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Combined effects of exercise/physical activity and diet/nutrition on chronic inflammation of overweight/obese children and adolescences: A systematic review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - No financial support.

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

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 30 November 2024 and was last updated on 30 November 2024.

INTRODUCTION

Review question / Objective The aim of this systematic review and meta-analysis was to examine the effects of combined physical activity and/or exercise with diet and/or nutrition interventions, on chronic inflammation indices of healthy overweight and obese children and adolescents up to 18 years old.

Condition being studied Dietary interventions, specifically caloric restriction, and regular exercise have been proven effective to reduce chronic inflammation in overweight/obesity, and related metabolic dysfunctions, while regular exercise it is also important for the treatment of chronic inflammation and obesity-related conditions. While the effects of physical activity/exercise and diet/nutrition as single interventions on overweight/obesity of children and adolescents' health have been widely examined, the effects of combined interventions physical activity/exercise and diet/

nutrition have not been extensively investigated. This is important to examine, in order to determine whether this combined intervention is a vehicle to mitigate health problems in children and adolescents with overweight and obesity.

METHODS

Participant or population Generally healthy overweight and obese children and adolescences with body mass index (BMI) >85th percentile aged 0-18 (mean) years old. We considered any ethnicity.

Intervention Combination of any exercise/physical activity and any diet/nutrition.

Comparator A control group (i.e. no exercise/physical activity and diet/nutrition), or a control situation (in cross-over design randomized studies).

Study designs to be included We accepted studies in any language, randomized controlled trials (RCT), quasi-randomized controlled trials (CT) and Single Group Design interventional Studies (SGDS).

Eligibility criteria For the selection of the eligible studies, we based on the Population, Intervention, Comparator, Outcome and Study design methodology, with inclusion and exclusion criteria as outlined below:

Population: Generally healthy overweight and obese children and adolescences with body mass index (BMI) >85th percentile aged 0-18 (mean) years old. We considered any ethnicity.

Intervention: Combination of any exercise/physical activity and any diet/nutrition.

Comparator: A control group (i.e. no exercise/physical activity and diet/nutrition), or a control situation (in cross-over design randomized studies).

Outcome: Chronic inflammation markers (C-reactive protein (CRP), interleukin (IL)-6, IL-8, IL-10, IL-1 β and tumor necrosis factor alpha (TNF- α)).

Study design: We accepted studies in any language, randomized controlled trials (RCT), quasi-randomized controlled trials (CT) and Single Group Design interventional Studies (SGDS).

We excluded studies with no exercise and/or physical activity intervention in combination with diet and/or no nutrition intervention. Studies that did not examine the above-mentioned inflammatory markers or focused on psychological or other physiological indices were also excluded. Also, leptin and adiponectin were not accepted as eligible inflammatory markers, since they do not directly indicate inflammation. Studies included, non-healthy overweight/obese (>85th percentile) children and adolescences 0-18 years old and non-overweight/obese (<85th percentile) children and adolescences 0-18 years old, as well as adult participants were also excluded. Studies with an association design, were not considered. Finally, we excluded studies involved animals, and reviews, study protocols, editorials, systematic reviews, conference proceedings publications and magazines.

Information sources The search was conducted in three databases: Pubmed, SportDiscus, and Web of Science.

Main outcome(s) Chronic inflammation markers (C-reactive protein (CRP), interleukin (IL)-6, IL-8, IL-10, IL-1 β and tumor necrosis factor alpha (TNF- α)).

Quality assessment / Risk of bias analysis For Randomized Controlled Trials, the Cochrane library tool was utilized, while for the other design studies, the Research Triangle Institute Item Bank (RTI-IB) tool was employed for bias risk assessment.

Strategy of data synthesis For the eligible studies that did not offer data for a meta-analysis a narrative data synthesis method was adopted, and a relative table was created to assist with the interpretation. For the studies that offer data for a meta-analysis, a random effect model continuous meta-analysis was adopted, using data from intervention and control groups, either post-intervention or pre- and post-intervention for Single Group Design Studies. Standardized mean difference (SMD) was used given that variables had different units of measurement.

Subgroup analysis Subgroup analysis was used for age (10 years) and intervention duration (12 weeks).

Sensitivity analysis Not applicable.

Country(ies) involved Greece.

Keywords Childhood obesity, Chronic inflammation, Inflammatory index.

Contributions of each author

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