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Corresponding author:
Xiao-lin Shi

xlshi-2002@163.com

Author Affiliation:
The Second Affiliated Hospital,
Zhejiang Chinese Medical
University.

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None declared.

Antiosteoporosis Effect of the Tanshinol in Animal Models of Osteoporosis: A Systematic Review and Meta-Analysis

Wang, S¹; Lin, Q²; Yuan, YF³; Zhou, H⁴; Shi, XL.

Review question / Objective: Osteoporosis (OP), a disease characterized by low bone mass and trabecular degeneration of bone tissue, with a rapidly growing prevalence worldwide. Osteoporosis is mainly associated with the normal aging process in Most of the patients. Nevertheless, It can also occur due to secondary causes, such as the using of glucocorticoids, alcohol abuse, or diabetes. It is estimated that about 50% of women which aged over 50 years have osteoporosis. Fractures are a serious consequence of osteoporosis, which could increase disability and fatality rates significantly, bring great economic burden to family and society. It is estimated that there are approximately 40 million women with low BMD, 300,000 hip fractures, and medical expenditures of closely \$17-20 billion for osteoporosis per year in United States.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 March 2022 and was last updated on 12 March 2022 (registration number INPLASY202230053).

INTRODUCTION

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associated with the normal aging process in Most of the patients. Nevertheless, It can also occur due to secondary causes, such as the using of glucocorticoids, alcohol abuse, or diabetes. It is estimated that about 50% of women which aged over 50 years have osteoporosis. Fractures are a

serious consequence of osteoporosis, which could increase disability and fatality rates significantly, bring great economic burden to family and society. It is estimated that there are approximately 40 million women with low BMD, 300,000 hip fractures, and medical expenditures of closely \$17-20 billion for osteoporosis per year in United States.

Condition being studied: Tanshinol was shown to be a bone-protective function in ovariectomized (OVX) rats model, while regulating bone turnover markers, possibly via blocking the NF- κ B pathway. It is indicated that Tanshinol may have anti-osteoporotic effects in vivo or in vitro. However, The clinical using of tanshinol is limited by those scattered evidence. Tanshinol anti-osteoporosis was recently reported, But the observed outcome is not exactly the same, as is the animal modeling method, which prompting us to conduct a meta-analysis and systematic evaluation. To collect and analyze all available data of tanshinol treatment in osteoporosis animal models is the primary objective of this systematic review, which could provide a reference information for anti-osteoporosis studies in complementary medicine.

METHODS

Search strategy: Electronic searches were performed in eight databases without language restrictions from their respective inception to January 2022: PubMed, EMBASE, Web of Science, Cochrane Library, Chinese National Knowledge Infrastructure, Chinese Biomedical Literature Database, Chinese VIP Database, and Wanfang Database. The search terms used were adjusted to ensure efficient literature retrieval. For example, the Retrieval type for web of science were: (((TS=("Danshensu")) OR TS=(Tanshinol)) OR TS=("dan shen su a")) OR TS=("Salvianic acid A")) AND TS=(osteoporosis).

Participant or population: Animal studies.

Intervention: The treatment group received tanshinol as monotherapy, regardless of

dosage, medicament type, route of administration, and time for the medicine application.

Comparator: Blank treatment or isometric placebo was received in the control group.

Study designs to be included: Only animal studies that assessed the efficacy and safety of tanshinol for OP were included, regardless of publication status or language.

Eligibility criteria: We included controlled studies assessing the administration of tanshinol for OP animal models established by different methods, regardless of animal species, age, weight, and gender.

Information sources: Electronic searches were performed in eight databases without language restrictions from their respective inception to 2022: PubMed, EMBASE, Web of Science, Cochrane Library, Chinese National Knowledge Infrastructure, Chinese Biomedical Literature Database, Chinese VIP Database, and Wanfang Database.

Main outcome(s): The primary outcome measures were bone mineral density(BMD, including BMD-femur and BMD-lumbar).

Additional outcome(s): The secondary outcome measure were Static parameters for bone tissue morphometry (femur, tibia) and Bone biomechanics(femur), (1)bone volume over total volume(BV/TV), (2) trabecular number (Tb.N), (3)trabecular thickness (Tb.Th), (4)trabecular separation (Tb.Sp), (5)bone maximum load,(6)bone elastic load.

Quality assessment / Risk of bias analysis: The risk of bias was tested by the CAMARADES 10-item quality checklist for each study.

Strategy of data synthesis: When high heterogeneity or statistical heterogeneity was detected, a random effect model ($I^2 \geq 50\%$) was used, otherwise a fixed effect model ($I^2 < 50\%$). The effect of publication

bias was studied by Eegg's test for publication bias. Continuous variables used mean difference (mean difference, MD) or standard mean deviation (standard mean difference, SMD) to calculate a 95% credible interval (confidence intervals, CI).

Subgroup analysis: There were no subgroup analyses.

Sensitivity analysis: we performed a sensitivity analysis by omitting single studies one by one.

Country(ies) involved: China.

Keywords: Meta-Analysis; Tanshinol; Animal Models.

Contributions of each author:

Author 1 - Shen Wang.

Email: 244430214@qq.com

Author 2 - Qian Lin.

Email: linqian8868@163.com

Author 3 - Yi-feng Yuan.

Email: 501292122@qq.com

Author 4 - Hang Zhou.

Email: 787840697@qq.com

Author 5 - Xiao-lin Shi.

Email: xlshi-2002@163.com