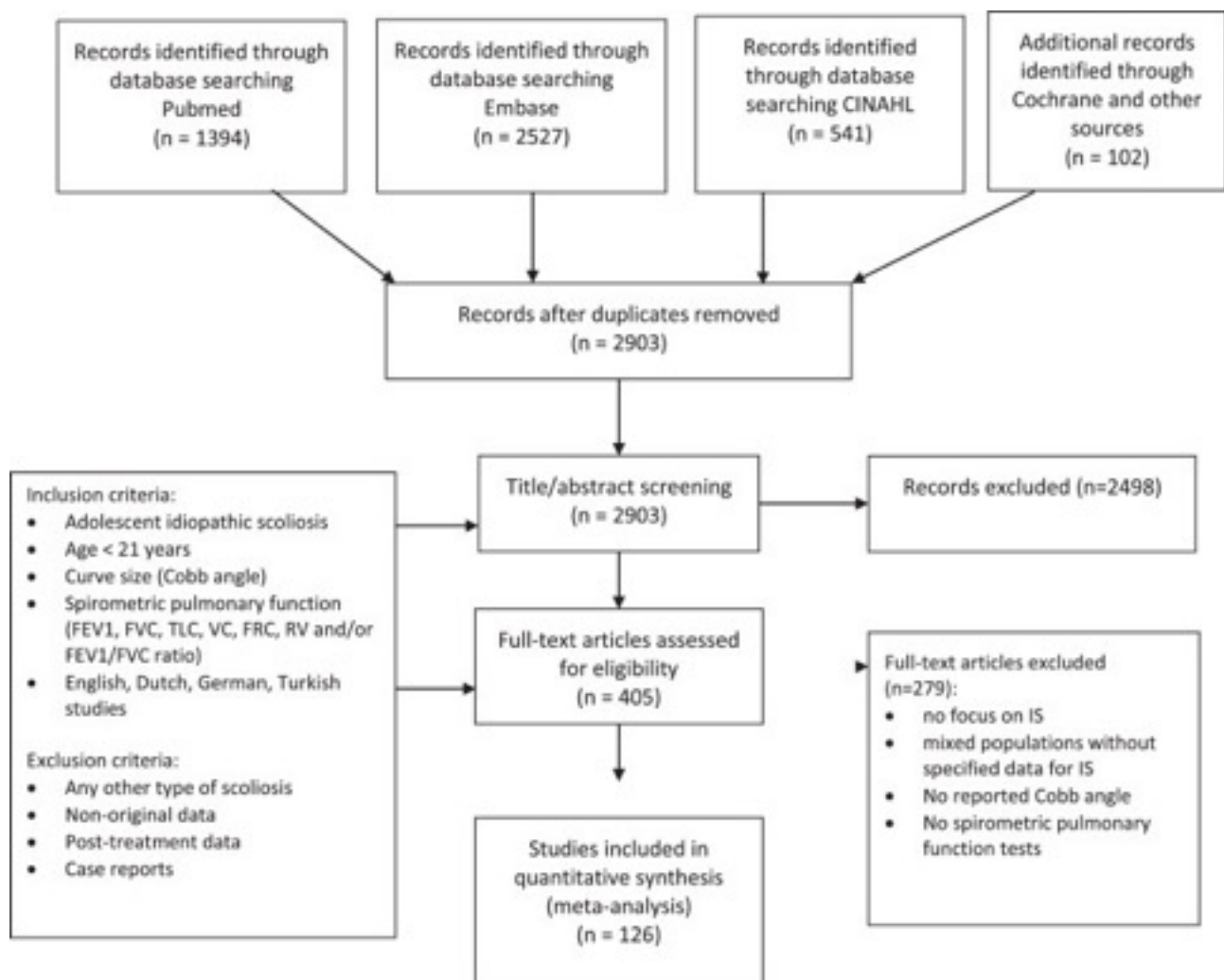


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# Pulmonary function in children and adolescents with untreated idiopathic scoliosis: a systematic review with meta-regression analysis

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# Abstract

## BACKGROUND CONTEXT

One of the controversies in untreated idiopathic scoliosis is the influence of curve size on respiratory function. Whereas scoliosis patients with curves over 90 to 100 degrees are agreed to be at risk for cardiorespiratory failure in later life, the impairment of curves below 90 degrees is generally considered mild. Although various studies showed that pulmonary function is affected in patients with scoliosis, quantification of the relation between curve size and pulmonary function is lacking.

## PURPOSE

This systematic review with meta-regression analysis aims to characterize the relation between pulmonary function tests and scoliosis severity in children and adolescents with idiopathic scoliosis.

## STUDY DESIGN

Systematic review with meta-regression analysis.

## METHODS

Pubmed, Embase, Cochrane, and CINAHL were systematically searched until November 3, 2020, for original

articles that reported (1) severity of scoliosis quantified in Cobb angle, and (2) pulmonary function tests in children and adolescents with untreated idiopathic scoliosis. Exclusion criteria were other types of scoliosis, non-original data, post-treatment data, and case reports. All study designs were included, and relevant study details and patient characteristics were extracted. The primary outcome was the effect of Cobb angle on pulmonary function as expressed by the slope coefficient of a linear meta-regression analysis.

## **RESULTS**

A total of 126 studies, including 8,723 patients, were retrieved. Meta-regression analysis revealed a statistically significant inverse relation between thoracic Cobb angle and absolute and predicted forced vital capacity in 1 second, forced vital capacity, vital capacity, and total lung capacity. For these outcomes, the slope coefficients showed a decrease of 1% of the predicted pulmonary function per 2.6 to 4.5 degrees of scoliosis. A multivariable meta-regression analysis of potential confounders (age, year of publication, and kyphosis) hardly affected the majority of the outcomes.

## **CONCLUSION**

This meta-regression analysis of summary data (means) from 126 studies showed an inverse relationship between the thoracic Cobb angle and pulmonary function. In contrast to previous conclusions, the decline in pulmonary function appears to be gradual over the full range of Cobb angles between  $<20$  and  $>120$  degrees. These findings strengthen the relevance of minimizing curve progression in children with idiopathic scoliosis.

## **Keywords**

Cobb angle  
Relationship  
Adolescents  
Idiopathic scoliosis  
Meta-regression  
Pulmonary function

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