INPLASY

The Effect of Hyperbaric Oxygen on the Activities of Daily Living and Clinical Efficacy in Patients with Craniocerebral Injury:a meta-analysis

INPLASY202510022

doi: 10.37766/inplasy2025.1.0022

Received: 7 January 2025

Published: 7 January 2025

Xu, GY; Zhang, Q; Qiu, ZG.

Corresponding author:
Guangyu Xu

544073964@qq.com

Author Affiliation:
Shandong University of Traditional Chinese Medicine.

ADMINISTRATIVE INFORMATION

Support - Natural Science Foundation of Shandong Province.

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

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202510022

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 7 January 2025 and was last updated on 7 January 2025.

INTRODUCTION

Review question / Objective To systematically evaluate the improvement of hyperbaric oxygen on the activities of daily living and clinical efficacy in patients with craniocerebral injury.

Condition being studied Hyperbaric oxygen refers to a therapeutic method in which pure oxygen or high - concentration oxygen is breathed in an environment with a pressure exceeding one standard atmosphere (atm). This treatment takes advantage of the increased pressure to dissolve more oxygen in the blood and tissues, thereby improving the body's oxygen supply and promoting tissue repair and functional recovery. In the medical field, it is commonly used to treat a variety of diseases, such as carbon monoxide poisoning, decompression sickness, and cerebral ischemia - hypoxia diseases.
Craniocerebral injury refers to the damage to the scalp, skull, and/or brain tissue caused by external forces acting on the head. These external forces can be direct blows, collisions, or indirect deceleration, acceleration movements, etc. Craniocerebral injuries can be classified into open injuries and closed injuries, with a wide range of severity. Mild cases may only present with transient symptoms such as headache and dizziness, while severe cases may lead to coma, paralysis, and even endanger life. After the injury, a series of pathophysiological changes may occur, such as intracranial hematoma and cerebral edema, affecting the nervous system function to varying degrees.

METHODS

Search strategy Computerized searches were conducted in PubMed, Web of Science, Embase, CNKI, WanFangData, and VIP for RCTs on hyperbaric oxygen for craniocerebral injury from the inception of the databases to December 2024. The search was performed using a combination of subject terms and free words, and the language was restricted to Chinese and English.

Participant or population Patients aged ≥ 18 years diagnosed with craniocerebral injury.

Intervention The intervention in the observation group was hyperbaric oxygen or hyperbaric oxygen combined with other therapies.

Comparator The intervention in the control group was other therapies except hyperbaric oxygen.

Study designs to be included Randomized controlled trials on hyperbaric oxygen treatment for craniocerebral injury.

Eligibility criteria Inclusion Criteria
Study Subjects: Patients aged ≥ 18 years diagnosed with craniocerebral injury.
Intervention Measures: The intervention in the observation group was hyperbaric oxygen or hyperbaric oxygen combined with other therapies, and the intervention in the control group was other therapies except hyperbaric oxygen.
Outcome Measures: The primary outcome measures were the Activities of Daily Living scale (ADL), Barthel Index (BI), Functional Independence Measure (FIM), and total effective rate. The secondary outcome measures were the Glasgow Coma Scale (GCS), National Institutes of Health Stroke Scale (NIHSS), Glasgow Outcome Scale (GOS), and Fugl-Meyer Motor Assessment (FMA).
Study Type: Randomized controlled trials (RCTs).
Exclusion Criteria
Non-original studies, such as review articles, conference abstracts, expert opinions, and case reports.
Studies with unclear research design or incomplete data that could not extract key information.
Studies involving patients with non-traumatic brain injury or other neurological diseases.
Studies that did not provide a clear definition of craniocerebral injury or did not describe the severity of the injury.
Studies published in languages other than English or Chinese.
Studies for which the full text could not be obtained to extract data.

Information sources PubMed, Web of Science, Embase, CNKI, WanFangData, and VIP.

Main outcome(s) Activities of Daily Living scale (ADL), Barthel Index (BI), Functional Independence Measure (FIM), and total effective rate.

Additional outcome(s) Glasgow Coma Scale (GCS), National Institutes of Health Stroke Scale (NIHSS), Glasgow Outcome Scale (GOS), and Fugl-Meyer Motor Assessment (FMA).

Quality assessment / Risk of bias analysis Two researchers will evaluate the quality of RCTs that are screened and decided to be included in the analysis by referring to the "Cochrane Collaboration's Risk of Bias Assessment Criteria." Specific content should include: random allocation method, masking of allocation scheme, blinding, blinding evaluation of outcomes, completeness of outcome data, and selective reporting of studies.

Strategy of data synthesis ReviewManager 5.4 software and Stata 16.0 software were used for statistical analysis. The Q test and I^2 statistic were used to evaluate the heterogeneity between the two groups. If $P > 0.1$ and $I^2 < 50\%$, it indicated no statistical heterogeneity between the two groups, and a fixed-effects model was used for analysis. If P 50%, it indicated statistical heterogeneity between the two groups. Sensitivity analysis was performed to identify and exclude studies with large heterogeneity, and the heterogeneity was reanalyzed. If significant heterogeneity still existed, a random-effects model was used for analysis.

Subgroup analysis If there is a high degree of heterogeneity among the studies, perform a subgroup analysis. Group the studies according to factors such as publication year, intervention time, patient age, or intervention measures.

Sensitivity analysis If there is a high degree of heterogeneity among the studies, conduct a sensitivity analysis. Use Stata 16.0 software for the sensitivity analysis. If a single study has a significant impact on the heterogeneity and the heterogeneity becomes low after removing this study, then remove the study and adopt the fixed - effects model. If no single study has a significant impact on the heterogeneity, attempt to perform a subgroup analysis. If the subgroup analysis fails, adopt the random - effects model.

Language restriction English and Chinese.

Country(ies) involved USA, England and China.

Keywords Hyperbaric oxygen; Craniocerebral injury; Activities of daily living; Clinical efficacy; Meta-analysis.

Contributions of each author
Author 1 - Guangyu Xu.
Email: 544073964@qq.com
Author 2 - Qian Zhang.
Author 3 - Zhengang Qiu.
Email: qzg_2002@163.com