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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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

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

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

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

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

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

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

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

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

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

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

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

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

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

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

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

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

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

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

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

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

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

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

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

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

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

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

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

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

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

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

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

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

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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EVALUATION OF THE ROLE OF COENZYME Q 10 IN THE BLOOD OF BREAST CANCER WOMEN

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Abstract.

Background: Cancer is an abnormal proliferation of cells in a tissue or organ that causes the cells to change their nature, eventually producing a lump or mass and spreading to other regions of the body in most cases. **Aim of the study:** The purpose of this study is to evaluate the level of coenzyme Q 10 in breast cancer patients and to determine their relationship to the proliferation of breast cancer. **Methods:** This study has investigated 90 women (60 patients and 30 controls) subdivided according to stages of cancer status. **Results:** This study shows the mean of coenzyme Q 10 was observed in breast cancer women (16.91±2.52) as compared with the healthy control group (42.49±7.45) the difference was highly significant at a P. value of 0.0003. The mean and stander deviation of coenzyme Q 10 in women with breast cancer (stage 1, stage2, stage3, and metastatic stage) were (28.03b±5.81, 17.51b±3.42, 22.71b±4.38, and 17.93b±2.92) in comparison with healthy women were(40.22a±3.13). **Conclusions:** It was concluded that the levels of coenzyme Q 10 were significantly decreased in breast cancer women as compared with healthy women.

Key words. Breast cancer, Coenzyme Q 10, Selenium.

Introduction.

Cancer is defined by a loss of control over cellular growth and development, which results in excessive cell proliferation and spread [1]. Breast cancer has a strong proclivity for spreading to lymph nodes, the lungs, the bones, and the liver.

Breast cancer (BC) is the second most common cancer worldwide and the most frequent malignant disease, with an estimated 2.3 million cases and 685,000 deaths in 2020, and the cases are expected to reach 4.4 million in 2070 [2]. Among women, breast cancer accounted for approximately 24.5% of all cancer cases and 15.5% of cancer deaths, ranking first for incidence and mortality in the majority of the world countries in 2020 [3-5].

Its aetiology and causative factors are complex and interlinked which include family history, gene susceptibility, hormone, diet, lifestyle factors and environmental exposures [6,7].

Coenzyme Q10 is a lipid compound with 10 isoprenoid units and is widely distributed in the human body. It is a lipophilic inner mitochondrial membrane cofactor that is used to shuttle electrons in the formation of ATP. Hence, it has a fundamental role in cellular bioenergetics, which has led to its clinical application in problems involving tissues with high metabolic requirements, such as heart muscle. Second, beyond its role in generating ATP, CoQ10 serves as an antioxidant or free radical scavenger [8]. Decreased levels of CoQ10 have been found in the plasma of women with breast cancer and cancerous breast tissue, and low levels correlated with a worse prognosis [9].

Selenium(Se) is a chemical element recognized as nutritionally essential for humans which is present in the human diet as selenomethionine in plants and as selenocysteine in meat, but it is toxic at levels slightly higher than those required for health and it can attend as a potential cancer preventive agent, at least in populations with low intake [10].

Selenium status correlates with breast cancer survival. As a result, one way to curb breast cancer mortality would be via Se supplementation, especially in patients with severely depleted Se status6. The ability of selenium to counteract cancer cell growth due to its effects on DNA stability, cell proliferation, necrotic and apoptotic cell death in healthy and malignant cells, and/or regulation of oxidative stress and the immune system [11,12].

Materials and methods.

This study investigated 90 women (60 patients and 30 controls), ages between (30-70) years. The patients were referred to three main facilities, Kirkuk oncology centre, consultation of early detection of breast tumours in Azady Hospital, and Kirkuk General Hospital from November 2022 to March 2023. The individuals of this study were divided into five groups: The first group was breast cancer women who have a tumour in stage 1 (n=14). The second group were breast cancer women have a tumour in stage 2 (n=22). The third group were breast cancer women who have a tumour in stage 3 (n=16). The fourth group were breast cancer women who have a tumour in the metastatic stage (n=8). The fifth group was healthy women with a negative family history of breast cancer were included in this study as a control group. Clinical history data, information on age, weight, height, marital status, and family history of breast cancer. About 5 ml of venous blood was collected from each case by using a sterile disposable syringe then unloaded into gel tubes and allowed to clot at room temperature for 20 minutes. All samples were centrifuged at 3000 rpm for 15 minutes; sera removed and divided into three Eppendorf tubes 500 µl for each sample, then stored at -30 C until used to the time of biochemical assay which included parameters: Coenzyme Q10. The kit was an Enzyme-Linked Immunosorbent Assay (ELISA) for all parameters which worked manually and then measured by the Mindry device. The work included the measurement of the weight and height of each woman included in this study and BMI was calculated by using the following formula: weight in kilograms divided by height in squared meters. Quantifying obesity by the BMI classification of WHO, and the international obesity task force.

Results.

Table 1. explains the Relation between breast cancer and healthy women regarding the mean ± SD of Coenzyme among 60 breast cancer women and 30 control. The mean serum Coenzyme concentrations in women with breast cancer in stage I was (28.0±5.81), while in stage II(G2), stage III(G3),

and stage IV(G-M) were (17.51±3.42, 22.71±4.38, 17.93±2.92) respectively, in compared with control was (40.22±3.13) at p-value 0.0003. (Table 2).

The results revealed a significant decline in serum Selenium concentrations according to the Control Group. The Coenzyme levels were (0.09±0.05) in breast cancer women, and (0.17±0.07) in the control group at p-value (p< 0.040), as shown in Table 3.

The mean serum Selenium in women with breast cancer in stage I was (0.14a±0.05), while in stage II(G2), stage III(G3), and stage IV(G-M) were (0.11ab±0.03, 0.08b±0.02, 0.12a±0.05) respectively in compared with control was (0.2a±0.05) at p-value 0.028 (Table 4).

Table 1. *Relation between breast cancer and healthy women regarding the Coenzyme Q10.*

Studied groups	Coenzyme Q10
Breast Cancer women	16.91±2.52
Control Group	42.49±7.45
P. value	0.0003

Table 2. *Relation of Coenzyme with the Stage of breast cancer women.*

Breast cancer women	Coenzyme10
G1 (N.14)	28.03b±5.81
G2 (N.22)	17.51b±3.42
G3 (N.16)	22.71b±4.38
G-M (N.8)	17.93b±2.92
Control(N.30)	40.22a±3.13
P-Value	0.0003

Table 3. *Relation between breast cancer and healthy women regarding the Selenium.*

Studied groups	Selenium
Breast Cancer women (n=60)	0.09±0.05
Control Group (n=30)	0.17±0.07
p value	0.040

Table 4. *Relation of Selenium with the Stage of breast cancer women.*

Breast cancer women	Selenium
G1 (N.14)	0.14a±0.05
G2 (N.22)	0.11ab±0.03
G3 (N.16)	0.08b±0.02
G-M (N.8)	0.12a±0.05
Control(N.30)	0.2a±0.05
P-Value	0.028

Discussion.

Our findings show a decrease in Q 10 in breast cancer women in comparison with control. These results agree with Portakal et al. [13]; Jolliet et al. [14] and disagree with Chai [15]. This finding could define CoQ10 as a marker of body antioxidant capacity, which is significantly lower in cancerous tissues compared with the control. This could reflect the consumption of Q against peroxidative damage in tumour tissues [13]. Previous in vivo and in vitro studies have reported that Q10 is an important antioxidant for unsaturated lipids of mitochondrial membranes against free radical damage. This protective effect is related to direct interaction with lipid peroxidation products [15]. Since Q10 is present in the central plain of the membrane, it may react with perferryl, peroxyl and lipid radicals, and may inhibit initiating and promotion stages of lipid peroxidation. Also prevents lipid peroxidation by regeneration of alpha tocopherol indirectly [16,17].

Reduced Q plays a role not only against lipid peroxidation but also against oxidative damage of proteins and DNA [16,18]. It was shown that Q10 may also directly react with superoxide radicals [17]. A previous study reported that plasma Q10 concentration was lower than 0.5 mg/mL in breast cancer. According to the ability of Q10 to prevent lipid peroxidation in the cell, it could reduce the susceptibility of the cell to cancer development. Exogenous Q10 administration via nutrition may help increase the protective effect of Q10 in breast tissue especially in women in high-risk groups [19]. A mutation in the gene encoding PHB-polyprenyl transferase (COQ2), the second enzyme in the biosynthetic pathway of CoQ10. PHB-polyprenyl transferase mediates the conjugation of the benzoquinone ring with the decaprenyl side chain and, thus, plays a central role in the biosynthesis of CoQ10 cause of primary CoQ10 deficiency [20]. defect in the COQ9 gene was identified, leading to a primary CoQ10 deficiency potentially treatable with CoQ10 supplementation [21].

Our findings disagree with El-Attar et al. [22], that show increased CoQ10 levels in breast cancer patients when compared to the healthy controls. Initially, low circulating levels of CoQ10 have been associated with poor prognosis for several cancer types most of the breast cancer patients were in the early stage of the disease and none of them showed signs of metastasis which is consistent with the fact that low circulating levels of CoQ10 were associated with poor prognosis. Also, patients who developed metastasis had lower CoQ10 levels than those who did not and subjects with lower baseline CoQ10 levels had shorter disease-free intervals [23]. It's also noteworthy that women at either extreme value of CoQ10 may be at increased risk of breast cancer [24].

Our finding revealed a significant decline in serum Selenium concentrations according to the control Group. The Coenzyme levels were (0.0873±0.0543) in breast cancer women, and (0.1689±0.0741) in the control group at p-value (p < 0.040), as shown in Table 4

Our findings agree with Babaknejad et al. [25] and Zhu et al. [26]. There is a correlation between selenium deficiency and the incidence of breast cancer [27]. Another study shows a relationship between Se and breast cancer in women consuming a non-western diet sufficient in selenium which suggests that selenium aids in the protection against breast cancer [28]. The statistically significant lower concentrations of serum Se in women with breast cancer by a mechanism that Se may prevent peroxidative damage from polyunsaturated fatty acids through its role as a component of glutathione peroxidase, an enzyme present in breast tissue [29]. Other mechanisms, such as stimulation of immunocompetence by Se also may contribute to its protective effect [30].

Selenium (Se) is an essential trace element of the human diet and plays a critical role in many aspects of human health demonstrating that Se status correlates with breast cancer survival. As a result, one way to curb breast cancer mortality would be via Se supplementation, especially in patients with

severely depleted Se status. Se manifests its biological activity through incorporation into selenoproteins as selenocysteine [31].

Human body Se is incorporated into the polypeptide backbone of some proteins and through them it regulates the cellular antioxidant defence system, DNA damage and protein function. Se also controls cell-mediated immunity and B-cell function. The lower serum Se levels in cancer patients can be attributed to either lower Se intake, to sequestration of this element by the tumour cells or both [32].

Our results disagree with Kuo et al. [33]. Se concentration in breast cancer was nearly fourfold greater than in the adjacent normal breast tissue [34].

These results agree with ABDI, Sheyda, et al. [35]. The CoQ10 level decreases when the stage of cancer progresses. This remarkable reduction may be a result of the chemotherapy treatment given to the patients, their diet, and socioeconomic status [36]. Low levels of coenzyme Q10 in the circulation of women with breast cancer, in early and metastatic stages suggested a correlation between plasma levels of CoQ10 and the tumoral expression levels of AMPK, PFKFB3, VEGF, and VEGFR [35]. It has been shown that CoQ10's antioxidant properties and central role in mitochondrial oxidative phosphorylation make it useful as an adjunct therapy for breast cancer [37]. The regulation of Q10 is subjected to physiological factors that are related to the oxidative activity of the organism; they increase under the influence of oxidative stress, e.g., physical exercise, cold adaptation, thyroid hormone treatment, and decrease during ageing [38].

In addition, a decrease in the synthesis of Q10 is affected by drugs such as HMG-CoA reductase inhibitors used to treat elevated blood cholesterol levels by blocking cholesterol biosynthesis also block CoQ10 biosynthesis. The resulting lowering of blood CoQ10 level is due to the partially shared biosynthetic pathway of CoQ10 and cholesterol [37]. Also mutation or defect in genes that inter in Q10 biosynthesis or mitochondrial DNA that cause CoQ10 deficiency in breast cancer [39].In addition, intake of Q10 supplementation for breast cancer women suffering from deficiency of Q10 level help improves prognoses because inhibits angiogenesis in endothelial cells via reduction of vascular endothelial growth factor (VEGF) expression and helps the immune system work better and makes the body better able to resist certain infections and types of cancer. In breast cancer [40] Rodick et al., showed that the use of CoQ10 with chemotherapy such as Tamoxifen is effective in patients suffering from breast cancer which decreases the side effect of chemotherapy [41]. Our result disagrees with Brea-Calvo et al. [42]. found an increased concentration of CoQ10 (due to increased biosynthesis) in cancer cell lines after chemotherapy treatment with camptothecin, etoposide, doxorubicin, and methotrexate.

Our findings agree with Singh et al. [43], which show a decrease in selenium levels in all stages of breast cancer in compare with the control. Another study shows that women whose breast cancer was in complete remission had normal or near-normal serum levels of selenium. In contrast, the women with clinically active tumours had the lowest mean level. The decrease in serum selenium in patients with stage I disease was minimal; however, the difference was greater in women with larger tumours and extended disease suggesting that serum selenium may be influenced by age, menopausal status, or clinical status in the sample of patients studied [44]. Selenium is an important inorganic antioxidant, and diminished circulating levels of this element may largely result from uptake by tumoral tissue, which uses reduced glutathione as an electron donor [45]. Selenium is a component of glutathione peroxidase, an enzymatic antioxidant, and acts as an antitumor agent The decrease in serum selenium may be the result of increased activity or increased tumoral mass, which in turn may increase the amount of free radicals in the tumoral tissue. These free radicals may attract greater amounts of selenium through electrophilic mechanisms [46].

A deficiency of selenium may contribute to mammary carcinogenesis due to the roles of these elements in regulating cell proliferation, differentiation, and apoptosis. Additionally, selenium has immune-enhancing and antioxidant effects [47]. Other studies suggest that the decrease in serum concentrations of selenium in women with breast cancer was a consequence rather than a cause of cancer this notice come from the levels of selenium were lower in women with more advanced cancer than in patients whose disease was in an earlier stage, when the tumoral mass was smaller [48].

Conclusion.

Breast cancer is a debilitating disease that affects millions of women worldwide. It is a complex disease that arises due to various genetic and environmental factors. Despite the significant advances made in the field of breast cancer research in recent years, the exact molecular mechanisms underlying the disease's pathogenesis remain elusive. Recent studies have suggested that alterations in mitochondrial function and oxidative stress may play a crucial role in breast cancer development. Coenzyme Q10 (CoQ10) is a crucial component of the mitochondrial electron transport chain, playing a vital role in cellular energy production. It also has potent antioxidant properties, protecting cells from oxidative damage. We found that the levels of CoQ10 are significantly decreased in breast cancer women as compared to healthy women. This suggests that impaired mitochondrial function and increased oxidative stress may contribute to breast cancer development. However, the exact mechanisms underlying the reduction in CoQ10 levels in breast cancer patients remain unclear. Further research is needed to investigate the role of CoQ10 in breast cancer pathogenesis and to develop novel therapeutic strategies targeting mitochondrial dysfunction and oxidative stress in breast cancer patients.

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