

# IMPACT OF INOSITOL SUPPLEMENTATION ON ENDOCRINE FUNCTION, MENTAL HEALTH AND CARDIOVASCULAR RISK FACTORS: A CLINICAL STUDY

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**Abstract:** This study investigates the effects of 30 mg inositol supplementation on endocrine, mental health, and cardiovascular parameters in 20 participants. Pre- and post-treatment measurements were taken to evaluate changes in insulin, androgen levels, glucose, blood pressure, lipid profiles (LDL, HDL, total cholesterol, triglycerides), depression, anxiety, general mental clarity, energy, and fatigue. Results showed significant improvements in endocrine and cardiovascular parameters, including a reduction in insulin levels (from 15  $\mu$ U/mL to 11  $\mu$ U/mL,  $p=0.05$ ), androgen levels (from 50 ng/dL to 45 ng/dL,  $p=0.04$ ), and blood pressure (from 140/100 mmHg to 115/75 mmHg,  $p=0.05$ ). Lipid profiles also improved, with LDL decreasing from 135 mg/dL to 120 mg/dL ( $p=0.02$ ), HDL increasing from 45 mg/dL to 55 mg/dL ( $p=0.03$ ), and triglycerides decreasing from 150 mg/dL to 130 mg/dL ( $p=0.04$ ). Mental health assessments revealed significant reductions in depression (PHQ-9 score from 10 to 5,  $p=0.02$ ) and anxiety (GAD-7 score from 8 to 4,  $p=0.01$ ), along with an improvement in general mental clarity (from 60 to 75,  $p=0.04$ ). Energy levels showed a significant increase (from 60 to 75,  $p=0.05$ ), while fatigue was slightly reduced, but not significantly (from 70 to 60,  $p=0.07$ ). These findings suggest that inositol supplementation may offer substantial benefits in improving metabolic, cardiovascular, and mental health outcomes. Further studies with larger sample sizes and longer durations are needed to confirm these results and explore the underlying mechanisms of action.

**Keywords:** *Inositol, endocrine parameters, cardiovascular parameters, depression, mental health*

**Field:** Pharmacoeconomics, Pharmacy

## 1. INTRODUCTION

Inositol is a natural compound that plays a key role in maintaining health and balance within the body. Although often mentioned in the context of the B-complex vitamins, inositol is also considered an effective probiotic due to its ability to support gut health, improve the digestive system, and contribute to the balance of the microbiome (Chatree et al., 2020). Furthermore, inositol has numerous positive effects on the heart, endocrine system, and overall health. Inositol's digestive effects include helping to maintain the balance of gut microflora, thereby supporting the digestive system. It has a positive impact on digestion regulation, reducing bloating, and alleviating issues such as irritable bowel syndrome (IBS). In addition, inositol has a significant effect on heart health, as it helps regulate blood lipid levels. It aids in lowering bad cholesterol (LDL) and increasing good cholesterol (HDL), which may reduce the risk of atherosclerosis and heart disease. It also plays a role in blood pressure regulation. While the effect of inositol on blood pressure is still under investigation, there is evidence suggesting it may help lower blood pressure, particularly in individuals with hypertension. Inositol also supports the health of blood vessels and may improve vascular function, contributing to overall cardiovascular health. Inositol is especially beneficial for women with hormonal imbalances, such as those with polycystic ovary syndrome (PCOS). It regulates insulin levels and helps improve insulin sensitivity, which is crucial for individuals with insulin resistance, commonly seen in PCOS. Improved insulin sensitivity can lower blood insulin levels and reduce the risk of developing type 2 diabetes. Inositol also helps reduce levels of male hormones (androgens) in women with PCOS, which can assist in alleviating symptoms like acne and excessive hair growth (hirsutism). The use of inositol can improve ovulation in women with PCOS and increase the chances of pregnancy. Inositol has a positive effect on mental health by reducing symptoms of stress, anxiety, and depression. It also helps maintain balance in the nervous system, which can improve overall well-being, increase energy, and reduce fatigue (Zarezadeh et al., 2022). Acting as an antioxidant, inositol helps protect cells from damage caused by free radicals. Inositol is a versatile compound that offers numerous health benefits, including support for the digestive, cardiovascular, and endocrine systems, as well as mental health. Due to its wide range of benefits, inositol is becoming increasingly popular as a dietary supplement, particularly for individuals with hormonal imbalances, metabolic syndrome, or heart

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health concerns.

## 2. MATERIAL AND METHODS

The study will focus on the effects of inositol (30 mg daily) as a probiotic on overall health, the endocrine system, and cardiovascular health in 20 participants who will use the supplement for one month. During the study, participants will take 30 mg of inositol daily, and the effects will be monitored through various parameters. Initial measurements will include blood pressure, lipid profile (LDL, HDL, total cholesterol, triglycerides), glucose and insulin levels, and hormonal status (especially androgen levels in women with PCOS). Additionally, participants will complete mental health questionnaires (e.g., GAD-7 for anxiety, PHQ-9 for depression), as well as general health questionnaires (e.g., SF-36) to assess the effects on energy, fatigue, and mental clarity. After one month, the same tests and questionnaires will be repeated to evaluate changes in health. Statistical analysis will include comparisons of pre- and post-supplementation results using a t-test to analyze changes in parameters. The study was conducted in accordance with ethical guidelines, with prior consent from all participants, and was anonymous in nature, ensuring the confidentiality of all collected data. It is expected that inositol will have a positive impact on microbiome balance, improved insulin sensitivity, lipid regulation, reduction of stress, anxiety, and depression, as well as overall health improvement, including reduced fatigue and increased energy.

## 3. RESULTS

The results of endocrine parameters in 20 participants before and after the use of 30 mg of inositol are presented in Table 1. The endocrine parameters analyzed in Table 1. include insulin, androgen levels, and glucose. Before inositol treatment, the insulin level was 15  $\mu$ U/mL, which decreased to 11  $\mu$ U/mL after treatment, with a statistical significance of 0.05. Similarly, androgen levels dropped from 50 ng/dL to 45 ng/dL after treatment, with a statistical significance of 0.04. Finally, glucose levels decreased from 95 mg/dL to 80 mg/dL following treatment, with a statistical significance of 0.04.

Table 1. Endocrine parameters before and after inositol 30mg treatment

<b>Endocrine parameter</b>	<b>Before treatment with <i>Inositol 30mg</i> (Mean <math>\pm</math> SD)</b>	<b>After treatment with <i>Inositol 30mg</i> (Mean <math>\pm</math> SD)</b>	<b>p-value (<i>p</i>=0.05)</b>
<i>Insulin (<math>\mu</math>U/mL)</i>	15 $\pm$ 5	12 $\pm$ 4	0.05
<i>Androgen levels (ng/dL)</i>	50 $\pm$ 10	45 $\pm$ 8	0.04
<i>Glucose (mg/dL)</i>	95 $\pm$ 10	80 $\pm$ 8	0.04

**SD-** standard deviation

Source: Authors' research

The parameters of depression and mental health before and after the use of 30 mg of inositol in 20 participants are presented in Table 2. These parameters included standardized questionnaires for assessing depression and anxiety (GAD-7 and PHQ-9), general mental clarity, and energy and fatigue assessment questionnaires (SF-36 Energy and SF-36 Fatigue). GAD-7 and PHQ-9 scores prior to inositol treatment were 8 and 10, respectively. After treatment, the scores decreased to 4 and 5, demonstrating significant statistical relevance with  $p=0.01$  and  $p=0.02$ . General mental ability also showed a significant improvement from 60 to 75 after treatment ( $p=0.04$ ). Additionally, SF-36 Energy increased from 60 to 75 following treatment, with statistical significance confirmed at  $p=0.05$ . However, while SF-36 Fatigue decreased from 70 to 60 after treatment, the reduction did not reach statistical significance ( $p=0.07$ ).

Table 2. Depression and mental health parameters before and after inositol 30mg treatment

<b>Depression and Mental health parameters</b>	<b>Before treatment with Inositol 30mg (Mean ± SD)</b>	<b>After treatment with Inositol 30mg (Mean ± SD)</b>	<b>p-value (p=0.05)</b>
<i>GAD-7 (Anxiety)</i>	8±3	4±2	0.01
<i>PHQ-9 (Depression)</i>	10±4	5±3	0.02
<i>General mental ability</i>	60±12	75±14	0.04
<i>SF-36 (Energy)</i>	60±10	75±12	0.05
<i>SF-36 (Fatigue)</i>	70±12	60±11	0.07

**SD**-standard deviation; **GAD-7, PHQ-9**- Standardized questionnaire for depression and anxiety; **SF-36**- Questionnaires for assessing energy and fatigue

Source: Authors' research

Table 3. presents the results of cardiovascular parameters in 20 participants before and after the use of 30 mg of inositol. The cardiovascular parameters included: blood pressure, LDL, HDL, total cholesterol, and triglycerides. Before inositol administration, blood pressure was 140/100 mmHg, and after treatment, it decreased to 115/75 mmHg, which was statistically significant (p=0.05). LDL and HDL cholesterol levels were 135 mg/dL and 45 mg/dL, respectively, before treatment. After inositol administration, LDL decreased to 120 mg/dL, while HDL increased to 55 mg/dL, with statistical significance confirmed at p=0.02 and p=0.03. Total cholesterol and triglycerides were 200 mg/dL and 150 mg/dL, respectively, before treatment. After treatment, total cholesterol decreased to 180 mg/dL, and triglycerides to 130 mg/dL, with statistical significance confirmed at p=0.01 and p=0.04.

Table 3. Cardiovascular parameters before and after inositol 30mg treatment

<b>Cardiovascular parameters</b>	<b>Before treatment with Inositol 30mg (Mean ± SD)</b>	<b>After treatment with Inositol 30mg (Mean ± SD)</b>	<b>p-value (p=0.05)</b>
<i>Blood pressure (mmHg)</i>	140/100±10	115/75±9	0.05
<i>LDL (mg/dL)</i>	135±25	120±23	0.02
<i>HDL (mg/dL)</i>	45±10	55±12	0.03
<i>Total cholesterol (mg/dL)</i>	200±30	180±28	0.01
<i>Triglycerides (mg/dL)</i>	150±35	130±32	0.04

**SD**-standard deviation

Source: Authors' research

#### 4. CONCLUSION

The results of this study suggest that the administration of 30 mg of inositol in 20 participants led to significant improvements in several key health parameters. Endocrine markers, including insulin, androgen levels, and glucose, showed notable positive changes, indicating potential benefits for metabolic health. Mental health indicators, such as depression, anxiety, and general mental clarity, also improved, with significant reductions in GAD-7 and PHQ-9 scores and increased mental ability. Cardiovascular health was positively affected, with reductions in blood pressure, LDL cholesterol, and triglyceride levels, alongside an increase in HDL cholesterol. These findings suggest that inositol supplementation may offer therapeutic benefits for both metabolic and cardiovascular health, as well as mental well-being. Further research is needed to confirm these results and assess the long-term effects.

#### 5. DISCUSSION

The results of this study provide valuable insights into the potential therapeutic effects of 30 mg inositol supplementation on various health parameters. The significant improvements observed in endocrine, mental health, and cardiovascular markers highlight the multifaceted benefits of inositol, which align with previous research supporting its role in metabolic regulation, mood enhancement, and cardiovascular health. In terms of endocrine parameters, the observed reductions in insulin and androgen levels and the slight decrease in glucose levels suggest that inositol may play a role in improving metabolic health, particularly in insulin sensitivity and the management of androgen-related conditions. Previous

studies have demonstrated inositol's efficacy in managing insulin resistance, particularly in conditions such as polycystic ovary syndrome (PCOS), which is associated with both insulin resistance and elevated androgen levels (Kamenov i Gateva, 2020; Roseff i Montenegro, 2020; Facchinetti et al., 2019). The significant reduction in insulin levels (from 15  $\mu$ U/mL to 11  $\mu$ U/mL) and the decrease in androgen levels are consistent with these findings, supporting the hypothesis that inositol may help modulate endocrine function (Greff et al., 2023). Mental health parameters also showed promising results, with significant reductions in both depression and anxiety, as measured by the GAD-7 and PHQ-9 scores, alongside an improvement in general mental clarity. The increase in mental ability scores further suggests a potential cognitive-enhancing effect of inositol. These findings corroborate existing literature that highlights inositol's role in modulating serotonin pathways, which may contribute to its antidepressant and anxiolytic effects (Blampied, 2021). The increase in energy levels observed, although statistically significant, was tempered by the lack of significant improvement in fatigue levels ( $p=0.07$ ). This discrepancy warrants further investigation to determine whether longer treatment durations or higher doses may be necessary to achieve more consistent improvements in fatigue (Mashayekh-Amiri et al., 2022). Regarding cardiovascular health, the observed reductions in blood pressure, LDL cholesterol, and triglyceride levels, as well as the increase in HDL cholesterol, are of particular interest. Inositol has previously been suggested to have lipid-lowering effects, which is supported by our findings showing a significant reduction in both LDL (from 135 mg/dL to 120 mg/dL) and triglycerides (from 150 mg/dL to 130 mg/dL), coupled with an increase in HDL (from 45 mg/dL to 55 mg/dL) (Shokrpour, et al., 2019). These changes are consistent with the growing body of research that suggests inositol may have a favorable impact on lipid metabolism, potentially reducing the risk of cardiovascular diseases (Shokrpour, et al., 2019). Additionally, the significant decrease in blood pressure (from 140/100 mmHg to 115/75 mmHg) supports the notion that inositol may help improve vascular health, potentially through mechanisms such as enhanced endothelial function and reduced arterial stiffness (Tari et al., 2021). However, several limitations must be considered. The sample size of 20 participants is relatively small, and the duration of treatment was not specified, which may affect the generalizability of the findings. Additionally, the lack of statistically significant improvement in fatigue ( $p=0.07$ ) calls for further investigation into the optimal dose and treatment duration required to achieve more consistent results in this domain. Further studies with larger sample sizes and more rigorous control conditions are necessary to confirm the long-term effects of inositol supplementation and to determine its potential role as a therapeutic agent in managing metabolic, cardiovascular, and mental health disorders. In conclusion, this study provides promising evidence for the efficacy of 30 mg inositol supplementation in improving endocrine function, mental health, and cardiovascular health. These findings contribute to the growing body of literature supporting the multifactorial benefits of inositol, although further research is needed to better understand the underlying mechanisms and long-term clinical implications.

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