

· 论著 ·

慢跑与未绝经成年女性骨密度相关关系的 Meta 分析

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摘要: 目的 采用 Meta 分析方法综合评价慢跑对未绝经成年女性骨密度的影响。方法 计算机检索 Pubmed、Embase、cochrane、中国生物医学文献数据库、中国知网、万方及维普等英文、中文文献数据库,并手工检索中国骨质疏松杂志、解剖学进展杂志等相关杂志,收集有关未绝经成年女性骨密度(bone mineral density, BMD)与慢跑相关性的随机对照试验,评价指标为 BMD。评估纳入文献质量,提取有效数据,采用 cochrane 提供的 Review Manager 5.3 软件对数据进行分析。结果 共检索出相关文献 142 篇,其中 2 篇文献符合制定的纳入和排除标准。2 篇文献合计 64 名研究对象。Meta 分析结果为:异质性检验 $I^2 = 0\%$, $\chi^2 = 0.42$, $P = 0.52$, 研究数据间异质性小,采用固定效应模型分析。慢跑组与对照组骨密度差异有统计学意义($Z = 3.05$, $P = 0.002$), $SMD = 0.09$, 95% CI 为(下限 0.03, 上限 0.15)。结论 慢跑可改善未绝经成年女性骨密度,对预防未绝经成年女性骨量减少具有重要意义。

关键词: 慢跑;骨密度;未绝经成年女性;Meta 分析

Meta-analysis on the relationship between jogging and bone mineral density in pre-menopausal women

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Abstract: Objective Using Meta-analysis to evaluate the effect of jogging on bone mineral density in pre-menopausal women. **Methods** English and Chinese literature databases, including Pubmed, Embase, the Cochrane, CNKI, Wanfang database and VIP were searched for randomized controlled trials that evaluated the effects of jogging on BMD in pre-menopausal women. Additional manual search was conducted for journals including the Chinese Journal of Osteoporosis and Progress in Anatomy. After evaluating the quality of the research literature, available data were extracted, and data analyses were performed using the Review Manager 5.3 provided by Cochrane. **Results** 142 related literature were checked, and among them two conformed the inclusion criteria and the exclusion criteria, involving 64 subjects. The results of Meta-analysis showed that the heterogeneity of the test were: $I^2 = 0\%$, $\chi^2 = 0.42$, $P = 0.52$. The heterogeneity of the studies was small by adopting the fixed effects model. The difference of bone mineral density was statistically significant between women in the jogging group and in the control group [$(Z = 3.05, P = 0.002; SMD = 0.09, 95\% CI(0.03, 0.15))$]. **Conclusion** Jogging exercise can improve bone mineral density in pre-menopausal women, which is important for the prevention of osteoporosis in this population.

Key words: Jogging; Bone mineral density; Pre-menopausal women; Meta-analysis

随着经济和科技的不断发展,人们的生活水平及生活质量不断提高,生存年龄较前延长,一些相应疾病的发病率及死亡率也随之升高,如冠心病^[1]、

糖尿病^[2]及骨质疏松^[3]等。其中骨质疏松症会引起自身骨量的流失而不引起人们的注意,被称为人类“无声杀手”^[4]。骨质疏松使骨量不断减少,骨结构变化,骨骼脆性增大,发生骨折的风险也随之升高,导致生活质量下降和寿命缩短,加重社会经济负担^[5]。研究表明^[6-8],慢跑能有效增加未绝经成年

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女性的骨密度,从而早期预防骨质疏松症的发生,但目前暂无相关研究系统评价慢跑与未绝经常年女性骨密度的相关性。本研究通过 Meta 分析的方法,系统评价慢跑与未绝经成年女性骨密度的相关性,为未绝经成年女性早期预防骨质疏松症的发生提供科学运动依据。

1 材料与方

1.1 材料来源

以“骨密度”、“骨质疏松”、“骨量减少”、“慢跑”、“缓跑”、“健身跑”、“未绝经成年女性”、“Bone mineral density”、“Osteoporosis”、“Bone loss”、“Jogging”、“Pre-menopausal women”等为检索词,两位研究者分别独立检索 Pubmed、Embase、Cochrane、中国生物医学文献数据库、中国知网、万方及维普数据库,手工检索相关杂志,如中国骨质疏松杂志、解剖学进展杂志等,检索时间限定为从建库开始至 2015 年 11 月,并通过人工检索等方法,检索未发表文献,共检索出相关文献 142 篇。

1.2 文献纳入标准

公开及未公开发表的有关未绝经成年女性骨密度与慢跑的随机对照研究;文献提供了慢跑组与对照组病例总数,骨密度均数及标准差;提供研究开展、发表的年限;资料完整,至少有一个对照组;研究对象为未绝经成年女性;采用双能 X 线骨密度仪测量骨密度。

1.3 文献排除标准

动物实验;横断面研究的综述、文献及信件等其他文献资料;非随机对照研究;剔除发表重复、数据不完整而无法进行分析处理的文献及不能提取可供统计分析数据的研究及评论等;可信度低的文献;超声测量骨密度的文献。

1.4 文献评价

两位研究者分别对文献进行质量评价、筛选,并剔除重复、信息不完整、研究质量差的文献,有分歧时两人讨论,直至意见统一或咨询第三人解答。文献中不清楚的信息,通过邮件的方式联系文献第一作者或通讯作者,寻求满意答复。

1.5 评价指标

评价指标为骨密度。

1.6 数据出来及统计学分析

异质性检验:采用 Review Manager5.3 对纳入的 2 篇文献进行 Meta 分析。对文献所得数据结果进行异质性检验^[9],当结果不存在异质性时,采用固定效应模型进行,反之用随机效应模型。森林图:绘制森林图,得出 Meta 分析结果。敏感性分析:因纳入分析的文献较少,且 2 篇文献中的例数较接近,Meta 分析中所占权重大小相近,敏感性分析未能进行。发表性偏倚分析:以 Meta 分析结果中的慢跑组与对照组骨密度加权均数之差(WMD)为横坐标,以样本总例数为纵坐标绘出漏斗图。

2 结果

2.1 文献检索过程及结果(图 1)

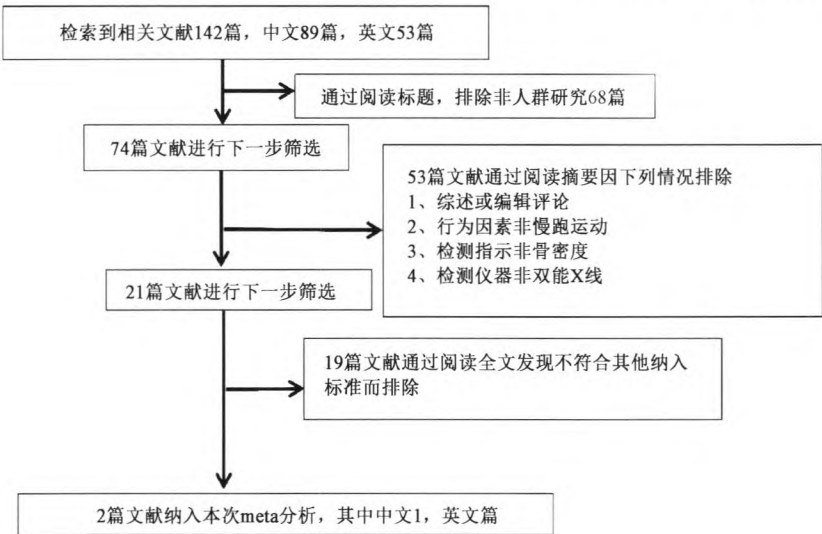


图 1 文献纳入过程
Fig. 1 Flow chart of selection of articles for this meta-analysis

2.2 纳入文献的基本情况

2 篇文献符合制定的纳入标准和排除标准,其

基本信息如表 1 所示。2 篇文献累计样本量 64 例，为 1992 年、1995 年，研究人群来源于 2 个国家。其中慢跑组 31 例，对照组 33 例，文献发表时间分别

表 1 表 1 纳入文献的基本情况
Table 1 Table 1 Characteristics of included studies

出处	研究人群	年限(年)	慢跑组		对照组	
			例数(n)	BMD(g/cm ²)	例数(n)	BMD(g/cm ²)
Harter ^[9]	科瓦利斯	1992 年	10	1.13 ± 0.18	8	1.08 ± 0.13
王玉昕 ^[10]	中国	1995 年	21	0.71 ± 0.11	25	0.61 ± 0.11

2.3 纳入文献的 Cochrane 风险偏倚评估(图 2)
纳入文献的风险偏倚处于中等水平。

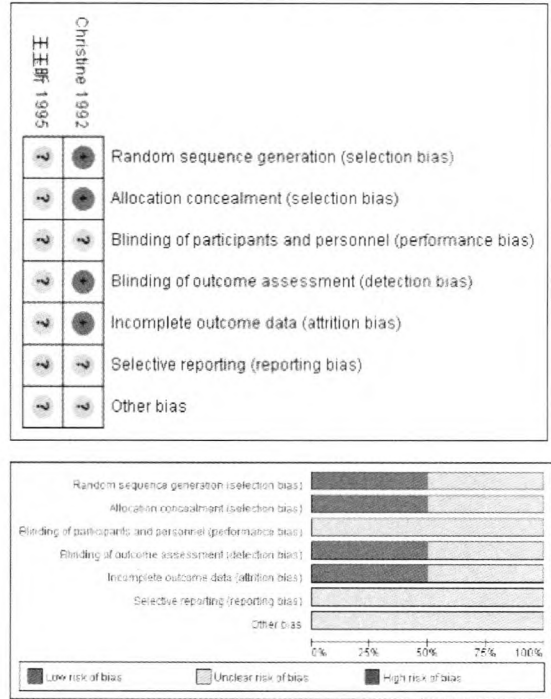


图 2 纳入文献的 Cochrane 风险偏倚评估

Fig.2 Cochrane risk bias assessment of included studies

2.4 异质性检验

未绝经女性慢跑组和对照组骨密度的异质性检验结果为 $\chi^2 = 0.42, P = 0.52 > 0.05$, 采用固定效应模型分析。

2.5 森林图(图 3)

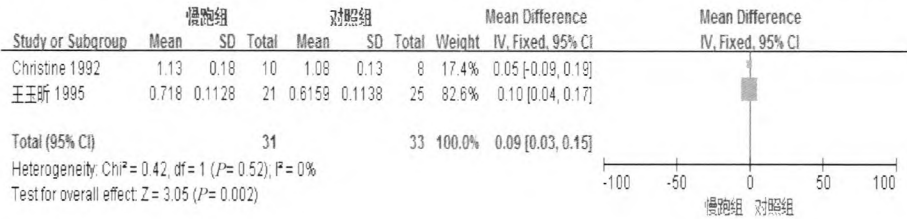


图 3 慢跑与未绝经成年女性骨密度相关关系的 Meta 分析

Fig.3 Meta-analysis of the relationship between jogging and bone mineral density in pre-menopausal women

Mansfield 等^[13]发现长期定时定量的训练,可以增加体内雌性激素水平,对骨密度含量有不同程度的提升。

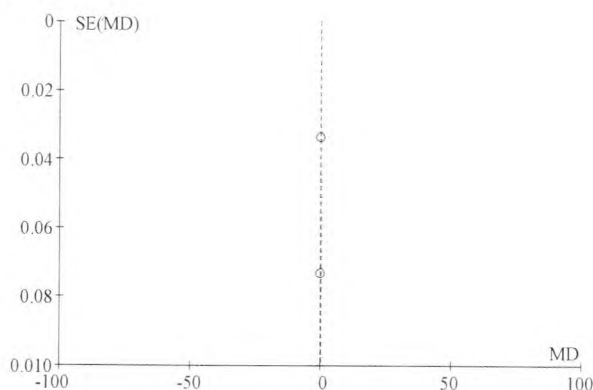


图 4 慢跑与未绝经成年女性骨密度关系的漏斗图

Fig. 4 Funnel chart of the relationship between jogging and bone mineral density in pre-menopausal women

此次 Meta 分析的结果与 Branca、Grimston 等人的研究结果相一致。Branca 等^[14]证明运动对骨骼的生长与发展有相当重要的作用。Grimston 等^[15]发现经常参与跑步、跳舞的受试者骨密度较高。我国学者黄志强^[6]、王玉昕^[16]、何晓端^[17]等也曾报道慢跑运动可改善女性骨密度的研究。可见慢跑运动作为一种简单易行,老少皆宜的运动方式,可改善未绝经成年女性骨密度的含量。

本次研究中所纳入的文献有 2 篇,一篇为中文,一篇为英文,研究中虽然通过发表偏倚进行偏倚控制,但纳入此次 Meta 分析的文献数量少,不能较好地排除国家、地区、民族、人种、饮食以及社会经济发展水平等因素的影响,故不能混杂偏倚的存在,还需后续多中心、随机对照临床试验进一步加以验证。

综上所述,尽管此次纳入的研究对象较少,以及无法完全消除研究对象间的异质性,但本次 Meta 分析结果仍具有较好的参考意义,为科学运动预防骨质疏松提供理论依据。

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