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The effect of exercise intervention on inhibitory function in obese children and adolescents: a systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

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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 13 May 2024 and was last updated on 19 January 2025.

INTRODUCTION

Review question / Objective Compared to typical children and adolescents, overweight and obese patients exhibit significant deficits in inhibitory function. However, there is currently a high variability in the effectiveness of exercise interventions for inhibitory function in obese children and adolescents, and a lack of consistency in clinical protocols. The purpose of this study was to conduct a systematic review of the intervention effects of exercise interventions on inhibitory function in obese children and adolescents.

Condition being studied Obesity not only increases the prevalence of physical diseases in children and adolescents but also negatively affects their cognitive function development . Extensive inhibitory function deficits have been reported in overweight and obese patients compared to normal children and adolescents.
Several studies conducted at home and abroad have confirmed that exercise has a positive impact on enhancing inhibitory function in obese children and adolescents . However, the differences in experimental design, intervention protocols, outcome indicators, etc., among these studies lead to widely varying results. The lack of consistency hinders the development of a standardized clinical program for exercise intervention aimed at enhancing inhibitory function in obese children and adolescents.

METHODS

Participant or population Obese or overweight children and adolescents who meet the WHO's determination, aged 6 to 19 years old, and their race, nationality and gender are not limited.

Intervention The experimental group used exercise intervention.

Comparator The control group was routine activities, sedentary reading or watching cartoons.

Study designs to be included Randomized controlled trial (RCT).

Eligibility criteria Based on the PICOS principle, the literature inclusion criteria of this study included (1) study type. Randomized controlled trial (RCT), years from January 2000 to January 2024, there was no significant difference between the experimental group and the control group before the experiment; (2) Study subjects. Obese or overweight children and adolescents who meet the WHO's determination, aged 6 to 19 years old, and their race, nationality and gender are not limited; (3) Interventions. The experimental group used exercise intervention, and the control group was routine activities, sedentary reading or watching cartoons; (4) Outcome indicators. Response time to the inhibition task.
Exclusion criteria:(1) Non-Chinese and English literature; (2) Repeatedly published literature; (3) Incomplete data or unavailability of raw data; (4) Measurement paradigm used in the study did not satisfy the Meta-analysis needs; (5) Case studies, review literature, conference papers, gray literature.

Information sources Web of Science, PubMed, Cochrane Library, EBSCO, WanFang Database, and China Knowledge Resource Integrated Database (CNKI).

Main outcome(s) Outcome indicators. Response time to the inhibitiontask.

Quality assessment / Risk of bias analysis The quality of the literature was assessed using the Physiotherapy Evidence Database (PEDro) scale. The scale included " eligibility criteria"," randomized allocation", "allocation concealment ", " baseline equilibrium", " intervention and control of exercise load "," Blinding of Outcome Assessment ", " Dropout Rate ≤15%"," ITT Intentions Treatment Analysis ","Statistical analysis between groups "," Point estimation and variability measurement "10 entries. The total score was 10, where <4 was poor quality, 4 to 5 was moderate quality, 6 to 8 was good quality, and 9 to 10 was high quality, and only literature of moderate quality or higher was included in this study to ensure the reliability of the results. Literature quality scoring was performed independently by 2 researchers, and in case of disagreement, a third researcher discussed together until the opinion was unified.

Strategy of data synthesis Stata 12.0 software was used for statistical analysis. Because the inhibitory function of the outcome index included three task types, Stroop, Flanker and Go/No-go, standardized mean difference (SMD) and 95% confidence interval (CI) were used as effect analysis statistics. The magnitude of heterogeneity was determined using I2; if I2 was <50%, a fixed-effects model was used for Meta-analysis; if I2 was ≥50%, a random-effects model was used for Meta-analysis. The size of effect sizes was analyzed, with 0. 2, 0. 5, and 0. 8 representing small, medium, and large effect sizes, respectively. Obvious clinical heterogeneity was handled using subgroup analysis; in addition, when the outcome indicators were included in ≥10 RCTs, the risk of publication bias was assessed by producing a funnel plot.

Subgroup analysis Due to heterogeneity,subgroup analyses were conducted on exercise content, intensity, volume, duration, task type, and participants' body mass index.

Sensitivity analysis In order to test whether the results of the study were stable and reliable, this study used the sensitivity analysis method of excluding single studies one by one and observing the difference between the combined effect size and the total effect size of the remaining studies.

Country(ies) involved China.

Keywords obesity; children and adolescents; exercise intervention; inhibitory function; executive function.

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