



REVIEW ARTICLE

Influence of the breathing pattern on the learning process: a systematic review of literature[☆]



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KEYWORDS

Mouth breathing;
Learning;
Reading;
Writing;
Mathematics

Abstract

Introduction: Mouth breathing leads to negative consequences on quality of life, especially in school-age children.

Objective: To determine whether the breathing pattern influences children's learning process.

Methods: This systematic review was carried out according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) instructions, with no restrictions regarding the year of publication and language, created based on the clinical question formulation according to the Problem/Patient/Population, Intervention/Indicator, Comparison, Outcome (PICO) strategy: "Is the mouth-breathing child more likely to have learning disabilities when compared to nasal breathers?" in the SciELO, PubMed, LILACS, and Scopus electronic databases. Google Scholar was used to search the gray literature. The keywords "learning," "mouth breathing," and their equivalent terms in Portuguese were used in an integrated manner. The studies included in the review were observational, conducted with schoolchildren aged 7–11 years. Afterwards, the studies were evaluated regarding their methodological quality. The research was performed by two eligible reviewers.

Results: A total of 357 records were obtained, of which 43 records were duplicate. After applying the eligibility criteria, ten articles were included in the research scope. Half of the studies used a control group and otorhinolaryngological assessment, whereas a minority used validated (20%) and sample calculation protocols (10%). The evaluation procedures were varied. Overall, 80% of the articles showed a higher incidence of learning disabilities among mouth breathers.

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PALAVRAS-CHAVE

Respiração bucal;
Aprendizagem;
Leitura;
Escrita;
Matemática

Conclusion: This systematic review has shown that mouth breathers are more likely to have learning difficulties than nasal breathers.

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A influência do modo respiratório no processo de aprendizagem: uma revisão sistemática da literatura

Resumo

Introdução: A respiração oral traz consequências negativas para a qualidade de vida das pessoas, principalmente para escolares.

Objetivo: Verificar se o modo respiratório influencia no processo de aprendizagem infantil.

Método: Esta revisão sistemática foi realizada seguindo as instruções PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*), sem restrição quanto ao ano de publicação e idioma, elaborada a partir da formulação de questão clínica elaborada pela estratégia P.I.C.O.: "A criança respiradora oral tem mais chances de apresentar dificuldades de aprendizagem quando comparada à respiradora nasal?", nas bases de dados eletrônicas SciELO, PubMed, LILACS e Scopus. Foi utilizado o *Google Scholar* para pesquisa da literatura cinza. As palavras-chave "aprendizagem", "respiração bucal", "learning" e "mouth breathing" foram utilizadas de forma integrada. Os estudos incluídos foram observacionais, realizados com escolares entre sete e onze anos. Em seguida, os estudos foram avaliados quanto à sua qualidade metodológica. Toda a pesquisa foi realizada por dois revisores de elegibilidade.

Resultados: Foram obtidos 357 registros, sendo 314 blindados (43 registros em duplicidade). Após os critérios de elegibilidade, dez artigos integraram o escopo desta pesquisa. Metade dos estudos usou grupo controle e fez uso de avaliação otorrinolaringológica, a minoria fez uso de protocolos validados (20%) e de cálculo amostral (10%). Os procedimentos de avaliação foram variados. De forma geral, 80% dos artigos evidenciaram maior ocorrência de distúrbio de aprendizagem em respiradores orais.

Conclusão: Esta revisão sistemática demonstrou que indivíduos com respiração oral apresentam maior tendência de dificuldades na aprendizagem do que os nasais.

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Introduction

Learning disorders may occur due to multifactorial reasons, among which are auditory information processing alterations,^{1,2} attention deficit, interpersonal relationship difficulties, behavioral disorders, cognitive deficits, disadvantaged socioeconomic background,³ family history of learning difficulties and disabilities,⁴ as well as others, such as mouth breathing – which can compromise learning.⁵

When breathing is performed only through the mouth, it can be considered a pathological adaptation resulting from difficulty of breathing through the nose,⁶ and it results in the inspiration of a drier, unfiltered air, at a colder or warmer temperature than the expected, which ultimately overwhelms the tonsils and the larynx and can cause chronic inflammation. If such pathological adaptation occurs over a long period, it can result in tonsillar hypertrophy and subsequently, varying degrees of upper airway obstruction. Thus, there will be resistance to gas flow, permanent increase in energy expenditure, and adaptations that are structural

(high-arched palate and dental malocclusion) and functional (orofacial muscle flaccidity, dysphonia, and sleep apnea, for instance), that can impair the quality of sleep, mood, behavior, and school performance,⁷ although there is no significant scientific evidence to support the association between the altered breathing pattern and learning difficulties.

Considering the high prevalence of mouth breathing in childhood⁸ and the possibility of its impact on learning, this study was designed in order to verify, through a systematic review of the literature, whether this breathing pattern influences children's learning process.

Methods

The methodological approach used in this review follows, including article search strategy and eligibility criteria, the data collection phase, and analysis. This systematic review was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.⁹

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