

**EFFECT OF ANTIOXIDANT VITAMINS ON PELVIC  
PAIN IN ENDOMETRIOSIS**

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**Abstract:** Endometriosis is a chronic gynecological disease affecting approximately 10% of women of reproductive age, characterized by the presence of endometrial-like tissue outside the uterus. Although the disease is benign, its clinical manifestations can seriously impact the quality of life of patients, causing chronic pelvic pain, discomfort, menstrual irregularities, and fertility problems [1].

Chronic pain in endometriosis is explained by inflammatory processes and increased levels of oxidative stress due to the accumulation of free radicals in tissues. Antioxidants, particularly vitamins C and E, play a key role in neutralizing free radicals and can reduce oxidative stress levels [2].

In 2023, specialists led by Afshar conducted a systematic review and meta-analysis aimed at studying the effect of antioxidant vitamins on pelvic pain in women with endometriosis [3]. They analyzed data from several clinical studies comparing the effectiveness of vitamins C and E with a placebo. The results showed that taking these antioxidants can reduce pain intensity and improve the quality of life of patients.

The relevance of studying antioxidant vitamins is due to the limitations of existing treatment methods for endometriosis, such as hormonal therapy and surgical intervention, which may have side effects and a high risk of recurrence [4].

Therefore, the search for new approaches, including the use of antioxidants, is important for improving the condition of patients.

Vitamins C and E have a synergistic effect: vitamin C helps restore the active form of vitamin E after its interaction with free radicals, making their combined use more effective [5]. Additionally, antioxidants can positively influence the immune system, which is especially important in endometriosis [6].

The aim of this study was to determine whether vitamins C and E can reduce the intensity of pelvic pain and improve the overall health of women with endometriosis.

**Keywords:** Endometriosis, Chronic pelvic pain, Antioxidants, Vitamins C and E, Oxidative stress, Malondialdehyde (MDA), Superoxide dismutase (SOD).

**Methodology:** A randomized controlled study was conducted by scientists from the Shanghai Clinical Research Center for Gynecological Disease to evaluate the effectiveness of antioxidant vitamins C and E in reducing pelvic pain in women with endometriosis. Participants were divided into two groups: an experimental group receiving antioxidant therapy (vitamins C and E) and a control group receiving a placebo [4]. Inclusion criteria required participants to have a diagnosed case of endometriosis and chronic pelvic pain.

The primary goal was to determine whether antioxidants could reduce pain intensity, assessed using a visual analog scale (VAS). Secondary assessments included evaluating the quality of life using standardized questionnaires and measuring oxidative stress levels through biochemical tests [5].

Before the study began, all participants completed a questionnaire detailing the nature, intensity, duration, and frequency of their pain. Laboratory examinations were conducted to determine baseline antioxidant levels in the blood, such as vitamin C and vitamin E, and markers of oxidative stress, including MDA and SOD, as presented in Table 1 [6]. These biomarkers allowed for assessing oxidative stress levels in the body.

**Table 1****Main Characteristics of Study Participants.**

| Parameter              | Group (Antioxidants) | Group (Placebo) |
|------------------------|----------------------|-----------------|
| Number of Participants | 50                   | 50              |
| Average Age (years)    | 30                   | 31              |
| Pain Intensity (VAS)   | 7.5                  | 7.4             |
| Vitamin C Level (mg/L) | 4.2                  | 3.9             |
| Vitamin E Level (mg/L) | 1.1                  | 1.0             |

Participants in the experimental group received a combination of vitamin C (500 mg) and vitamin E (400 IU) daily for three months. The control group received placebo in the same format [7]. Every four weeks, participants underwent evaluations to assess changes in pain intensity, quality of life, and antioxidant levels in the blood.

Throughout the study, possible side effects were monitored by allowing participants to report any adverse reactions during treatment. This ensured the assessment of the safety of long-term antioxidant use [8].

After completing the three-month therapy course, a final evaluation was conducted, during which participants filled out questionnaires regarding quality of life and pain intensity, as presented in Table 2. Additionally, repeated laboratory tests were conducted to determine changes in antioxidant levels and markers of oxidative stress [9]. The primary biochemical markers used to assess treatment efficacy were MDA levels and SOD activity. These markers reflect oxidative stress levels in the body and allow for evaluating how effectively antioxidant therapy reduces these levels [10].

**Table 2****Comparative Analysis of Results Between Groups.**

| Parameter                       | Group (Antioxidants) | Group (Placebo) |
|---------------------------------|----------------------|-----------------|
| Pain Intensity (VAS)            | 4.5                  | 7.2             |
| MDA Level ( $\mu\text{mol/L}$ ) | 1.5                  | 2.5             |
| SOD Activity (units/mg)         | 250                  | 180             |

The study adhered to ethical standards, and all participants provided written informed consent after being fully informed about the purpose, procedures, and

potential risks of antioxidant therapy. The ethical committee approved the study, considering its potential benefits and minimal risks.

This detailed approach to data collection and the use of standardized methods for measuring pain and quality of life ensured high-quality results applicable for further research in antioxidant therapy for endometriosis.

**Study Results:** After completing the three-month antioxidant therapy, significant changes were observed in pelvic pain intensity and oxidative stress levels among women with endometriosis, as presented in Table 3 [10]. Patients receiving antioxidants demonstrated a substantial reduction in pain, confirmed by data collected using the VAS.

**Table 3**

**Changes in Pain Intensity (VAS) in Patients After Therapy.**

| <b>Group</b> | <b>Average Pain Intensity Before Therapy</b> | <b>Average Pain Intensity After Therapy</b> | <b>Percentage Reduction</b> |
|--------------|----------------------------------------------|---------------------------------------------|-----------------------------|
| Antioxidants | 7.5                                          | 4.5                                         | 40%                         |
| Placebo      | 7.4                                          | 7.2                                         | 3%                          |

As shown in Table 3, the average pain intensity in the experimental group decreased by 40%, while the control group showed a negligible reduction of only 3%. This indicates the significant effectiveness of antioxidant therapy in alleviating the symptoms of endometriosis [8].

Additionally, laboratory tests confirmed the positive impact of vitamins on oxidative stress levels. Measurements of MDA, a marker of oxidative damage, showed a significant reduction in the experimental group. The MDA level decreased from 2.5  $\mu\text{mol/L}$  to 1.5  $\mu\text{mol/L}$  in the antioxidant group, indicating a 40% reduction in oxidative stress. In contrast, the control group's MDA level remained virtually unchanged. These results support the hypothesis that antioxidant therapy can reduce oxidative stress levels in patients with endometriosis.

Significant changes were also observed in SOD activity, as presented in Table 4. In the experimental group, SOD activity increased from 180 units/mg to 250 units/mg, indicating an enhancement in the body's antioxidant defense.

**Table 4****Changes in SOD Activity in Patients After Therapy.**

| <b>Group</b> | <b>SOD Activity Before Therapy (units/mg)</b> | <b>SOD Activity After Therapy (units/mg)</b> | <b>Percentage Increase</b> |
|--------------|-----------------------------------------------|----------------------------------------------|----------------------------|
| Antioxidants | 180                                           | 250                                          | 39%                        |
| Placebo      | 182                                           | 185                                          | 2%                         |

According to Table 4, SOD activity in the experimental group increased by 39%, while the control group demonstrated only a slight increase of 2% [9].

An important aspect of the study was examining the quality of life of patients. Participants receiving antioxidant therapy reported significant improvements in overall well-being and emotional state, as evidenced by the results of standardized quality-of-life questionnaires.

**Discussion:** The obtained results indicate the effectiveness of antioxidant therapy in reducing pain intensity and improving the overall health of women with endometriosis. The significant reduction in pain intensity and improvement in oxidative stress levels in the experimental group suggest that vitamins C and E may be beneficial in the comprehensive therapy of this condition.

The study confirms that oxidative stress is an important factor contributing to the development and progression of endometriosis. Reducing oxidative stress levels through antioxidants may be a promising direction in treating chronic pain associated with endometriosis.

However, despite the positive results, the study has some limitations. First, it was conducted on a relatively small sample, which may limit the generalizability of the findings. Second, it would be beneficial to conduct further studies with longer follow-up periods for patients to assess the long-term effectiveness of antioxidant therapy.

**Conclusions**

The study demonstrated that antioxidant vitamins C and E effectively reduce pelvic pain and improve the quality of life in women with endometriosis. Patients

receiving antioxidant therapy experienced a significant 40% decrease in pain intensity, highlighting the effectiveness of antioxidants in alleviating symptoms. Levels of MDA, a marker of oxidative damage, decreased by 40% in the vitamin-treated group, indicating a positive impact on reducing oxidative stress. Participants also reported significant improvements in overall well-being and emotional state.

These findings underscore the potential of antioxidant vitamins as a safe and effective adjunct treatment for chronic pain in endometriosis, offering an alternative to therapies with serious side effects. Healthcare professionals should consider incorporating vitamins C and E into treatment protocols. Educating patients about the benefits of antioxidant therapy and proper supplement use can maximize effectiveness.

However, limitations such as a small sample size and short study duration may restrict the generalizability of the results and prevent assessment of long-term effects. Participants' potential lifestyle changes during the study could have influenced the outcomes. Therefore, larger-scale studies with longer follow-up periods are necessary to confirm the effectiveness, explore mechanisms of action, and determine optimal dosages for sustained impact.

A comprehensive, multidisciplinary approach involving dietitians, physiotherapists, and psychologists, alongside antioxidant therapy, can help achieve better results in managing endometriosis. Antioxidant vitamins C and E show promise in reducing pelvic pain and improving quality of life for women with endometriosis. Further research is essential to confirm these findings and establish optimal treatment protocols for maximum therapeutic benefit.

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