

# INPLASY PROTOCOL

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**Corresponding author:**  
Huihui Wang

wanghhlzu@163.com

**Author Affiliation:**  
Lanzhou University

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None declared.

## Obstructive sleep apnea and serum total testosterone: a system review and meta-analysis

Lu, J<sup>1</sup>; Xu, L<sup>2</sup>; Yang, Y<sup>3</sup>; Meng, Y<sup>4</sup>; Li, Y<sup>5</sup>; Wang, H<sup>6</sup>; Liu, B<sup>7</sup>.

**Review question / Objective:** Testosterone deficiency (TD) negatively affects male sexuality, reproduction, general health, and quality of life. In recent years, a decrease serum testosterone levels were caused by obstructive sleep apnea (OSA). However, these results are controversial and lack the support of a large number of high-quality studies. Hence, we performed a meta-analysis to assess the association between OSA and serum testosterone levels.

**Condition being studied:** This present study aims to systematically evaluate the correlation between obstructive sleep apnea (OSA) and Testosterone deficiency (TD). In recent years, a decrease serum testosterone levels were caused by OSA. However, these results are controversial. Hence, we conducted a systematic retrieval in the electronic databases (PubMed, Web of Science, the Cochrane Library, EMBASE) from their inception to September 2021 and studies with definitive diagnoses of OSA, including effects of OSA on testosterone level were choose for random effect model analysis.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 March 2022 and was last updated on 21 March 2022 (registration number INPLASY202230110).

### INTRODUCTION

**Review question / Objective:** Testosterone deficiency (TD) negatively affects male sexuality, reproduction, general health, and quality of life. In recent years, a decrease serum testosterone levels were caused by obstructive sleep apnea (OSA). However,

these results are controversial and lack the support of a large number of high-quality studies. Hence, we performed a meta-analysis to assess the association between OSA and serum testosterone levels.

**Rationale:** This present study aims to systematically evaluate the correlation

between obstructive sleep apnea (OSA) and Testosterone deficiency (TD) by meta-analysis.

**Condition being studied:** This present study aims to systematically evaluate the correlation between obstructive sleep apnea (OSA) and Testosterone deficiency (TD). In recent years, a decrease serum testosterone levels were caused by OSA. However, these results are controversial. Hence, we conducted a systematic retrieval in the electronic databases (PubMed, Web of Science, the Cochrane Library, EMBASE) from their inception to September 2021 and studies with definitive diagnoses of OSA, including effects of OSA on testosterone level were choose for random effect model analysis.

## METHODS

**Search strategy:** We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines to conduct our review and analysis. Two authors performed PubMed, Cochrane Library and EMBASE independently. Combination of relevant text terms : (1)Apneas, Obstructive Sleep or obstructive sleep apnea hypopnea syndrome or OSAHS or obstructive sleep apnea or OSA or obstructive sleep apnea syndrome or OSAS or obstructive sleep hypopnea or sleep apnea or obesity hypoventilation syndrome or upper airway resistance syndrome; (2) testosterone or androgen or epitestosterone or hydroxytestosterone or methyltestosterone or testosterone propionate or Testosterone Sulfate or 8-Isotestosterone or Methenolone, including MeSH terms: “sleep apnea syndromes” and “testosterone” which were found in the MeSH hierarchy. The last search update was September 2021. The eligibility of identified citations was independently reviewed by two reviewers.

**Participant or population:** The mian participants is patients of Obstructive sleep apnea (OSA).

**Intervention:** Studies are observational case-control studies.

**Comparator:** Non-exposed control group people without sleep apnea syndrome.

**Study designs to be included:** Case-control studies will be included.

**Eligibility criteria:** The inclusion criteria: (a) original observational case-control studies that evaluated the association between OSA and testosterone; (b) studies using validated instruments to measure testosterone; (c) studies in which OSA was diagnosed using polysomnography and/or characteristic symptoms (A) studies using validated instruments to measure testosterone; (B) studies in which OSA was diagnosed using polysomnography and/or characteristic symptoms.

**Information sources:**

<https://pubmed.ncbi.nlm.nih.gov/>  
<https://www.cochranelibrary.com/>  
<https://www.embase.com/landing?status=grey>

**Main outcome(s):** This meta-analysis included 24 case-control studies with 1389 patients and 845 controls . The serum testosterone level in the male OSA group was significantly lower than that of control group Results indicated that OSA was one of factors contributing to TD in men.

**Additional outcome(s):** There was no difference in female OSA patients and control.

**Data management:** We used standardized evaluation forms to extract data. Any disagreement in extracted data was resolved through consultation. Data were extracted using standardized evaluation forms: first author's last name, year of publication, country of the study, gender, population size, age (range or mean), assay approach, sleep Apnea Diagnosis, serum total testosterone (mean and standard deviation), Body Mass Index (BMI), Apnea-Hypopnea Index (AHI).

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**Quality assessment / Risk of bias analysis:**

The review of eligible scientific reports identified by the searches was completed by 2 authors investigators to identify reports for review in full text. Two researchers evaluated the quality of the included literature according to the NOS form, including 8 items with a total score of 9 points, excluding low-quality studies with a score less than 6 points. Heterogeneity was assessed by Cochrane Q test and Higgins I<sup>2</sup> test. When significant heterogeneity was noted among studies, random effects analysis was used.

**Strategy of data synthesis:** The meta-analysis was performed using Stata 15.0 software. To evaluate the effect of OSA on serum testosterone, we calculated the standardized mean difference (SMD) with Hedge's g formula.

**Subgroup analysis:** Subgroup analysis was performed according to different detection method, race duration, different age and BMI.

**Sensitivity analysis:** Sensitivity analysis was performed to assess whether individual studies significantly affected the outcome of the combination.

**Language:** No.

**Country(ies) involved:** China.

**Keywords:** Obstructive sleep apnea, testosterone, meta-analysis.

**Contributions of each author:**

**Author 1 - Jiyuan Lu** - The author provided concept, design, and manuscript preparation.

Email: yxmm87k@163.com

**Author 2 - Lingdan Xu** - The author provided manuscript preparation, manuscript editing, and manuscript review.

**Author 3 - Yanduo Yang** - The author provided data acquisition, statistical analysis.

Email: yangyd21@lzu.edu.cn

**Author 4 - Yucheng Meng** - The author contributed to literature search.

**Author 5 - Yi Li** - The author contributed to definition of intellectual content.

**Author 6 - Huihui Wang** - The author contributed to manuscript review.

Email: wanghhlzu@163.com

**Author 7 - Bin Liu** - The author contributed to manuscript editing.