0.05^{a}
Gen35+Fert.	4.52 ± 0.05^{a}	3.62 ± 0.22^{c}	2.46 ± 0.05^{c}
P-value	**0.05**	**0.05**	**0.05**

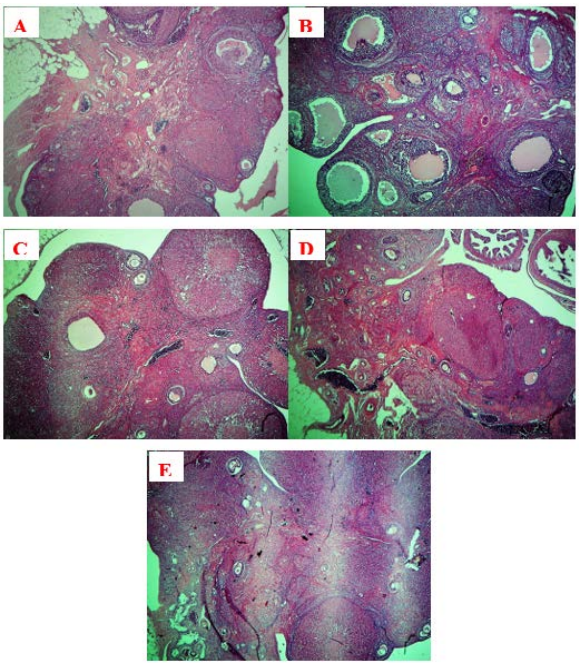

Figure 1. *Ovary section with H&E stain. X200. A) ovary section of control group shows normal follicle, graafian follicle and a healthy corpora lutea. B) Ovary of PCOS shows multi ovarian follicular cysts, thickened theca and granulosa layers, pyknotic oocyte within Graafian follicles and reduction in corpora lutea in stroma of ovary. C) Fert. group shows normal corpus luleum, newly follicles were noted. D) Gene 35 group shows healthy appearance of corpus luteum and graffian follicle. E) Gene 35+Fert. group shows normal dark dye granulosa and theca layers, corpus luteum. H&E. X200.*

Histopathological study:

Ovary section of control group presented with normal follicles, oocyte and graafian follicles as in (Figure A). PCOS ovary in (Figure B) notice a multiple follicular cyst with thick granulosa and theca layers. Histopathological examination of treated groups in (Figure C, D and E) reveals a marked reduction of ovarian cyst along with formation of newly follicles and normal corpora lutea.

Discussion.

Because the negative health impact of infertility and the wide occurrence of PCOS, this study is designed to evaluate the remedial potential of chasteberry, green tea extracts, L-arginine with some minerals as fertility drug and Gene 35 drug that consist of cyproterone and ethinylestradiol, on induced PCOS in rats by letrozole.

From the present result, the hormonal concentration of PCOS group showed increase in serum testosterone, AMH, LH, PRL and insulin level. However, there is a decrease in serum FSH concentration, this result is in line with Shehab et al. [2], this may be related to the effect of letrozole for induction of hormonal disturbance and thus PCOS evolution.

Paixao and his colleagues [21] reported that letrozole cause an excess of androgen by preventing it is transformation to estradiol and consequently higher LH level [22] through interaction with GnRH causing stimulation of theca interna cells to secrete more androgen and necrosis of granulosa cells thus cystic ovary development [21]. Several studies showed that hyperinsulinemia the primary source for evolution of ovarian hyperandrogenism, therefore, drug therapy for controlling glucose level used in PCOS to alleviate insulin concentration, controlling hyperinsulinemia and consequently hyperandrogenemia with ovulation restoration in PCOS women [23].

Cystic ovary progress due to sex steroid hormonal disturbances that controlling ovulation, follicular growth and maturation [24]. Several studies mentioned that the hormonal picture of PCOS consisting of higher level of LH and low concentration of FSH causing positive feedback on GnRH leading to greater secretion of LH hormone [25,26]. However, an opposite result was obtained in the treated groups as compared to PCOS. Increase AMH level and follicular arrest is a result of increase production of testosterone hormone due to over secretion of LH in PCOS [27]. Anti Mullerian hormone is used for identification and diagnosis of PCOS instead of number and follicular size on ultrasonography; research showed that women with PCOS have an increased concentration of AMH than those without PCOS [28,29].

The positive therapeutic potential obtained from treated groups reflected by reducing level of AMH, LH, PRL, testosterone and insulin level, on the other hand an increase FSH concentration this result is in similarity with [30,31]. The remedial effect acquired lead to attenuate the hyperandrogenism, excess LH, insulin resistance and enhance FSH effect on folliculogenesis, follicle growth, maturation and finally alleviating cystic ovary disorder [32].

Fertility drugs exhibit the beneficial effect on PCOS through their constituent; chasteberry extract is a notorious phyto-therapeutic agent used for management of PCOS [33] because of their possessing on casticin flavonoids that contribute to restoration of normal PRL hormonal level thus alleviating PCOS and enhancing fertility [34]. Green tea extracts another constituent of fertility drug that reduce insulin resistance through increase secretion of adiponectin from differentiated adipocyte by their catechins binding with peroxisome proliferator activated receptors. Green tea extracts also found to reduce theca cell thickness by promoting lipolysis and inhibiting their proliferation leading to reduce androgen production from this layer [30]. Furthermore, L-Arginine also present in fertility drug that provide antioxidant effect against oxidative stress induced cystic ovary and infertility disorder [35]. Finally, fertility drug also contains selenium that possess a pivotal role in reducing insulin level and insulin resistance associated with PCOS in addition to their antioxidant effect [36].

Gene 35 drug is a common medication used in treatment of ovulation disorder because of their ability to exhibit anti-gonadotropic effect, androgen receptor antagonist and limits production of androgen thus allowing single follicle development [37].

Histopathological analysis of PCOS revealed the presence of several sub capsular follicular cyst, thickened ovarian capsule, absence of corpora lutea and granulosa cells degeneration with hyperplastic theca cells [1,31,38], these results are in line with the current study. This result may be related to the oxidative stress provided by letrozole to induce PCOS [39,40]; it was found to cause a decrement in catalase, glutathione and superoxide dismutase level [41]. However, all treated group shows a marked reduction in cystic ovary, follicle development and appearance of corpus luteum. Group treated with fertility drugs along with Gene 35 drug provide an augmented result about fertility and improving PCOS condition.

Conclusion.

There is a remarkable enhancement in number of ovarian cysts and hormonal levels in relation to PCOS, therefore, this study is recommended that Gene 35 and fertility supplement can be used in treatment of PCOS patients as supportive and treatment due to their augmented effect in controlling several pathways of PCOS pathogenesis.

Conflict of interest.

All authors declare that they have no conflict of interest.

REFERENCES

1. Abdallah AB, El-Ghannam MA, Hasan AA, et al. Selenium nanoparticles modulate steroidogenesis-related genes and improve ovarian functions via regulating androgen receptors expression in polycystic ovary syndrome rat model. Biological Trace Element Research. 2023;201:5721-5733.

2. Abdel-Rhman A, Morsy W, Selim N, et al. L-arginine supplementation attenuates ovarian oxidative stress in female rats subjected to chronic intermittent hypoxia. Physiology international. 2023;110:326-341.

3. Abdulmalek SA, Balbaa M. Synergistic effect of nano-selenium and metformin on type 2 diabetic rat model: Diabetic complications alleviation through insulin sensitivity, oxidative mediators and inflammatory markers. PloS one. 2019;14:e0220779.

4. Awonuga AO, Camp OG, Abu-Soud HM. A review of nitric oxide and oxidative stress in typical ovulatory women and in the pathogenesis of ovulatory dysfunction in PCOS. Reproductive Biology and Endocrinology. 2023;21:111.
5. Biswal S. Phytochemical analysis and a study on the antiestrogenic antifertility effect of leaves of Piper betel in female albino rat. Ancient science of life. 2014;34:16-22.
6. Chen SN, Friesen JB, Webster D, et al. Phytoconstituents from Vitex agnus-castus fruits. Fitoterapia. 2011;82:528-533.
7. Krishna MB, Joseph A, Thomas PL, et al. Impaired arginine metabolism coupled to a defective redox conduit contributes to low plasma nitric oxide in polycystic ovary syndrome. Cellular Physiology and Biochemistry. 2018;43:1880-1892.
8. Genazzani AD, Prati A, Genazzani AR, et al. Synergistic effects of the integrative administration of acetyl-L-carnitine, L-carnitine, L-arginine and N-acetyl-cysteine on metabolic dynamics and on hepatic insulin extraction in overweight/obese patients with PCOS. Gynecol. Reprod. Endocrinol. Metab. 2020;1:56-63.
9. Tiwari M, Prasad S, Pandey AN, et al. Nitric oxide signaling during meiotic cell cycle regulation in mammalian oocytes. Front Biosci. 2017;9:307-318.
10. Ragy MM, Abdel-Hamid HA, Toni ND. Pathophysiological changes in experimental polycystic ovary syndrome in female albino rats: Using either hemin or L-arginine. Journal of cellular physiology. 2019;234:8426-8435.
11. Haidari F, Omidian K, Rafiei H, et al. Green tea (Camellia sinensis) supplementation to diabetic rats improves serum and hepatic oxidative stress markers. Iranian journal of pharmaceutical research: IJPR. 2013;12:109.
12. Sabu MC, Kuttan R. Anti-diabetic activity of medicinal plants and its relationship with their antioxidant property. Journal of ethnopharmacology. 2002;81:155-160.
13. Kshama DN. FROM NATURE TO NURTURE: A REVIEW OF HERBAL APPROACHES TO POLYCYSTIC OVARY SYNDROME (PCOS). InObstetrics and Gynaecology Forum. 2024;34:1142-1152.
14. Kakadia N, Patel P, Deshpande S, et al. Effect of Vitex negundo L. seeds in letrozole induced polycystic ovarian syndrome. Journal of Traditional and Complementary Medicine. 2019;9:336-345.
15. Feyzollahi Z, Kouchesfehani HM, Jalali H, et al. Effect of Vitex agnus-castus ethanolic extract on hypothalamic KISS-1 gene expression in a rat model of polycystic ovary syndrome. Avicenna journal of phytomedicine. 2021;11:292.
16. Ghahremaninasab P, Shahnazi M, Khalili AF, et al. The effects of combined low-dose oral contraceptives and Vitex agnus on the improvement of clinical and paraclinical parameters of polycystic ovarian syndrome: a triple-blind randomized controlled clinical trial. Iranian Red Crescent Medical Journal. 2016;18.
17. Penning-van Beest FJ, Bezemer ID, Smits E, et al. Reduction in use of cyproterone/ethinylestradiol (Diane-35 and generics) after risk minimization measures in the Netherlands, UK and Italy. Contraception. 2020;102:243-245.
18. Lu K, Li N, Zhang M, et al. Effects of letrozole combined with ethinylestradiol and cyproterone acetate tablets on serum sex hormones and lipid metabolism in patients with polycystic ovary syndrome. American Journal of Translational Research. 2023;15:1271.
19. Bremer AA, Miller WL. The serine phosphorylation hypothesis of polycystic ovary syndrome: a unifying mechanism for hyperandrogenemia and insulin resistance. Fertility and sterility. 2008;89:1039-1048.
20. Dinsdale N, Nepomnaschy P, Crespi B. The evolutionary biology of endometriosis. Evolution, medicine, and public health. 2021;9:174-191.
21. Ghafurniyan H, Azarnia M, Nabiuni M, et al. The effect of green tea extract on reproductive improvement in estradiol valerate-induced polycystic ovarian syndrome in rat. Iranian journal of pharmaceutical research: IJPR. 2015;14:1215.
22. Ibrahim YF, Alorabi M, Abdelzaher WY, et al. Diacerein ameliorates letrozole-induced polycystic ovarian syndrome in rats. Biomedicine & Pharmacotherapy. 2022;149:112870.
23. Jahan S, Abid A, Khalid S, et al. Therapeutic potentials of Quercetin in management of polycystic ovarian syndrome using Letrozole induced rat model: a histological and a biochemical study. Journal of ovarian research. 2018;11:1-0.
24. Jelodar G, Masoomi S, Rahmanifar F. Hydroalcoholic extract of flaxseed improves polycystic ovary syndrome in a rat model. Iranian journal of basic medical sciences. 2018;21:645.
25. Karateke A, Dokuyucu R, Dogan H, et al. Investigation of therapeutic effects of erdosteine on polycystic ovary syndrome in a rat model. Medical Principles and Practice. 2019;27:515-522.
26. Lakshmi JN, Babu AN, Kiran SM, et al. Herbs as a source for the treatment of polycystic ovarian syndrome: A systematic review. BioTech. 2023;12:4.
27. Moolhuijsen LM, Visser JA. Anti-Müllerian hormone and ovarian reserve: update on assessing ovarian function. The Journal of Clinical Endocrinology & Metabolism. 2020;105:3361-3373.
28. Padubidri VG, editor. Howkins And Bourne Shaw S Textbook Of Gynaecology. Elsevier India. 2008.
29. Paixão L, Ramos RB, Lavarda A, et al. Animal models of hyperandrogenism and ovarian morphology changes as features of polycystic ovary syndrome: a systematic review. Reproductive Biology and Endocrinology. 2017;15:1-1.
30. Pellatt L, Hanna L, Brincat M, et al. Granulosa cell production of anti-Mullerian hormone is increased in polycystic ovaries. The Journal of Clinical Endocrinology & Metabolism. 2007;92:240-245.
31. Puglia LT, Lowry J, Tamagno G. Vitex agnus castus effects on hyperprolactinaemia. Frontiers in Endocrinology. 2023;14:1269781.
32. Rojas J, Chávez M, Olivar L, et al. Polycystic ovary syndrome, insulin resistance, and obesity: navigating the pathophysiologic labyrinth. International journal of reproductive medicine. 2014;2014:719050.
33. Ryu Y, Kim SW, Kim YY, et al. Animal models for human polycystic ovary syndrome (PCOS) focused on the use of indirect hormonal perturbations: a review of the literature. International journal of molecular sciences. 2019;20:2720.
34. Seghinsara AM, Shoorei H, Taheri MM, et al. Panax ginseng

extract improves follicular development after mouse preantral follicle 3D culture. Cell Journal (Yakhteh). 2019;21:210.
35. Shehab NG, Anbar HS, Alrouby NM, et al. New alternative herbal remedies for treatment of letrozole-induced polycystic ovary syndrome in rats. Journal of Applied Pharmaceutical Science. 2023;13:163-179.
36. Sjahfirdi L, Azis SN, Maheshwari H, et al. Estrus period determination of female rats (Rattus norvegicus) by Fourier Transform Infrared (FTIR) through identification of reproductive hormones metabolites in urine samples. International Journal of basic & Applied Sciences. 2011;11:158-583.
37. Tseng TA. The role of anti-Müllerian hormone in diagnosing and managing PCOS. Women's Healthcare, NPWOMENSHEALTHCARE.com. 2016:34-39.
38. Walters KA, Allan CM, Handelsman DJ. Androgen actions and the ovary. Biology of reproduction. 2008;78:380-389.
39. Younas A, Hussain L, Shabbir A, et al. Effects of fagonia indica on letrozole-induced polycystic ovarian syndrome (PCOS) in young adult female rats. Evidence-Based Complementary and Alternative Medicine. 2022;2022:1397060.
40. Zangeneh FZ, Naghizadeh MM, Minaee BA, et al. PCOS and Sympathetic outcome: Role of the central and peripheral nervous system in ovarian function of rat. Asian J Pharm Clin Res. 2012;5:26-32.
41. Zhang J, Su M, Xu L, et al. Efficacy and metabolic safety of long-term treatment with ethinyl oestradiol/cyproterone and desogestrel/ethinyl oestradiol tablets in women with polycystic ovary syndrome. Nan Fang yi ke da xue xue bao= Journal of Southern Medical University. 2018;38:917-922.