INPLASY

INPLASY202470059

doi: 10.37766/inplasy2024.7.0059

Received: 14 July 2024

Published: 14 July 2024

Effects of Maturation Stage on Physical Fitness in Youth Male Team Sports Players After Plyometric Training: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202470059

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 July 2024 and was last updated on 14 July 2024.

INTRODUCTION

Review question / Objective Evaluate the differential impact of plyometric training on various physical fitness components (e.g., strength, power, speed, agility,) across different maturation stages (pre-pubertal, pubertal, and post-pubertal).

Rationale During adolescence, significant physiological changes occur, impacting muscle strength, power, speed and agility. Plyometric training is widely used to enhance these physical fitness components due to its effectiveness in improving explosive strength and neuromuscular performance. However, the response to plyometric training may vary depending on the maturation stage, which can influence the adaptation process and overall trainingoutcomes.

Condition being studied The condition being studied is the impact of maturation stages on physical fitness in youth male team sports players. Adolescence is a period characterized by rapid and significant physical and physiological changes, which can affect how young athletes respond to different types of training. Plyometric training, which involves high-intensity exercises designed to enhance explosive strength, power, speed, and agility, may have varying effects depending on the athlete's stage of maturation (pre-pubertal, pubertal, and post-pubertal).

METHODS

Search strategy An electronic search was performed in the following databases PubMed, Web of Science, Scopus. The search strategy was performed using Boolean operators AND and OR and the following keywords: “plyometric”, “ballistic”, “stretch-shortening cycle”, “jump training”, “Youth”, “Young”, “Teen”, “Puberty”, “Maturation”, “Agility”, “direction”, “balance”, “Stability”, “velocity”, “Sprint”, “Jump”, “Explosive”, “Muscle”, “Power” and “strength”.

Participant or population Group average age is between 10 and 18 years old, consisting of male

adolescent team sport athletes, with no restrictions on their fitness level or competitive level.

Intervention Group average age is between 10 and 18 years old, consisting of male adolescent team sport athletes, with no restrictions on their fitness level or competitive level.

Comparator The study must include an experimental group undergoing plyometric training and a comparable control group. The control group must not engage in any plyometric training.

Study designs to be included Controlled trials.

Eligibility criteria Population - Group average age is between 10 and 18 years old, consisting of male adolescent team sport athletes, with no restrictions on their fitness level or competitive level(Inclusion criteria) Participants who are unable to participate in the plyometric training program due to health issues(Exclusion criteria)
Intervention - Plyometric training lasting ≥4 weeks(Inclusion criteria) Implement an intervention combining plyometric training and weight training(Exclusion criteria)
Comparator - The study must include an experimental group undergoing plyometric training and a comparable control group. The control group must not engage in any plyometric training(Inclusion criteria) A study without a control group(Exclusion criteria)
Outcome - At least 1 measure of physical fitness (e.g., countermovement jump) before and after the training intervention(Inclusion criteria) There are no indicators related to physical fitness (e.g., countermovement jump) before and after the training intervention(Exclusion criteria)
Study design - Controlled trials(Inclusion criteria) Non-controlled trials(Exclusion criteria).

Information sources Pubmed,web of science, scopus.

Main outcome(s) Countermovement jump height,Standing long jump distance,linear sprint time,change-of-direction time,Maximal strength.

Data management Means and standard deviations of dependent variables at pre- and post-intervention in the included studies were extracted using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA).

Quality assessment / Risk of bias analysis The Physiotherapy Evidence Database (PEDro) scale was used to assess the methodological quality of the included studies.

Strategy of data synthesis The data were performed using Stata/SE software v.15.1 (StataCorp, College Station, TX).

Subgroup analysis The median split technique was used to divide the moderator variables (frequency, duration, and total number of training sessions) into subgroups.

Sensitivity analysis Exploring risk of bias using the extended Egger test.Multivariate random effects meta-regression was performed to verify whether any training variables (frequency, duration, and total number of training sessions) could predict the effects of PT on physical fitness variables.

Language restriction English.

Country(ies) involved China.

Keywords Physical Fitness; Plyometric Training; Maturation Stage.

Contributions of each author
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