



Efficacy of N-Acetyl Cysteine Monotherapy as a Cost-Effective Initial Treatment in Infertile Women: A Prospective Comparative Study

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Abstract

Background:

Infertility is a multifactorial condition in which oxidative stress and metabolic dysfunction, particularly insulin resistance, play a significant role. N-acetyl cysteine (NAC), a precursor of glutathione, has been explored for its antioxidant and insulin-sensitizing properties.

Aim:

To evaluate the efficacy of NAC monotherapy as an initial, cost-effective treatment in infertile women.

Methods:

This prospective comparative study was conducted over a period of two years (January 2022–December 2023) and included 100 infertile women. Participants were divided into two groups: 50 received NAC 600 mg twice daily for 6 months, and 50 served as controls receiving lifestyle advice. Follicular monitoring was performed using transvaginal ultrasonography. Ovulation and conception rates were assessed. Subgroup analysis was conducted for patients with PCOS.

Results:

Ovulation occurred in 32/50 (64%) women in the NAC group compared to 18/50 (36%) in controls ($p=0.006$). Conception rates were 14/50 (28%) in the NAC group versus 6/50 (12%) in controls ($p=0.045$). Among PCOS patients ($n=60$), ovulation rates were significantly higher in the NAC group (70% vs 40%, $p=0.01$).

Conclusion:

NAC monotherapy significantly improves ovulation and conception rates and represents a safe, affordable initial therapeutic option, particularly in PCOS-related infertility.

Keywords: N-acetyl cysteine, infertility, PCOS, ovulation, antioxidant therapy

Introduction

Infertility affects a considerable proportion of couples worldwide and poses both medical and psychosocial challenges. Among the various etiological factors, oxidative stress and insulin resistance have emerged as key contributors, particularly in women with polycystic ovary syndrome (PCOS).

N-acetyl cysteine (NAC), a derivative of the amino acid cysteine, acts as a precursor to glutathione and

exhibits potent antioxidant activity. It also enhances insulin sensitivity and may improve ovarian function. While NAC has been studied as an adjunct to ovulation induction agents¹, evidence regarding its efficacy as monotherapy remains limited.^{2,3}

This study aims to evaluate the effectiveness of NAC as a standalone, cost-effective initial treatment option in infertile women.

Aims And Objectives

Primary Objective:

To assess ovulation rate following NAC therapy

Secondary Objectives:

1. To evaluate conception rate
2. To assess efficacy in PCOS subgroup
3. To evaluate safety and tolerability

Materials And Methods

Study Design:

Prospective comparative study

Study Setting:

Department of Obstetrics and Gynaecology, ABVIMS & Dr. RML Hospital, New Delhi

Study Duration:

January 2022 to December 2023

Sample Size:

100 patients (50 in NAC group, 50 controls)

Inclusion Criteria:

1. Women aged 20–35 years
2. Primary infertility ≥ 1 year
3. Anovulatory cycles or diagnosed PCOS (Rotterdam criteria) ⁴

Exclusion Criteria:

1. Male factor infertility
2. Tubal pathology
3. Endometriosis
4. Thyroid or prolactin disorders

Intervention

- NAC 600 mg orally twice daily for 6 months

Control Group

- Lifestyle modification (diet and exercise)

Monitoring

- Serial follicular monitoring using transvaginal ultrasonography
- Ovulation confirmed by follicular rupture and/or mid-luteal progesterone

Outcome Measures

1. Ovulation rate
2. Conception rate
3. Adverse effects

Statistical Analysis

Data were analyzed using SPSS software. Categorical variables were compared using Chi-square test. A p-value < 0.05 was considered statistically significant.

Results

Baseline Characteristics

Parameter	NAC Group	Control Group	p-value
Mean Age (years)	27.8 $\hat{\pm}$ 3.2	28.1 $\hat{\pm}$ 3.5	0.68
BMI (kg/m ²)	26.2 $\hat{\pm}$ 2.8	25.9 $\hat{\pm}$ 3.1	0.72
PCOS (%)	60%	60%	NS

Ovulation Rate

- NAC group: 32/50 (64%)
- Control group: 18/50 (36%)
- p = 0.006

Conception Rate

- NAC group: 14/50 (28%)
- Control group: 6/50 (12%)
- p = 0.045

PCOS Subgroup (n=60)

Outcome	NAC	Control	p-value
Ovulation	70%	40%	0.01
Conception	33.3%	13.3%	<0.05

Adverse Effects

1. Mild gastritis: 3 cases
2. Nausea: 2 cases
3. No serious adverse events observed

Discussion

The findings of this study demonstrate that NAC monotherapy significantly improves ovulation and conception rates in infertile women. The observed improvement is likely attributable to NAC’s antioxidant action and its ability to enhance insulin sensitivity.

The effect was particularly notable in women with PCOS^{5,6} supporting the hypothesis that NAC is more effective in conditions characterized by insulin resistance. These results are consistent with previous studies that have reported improved ovulatory outcomes with NAC therapy.⁷

Unlike conventional ovulation induction agents^{8,9}, NAC¹⁰ offers a favorable safety profile and is cost-effective, making it especially relevant in resource-constrained settings.

Limitations

1. Relatively small sample size
2. Single-center study
3. Non-randomized design

Conclusion

N-acetyl cysteine administered as monotherapy significantly improves ovulation and conception rates

and can be considered a safe, economical first-line treatment, particularly in women with PCOS-related infertility.

References

1. Badawy A, State O, Abdelgawad S. N-acetyl cysteine and ovulation induction. *Fertil Steril.* 2007;88(2):406–8.
2. Elnashar A, Fahmy M, Mansour A. N-acetyl cysteine vs clomiphene citrate. *Fertil Steril.* 2007;88(2):406–8.
3. Rizk AY, Bedaiwy MA. Oxidative stress in infertility. *Middle East Fertil Soc J.* 2002;7:2–8.
4. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. *Hum Reprod.* 2004;19:41–7.
5. Fulghesu AM, et al. Insulin resistance in PCOS. *Fertil Steril.* 2002;77:937–44.
6. Salehpour S, et al. NAC in PCOS patients. *Gynecol Endocrinol.* 2012;28:161–4.
7. Oner G, et al. Effects of NAC on ovulation. *Eur J Obstet Gynecol.* 2011;158:197–201.
8. Thakker D, et al. Role of antioxidants in infertility. *J Hum Reprod Sci.* 2015;8:123–9.
9. Agarwal A, et al. Oxidative stress and infertility. *Reprod Biol Endocrinol.* 2005;3:28.
10. Masha A, et al. NAC clinical applications. *J Clin Pharmacol.* 2010;50:139–45.