



A Meta-Analysis of BMI and Dental Caries in Children

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Introduction

There is a high prevalence of early childhood caries and childhood obesity.. One in four children are affected by dental caries. Many studies have concluded that ECC is a multifactorial disease caused by many factors such as poor oral hygiene, socioeconomic status (SES), obesity, poor diet, and oral microbiome. Obesity rates in both children and adolescents have only risen in the last two decades: 18.4% of children between 2-19 were considered obese and 5.2% had severe/morbid obesity. Therefore, it is important to understand if there is a causal relationship that may provide improved treatment modalities. The aim of this meta-analysis was to determine the relationship between BMI and incidence of dental cares as quantified by DMFT (decayed, missing or filled teeth) in children between the ages of 2 and 17.

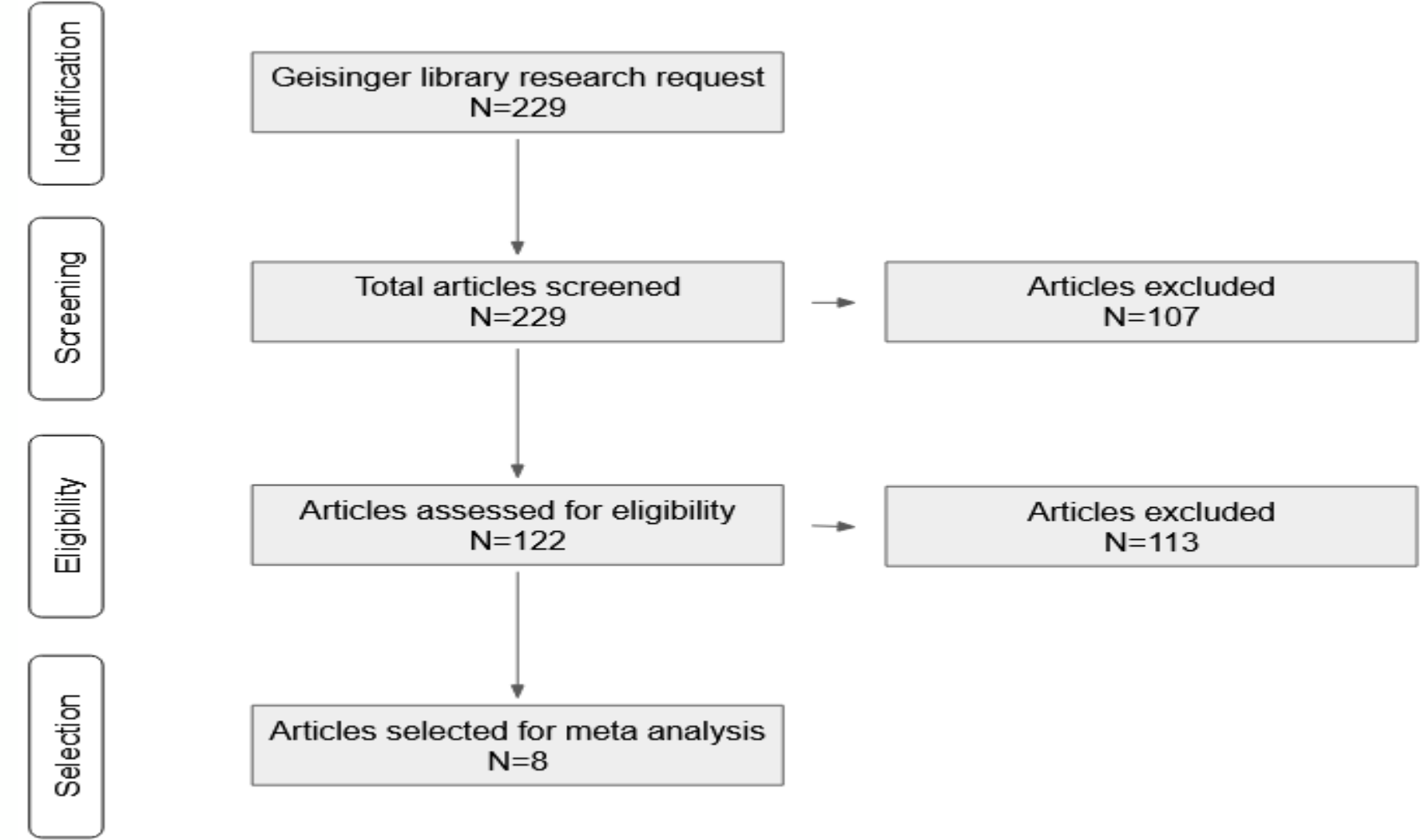


Figure 1. Flow diagram of study selection.

Methods and materials

A literature search of published articles was performed in OVID Medline between 2000 and 2023. Studies included were: 1) Observational studies and 2) Articles that studied the DMFT and BMI in children between 3 and 18. The exclusion criteria were: 1) Studies that had unclear definition on BMI subgroups and 2) Studies that did not report sufficient summary statistics for the analysis. Meta-analyses were conducted for each included continuous outcome using random-effects model. The overall mean from studies reporting a single mean with corresponding 95% CI (Confidence Interval) were estimated using the inverse variance method. Each included study’s pooled estimates and measures of variability were used to generate forest plots.

Results

The initial search yielded 229 articles. After duplicates were removed, 112 remained. The citations of each included article were checked for any studies that meet inclusion criteria and were not already in the initial data search. In the end, 8 articles were included in the final meta-analysis. 8 studies with 4,490 patients were included BMI categories were defined as follows: Underweight (BMI < 18.5), Normal (18.5 ≤ BMI ≤ 24.9), Overweight (25 ≤ BMI ≤ 29.9), Obese (BMI ≥ 30). The outcome of DMFT was assessed by BMI categories and the mean SD (Standard Deviation) was summarized in the forest plot (Figure 2). For each BMI category, mean DMFT values were 2.18, 2.66, 3.13, and 3.38 respectively from underweight to obese. Two studies reported outcomes for ages 3-18, two studies for ages less than 12, and 3 studies for ages greater and equal to 12 (Table 1)

Discussion

The evidence suggests that there is no significant correlation between BMI and dental caries (DMFT). While both BMI and dental caries are important health indicators, they reflect distinct aspects of health and are influenced by a range of factors. Previous studies exploring the connection between BMI and DMFT have produced inconclusive or contradictory findings, with some studies suggesting a weak association while others showing no meaningful correlation. Nevertheless, it is crucial to acknowledge the limitations inherent in BMI assessment, including its inability to differentiate muscle mass accurately, its estimation of body fat, and its oversight of overall body composition. Therefore, addressing dental caries requires case by case interventions that focus on promoting good oral hygiene practices, reducing sugar consumption, and improving access to routine dental care, rather than solely relying on BMI as a predictive factor.

Table 1. DMFT and BMI categories by age subgroups.

Subgroup	Underweight	Normal	Overweight	Obese
Overall: 3-18	2.14 [1.92, 2.36]	2.00 [1.24, 2.76]	5.23 [0, 11.08]	2.98 [1.91, 4.05]
Age < 12	2.24 [1.94, 2.54]	4.05 [0.76, 7.34]	3.23 [1.92, 4.53]	3.43 [2.42, 4.45]
Age >= 12	2.39 [1.22, 3.56]	-	2.83 [1.70, 3.97]	3.75 [2.55, 4.95]

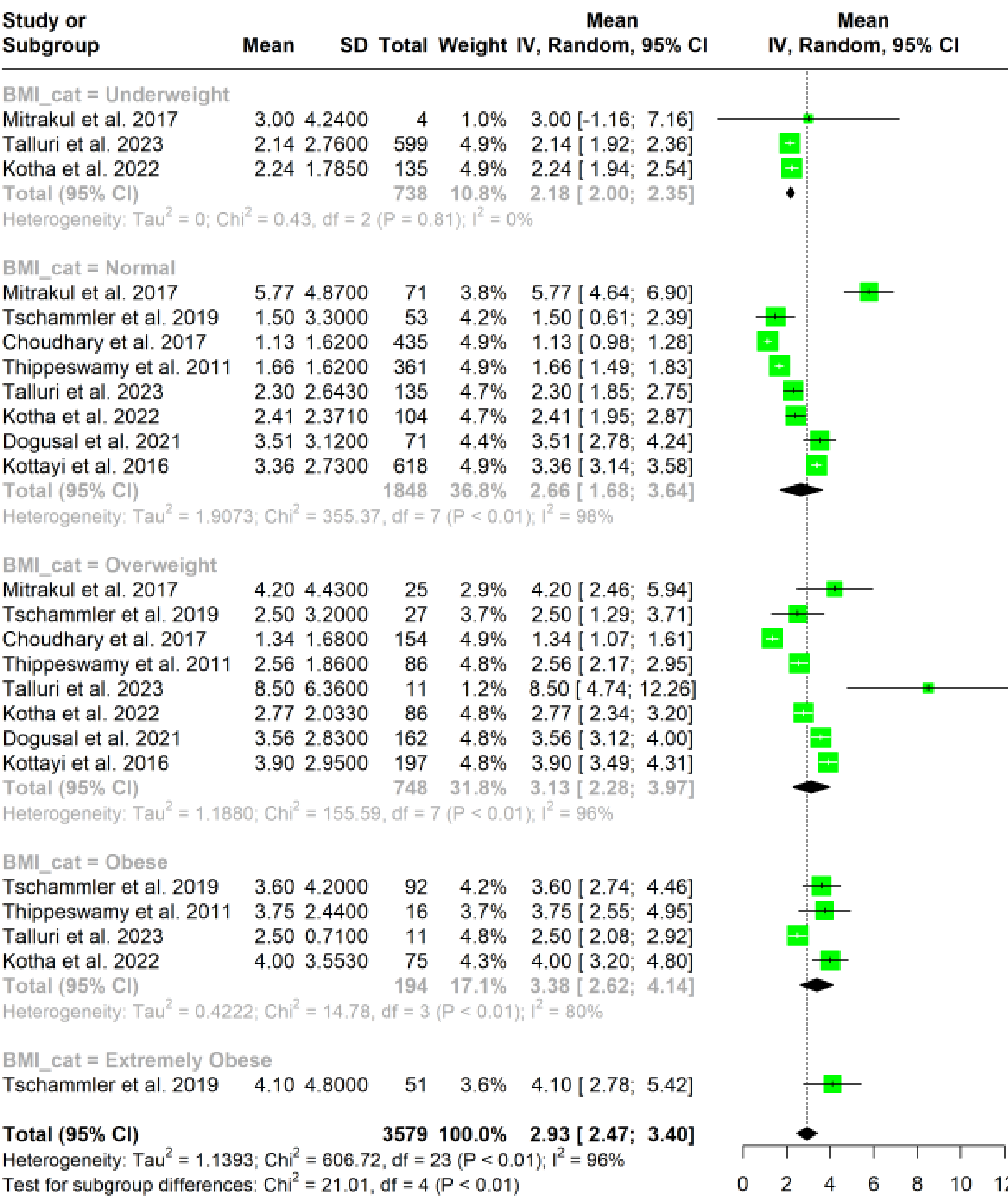


Figure 2. Forest plot of DMFT by BMI categories

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