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Review Article

Association Between Type 1 Diabetes Mellitus and Dental Caries in Children: A Systematic Review

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Abstract

Background: Diabetes mellitus is one of the diseases with chronic prevalence. Keep going increased, not only in adults but also in children. Diabetes mellitus type 1, the most common, occurs in children. Dental caries is an infection caused by metabolizing bacteria Streptococcus mutans, and Lactobacilli that convert carbohydrates into acid that damages tooth enamel. Diabetes can cause changes in saliva composition and flow. Saliva is vital in guarding a healthy tooth by neutralizing acid and providing minerals for remineralizing tooth enamel. Method: A systematic review was done by reviewing research through English data sources Pub Med, Proquest, Cochran, and Wiley. Four studies were included according to the inclusion criteria. Result: The results of a review of these four journals showed that children aged 6-18 who have type 1 or type 2 diabetes mellitus have a higher risk of developing dental caries or dental diseases. Children with diabetes are predisposed to have more glucose in their saliva. High glucose can become a source of nutrition for bacteria cariogenic, which contributes to the formation of plaque and acids that damage teeth. Conclusion: Diabetes mellitus is a risk factor for oral health. Diabetes Mellitus had a significant correlation with dental caries in children.

Keywords: Diabetes Mellitus, Children.

Introduction

Diabetes mellitus is one of the chronic diseases that the prevalence keeps increasing, not only in adults but also in children. Diabetes mellitus type 1 is the most common type that occurs in children. It is characterized by the failure of insulin production by the pancreas, which causes chronic hyperglycemia. Condition hyperglycemia This can cause various complications, one of them is enhancement risk incident caries tooth [1].

Dental caries are disease infections caused by metabolizing bacteria Streptococcus mutans and Lactobacilli carbohydrates become acid, which then damages tooth enamel [2]. Children with diabetes mellitus risk more tall experiencing caries tooth for several reasons. First, levels of high glucose in the blood can increase the rate of glucose in saliva, creating more environment conducive to the growth of bacteria. Second, diabetes mellitus can influence the flow and composition of saliva, reducing effect saliva's protective effect on teeth [3,4].

This matter is caused by the influence of hyperglycemia's chronic effects on oral flora and salivary function, as well possibility of changing patterns of eating and habits of clean mouth in children with diabetes. Additionally, control of poor glycemia in children with diabetes mellitus relates to the high incidence of caries [5,6].

Diabetes can cause changes in saliva composition and flow. Saliva works important in guarding the healthy tooth by neutralizing acid and providing minerals for the remineralization of tooth enamel. Decline frequent flow of saliva (xerostomia). Experienced by diabetics, which causes condition mouth to become more dry and vulnerable to caries[7,8].

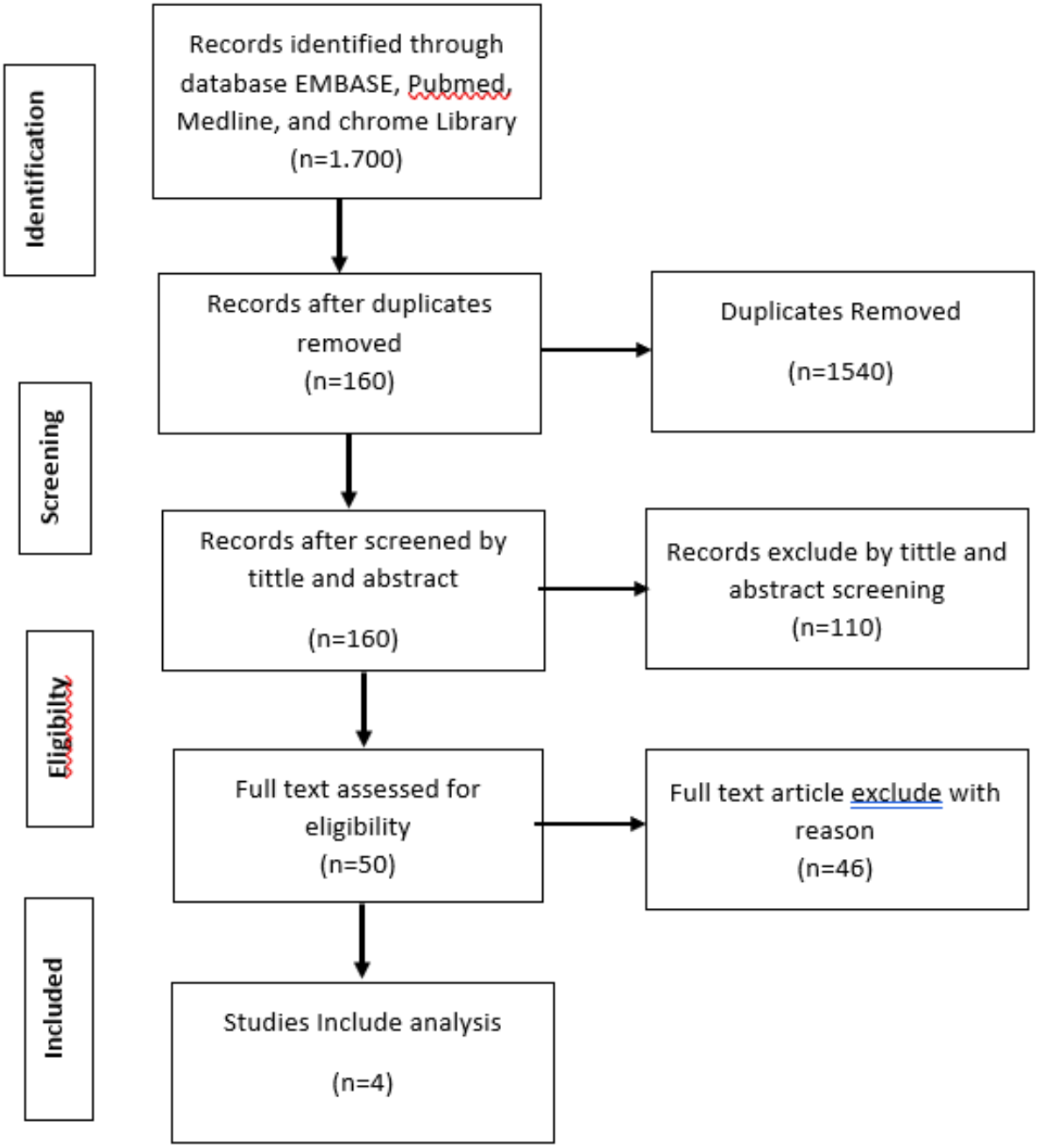
Studies emphasize the importance of monitoring a healthy mouth in a way periodically in children with diabetes mellitus, as well as necessary intervention more prevention intensive to reduce the risk of caries. Therefore that is important for power medical and elderly to understand the connection between diabetes mellitus and caries tooth to increase the quality of life for children suffering from diabetes mellitus.

Methods

This research method is a systematic review that is carried out systematically using the Preferred Reporting Items for Systematic Reviews and Metanalysis method (PRISM). Search review studies through Pub Med, Proquest, Cochran, and Wiley databases, in English. Keywords Diabetes Mellitus and dental caries. The

strategy used in the search for articles using the Picos Framework consists of

1. Population: children with diabetes Mellitus type I or diabetes Mellitus type II for at least a year
2. Intervention: deft or DMF-T
3. Result: Children with Diabetes Mellitus had a higher risk of dental caries
4. Study design is the research design used in the articles reviewed, namely: cross-sectional and observational study from January 2019 to June 2024



An article search was carried out according to keywords and inclusion criteria, there were 1700 articles found but after evaluation 50 articles met the inclusion criteria. Then 4 articles are rated quality, which can be seen in Chart 1

Table 1: Summary Of Results for A Systematic Review

Author, Year of Publication	Country	Purpose	Design	N	Range of Age	Result
(Pachoński et al., 2020)	Poland	investigating the association between caries, periodontal diseases, and diabetes among children using dental indices	Cross-sectional study	50 children	10-18 yo	Children with poorly controlled type 1 diabetes were characterised by a significantly higher intensity of caries.
(Afzal et al., 2022)	Lahore	To compare the dental caries and gingival bleeding status among diabetic and non-diabetic type 2 children Design	Cross sectional study	400 children	6-18 yo	Among non-diabetic subjects, there were 191 (47.8%) males and 209 (52.2%) females respectively and among diabetic subjects, there were 198 (49.5%) males and 202 (50.5%) females respectively. Prevalence of teeth with dental caries among Non-diabetic subjects was found to be 87% (350) whereas among diabetic subjects, it was found to be 93% (371)
(Gunasekaran et al., 2022)	Melbourne	To investigate the oral health of children and adolescents with type 1 diabetes (T1D) and its associations with diabetes-related and lifestyle factors	Cross-sectional study	80 children	8-18 yo	Poor oral health is common in children with Diabetes Melitus Type I, regardless of HbA1c. Given potential implications for short- and long-term systemic health.
(Awad et al., 2021)		To assess oral health status in relation to diabetes-related variables in a cohort of children and adolescents with type 1 diabetes mellitus (T1DM)	Cross-sectional study		6-17 yo	Significantly higher frequency of patients had fair oral hygiene and moderate gingivitis (P<0.001), there was significant increase in primary dental caries in children diagnosed with diabetes before six years (P=0.004). Patient's age was positively correlated with SSFR, gingival-index and DMFT-index

This study included 4 articles in the analysis the features outlined in Table 1, provide a comprehensive summary of the reason for dental health in individuals 6-18 years old with Diabetes Mellitus Type II and Type II and who had dental caries.

Review results from 4 journals showing Diabetes Mellitus type I and type II have a significant relationship with the number of incident caries. Children with Diabetes have a higher risk higher for those affected by Caries compared with children who don't have a history of illness caries

Discussion

Dental caries is a problem with significant health outcomes in children and their prevalence is high in various countries, including Indonesia. Diabetes in children also shows enhancement prevalence, and conditions This can worsen the risk happen caries tooth. Therefore that is important to increase awareness about the connection between diabetes and a healthy mouth, as well importance guard a clean mouth and good diabetes control to prevent Health.

Consumption of foods and drinks that are high in sugar can increase the risk of caries Because bacteria inside the mouth ferment the sugar to become acid that damages the tooth enamel [9]. Children with diabetes predisposed own rate more glucose tall in their saliva. High glucose This can become a source of nutrition for bacteria cariogenic like *Streptococcus mutants*, which contribute to the formation of plaque and acids that damage tooth enamel [10].

Children with diabetes and the elderly must be given education about the importance guard cleanliness good mouth and live inspecting teeth in a way routine. Education This covers technique brushing correct gear, usage of thread teeth, and a healthy diet that is low in sugar. Children with diabetes and the elderly must be given education about the importance guard cleanliness good mouth and inspecting teeth in a way routine. Education This covers technique brushing correct gear,

usage of thread teeth, and a healthy diet that is low in sugar [11]

The result of a systematic review of 4 articles on children who have diabetes mellitus against the number of incident caries. Journal with sample study as many as 400 children aged 6-18 years who have diabetes disease outcome show me that the prevalence of teeth with dental caries among non-diabetic subjects was found to be 87% (350) whereas among diabetic subjects, it was found to be 93% (371). The prevalence of teeth without dental caries was found to be 13% (50) among non-diabetic subjects whereas among diabetic subjects, it was found to be 7% (29).

The results of research conducted by Pachonski in Polan show that The DMFT index was used to determine the level of dental caries among the participants of the study. The highest DMFT value (14) was observed in the children with diabetes mellitus group. In the WC and group control, the highest DMFT values were 11 and 9, respectively. The lowest value in all studied children was 0. Statistical analysis - sis revealed a significant difference between the DMFT values in the PC and WC groups (post-hoc test p = 0.04). The Average value in the group child with diabetes is 5.80 while in the control group, it is 3.88 [5].

Research Gunasekaran in Melbourne, Australia 2022 shows result that Over half, 47/80 (58.7%) of the participants experienced dental caries. When early lesions were excluded, 20/80 (25.0%) of participants had advanced carious lesions for nine participants, of whom five had carious lesions extending radiographically into dentine. Caries prevalence across the different age groups were: 8–10 years (9/11, 81.8%), 11–14 years (25/41, 61.0%), and the 15–18 years (13/28, 46.4%) age groups. Half (40/80) of the participants reported hypoglycemic episodes at least three or more times-a- week, requiring home management with rapid-acting carbohy- drates. More than half of the children 43/76 (56.6%) consumed sweets and candies several times a week or more, and 41/78 (52.6%) consumed sweet cakes and biscuits several times a week or more. A total of 24/80 (30.0%) parents reported regularly giving additional snacks either before bed or overnight to prevent a hypoglycemic episode from occurring.

The research by Awad showed that a significant increase in the prevalence of permanent dental caries (DMFT-index) was observed during the adolescence period (P=0.001), in children with longer T1DM duration (>5 years) compared to those with diabetes duration 0.5-2 years (P=0.019) and in children with poor compared to those with good glycemic control (P=0.028). A significant increase in the prevalence of primary dental caries (dft-index) was observed in children with earlier onset of T1DM (before six years of age) compared to those with age at onset of T1DM between 6-12 years (P=0.004) and in children with good compared to those with poor glycemic control (P=0.010).

Correlation analyses revealed that the patient´s age was positively correlated with SSFR, DMFT, and GI. There was a significant positive correlation between GI and age at T1DM onset and between DMFT and both T1DM duration and HbA1c level. The dft- index was negatively correlated with the patient´s age, age at onset and duration of T1DM, and HbA1c level. Among oral health-related variables, there was a significant positive correlation between OHI-S and GI and a significant negative correlation between the dft-index and both SSFR and DMFT[12]

Conclusions

The result of the review article shows that Diabetes mellitus is a risk factor for oral health. Diabetes Mellitus had a significant correlation with dental caries in children.

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