

# GEORGIAN MEDICAL NEWS

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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 ВИНТИ 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 ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებშიდან.

### WEBSITE

[www.geomednews.com](http://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](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. Корректур авторам не высылаются, 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 computer-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.nlm.nih.gov/bsd/uniform_requirements.html)  
[http://www.icmje.org/urm\\_full.pdf](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 საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ 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 შედეგის 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 ფხიხლებში 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.

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## CONCENTRATION OF MALONDIALDEHYDE IN WIVES INFECTED WITH TOXOPLASMA GONDII WHICH CORRELATES WITH INTRAUTERINE INSEMINATION IN BAGHDAD'S POPULATION COUPLES

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### Abstract.

The current study focused on the prevalence of Toxoplasmosis disease among wives who underwent the process of artificial insemination (IUI) and its relationship to the elevated proportion of free radicals in the blood plasma in private laboratory for IUI procedure. The study included 60 women who underwent (IUI) procedure and have positive results for toxoplasmosis (IgG and IgM) compared to wives who tested negative for toxoplasmosis for ages groups from 20 to 35 years. The study focused on the impact of the above-mentioned diseases on the success rate of the operation among the group of infected and uninfected women, based on the examination of toxoplasma IgG and IgM. The results indicated that there are high statistic levels in terms of infected and uninfected women ( $p < 0.01$ ). In the outcome of different IUI steps, potential roles of oxidative stress have been implicated. In this prospective cohort study, due to female factor infertility, there was a highly significant deference between low and high value of Malondialdehyde as a marker of oxidative stress ( $P < 0.001$ ).

**Key words.** Intrauterine insemination, toxoplasmosis, oxidative stress.

### Introduction.

The protozoa *Toxoplasma gondii* is a causative agent of toxoplasmosis in both humans and animals [1]. Because of its widespread environmental contaminations, impressive ranges of hosts and its variable means of infections to animals, toxoplasmosis is regarded as one of the most global frequent parasitic infection [2]. Acute toxoplasmosis is usually asymptomatic in healthy adult people, but symptoms may involve headache, swollen lymph node, fevers and fatigues or muscle pain which may last for one month [3]. Infants infected by placental transmission may be born with nasal malformation, however, such complication is rarely seen in the newborn [4]. Toxoplasmosis enters a latent phase in the majority of immunocompetent persons, where only the bradyzoite (tissue cyst) is present [5]. Such tissue cysts and lesions may be found in the retina, alveolar lining of lung, heart, skeletal muscles, and the central nervous system, with brain involvement [6].

Cutaneous toxoplasmosis is rare, including roseola and erythema multiform, prurigo-like nodule as well as maculopapular lesion [5]. Newborns likely develop echymoses, punctate macule and blueberry muffin lesion. The diagnosis of cutaneous toxoplasmosis depends upon the presence of *T. gondii* tachyzoites in the epidermis [7]. The life cycle of *T. gondii* is of many forms [8]. The acute infection is caused by tachyzoites which divide quickly and spread through the body tissues [8,9]. Following proliferation, tachyzoites are converted into bradyzoites, which take the latent intracellular forms and

are formed basically in the brain and muscles [10].

As soon as bradyzoites are formed, they are able to remain in the host's tissues for the life span [2]. In healthy hosts, when some bradyzoites are converted into active tachyzoites, the immune system may destroy them. Tachyzoites can cause significant neurological damage when the immune system is weak [11]. *Toxoplasma gondii* attains balance through the manipulation of the immune response of the host and decreases this response which lead to increase the parasite's reproductive advantage [12]. When the parasite invades the cells for the first time, it liberates ROP protein from the Rhoptry organelle bulb [13]. These proteins undergo translocation to the nucleus so as to be able to activate the STAT pathway and cause modulation of the cytokine expression [14].

Intrauterine insemination is an assistant reproductive technology [15]. There is a general agreement on the preference of intrauterine insemination to the more expensive and invasive assisted reproduction methods and offering it as the first-choice treatment in moderate and unexplained male and female factors subfertility cases [16].

The justification of intrauterine insemination with homologous sperm is that it leads to bypass of the cervical-mucus barrier and increases the motile sperm numbers with highly normal form proportions at the fertilization site [17]. In the few past decades, homologous artificial inseminations were only carried out in male subfertility and psychological dysfunction cases, like retrograde ejaculations, impotence, and hypospadias. With the routinely application of post-coital examination, other indications were added including immunologic causes and hostile cervical mucous [15].

Indeed, the interest in IUI is related to the refinement of methods for washed motile sperm preparation. Such washing methods are required for removing infectious agent, prostaglandins, antigenic protein, non-motile sperms, WBCs, and immature germ cell [18]. This can improve spermatozoa quality via reducing free oxygen radical formation following spermatozoa preparations. Finally, it will lead to improvement of in vivo and invitro fertilizing capability of the sperms [16]. In the majority of moderate and unexplained male subfertility cases, published data indicated that treatment initiation with IUI was shown to be more cost effective than IVF [15].

Surprisingly and regardless of evidenced argument, data from New Zealand and Australia noticeably showed that about 80% of fertility facilities are persuaded that IUI is cost-effective, however, about 33% of these facilities still uphold IVF as the first line treatment even with patent tubes and normal seminal properties [18]. Such procedure can be really interesting for resource-poor countries, because IUI programs are easily performed. These methods and techniques are easily learnt, with



the least direct and indirect costs in comparison with IVF/ICSI as well as very rare serious complications [19].

Oxidative stress is an imbalance between reactive oxygen species (ROS) and antioxidant defense [4]. The most important molecules determined in human serum are Malondialdehyde, which are produced by lipid peroxidation cascade process that ends with low-molecular electrophilic aldehyde production e.g. Malondialdehyde (MDA) and 4-hydroxynonenal. Remarkably, MDA is able to bind with mitochondrial proteins resulting electron leakages and formation of cellular reactive oxygen species (ROS), leading to worsened oxidative stresses [20]. Antioxidant enzymes can mitigate such abnormalities [21].

In spite of substantial progresses in the assisted reproductive technology (ART), there is a remarkable low rate of success in this method. Several factors are shown to affect the outcomes of IUI and ART [9]. Oxidative stress is regarded as one of the most essential factors which influence different IUI and ART procedure steps and its unavoidable outcomes [4].

ROS is increased as a result of some environmental conditions and diseases such as obesity, smoking, and nutrition, and can cause many pathologic disorders like cancers, periodontitis, neurodegenerations, cardiovascular disease, diabetes and renal disease [22]. It was demonstrated by previous studies that endometrial secretions and menstrual discharges are novel samples to identify oxidative stress biomarker [23].

During IUI and ART procedures, implantation, and the subsequent steps post implantation is highly sensitive to ROS-induced oxidative damages. Any probable damage may result in a negative effect on pregnancy establishment [24]. Idiopathic recurrent pregnancy losses and spontaneous abortions are the contrary effects of oxidative stress on pregnancy [25]. Successful implantations require appropriate interactions between the embryos and endometrium. It was revealed by previous studies that antioxidant enzymatic systems were involved in the embryo's development as well as their receptive uterine endometrium prior to implantations [26]. There are many methods to assess endometrial receptivity and maturity [27]. In one of the methods, endometrial secretions are analyzed during implantation windows. It was demonstrated by recent studies that endometrial secretions may denote the interactions between an embryo and an intrauterine environment [28,29]. In addition, it was shown that aspirations of endometrial secretions before embryo transfers may be carried out without influencing the implantation rate [30,31]. To the best of our knowledge, there was no previous analysis of endometrial secretion to identify the oxidative stress markers. In the current study, our aim was to investigate whether there was an impact of oxidative stress markers on IUI & IVF success (Figure 1).

### Materials and Methods.

Blood serum was taken from arm blood vessel of women (60 which have positive for toxoplasmosis and 30 with negative results as control cases) by disposable 5mm syringe. With using Lab. Centrifuge, we separate the serum to be used finally for laboratory assay. Kit stripe (Toxoplasma IgG and IgM) was used to determined positive and negative results. The current case-control seroprevalence study was designed to detect anti-Toxoplasma IgG antibody and anti-Toxoplasma IgM antibody



**Figure 1.** Diagram showing different variables affecting success rates in IUI programmers (artificial insemination IUI).

levels using the enzyme-linked immunoassays. For MDA assaying, the Bioxytech MDA-586 spectrophotometric kit (Catalog No: 21044) was purchased from Oxis International, Inc. (Foster City, CA, USA), and the analysis was done in accordance with the procedures of the manufacturer [32,33].

IUI was done by simple layer and centrifuged method. After 20-30 minute the supernatant which contain the active sperm and the solution of activation buffer was obtained using a syringe. The syringe was linked (which contain the seminal fluid sample of husbands) to a special IUI catheter. By Gynecologist, the sample was housed into the wife uterus. After one hour, the wife was allowed to go home. Pregnancy test was done after 10 days to IUI.

Statistical analysis: Data were analyzed by the SPSS V<sub>r</sub>24 program, and the t-test with Mont Carlo test (MCP) were analyzed at 5% & 1% level of significances.

### Results.

The distribution of age groups of 60 wives which explain the role of age in successful IUI procedure. There was an adverse effect of age on this technique (Table 1).

The number of wives that have positive and negative IgG or/ and IgM of toxoplasmosis (Table 2).

The results showed that there was a statistically significant difference in wives that succeeded by IUI procedure relation to the presence of IgG+ or IgG- and IgM+ or IgM- (Table 3).

The results indicated that there was a highly statistically significant difference in concentration of MDA in serum of wives infected with Toxoplasmosis and control groups enrolled in IUI procedure. The results find that there is a statistically significant difference in wives succeeded by IUI procedure in relation to presence of IgG positive and negative results (P <0.05). The results showed that there was a statistically significant difference in wives succeeded by IUI procedure in relation to presence of IgM positive or negative results (P <0.01) (Table 4).

### Discussion.

It was shown that toxoplasmosis is a crucial disease owing to its worldwide distribution and variable kinds of diseases it causes. Toxoplasmosis has been known to cause certain critical

**Table 1.** Numbers of wives and their age groups.

Numbers	Age	Percent of IUI succeeded	p value	Significance
G1: 15	20-25	23%	G1 and G2 P<0.01	Yes
G2: 20	26-30	17%	G2 and G3 P<0.01	Yes
G3: 25	31-35	13%		

**Table 2.** Results of IgG and IgM in wives with toxoplasmosis.

Numbers of wives	IgG	IgM
22	positive	Negative
4	negative	Positive
2	positive	Positive
30	Negative	Negative

**Table 3.** Number of IUI succeeded and presence of anti-toxoplasma IgG and IgM.

No. of IUI succeeded	Toxo. IgG positive	Toxo. Ig G negative	Toxo. IgM positive	Toxo. IgM negative	P value
9 (60)	2 / 60 (1.2 %)	4 / 60 (2.4 %)			P < 0.05
4 (60)			1 / 60 (0.6 %)	3/ 60 (1.8 )	P < 0.01
1 (60)					P < 0.05

**Table 4.** MDA concentrations in serum of wives infected with Toxoplasmosis and control groups enrolled in IUI procedure.

Age	Patients MDA $\mu\text{M mL}^{-1}$	Controls MDA $\mu\text{M mL}^{-1}$	P Value	Significance
20-25	335±38.16	295.66±40.32	< 0.01	Highly
26-30	342±43.52	312±42.23	< 0.001	Significant
31-35	351±44.78	321±45.43	< 0.001	

impacts on the reproductive capability for men and women [34]. Thus, the present study was designed to investigate the seropositivity rate of toxoplasmosis in infertile cases who underwent IUI procedure. This result approximates other Egyptian study which estimated similar seroprevalence [34]. Such high prevalence is attributed to health education lack and exposures to risk factors such cats, ingestion of raw and unwashed vegetable, agricultural activities, drinking insufficient boiled milk and ingestion of undercooked meat [35].

The results of regional prevalence of toxoplasma seropositivity were higher than those of other studies such as studies conducted in Turkey [36], Chile [37] and united states [38]. Nevertheless, these findings were less than those estimates of among blood donor individuals in the southern Mexican states [34]. Geographic and temporal factors could be behind the variation in toxoplasma prevalence between countries [39].

Our results reported a highly significant prevalence ( $p < 0.01$ ) of toxoplasmosis in infertile females (54.75%) when compared to the controls (35.66%), and this may suggest a positive relationship between toxoplasmosis and infertility. The results in our study agreed with the finding of Menard et al. (2021), who detected a higher prevalence of toxo IgG antibodies by ELISA in infertile females when compared with pregnant women

5.6% [11]. The reported mechanism for reciprocal association between infertility and chronic toxoplasmosis includes patients developing endometritis and fetal rejections because of release of the parasite from cysts endometrial tissues during placental formation [40], impaired folliculogenesis in the ovary [41].

In the current study, the prevalence of toxo IgG antibodies among the older age group (30-39) years was found to be higher than other age groups 52.65% in infertile females and 33.7 % in pregnant women. This finding was consistent with other studies regarding increasing toxo seropositivity with age [42]. It is suggested that toxoplasmosis seropositivity increases with age since older people have more chance for exposure to parasitic infections [43].

Our findings demonstrated that the markers of oxidative stress (OS) in the endometrial secretion may be representing the uterine receptivity status before the embryonic transfer. The higher antioxidant levels like SOD, CAT or TAP, and the lower oxidative stress markers like LPO are correlated with successful IVF outcomes. Formerly, the association between female fertility and oxidative stress was inspected in many studies [44,45]. Oxidative stress arises from the imbalance between ROS overproductions and the body's antioxidant defense and is activated by age and diseases affecting female reproductions. Conditions such as endothelial dysfunctions, recurrent or early child loss, hypertension, premature births, ectopic pregnancy, and gestational diabetes are causes of oxidative stress. Bad lifestyle habits and environmental pollutant can lead to a worsened oxidative stress, suggesting a possible role for antioxidants to mitigate such impacts and improve fertility [46].

## Conclusion.

It can be concluded from our study that there was a high Toxoplasmosis disease IgG antibody seropositivity in females in Baghdad population. Accordingly, health education programs are necessary to primary toxoplasmosis prevention. In addition, infertile females showed a higher significant prevalence of toxoplasmosis than the control group particularly among older age groups. These findings indicated a possible association between infertility and toxoplasmosis, and further studies are recommended to clarify the mechanism of such correlation.

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