UNIVERSIDADE FEDERAL DE MINAS GERAIS
Faculdade de Odontologia
Colegiado de Pós-graduação em Odontologia

Luíza Costa Silva Freire

CONDIÇÕES BUCAIS EM CRIANÇAS E ADOLESCENTES COM DEFICIÊNCIA VISUAL: *REVISÃO SISTEMÁTICA E META-ANÁLISE*

Belo Horizonte
2021

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Dissertação apresentada ao Colegiado de Pós-graduação da Faculdade de Odontologia da Universidade Federal de Minas Gerais, como requisito parcial à obtenção do grau de Mestre em Odontologia – área de concentração em Odontopediatria

Orientadora: Profa. Dra. Raquel Gonçalves Vieira de Andrade
Coorientadora: Profa. Dra. Fabiana Vargas Ferreira

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CONDIÇÕES BUCAIS EM CRIANÇAS E ADOLESCENTES COM DEFICIÊNCIA VISUAL: REVISÃO SISTEMÁTICA E META-ANÁLISE

LUIZA COSTA SILVA FREIRE

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Prof(a). Raquel Gonçalves Vieira de Andrade – Orientadora
FO-UFMG

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FO-UFMG

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“Se podes olhar, vê. Se podes ver, repara.”

José Saramago

RESUMO

A deficiência visual (DV) é categorizada como DV à distância leve, moderada e severa ou cegueira; e DV para perto. A literatura, ainda que controversa, demonstra que os indivíduos com DV podem apresentar problemas bucais (como gengivite, cálculo, má higiene oral, cárie dentária e traumatismos dentários) com mais frequência. O objetivo deste estudo foi avaliar os principais problemas bucais de crianças e adolescentes com deficiência visual, em comparação com aqueles sem DV, através de uma revisão sistemática e metanálise. O estudo foi registrado no PROSPERO (CRD42020187777) e seguiu as diretrizes do PRISMA. As bases de dados PubMed, Web of Science, Scopus, Ovid, bem como a literatura cinzenta, foram consultadas sem restrições de idioma ou data de publicação. As buscas foram atualizadas até maio de 2021 e a estratégia PECO foi usada para identificar estudos observacionais envolvendo crianças e adolescentes com deficiência visual (DV) e aqueles sem DV para determinar e comparar seus problemas bucais. Os critérios de inclusão foram estudos observacionais (estudos de coorte, transversais e caso-controle), sendo excluídos resumos de conferências, relatos de casos e estudos cujos participantes apresentavam concomitantemente DV e outras deficiências que pudessem limitar sua capacidade de realizar a higiene bucal. Duas revisoras previamente calibradas (κ=93%) realizaram o processo de seleção dos estudos de forma independente. O risco de viés foi analisado com a ferramenta de avaliação crítica do Instituto Joanna Briggs para estudos transversais e os artigos que apresentaram metodologia homogênea foram incluídos em meta-análises. Os resultados foram relatados em odds ratio (OR), diferença padronizada das médias (SMD) ou diferença entre médias (MD), considerando-se um intervalo de confiança de 95% (IC). Do total de 1362 artigos recuperados, quinze foram incluídos, todos com delineamento transversal. A maioria dos estudos apresentou alto risco de viés. A meta-análise mostrou que que crianças e adolescentes com DV apresentaram 3.86 vezes mais chances de sofrerem traumatismos dentários do que aqueles sem DV (OR=3.86, CI=2.63 – 5.68, I2=0%). Além disso, indivíduos com DV apresentaram também piores índices de placa, com valores 0.80 maiores (MD=0.80, CI=0.58 – 1.02, I2=96%), índices gengivais 0.69 maiores (MD=0.69, CI=0.02 – 1.37, I2=100%), índices de cálculo 0.04 maiores (MD=0.04, CI=0.03 – 0.06, I2=0%), índices de higiene oral 0.71 maiores (piores) (MD=0.71, CI=0.24 – 1.18, I2=97%) e CPO-S 0.90 maiores (MD=0.90, CI=0.68 – 1.13, I2=26%). O presente estudo demonstrou que crianças e adolescentes com DV apresentaram piores desfechos de saúde bucal (maiores valores de índice para placa dentária, inflamação gengival, cálculo, higiene oral e CPO-S, além de mais chances de sofrerem traumatismos dentários) do que aqueles sem DV. É fundamental que o cirurgião-dentista esteja apto a atender pacientes com deficiência visual de maneira qualificada no atendimento primário, buscando uma abordagem individualizada e voltada para as necessidades de cada criança e seus cuidadores, visando reduzir as desigualdades em saúde bucal para este grupo.

Palavras-chave: adolescente; assistência odontológica para pessoas com deficiências; cálculos dentários; cárie dentária; criança; gengivite; higiene bucal; pessoas com deficiência visual; placa dentária; traumatismos dentários.

ABSTRACT

Oral health issues in children and adolescents with vision impairment: systematic review and meta-analysis

Vision impairment (VI) is categorized as mild, moderate and severe distance VI or blindness; and near VI. Despite controversies, the literature demonstrates that individuals with VI may present oral health issues (such as gingivitis, calculus, poor oral hygiene, tooth decay and dental trauma) more often. The aim of this study was to assess the main oral health issues of children and adolescents with vision impairment (VI), compared to those without VI, through a systematic review and meta-analysis. The study was registered at PROSPERO (CRD42020187777) and followed PRISMA guidelines. The PubMed, Web of Science, Scopus and Ovid databases, as well as the gray literature, were searched without language or publication date restrictions. The searches were updated up to May 2021 and the PECO strategy was used to identify observational studies involving children and adolescents with visual impairment (VI) and those without VI to determine and compare their oral health issues. Inclusion criteria were observational studies (cohort, cross-sectional and case-control studies), while conference abstracts, case reports and studies whose participants had concomitant VI and other deficiencies that could limit their ability to perform oral hygiene were excluded. Two previously calibrated reviewers (κ=93%) performed the study selection process independently. The risk of bias was assessed with the Joanna Briggs Institute critical appraisal tool for cross-sectional studies and the articles that had homogeneity of the methods were incorporated into meta-analyses. The results were reported as odds ratio (OR), standardized mean difference (SMD) or mean difference (MD), considering a 95% confidence interval (CI). Of the total of 1362 articles retrieved, fifteen were included, all with a cross-sectional design. Most studies had a high risk of bias. The meta-analysis showed that children and adolescents with VI were 3.86 times more likely to exhibit dental trauma than those without VI (OR=3.86, CI=2.63 – 5.68, I2=0%). In addition, individuals with VI also had worse plaque indices, with values 0.80 higher (MD=0.80, CI=0.58 – 1.02, I^2=96%), gingival indices 0.69 higher (MD=0.69, CI=0.02 – 1.37, I^2 =100%), calculus indices 0.04 higher (MD=0.04, CI=0.03 – 0.06, I^2=0%), oral hygiene indices 0.71 higher (poorer) (MD=0.71, CI=0.24 – 1.18, I^2=97 %) and DMFS 0.90 higher (MD=0.90, CI=0.68 – 1.13, I^2=26%). The present study demonstrated that, across a wide array of assessments, children and adolescents with VI had worse oral health outcomes (higher index values for dental plaque, gingival inflammation, calculus, oral hygiene and DMFS; and higher risk of exhibiting dental trauma) than those without VI. Dental surgeons must be able to treat patients with vision impairment and address their needs in primary care, seeking an individualized approach and focused on the needs of each child and their caregivers, aiming to reduce inequalities in oral health for this group.

Keywords: adolescent; child; dental calculus; dental care for disabled; dental caries; dental plaque; gingivitis; oral hygiene; visually impaired persons; tooth injuries.

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LISTA DE ABREVIATURAS E SIGLAS

BDTD	Biblioteca Digital Brasileira De Teses E Dissertações
CBO	Conselho Brasileiro De Oftalmologia
CEO	Centro De Especialidades Odontológicas
ceo-d	Dentes Decíduos Cariados, Extraídos Por Cárie Ou Obturados
ceo-s	Superfícies Cariadas, Perdidas Ou Obturadas De Dentes Decíduos
CID-11	Classificação Internacional De Doenças, 11ª Revisão
CPO-D	Dentes Permanentes Cariados, Perdidos Ou Obturados
CPO-S	Superfícies Cariadas, Perdidas Ou Obturadas De Dentes Permanentes
DP	Desvio Padrão
DV	Deficiência Visual
EUA	*Estados Unidos Da América*
FDI	Federação Dentária Internacional
IBGE	Instituto Brasileiro De Geografia E Estatistíca
IC	Intervalo De Confiança
MD	*Mean Difference*
MESH	*Medical Subjects Heading*
OMS	Organização Mundial De Saúde
OR	*Odds Ratio*
PECO	*Population; Exposure; Comparison; Outcome*
PNS	Pesquisa Nacional De Saúde
PRISMA	*Preferred Reporting Items For Systematic Reviews And Meta-Analyses*
SMD	*Standarized Mean Difference*
SUS	Sistema Único De Saúde

LISTA DE SÍMBOLOS

%	Porcentagem
®	Marca registrada
K	Kappa
≥	Maior ou igual a

SUMÁRIO

1 CONSIDERAÇÕES INICIAIS

1.1 Conceito

A visão possui um papel fundamental em todos os aspectos e fases da vida, visto que é o mais dominante dos cinco sentidos e permeia as interações interpessoais, sistemas de educação, esportes, comunicação social e muitos outros aspectos da vida contemporânea (OMS, 2019). Desde o nascimento, a capacidade de enxergar desempenha um papel crítico nas atividades cotidianas. Contribui para o desenvolvimento cognitivo, de habilidades motoras, da coordenação e do equilíbrio; possibilita o acesso imediato a materiais educacionais, permitindo melhores resultados acadêmicos; facilita o desenvolvimento de habilidades sociais e participação em esportes; aumenta a produtividade no trabalho, reduzindo a desigualdade; ajuda no gerenciamento de outras condições de saúde, no contato social e na independência e contribui para a saúde mental e bem-estar (Burton *et al*., 2021; OMS, 2019). A perda da visão, por sua vez, traz sérias consequências ao longo da vida, com limitações e restrições que podem afetar a autonomia do indivíduo e aumentar sua necessidade de atenção e assistência (Burton *et al*., 2021).

A deficiência visual (DV) ocorre quando o sistema visual e uma ou mais de suas funções de visão são afetados por uma condição ocular (OMS, 2019). Normalmente, a DV é mensurada usando exclusivamente a acuidade visual, principalmente se tratando de pesquisas de base populacional. A acuidade visual refere-se à capacidade de reconhecer detalhes em um ponto de fixação e é expressa como uma medida angular, geralmente mensurada como distância e/ou acuidade próxima (OMS, 2019). Existem diferentes formas de se expressar a acuidade visual, sendo a notação decimal e a Escala Optométrica de Snellen as mais comuns no Brasil (BRASIL, 2004; BRASIL, 2008). Assim, de acordo com a última Classificação Estatística Internacional de Doenças e Problemas Relacionados à Saúde (CID-11), a gravidade de uma deficiência visual é categorizada como DV à distância leve, moderada ou severa ou cegueira; e DV para perto (QUADRO 1) e pode ocorrer como uma deficiência isolada ou associada a outras deficiências de desenvolvimento, como paralisia cerebral, síndrome de Down e deficiência auditiva severa. (Batshaw *et al*., 2013).

Quadro 1 — ICD-9D90 *Vision impairment including blindness - International Classification of Diseases 11th Revision* (Classificação Internacional de Doenças – Prejuízos na Visão incluindo a cegueira - adaptada)

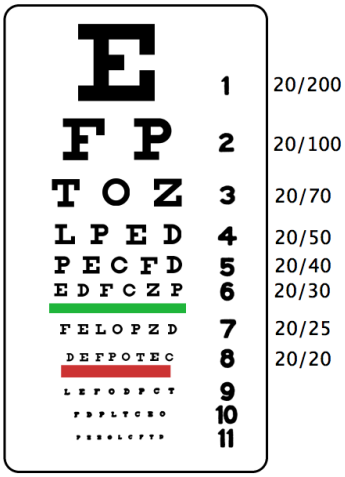
Categorias		**Apresentando acuidade visual à distância – pior que**	**Igual ou Melhor que**
0 - Sem prejuízo visual			6/12 5/10 (0,5) 20/40
1 – Com prejuízo visual suave		6/12 5/10 (0,5) 20/40	6/18 3/10 (0,3) 20/70
2 – Com prejuízo visual moderado		6/18 3/10 (0,3) 20/70	6/60 1/10 (0,1) 20/200
3 – Com prejuízo visual severo		6/60 1/10 (0,1) 20/200	3/60 1/20 (0,05) 20/400
4 - Cegueira		3/60 1/20 (0,05) 20/400 Percepção de luz	1/60 1/50 (0,02) 5/300 (20/1200) Ou contagem de dedos/metros
5 - Cegueira		1/60 1/50 (0,02) 5/300 (20/1200)	Percepção de luz
6 - Cegueira		Sem percepção de luz	
9		Indeterminada ou inespecífica ou conta os dedos a um metro	
Categoria perto		Apresentando uma acuidade visual de perto Pior que N6 ou M 0,8 com correção	

Fonte: OMS, 2019, p.11 (adaptada).

A baixa visão é considerada uma deficiência visual moderada a severa. Ela ocorre quando o valor da acuidade visual (capacidade de reconhecer um objeto à uma distância preestabelecida) é menor que 0,3 na notação decimal ou 20/70 na Escala Optométrica de Snellen e ≥ a 0,05 ou 20/400, ou quando existe uma perda de campo visual (amplitude da área alcançada pela visão) que chega a menos de 20°, no melhor

olho com a melhor correção possível (FIGURA 1). É considerado cegueira quando esses valores encontram-se abaixo de 0,05 ou 20/400 na Escala Optométrica de Snellen, ou uma perda de campo visual que chega a menos de 10°, no melhor olho com a melhor correção possível (OMS, 2019).

Figura 1 — Escala Optométrica de Snellen



Fonte: BRASIL, 2008, p.18.

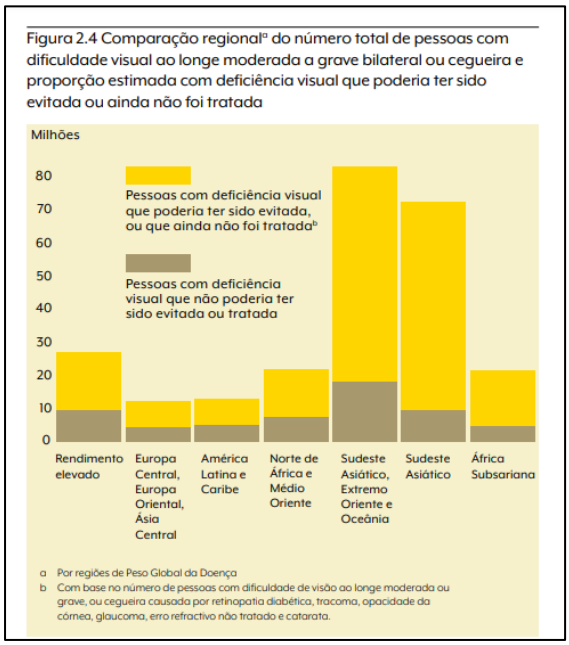
1.2 Prevalência

Aproximadamente, 596 milhões de pessoas no mundo tinham deficiência visual à distância em 2020, das quais 43 milhões eram cegas, sendo que a maior parte (90%) das pessoas afetadas vive em países de baixa e média renda (Burton *et al*., 2021). Estima-se que até 2050, fatores como a urbanização e o crescimento e envelhecimento geral da população, possam levar a cerca de 895 milhões de pessoas com deficiência visual à distância, das quais 61 milhões serão cegas (Burton *et al*., 2021).

Os dados de prevalência sobre DV em crianças e adultos com idade inferior a 40 anos são escassos e, no caso de crianças e adolescentes, consistem principalmente de pesquisas em escolas especiais (Gilbert, 2007; Burton *et al*., 2021). A prevalência de cegueira nessa faixa etária é menor (3 por 10.000 crianças em países de alta renda, 10 a 15 por 10.000 em países de baixa renda) e a mensuração da acuidade visual em crianças pequenas é desafiadora (OMS, 2007; CBO, 2019; Burton *et al*., 2021). A estimativa para 2020, foi de 1,44 milhões de crianças e adolescentes

de 0 a 14 anos com cegueira e 22,16 milhões com baixa visão, sendo que quase metade (45,6%) de todas as crianças cegas vivem no Sul da Ásia ou na África Subsaariana Ocidental (OMS, 2007; Burton *et al*., 2021). Fatores como nutrição inadequada, abastecimento de água e saneamento deficientes, falta de medicamentos essenciais, práticas culturais potencialmente prejudiciais (uso de remédios tradicionais) e baixo nível de escolaridade materna podem influenciar a ocorrência de cegueira em crianças e adolescentes (Gilbert, 2007). Em consonância com o supracitado, de acordo com a Organização Mundial de Saúde através do Relatório Mundial sobre a Visão (2019), há uma variação considerável na distribuição de indivíduos que apresentam DV entre as regiões e o nível de rendimento do país. De acordo com essas estimativas, a prevalência de cegueira bilateral em regiões de rendimento médio ou baixo da África Subsaariana Ocidental e Oriental (5,1%) e Sul da Ásia (4,0%) é relatada como sendo oito vezes superior à de todos os países de rendimento elevado (OMS, 2019) (FIGURA 2).

Figura 2 — Relação entre deficiência visual e rendimento do país



Fonte: OMS, 2019, p.33.

No Brasil, a deficiência visual é a mais representativa na população, com uma proporção de 3,6%, dentre as deficiências investigadas (física, intelectual, auditiva e visual) segundo dados da Pesquisa Nacional de Saúde (PNS) realizada em 2013, sendo que 16% da população com DV não conseguia realizar as atividades cotidianas

habituais ou apresentou grau intenso ou muito intenso de limitações na mesma pesquisa (IBGE, 2015). De acordo com o Conselho Brasileiro de Oftalmologia, a estimativa de um valor médio de prevalência de cegueira infantil para o Brasil é entre 0,5 e 0,6 por mil crianças, o que corresponderia a um intervalo de 24.250 a 29.100 crianças e adolescentes cegos dentre os 48,5 milhões de crianças e adolescentes brasileiros de 0 a 14 anos em 2014 (CBO, 2019).

1.3 Comprometimento causado pela DV

Embora o número de crianças e adolescentes cegos seja mais baixo que o de adultos e idosos na mesma condição, sua expectativa de vida é maior. Quando o número de crianças cegas é multiplicado pela sua expectativa de vida, têm-se uma estimativa de 75 milhões de anos vividos com cegueira, um número menor apenas do que o número de anos vividos com cegueira por catarata em idosos (OMS, 2007). Caso ocorra precocemente, a deficiência visual pode impactar negativamente no desenvolvimento físico, neuropsicomotor, cognitivo, social e emocional da criança logo no início da vida, gerando atrasos na fala, linguagem, locomoção, comportamento e socialização e dificultando a inclusão social de indivíduos, principalmente se as intervenções terapêuticas e educacionais precoces não forem implementadas (Batshaw *et al*., 2013). Além disso, o prejuízo visual em crianças e/ou adolescentes pode levá-las a ter menor performance escolar e apresentar menor auto-estima comparada às sem DV (OMS, 2019).

1.4 Saúde bucal de pessoas com deficiência visual

De acordo com a definição de saúde bucal proposta pela Federação Dentária Internacional (FDI) em 2016, seu caráter é multifacetado e inclui a capacidade de falar, sorrir, provar, cheirar, mastigar, engolir e transmitir diferentes emoções através de expressões faciais sem dor, desconforto ou doença do complexo craniofacial (Glick *et al*., 2016). Por constituir a saúde e o bem-estar físico e mental, a saúde bucal negativa pode prejudicar a qualidade de vida relacionada à saúde bucal e geral. Estudos

anteriores têm demonstrado que crianças com DV têm maior prevalência de problemas bucais como cárie dentária, doença periodontal e traumatismos dentários (Parkar *et al*., 2014; Singh *et al*., 2017; Tagelsir *et al*., 2013). Além da dor dentária e infecção, as consequências destes problemas bucais incluem alteração na aparência física, dificuldades na fala, problemas psicológicos e emocionais, afetando assim a qualidade de vida das crianças e de seus cuidadores (Singh *et al*., 2017; Tagelsir *et al*., 2013; Martins-Júnior *et al*., 2013; Perazzo *et al*. 2017).

1.5 Atendimento odontológico e a deficiência visual

A desigualdade em saúde bucal refere-se à forma como doenças bucais afetam desproporcionalmente os membros desfavorecidos da sociedade. Estas desigualdades são maiores dentre as pessoas com deficiência, visto que vivenciam mais frequentemente a pobreza e menos oportunidades de educação, emprego e independência em comparação com a população em geral e essas disparidades podem ser reduzidas modificando os determinantes sociais de saúde (Watt *et al*., 2015). Crianças com deficiência visual precisam receber informações e instruções sobre higiene bucal de forma diferenciada e individualizada, uma vez que sua destreza manual, geralmente, não é alterada (Rajput *et al*., 2020). Assim, os cuidadores/responsáveis têm um papel ativo no cuidado das crianças e precisam ter direito a informações e também de se sentirem capazes e motivados no cuidado de saúde bucal das suas crianças. A maioria destas crianças e adolescentes poderia e deveria ter suas necessidades odontológicas solucionadas em ambientes de atendimento primário (Atenção Primária à Saúde). Isto evidencia a necessidade de uma melhor formação e capacitação da equipe odontológica para atender as pessoas com deficiência (Watt *et al*., 2015), o que está diretamente relacionado à formação odontológica durante a Graduação. Sendo assim, este estudo se justifica pela necessidade de melhorar a base de evidências que suporta o atendimento às pessoas com deficiência, bem como definir os principais problemas bucais e dificuldades encontradas nessa população, permitindo que o planejamento de intervenções seja direcionado para a abordagem de suas reais necessidades de forma resolutiva e efetiva.

2 OBJETIVOS

2.1 Objetivo geral

Analisar, por meio de uma revisão sistemática e meta-análise, os principais problemas bucais que acometem crianças e adolescentes com deficiência visual (DV), comparados àqueles sem DV.

2.2 Objetivos específicos

- Verificar a ocorrência de placa dentária entre crianças e adolescentes com deficiência visual em comparação a um grupo sem DV;
- Verificar a ocorrência/prevalência de inflamação gengival entre crianças e adolescentes com deficiência visual em comparação a um grupo sem DV;
- Verificar a ocorrência de cálculo dentário entre crianças e adolescentes com deficiência visual em comparação a um grupo sem DV;
- Verificar condição de higiene bucal entre crianças e adolescentes com deficiência visual em comparação a um grupo sem DV;
- Verificar a ocorrência/prevalência de cárie dentária entre crianças e adolescentes com deficiência visual em comparação a um grupo sem DV;
- Verificar a ocorrência/prevalência de traumatismos dentários entre crianças e adolescentes com deficiência visual em comparação a um grupo sem DV;
- Avaliar a qualidade metodológica e homogeneidade dos estudos sobre o tema.

3 METODOLOGIA EXPANDIDA

3.1 Protocolo e registro

Esta revisão sistemática com metanálise foi registrada no Registro Internacional Prospectivo de Revisão Sistemática (em inglês, PROSPERO) sob o número de registro CRD42020187777. Esse trabalho foi conduzido de acordo com as Diretrizes de Itens Preferenciais para Revisões Sistemáticas e Meta-análises (PRISMA) (Page *et al*., 2021).

3.2 Critérios de elegibilidade

Os critérios de inclusão para esta revisão sistemática foram estudos observacionais (estudos de coorte, transversais e caso-controle). Os critérios de elegibilidade foram estabelecidos usando a seguinte estratégia PECO:

P (Population)	Crianças e adolescentes
E (Exposure)	Com deficiência visual
C (Comparison)	Crianças e adolescentes sem deficiência visual
O (Outcome)	Desfechos de saúde bucal

Foram excluídos dessa revisão resumos de conferências, ensaios clínicos controlados randomizados e não randomizados, revisões de literatura, relatos de casos e cartas ao editor, além dos trabalhos que incluíam participantes adultos/idosos. Os critérios de exclusão também compreenderam estudos cujos participantes apresentavam concomitantemente DV e outras deficiências que pudessem limitar sua capacidade de realizar a higiene bucal (deficiências intelectuais e/ou físicas, síndromes).

3.3 Fontes de busca e estratégia de pesquisa

Foram realizadas buscas nas seguintes bases de dados: *PubMed (National Library of Medicine), Web of Science (Clarivate Analytics), Scopus (Elsevier) e Ovid (Wolters Kluver)*, sendo atualizadas até maio de 2021. A estratégia de busca adotou os descritores (em inglês Medical Subject Headings – MeSH) referentes a estratégia PECO e seus sinônimos, sendo adaptada para cada base de dados eletrônica.

Para o PUBMED, a seguinte estratégia foi empregada: [“vision disorder” OR “vision impairment” OR “vision disability” OR “vision disabilities” OR “visual disorder” OR “visual impairment” OR “visual disability” OR “visual disabilities” OR “diminished vision” OR “reduced vision” OR “subnormal vision” OR “impaired vision” OR “low vision” OR blindness OR amaurosis OR “amauroses” OR “visual acuity” OR “visually impaired” OR “visually disabled” OR “defective vision” AND “oral health” OR “oral status” OR dental caries OR caries disease OR dental decay OR tooth decay OR root caries OR tooth caries OR dental injury OR dental injuries OR dental trauma OR traumatic dental injury OR traumatic dental injuries OR tooth injury OR tooth injuries OR tooth fracture OR tooth fractures OR gingivitis OR periodontitis OR “periodontal disease” OR “bleeding on probing” OR dental plaque OR bleeding gum OR periodontal pocket OR “gingival inflammation” OR gingiv* OR periodont* OR “oral hygiene” OR calculus].

Para as outras bases, a estratégia de busca foi modificada de acordo com as características de cada base. A literatura cinzenta também foi pesquisada, através do *Google Scholar* e *OpenGrey* com os descritores [“visual impairment” AND “oral health”]. Para o *Google Scholar*, a busca foi limitada às primeiras trezentas referências. Pesquisas manuais foram realizadas usando as listas de referência dos estudos incluídos. Nenhuma restrição foi imposta com relação ao idioma ou data de publicação. As referências foram gerenciadas por meio do software Endnote® (*Clarivate Analytics*, Filadélfia, EUA).

3.4 Processo de seleção dos estudos

Duas revisoras (LCSF e MOG) realizaram o processo de seleção dos estudos de forma independente. Os critérios de elegibilidade, bem como o treinamento da metodologia, foram testados em uma amostra inicial de 10% dos títulos e resumos para calibração das revisoras, utilizando o coeficiente Kappa (κ) para avaliar a concordância entre elas. O valor de κ foi de 0,93, o que indica uma excelente concordância.

A seleção dos estudos para a revisão sistemática foi realizada em duas etapas. Na primeira etapa do processo, foram avaliados os títulos e resumos dos artigos identificados durante as buscas. Os estudos que não atenderam aos critérios de elegibilidade foram excluídos e as divergências entre as duas revisoras na seleção dos estudos foram resolvidas por consenso. Na segunda etapa, o texto completo dos artigos pré-selecionados foi recuperado, bem como nos casos em que o resumo não estava disponível ou as informações contidas nele não eram suficientes para se chegar a uma conclusão. Os textos foram lidos na íntegra e os mesmos critérios de elegibilidade foram aplicados. Quaisquer divergências após esta fase foram discutidas com uma terceira revisora (FVF) para tomar a decisão final.

3.5 Extração dos dados

Foi elaborada uma planilha no Microsoft Excel® (Microsoft Corporation, Washington, EUA), na qual os dados relativos às características dos estudos foram documentados. Os seguintes dados foram extraídos independentemente por duas revisoras (LCSF e MOG): características dos estudos (autores, ano de publicação, desenho do estudo, país, amostragem, presença de estudo piloto, objetivo, calibração, perdas), detalhes sobre os participantes (faixa etária e sexo dos participantes, características sociodemográficas, tamanho da amostra), exposição (critérios de elegibilidade, tipo e critérios de classificação da deficiência visual), resultado (prevalência e média [desvio padrão] de problemas de saúde bucal, como: gengivite, cálculo dentário, higiene bucal, cárie dentária, traumatismos dentários e seus respectivos critérios diagnósticos, além de valores de p e medidas de efeito, quando

disponíveis). Nos casos de divergências ou dúvidas, uma terceira revisora foi consultada (FVF).

Os desfechos de interesse dessa revisão sistemática foram problemas relacionados à saúde bucal, coletados como variáveis discretas (valor absoluto de indivíduos apresentando o problema bucal e a prevalência do respectivo problema na população com e sem DV) ou contínuas (média e desvio padrão de cada problema avaliado na população com e sem DV) de acordo com a mensuração dos desfechos bucais.

3.6 Avaliação da qualidade metodológica

A qualidade metodológica nos estudos foi avaliada de forma independente por duas revisoras (LCSF e MOG), usando a ferramenta de avaliação crítica do *Joanna Briggs Institute* da *University of Adelaide (JBI)* (Moola *et al*., 2020) (Anexo A). Quaisquer dúvidas e discordâncias foram discutidas com uma terceira revisora (FVF). A ferramenta para estudos transversais é composta pelos seguintes itens: definição clara de critérios de inclusão e exclusão; descrição detalhada participantes, local e período de avaliação; uso de instrumento confiável e válido para a mensuração da exposição; uso de critérios objetivos e padronizados para mensurar a exposição; identificação de fatores de confusão; uso de estratégias para o controle de fatores de confusão; uso de critérios válidos e confiáveis para medir o desfecho e o uso de análise estatística apropriada. As respostas para cada item podem ser: Sim, Não, Incerto ou Não aplicável. Os itens podem ser classificados em: “baixo risco de viés” (se a resposta for “sim”), “alto risco de viés” (se a resposta for “não”) e “risco incerto de viés”.

3.7 Meta-análise

Os estudos que apresentaram homogeneidade de métodos foram incorporados à metanálise. Metanálises comparando a prevalência de traumatismos dentários e cárie dentária entre indivíduos com deficiência visual e indivíduos sem DV foram realizadas. Os resultados foram relatados em razão de chances ou ‘*odds ratio*’ (*OR*)

e intervalo de confiança de 95% (IC95%). Metanálises de dados contínuos comparando CPO-D, CPO-S, ceo-d, ceo-s, placa dentária, índice gengival, índice de higiene oral e cálculo dentário entre indivíduos com deficiência visual e indivíduos sem DV foram realizadas. Os resultados foram relatados em diferença padronizada das médias (*standarized mean difference* – *SMD*) e IC95% para meta-análise avaliando o mesmo desfecho de diferentes formas. Para metanálises avaliando o desfecho com a mesma medida/índice, a diferença entre médias (*mean difference* - *MD*) e IC95% foram determinados (Higgins *et al*., 2021). A heterogeneidade estatística foi avaliada com a estatística I^2 (Higgins *et al*., 2003).

3.7.1 Análise de sensibilidade

Para as metanálises que incluíram dados de, pelo menos, quatro estudos e apresentaram alto grau de heterogeneidade estatística, a análise de sensibilidade foi realizada na tentativa de se reduzir o I^2. Para metanálises com dados de, pelo menos, três estudos incorporados, a análise de sensibilidade também foi conduzida.

4 RESULTADOS E DISCUSSÃO

Artigo submetido e formatado de acordo com as normas do periódico Community Dentistry and Oral Epidemiology (Anexo B); Fator de impacto 2020: 3.383

ORAL HEALTH ISSUES IN CHILDREN AND ADOLESCENTS WITH VISION IMPAIRMENT: SYSTEMATIC REVIEW AND META-ANALYSIS

Luiza Costa Silva-Freire[1], Mariana Oliveira Guimaraes[1], Lucas Guimaraes Abreu[1], Fabiana Vargas Ferreira[2], Raquel Gonçalves Vieira-Andrade[1]

[1] Department of Child and Adolescent's Oral Health, School of Dentistry, Universidade Federal de Minas Gerais. Belo Horizonte-MG, Brazil.

[2] Department of Community and Preventive Dentistry, School of Dentistry, Universidade Federal de Minas Gerais. Belo Horizonte-MG, Brazil.

Luiza Costa Silva-Freire. Department of Child and Adolescent's Oral Health, School of Dentistry, Universidade Federal de Minas Gerais. Belo Horizonte-MG, Brazil. Email: luizacsf@hotmail.com

Mariana Oliveira Guimaraes. Department of Child and Adolescent's Oral Health, School of Dentistry, Universidade Federal de Minas Gerais. Belo Horizonte-MG, Brazil. Email: marianaolig@hotmail.com

Lucas Guimaraes Abreu. Department of Child and Adolescent's Oral Health, School of Dentistry, Universidade Federal de Minas Gerais. Belo Horizonte-MG, Brazil. Email: lucasgabreu01@gmail.com

Fabiana Vargas-Ferreira. Department of Community and Preventive Dentistry, School of Dentistry, Universidade Federal de Minas Gerais. Belo Horizonte-MG, Brazil. Email: fabivfer@gmail.com

Raquel Gonçalves Vieira-Andrade. Department of Child and Adolescent's Oral Health, School of Dentistry, Universidade Federal de Minas Gerais. Belo Horizonte-MG, Brazil. Email: raquelvieira.andrade@gmail.com

CONFLICT OF INTEREST

All authors declare no potential conflicts of interest in this study.

DATA AVAILABILITY STATEMENT

All relevant data are within the paper and its Supplementary files.

Corresponding author

Fabiana Vargas-Ferreira

Department of Community and Preventive Dentistry, School of Dentistry, Universidade Federal de Minas Gerais. Belo Horizonte-MG, Brazil.

Av. Antônio Carlos, 6627. Campus Pampulha / 31270-901, Belo Horizonte, MG, Brazil

E-mail: fabivfer@gmail.com

ORAL HEALTH ISSUES IN CHILDREN AND ADOLESCENTS WITH VISION IMPAIRMENT: SYSTEMATIC REVIEW AND META-ANALYSIS

ABSTRACT

Objective

The aim of this systematic review and meta-analysis was to evaluate the main oral issues of children and adolescents with vision impairment (VI) compared to those without VI.

Methods

Electronic and manual searches were performed without restrictions of language or date of publication. The PECO strategy was used to identify observational studies involving children and adolescents with VI and those without VI to determine and compare their oral issues. The methodological quality was assessed using the Joanna Briggs Institute critical appraisal tool. The studies that had homogeneity of the methods were incorporated into meta-analyses.

Results

Fifteen studies were included, all with a cross-sectional design. Overall, most studies presented methodological flaws and high risk of bias. The meta-analysis showed that children and adolescents with VI were 3.86 times more likely to exhibit dental trauma than those without VI (OR = 3.86, 95% CI = 2.63 - 5.68, I^2 = 0%). In addition, individuals with VI also had worse oral health outcomes, such as: plaque indices with values 0.80 higher (MD = 0.80, 95% CI = 0.58 - 1.02, I^2 = 96%), gingival indices 0.69 higher (MD = 0.69, 95% CI = 0.02 - 1.37, I^2 = 100%), calculus indices 0.04 higher (MD = 0.04, 95% CI = 0.03 - 0.06, I^2 = 0%), oral hygiene indices 0.71 higher (MD = 0.71, 95% CI = 0.24 - 1.18, I^2 = 97 %) and DMFS 0.90 higher (MD = 0.90, 95% CI = 0.68 - 1.13, I^2 = 26%).

Conclusions

Across a wide array of assessments, children and adolescents with vision impairment had worse oral health outcomes than those without VI.

Keywords: Child; Adolescent; Visual Impairment; Blindness; Oral health; Traumatic Dental Injuries; Dental Care for Disabled.

1. Introduction

Vision impairment (VI) occurs when the visual system and one or more vision functions are impaired by a condition affecting the eyes, and is categorized as mild, moderate or severe distance VI or blindness; and near VI[1]. Most published data measure VI using exclusively visual acuity, leaving aside individuals whose impairment is compensated with contact lenses[2] and including only people with moderate to severe VI (low vision) or blindness. About 43 million people worldwide were blind in 2020, and it is estimated that, by 2050, factors such as urbanization, population growth, and aging could lead to about 895 million people living with distance VI, of whom 61 million will be blind[3].

Problems related to vision can affect all stages of life, but young children and the elderly are especially affected[3]. Vision is crucial to child development, and an impaired vision can interfere with the cognitive, social function, and daily performance of young individuals, leading to problems with learning, development of motor skills, social inclusion, and self-esteem[2].

The inability to visualize the presence of dental plaque and its inadequate removal affects the oral health of children with VI, leading to higher prevalence rates of inflammatory periondontal processes and dental caries[4]. In addition to these changes, previous studies report that accidents and trauma are more prevalent in children with VI than children without disabilities, suggesting that events such as falls and collisions may be more frequent due to an impaired vision[5,6]. In addition to pain and infection, the consequences of these oral problems include physical changes, speech difficulties, psychological and emotional problems, thus affecting the quality of life not only of children, but of their caregivers as well[7,8].

Although many primary studies have investigated the association between VI and oral problems, evidence of this relationship has not been reported in a systematic review and meta-analysis yet. The findings of this study can contribute to an overview of how oral issues affect this population and what are their most frequent dental needs, guiding the planning of oral health services and improving dental care for people with VI. Therefore, the aim of the present study was to carry out a systematic review and meta-analysis to assess the main oral problems of children and adolescents with vision impairment (VI) compared to their peers without VI.

2. Methods

This systematic review with meta-analysis was registered in the PROSPERO database under the registration number CRD42020187777. The study was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline[9].

2.1. Eligibility criteria

The inclusion criteria were observational studies (cohort, cross-sectional, and case-control studies). The eligibility criteria were established using the PECO strategy to identify such studies conducted with children and adolescents (P—population) with vision impairment (VI) (E—exposure) compared to those without VI or sighted individuals (C—comparison) to determine and compare their oral health issues (O—outcome). Conferences abstracts, randomized and non-randomized controlled clinical trials, literature reviews, case reports, and letters to the editor were excluded. The exclusion criteria also comprised studies whose participants had other disabilities that could limit their ability to perform oral hygiene (mental/physical disabilities and syndromes).

2.2. Information sources and search strategy

The electronic databases PubMed, Web of Science, Scopus, and Ovid were searched for relevant articles published up to May 2021. The search strategy was tailored according to the characteristics of each database (Table 1 - Appendix S1).

The grey literature was also searched using OpenGrey and the Brazilian Digital Library of Thesis and Dissertations (BDTD). A search in Google Scholar was performed as well. In Google Scholar, the first 300 hits were screened. Manual searches were undertaken using the reference lists from the included studies. No restrictions were imposed with respect to language or date of publication. References were managed using the Endnote software (version 10; Clarivate Analytics, Philadelphia, USA).

2.3. Study selection process

Two reviewers (LCSF and MOG) performed the study selection independently. The eligibility criteria were tested on an initial sample of 10% of the titles and abstracts

for calibration of the evaluators. The Kappa coefficient (κ) was used to assess the agreement between them. The value of κ was 0.93, indicating an excellent agreement.

In the first phase of the study selection process for the systematic review and meta-analysis, the titles and abstracts of the identified references were evaluated. Studies that did not meet the eligibility criteria were excluded and the divergences between the two researchers in the study selection was resolved by consensus. In the second phase, assessments of the full texts were carried out with the pre-selected studies in the first phase and with those in which the information available in the abstract was not sufficient to reach a conclusion on inclusion/exclusion. Any disagreements after this phase were discussed with a third reviewer (FVF) to make the final decision.

2.4. Data collection

The following data were extracted independently by two reviewers (LCSF and MOG): characteristics of the studies (authors, year of publication, study design, country, sampling, presence of a pilot study, aim, calibration, and losses), details on participants (population age range and sex, socio-demographic characteristics, and sample size), exposure (eligibility criteria as well as type and classification criteria of vision impairment), outcome (prevalence as well as mean and standard deviation of oral health issues such as: dental plaque, gingivitis, calculus, periodontitis, oral hygiene, dental caries, traumatic dental injuries [TDI] and their respective diagnostic criteria). In cases of disagreements, a third reviewer was consulted (FVF).

2.5. Methodological quality appraisal

The methodological quality and risk of bias within studies was independently assessed by two reviewers (LCSF and MOG) using the critical appraisal tool of the Joanna Briggs Institute of the University of Adelaide (JBI)[10]. Any doubts and disagreements were discussed with a third reviewer (FVF).

2.6. Meta-analyses

The studies that had homogeneity of the methods were incorporated into meta-analyses. Meta-analyses comparing the prevalence of TDI and dental caries between individuals with VI and sighted individuals were performed. The results were reported

in odds ratio (OR) and confidence interval (CI). Meta-analyses of continuous data comparing DMFT, DMFS, dmft, dmfs, dental plaque, the gingival index, the oral hygiene index, and calculus between individuals with VI and sighted individuals were performed. The results were reported in standardized mean difference (SMD) and CI for meta-analyses assessing the same outcome in a variety of ways. For meta-analyses evaluating the outcome with the same measure, the mean difference (MD) and CI were determined[11]. Statistical heterogeneity was assessed with the I^2 statistics[12].

2.6.1 Sensitivity analysis

For meta-analyses with data of at least four studies incorporated and a high degree of statistical heterogeneity, sensitivity analysis was performed in an attempt to reduce the I^2. For meta-analyses with data of at least three studies incorporated, sensitivity analysis was also conducted.

3. Results

3.1 Study selection

There were 1,458 studies identified and retrieved. Following the removal of duplicates, 760 studies were considered in the first phase and screened based on their titles and abstracts. A total of 23 articles met the eligibility criteria for the second phase and were submitted to full-text analysis. Eight studies were then excluded and 15[5,6,13-25] were included in the qualitative analysis, 12 of which[5,6,13-19,21,23,24] were eligible for the meta-analyses (Figure 1). Detailed reasons for exclusion of the eight studies after full-text reading are reported in Table 2 (Appendix S1).

3.2. Studies characteristics

All included studies were cross-sectional studies with a comparison group, written in English and published between 1979 and 2021. The participants' age varied from two to 21 years[5,6,13-25] and the number of participants with VI ranged from 34[22] to 434[16]. Regarding the type of VI, three studies reported study subjects with blindness only[13,21,22], two studies reported subjects with total and partial VI[16,17] and 10 studies did not specify the degree of impaiment[5,6,14,15,18-20,23-25].

Regarding the oral health issues evaluated, nine studies assessed dental

caries[13,14,18,20,21-25], five evaluated TDI[5,6,13,17,23], eight measured outcomes related to periodontal health (gingival inflammation, calculus and periodontitis)[13-16,18-21] and 10 studies assessed oral hygiene or dental plaque[13-16,18-21,23,24]. Most studies used clinical examination for the assessment of oral health issues and only one[18] used information retrieved from hard copy dental records. Only six[5,14,15,17,19,25] of the 15 included articles reported calibration before starting the study. Eight studies were conducted in India[6,15,17,19,20,23-25], two in Saudi Arabia[5,14], one in Israel[16], one in Iraq[13], one in Turkey[21], one in Indonesia[22], and one in USA[18].

The prevalence of dental caries varied from 40%[23] to 84%[21] (individuals with VI) and 11.5%[23] to 83%[18] (sighted individuals). TDI ranged from 9%[5] to 32.5%[17] and 3.4%[13] to 8.7%[6] in children and adolescents with VI and without VI, respectively. Bleeding on probing varied from 0.6%[15] to 62.6%[19] in those with VI and 2.7%[15] to 55%[19] in sighted individuals. In contrast, good oral hygiene ranged from 22.8%[14] to 58%[19] and 49.4%[14] to 65%[19] in children and adolescents with VI and without VI, respectively. The main characteristics and results of the studies are summarized in Table 3 (Appendix S1).

3.3. Risk of bias for included studies

Risk of bias of the studies was assessed using the JBI critical appraisal tool (Table 4 - Appendix S1). Out of the 15 studies evaluated, three received “low risk of bias” in all items of the risk of bias assessment[14,17,25], but it is important to state that only one[17] used valid and reliable methods to measure all the outcomes. One article received “high risk of bias” in only one item out of the eight possible[6], also due to the outcome measurement. A valid and reliable index was not used and calibration of examiners was not reported. The study conducted by Solanki et al.[24] received “high risk of bias” in five items and “unclear risk of bias” in one item out of the eight possible. Although valid indices to measure the outcomes were used, this study did not state whether the examiners had been calibrated. In eight studies, the criteria for inclusion in the sample was unclear and the study participants and setting were not described in detail[5,13,15,16,18,19,21,23].

3.4. Results of individual studies

Two studies used multiple logistic regression model to evaluate the association between the exposure and outcome (dental caries)[18,25]. Both of them had a sample of children with disabilities, but only one performed the analysis separately (with subgroups), with results per type of disability[25]. The analysis adjusted for age, gender, and social class demostrated that children with VI were less likely to have caries experience in permanent teeth (OR = 0.32; 95% CI: 0.27-0.61). Although the study from Bimstein *et al*.[18] also included children with hearing impairment, the caries prevalence in the permanent dentition was not significantly different after controlling for age between children with deafness and blindness and children without disabilites.

Several studies included additional evaluations, such as oral health knowledge[14] and atitude towards oral health[22], showing that individuals with VI had received less information regarding oral health than the sighted group (P = 0.046)[14], but while knowledge significantly affected the caries index of children with VI (P < 0.05), attitude (P = 0.98), or practice (P = 0.42) did not[22]. Individuals with VI also had more systemic diseases (P = 0.002) and reported less dental visits (P = 0.028) than sighted individuals[14], and more dependence on caretakers than hearing impaired individuals (P < 0.01). Overjet of more than 3.5mm significantly increased risk of TDI among individuals with VI than that of sighted (P = 0.043)[17]. In contrast, assessment of oral hygiene practice and brushing frequency, showed that individuals with VI had similar[22] or better[15,19] habits than sighted. While 90.4% of teenagers with VI used soft bristle brush, 93% used tooth paste and 2.7% brushed their teeth twice a day, these habits were less frequent for sighted teenagers (76%, 86.7% and 0.0% respectively)[15].

3.5. Meta-analyses

In the meta-analysis evaluating dental plaque, data of four studies were pooled. The individuals evaluated were children and adolescents between six and 17 years. The meta-analysis demonstrated that the dental plaque index among children and adolescents with VI was 3.74 higher than the dental plaque index in sighted children and adolescents (SMD=3.74, CI=1.77 – 5.71, I2=99%) (Figure S2 - Appendix S2). The study of AlSadham et al., 2017 employing the Loe (1967) plaque index was removed and three studies employing the Silness and Loe (1964) plaque index remained. The meta-analysis showed that the dental plaque index among children and adolescents with VI was 0.80 higher than the dental plaque index among sighted children and

adolescents (MD=0.80, CI=0.58 – 1.02, I2=96%) (Figure 2).

In the meta-analysis assessing the gingival index (gingival inflammation), data of three studies were pooled. The individuals evaluated were children and adolescents between six and 15 years. The meta-analysis demonstrated that the gingival index among children and adolescents with VI was 3.53 higher than the gingival index in sighted children and adolescents (SMD=3.53, CI=0.38 – 6.68, I2=99%) (Figure S3 - Appendix S2) The study of AlSadham et al., 2017 employing the Nanda (1967) gingival index was removed and two studies employing the Loe and Silness (1963) gingival index remained. The meta-analysis showed that the gingival index among children and adolescents with VI was 0.69 higher than the dental gingival index among sighted children and adolescents (MD=0.69, CI=0.02 – 1.37, I2=100%) (Figure 2).

In the meta-analysis assessing calculus with the Calculus Index Simplified of Green and Vermillion, data of two studies were incorporated. Individuals evaluated were children and adolescents between six and 17 years. The meta-analysis demonstrated that the score of children and adolescents with VI was 0.04 higher than the score of sighted children and adolescents (MD=0.04, CI=0.03 – 0.06, I2=0%) (Figure 2).

In the meta-analysis evaluating the oral hygiene index by Greene & Vemillion (higher scores meaning poorer oral hygiene), data of three studies were pooled. The meta-analysis showed that children and adolescents with VI exhibited an oral hygiene score 0.71 higher (poorer) than the oral hygiene score of sighted children and adolescents (MD=0.71, CI=0.24 – 1.18, I2=97%) (Figure 2).

In the meta-analysis assessing prevalence of dental caries, data of four studies were pooled. The individuals evaluated were those between six and 18 years. No difference between individuals with VI and sighted individuals was observed (OR=2.04, CI=0.89 – 4.68, I2=83%) (Figure 3). For continuous outcomes on caries, data of four studies were pooled. A meta-analysis demonstrated that the DMFS was significantly higher among individuals with VI than among sighted individuals (MD=0.90, CI=068 – 1.13, I2=26%) (Figure 3). No difference between individuals with VI and sighted individuals was observed for DMFT (MD=-0.37, CI=-1.45 – 0.71, I2=98%) (Figure 3), dmft (MD=0.60, CI=-1.52 – 2.72, I2=98%) (Figure), and dmfs (MD=0.58, CI=-3.95 – 5.11, I2=84%) (Figure 3).

In the meta-analysis assessing prevalence of TDI, data of four studies were

pooled. The individuals evaluated were children and adolescents between six and 16 years. The meta-analysis demonstrated that children and adolescents with VI were 3.09 times more likely to exhibit TDI than sighted children and adolescents (OR=3.09, CI=1.88 – 5.08, I2=42%) (Figure 4).

3.5.1 Sensitivity analysis

We attempted to conduct sensitivity analysis for the meta-analyses of TDI, dental caries, DMFT, and dental plaque. Sensitivity analysis for dmft, the gingival index (gingival inflammation), and the oral hygiene index were also attempted. A reduction of I^2 was only feasible for the meta-analysis of TDI. After the removal of the study of AlSarheed et al., 2003, the I^2 plummeted to 0% and the results remained. Children and adolescents with VI were 3.86 times more likely to exhibit TDI than sighted children and adolescents (OR=3.86, CI=2.63 – 5.68, I^2=0%) (Figure 4).

4. Discussion

Social, physical or informational barriers and associated medical conditions may have a direct impact on oral health outcomes of people with vision impairment[14,19,21]. Inappropriate approach and the lack of knowledge and training of health care providers also play an important role, since conventional methods of oral health education are based on visual aids, such as plaque-disclosing dye and anatomical models, which are uneffective for children with VI[18,24].

The systematic review of literature of a particular condition or issue is the core of evidence synthesis[10] and represents an important tool in healthcare decisions. It summarises the available studies of a given topic and can provide better evidence of an association between the exposure and the outcomes evaluated. The present study demonstrated that, across a wide array of assessments, children and adolescents with VI exhibited worse oral health outcomes than their sighted peers. These findings corroborates with most studies reported in the literature[4,26,27], but also add to the current body of knowledge with the measures of effect for most of the outcomes. In meta-analyses considering reports of continuous data, children and adolescents with VI exhibited significantly higher values of the dental plaque index, gingival index (inflammation), calculus score, oral hygiene score, and the DMFS when compared to their sighted peers. In the meta-analyses assessing prevalence of TDI, children and adolescents with VI were 3.86 times more likely to exhibit TDI than those without VI.

Different potentially contributing factors can help to account for these findings. In this review, children and adolescents with VI exhibited poorer gingival, calculus, plaque, and oral hygiene indices' values when compared to their sighted peers. This can be due to lack of visualization of dental plaque to perform adequate removal or visual feedback of seeing calculus deposits or bleeding gums while brushing, and understanding the role of each of these signs in oral health[4,18]. Therefore, oral health education is of the utmost importance for this population in particular, and should be provided for both children and their parents. Dentists should be aware that caregivers have more difficulties in recognizing oral problems and their consequences in young children[8]. Hence, they should focus on a preventive approach early on, providing proper dental education to parents of toddlers with visual disabilities and encouraging early stimulation with tactile devices, not only to stimulate cognitive, emotional, sensorial, and motor aspects, but also for oral health education. Children and adolescents with VI can be taught and guided to perform practices of oral hygiene and these instructions should be based on audible or tactile forms of communication with a combination of different methods tailored to each child (based on the level of vision impairment, if the child reads Braille or print and if there is preexisting oral health knowledge)[18,28].

Although the overall prevalence of dental caries was reported as higher for groups with VI[21,23,24], some studies reported higher values in dental caries indices for the sighted group[13,20,22,25]. Regardless, no difference between groups was observed in the meta-analyses for prevalence, DMFT, dmft and dmfs, and only DMFS was significantly higher among individuals with VI. This could be due to inconsistencies and differences in methods, criteria, and population aspects among studies. Among all the studies that evaluated dental caries[13,14,18,20,21-25], only one was considered "low risk of bias" for all items evaluated and reported calibration of the examiners prior to clinical examination[14]. The lack of standardization of clinical examinations may have had an influence on the findings of studies, underestimating dental caries prevalence and index values. Conversely, the biofilm alone does not produce disease, and the exposure to dietary sugars is a determining fator to enamel demineralization and development of dental caries. Further studies assessing dietary patterns along with clinical findings (such as dental plaque and gingival inflammation) and oral hygiene habits are encouraged to investigate if children with VI are in fact at greater risk for

developing this disease. In addition, white spot lesions should also be evaluated, since they represent the early stages of dental caries and are reversible, if detected early enough.

Vision is the most dominant of the five senses and plays a critical role in every facet and stage of life, affecting the development of motor skills, coordination, and balance[2]. Vision impairment could facilitate the occurance of accidents, contributing to a higher frequency of falls or collisions. The study of Al Sadhan et al. showed that the percentage of children who visit a dentist regularly was significantly lower in the group with VI than in the control group (P= 0.028)[14], while the study of Rathore et al. demonstrated extensive unmet dental treatment needs for traumatized teeth in children with VI[6]. The importance of prompt treatment and care in cases of injuries and regular check-ups should be stressed upon[6]. In addition, preventive strategies should be implemented to limit or eliminate the risk of trauma among individuals in this population, such as the provision of a safe environment that is obstacle-free, with an anti-slip flooring and tactile paving to assist locomotion in schools and at home.

Only one[18] of the studies included was not conducted in Asia. This was expected, given that 51% of the world's population is located in three Asian regions alone (South, East and South-east Asia)[2,3] and account for 62% of the estimated 216.6 million people in the world presenting bilateral blindness and low vision[2]. The prevalence of distance vision impairment in many low and middle-income regions is estimated to be four times higher when compared to high-income regions[2]. Oral health-related quality of life has been shown to be unfavorable in adolescents with VI in India and Africa, with a high prevalence of dental caries and TDI[26,27]. Since VI was strongly associated with oral issues in this review, special attention should be given to these regions, in order to establish public health policies directed at preventing and treating such problems, reducing oral health inequalities and improving the quality of life of children and adolescents with VI.

In order to assess the quality of the studies included and to determine the extent to which they have addressed the possibility of bias in their design, methods, and analysis, the JBI critical appraisal tool was used[10]. The studies included in this review evaluated different outcomes and had differences in methods. Only one study[17] could be considered of "low risk of bias" for all the outcomes measured. The study of AlSadhan et al[14] was considered of "low risk of bias" for the assessment of dental

caries and dental plaque, but not for the evaluation of gingivitis or oral hygiene. The study of Rajput et al[25] was considered of “low risk of bias” for the assessment of dental caries and TDI, but not for gingivitis. Nine[6,13,16,18,20-24] out of the 15 studies did not report calibration of the examiners, even though five of them[13,16,20,21,24] used valid and reliable indices to measure the outcomes. Other nine studies[5,13,15,16,18,19,21,23,24] did not state a clear definition for inclusion criteria, eight[5,13,15,16,18,19,21,23] failed in describing the subjects and setting in detail and five[15,18,20,22,24] did not control confounding variables. Considering these limitations, future studies should be conducted with a more rigorous method, avoiding missing data and high risk of bias. We also encourage investigation in relation to access to dental care services and dietary habits of the participants to further explore the association between oral health and vision impairment.

The limitations of this systematic review are related to the presentation of results, since the studies included evaluated a variety of outcomes and used different indices to do so, which contributed to study heterogeneity and precluded the incorporation of all articles in the meta-analyses. Sample representativeness was also an issue, given that most studies used a convenience sample of children attending special schools, although it is more common to find participants with VI in the convenience setting. It is important to state that the design of all included studies was cross-sectional, not allowing us to determine causal relationship between exposure and outcome. To mitigate selection bias, searches were performed in multiple databases, including grey literature, without restriction on language or date of publication, and assessment of risk of bias was also conducted.

Based on the findings of this systematic review and meta-analysis, one can conclude that children and adolescents with visual impairment have a higher chance of having TDI and have higher index values (and therefore, poorer outcomes) for DMFS, dental plaque, gingival inflammation, calculus, and oral hygiene status. Further studies are needed with designs that enable to assess this association between VI and oral issues as well as the directionality of this relationship. Representative samples, standardized diagnostic methods, rigorous eligibility criteria as well as control of confounding factors and missing data are also important elements that future research should work on.

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FIGURES AND FIGURE LEGENDS

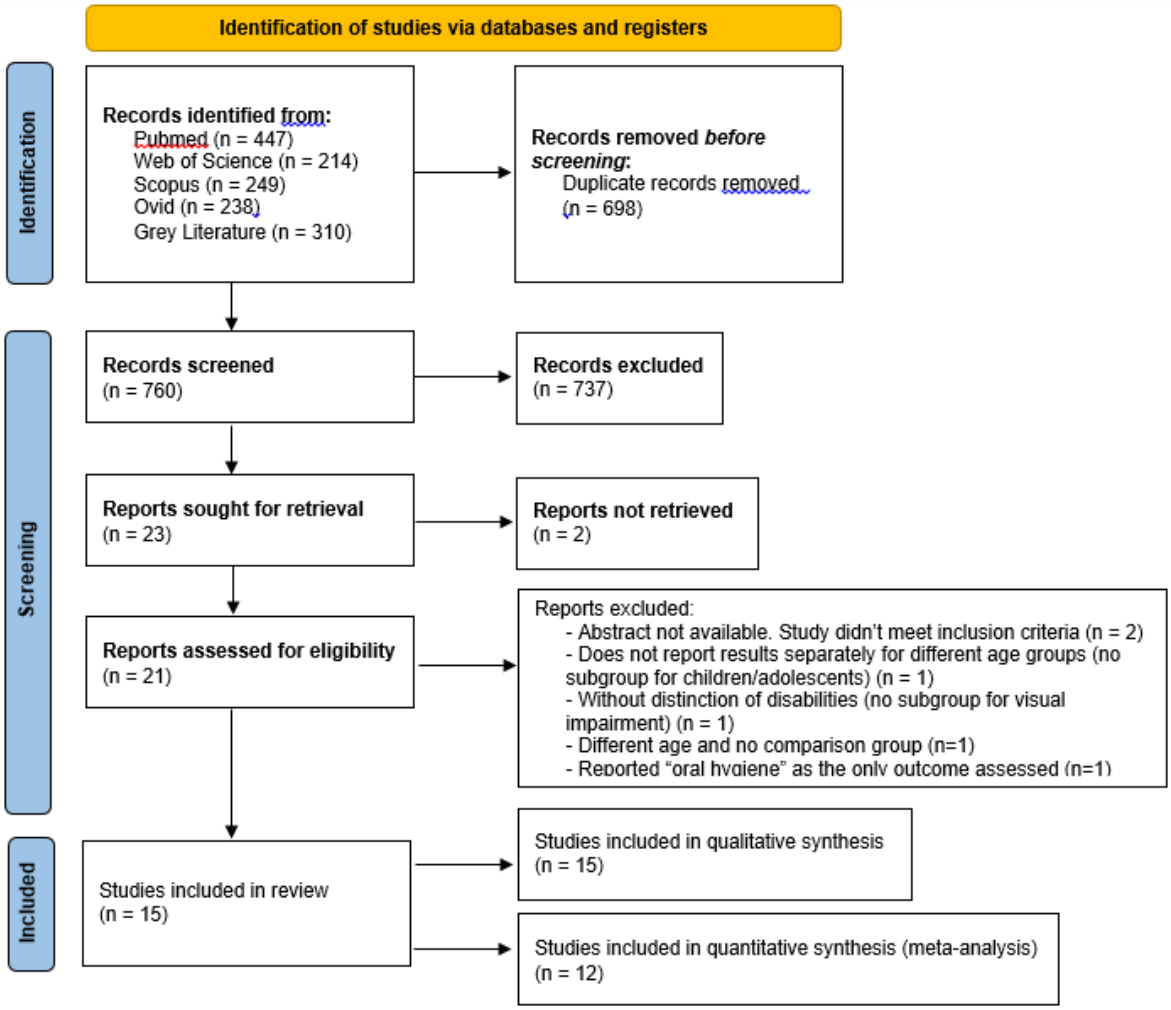

Figure 1. Screening of articles: PRISMA flow-diagram for study identification.

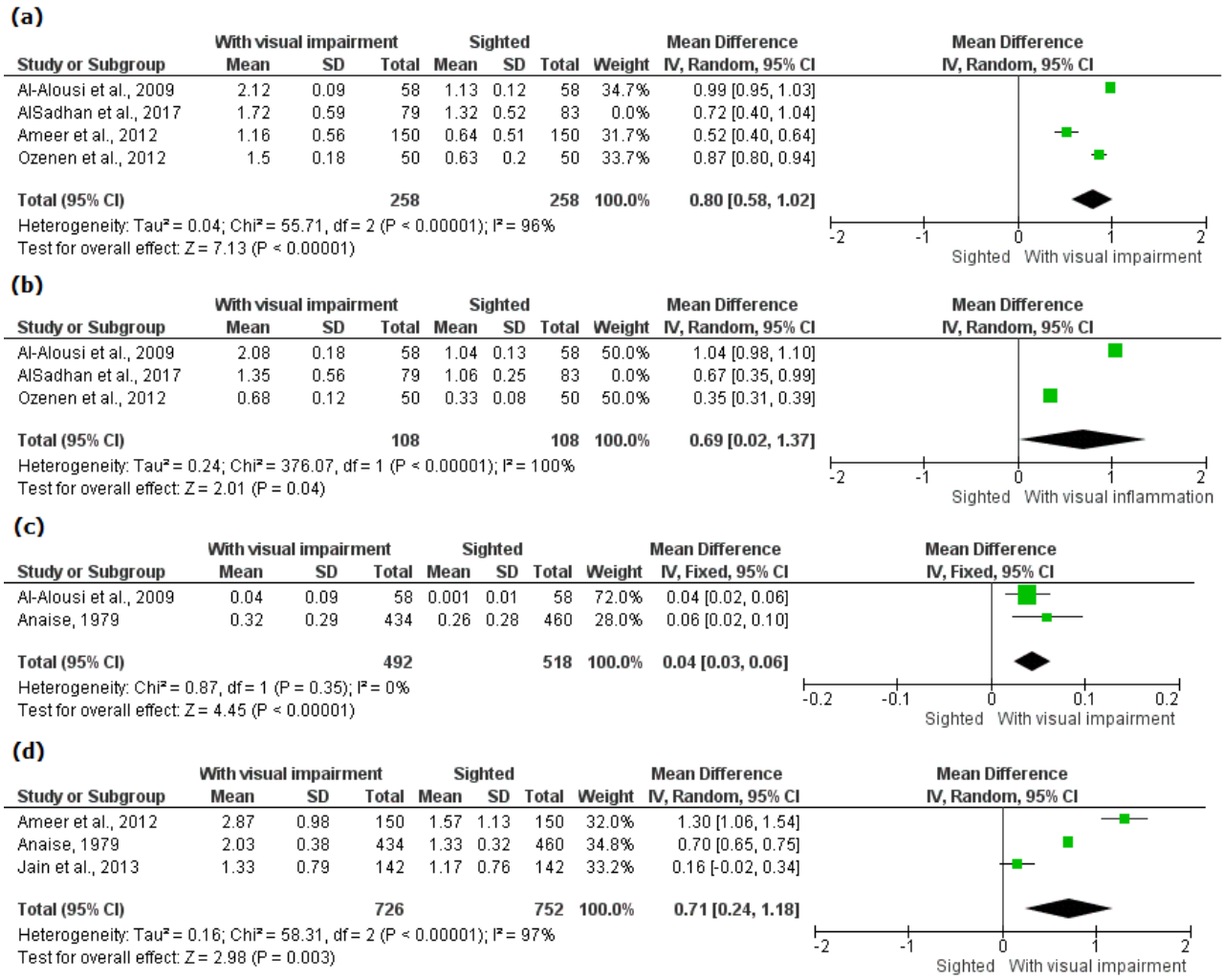

Figure 2. Forest plot of meta-analysis for the studies evaluating dental plaque (a), gingival inflammation (b), calculus (c) and oral hygiene (d) in children and adolescents with and without VI.

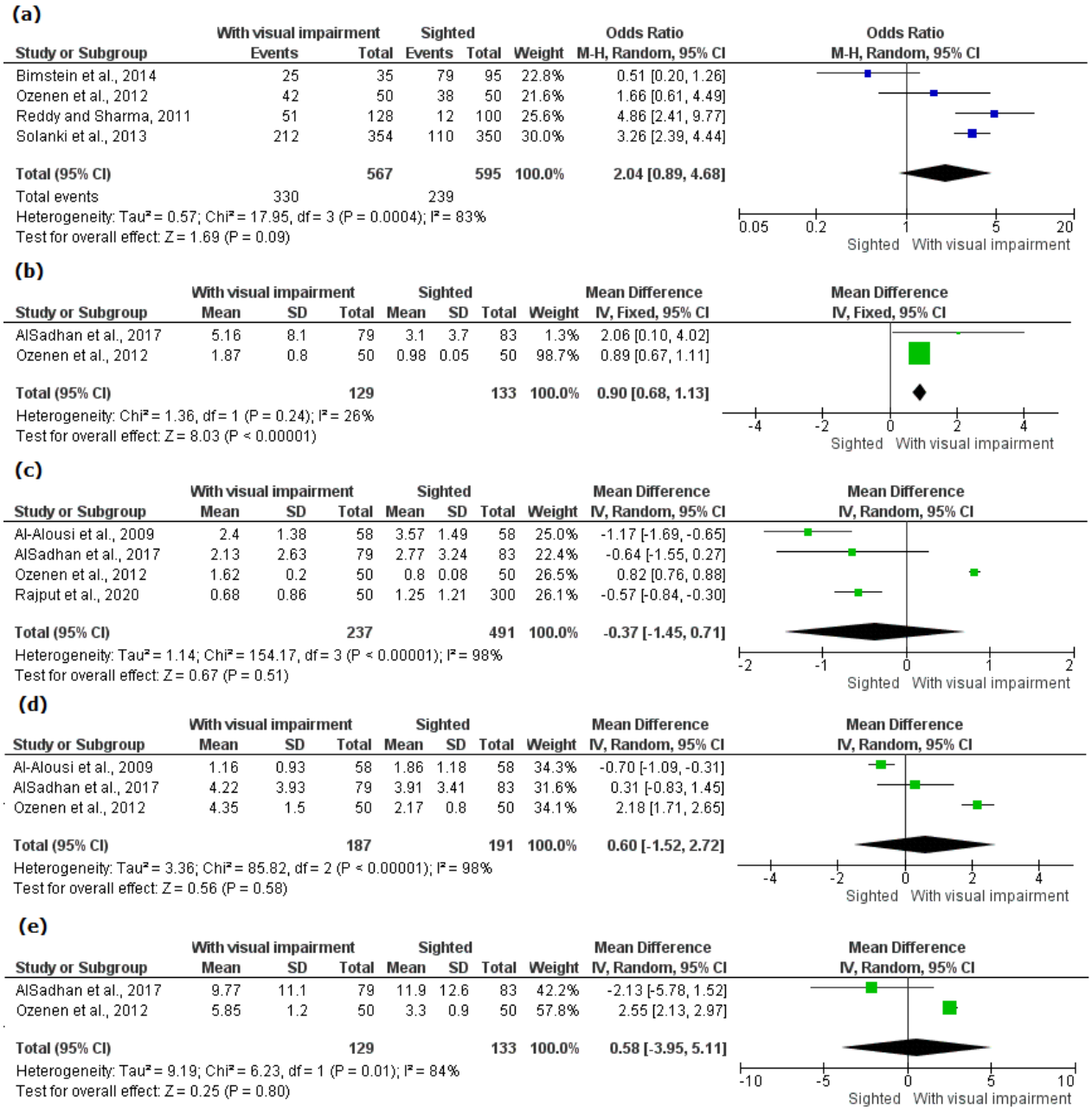

Figure 3. Forest plot of meta-analysis for the studies evaluating prevalence of dental caries (a), DMFS (b), DMFT (c), dmft (d) and dmfs (e) in children and adolescents with and without VI.

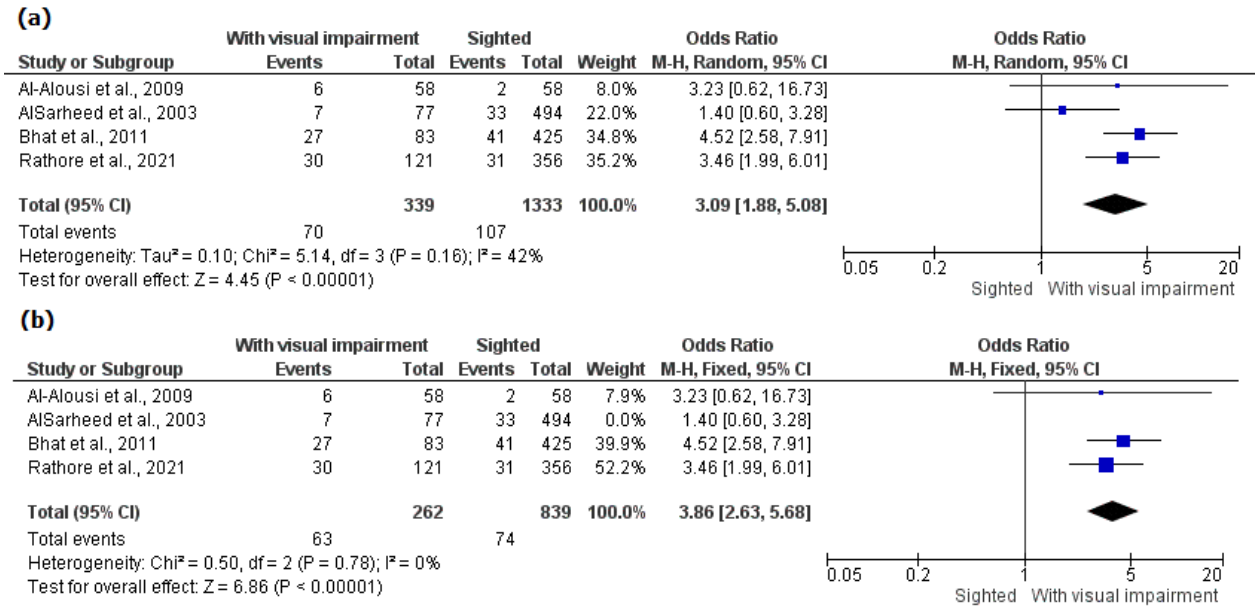

Figure 4. Forest plot of meta-analysis for the studies evaluating prevalence of traumatic dental injuries (a) and sensitivity analysis for the meta-analyses of TDI (b).

APPENDIX S1

SUPPLEMENTARY TABLES

TABLE 1. Search strategy.

Electronic database	Keyword search strategy
PUBMED SCOPUS WEB OF SCIENCE BDTD	"vision disorder" OR "vision impairment" OR "vision disability" OR "vision disabilities" OR "visual disorder" OR "visual impairment" OR "visual disability" OR "visual disabilities" OR "diminished vision" OR "reduced vision" OR "subnormal vision" OR "impaired vision" OR "low vision" OR blindness OR amaurosis OR "amauroses" OR "visual acuity" OR "visually impaired" OR "visually disabled" OR "defective vision" AND "oral health" OR "oral status" OR dental caries OR caries disease OR dental decay OR tooth decay OR root caries OR tooth caries OR dental injury OR dental injuries OR dental trauma OR traumatic dental injury OR traumatic dental injuries OR tooth injury OR tooth injuries OR tooth fracture OR tooth fractures OR gingivitis OR periodontitis OR "periodontal disease" OR "bleeding on probing" OR dental plaque OR bleeding gum OR periodontal pocket OR "gingival inflammation" OR gingiv* OR periodont* OR "oral hygiene" OR calculus
OVID	vision disorder OR vision impairment OR vision disability OR vision disabilities OR visual disorder OR visual impairment OR visual disability OR visual disabilities OR diminished vision OR reduced vision OR subnormal vision OR impaired vision OR low vision OR blindness OR amaurosis OR amauroses OR visual acuity OR visually impaired OR visually disabled OR defective vision AND oral health OR oral status OR dental caries OR caries disease OR dental decay OR tooth decay OR root caries OR tooth caries OR dental injury OR dental injuries OR dental trauma OR traumatic dental injury OR traumatic dental injuries OR tooth injury OR tooth injuries OR tooth fracture OR tooth fractures OR gingivitis OR periodontitis OR periodontal disease OR bleeding on probing OR dental plaque OR bleeding gum OR periodontal pocket OR gingival inflammation OR gingiv* OR periodont* OR oral hygiene OR calculus
GOOGLE SCHOLAR OPENGREY	"visual impairment" AND "oral health"

TABLE 2. Articles excluded after full text evaluation and reasons for exclusion.

Articles Excluded	Reasons For Exclusion
Agrawal A, Mahalez S, Talur NGN. A Comparative Study of Oral Hygiene Index between Blind and Normal School Going Children. *Indian Journal* of Stomatology. 2010; 1(1): 11-15	Reported "oral hygiene" as the only outcome assessed.
Arpak MN, Akkaya MM, Aksoy N. A comparison of blind and sighted children according to their oral health levels. Ankara Universitesi Dis Hekimligi Fakultesi dergisi (The Journal of the Dental Faculty of Ankara University). 1986; 13 (1-2-3): 131-137	Full text not available. The authors didn't respond to our attempts of contact.
Daryani H, Nagarajappa R, Sharda AJ, Asawa K, Tak M, Sanadhya S et al. Cariogram Model in Assessment of Dental Caries among Mentally Challenged and Visually Impaired Individuals of Udaipur, India. Journal of clinical and diagnostic research: JCDR. 2014; 8(1):206.	Does not report results separately for different age groups (no subgroup for children/adolescents)
Davis KL, Stewart FA. Dental health material for blind children. Journal of the American Dental Association. 1939; 67: 118-119.	Abstract not available. Study didn't meet inclusion criteria.
Jaccarino J. Vision impairment: treating the special needs patient with a sensory disability. 2009; Dental Assistant, 78(4): 8	Abstract not available. Study didn't meet inclusion criteria.
Krekmanova L, Hakeberg M, Robertson A, Braathen G, Klingberg G. Perceived oral discomfort and pain in children and adolescents with intellectual or physical disabilities as reported by their legal guardians. European Archives of Paediatric Dentistry. 2016; 17(4):223-230.	Without distinction of disabilities (no subgroup for visual impairment).
Lee SJ. Effect of the general Characteristics and Oral Public Health Behaviors of the Visually Impaired on the Oral Health Condition. The Journal of the Korea Contents Association. 2014; 14(1):337-345.	Different age and no comparison group.
Ligali TO, Orenuga OO, Oredugba FA. Prevalence of Dental Caries among Visually Impaired Institutionalized Adolescents in Lagos State. 2020; 37(1):13-18.	Full text not available. The authors didn't respond to our attempts of contact.

TABLE 3. Main characteristics and results of the studies included

Author/year	Setting (country)	Population (age)	Population (disability)	N of individuals with VI	N of SIGHTED individuals	Outcomes evaluated (index used)	Main results and conclusions
Anaise 1979	Israel	14-17	Blindness	434	460	Periodontitis (Russell's), oral hygiene (Greene and Vermillion) and calculus (Greene and Vermillion)	The periodontal needs and the dental health educational needs of the totally blind students are higher than those of the sighted adolescents, with the partially blind group exhibiting an intermediate stage between the higher values of PI and OHI of the totally blind and the lower values of the sighted students.
AlSarheed et al. 2003	Saudi Arabia	11-16	Visual (VI) and hearing (HI) impaired	77	494	TDI (Trauma index recommended by the British Association for the Study of Community Dentistry)	The present study demonstrated that the control group sustained a similar number of injuries to their anterior teeth as VI children. Trauma was more common among HI children followed by VI children and controls.
Al-Alousi et al. 2009	Iraq	6-15	Blindness	58	58	Dental caries (DMFT), TDI (WHO), gingival Index (Löe and Sillness) and calculus (Greene and Vermillion)	Concerning DMFT and dmft, dental caries was higher among normal students compared to blind ones, with highly significant difference. In contrast, concerning plaque and gingival index, they were higher in the blind, with a highly significant difference. Calculus index were also higher and traumatized teeth were more prevalent among blind compared to normal students, with a significant difference.
Bhat et al. 2011	India	12 and 15	Visual impairment	83	425	TDI (Andreasen's). Also evaluated presence of overjet and lip coverage.	Visually impaired children (32.5%) had significantly higher percentage of teeth fracture than that of sighted children (9.6%) (P = 0.001)
Reddy and Sharma 2011	India	6-15	Visual impairment	128	100	Dental caries (DFMT), TDI (Ellis and Davey) and oral hygiene (uninformed)	The conclusions drawn from this study were that there was a greater prevalence of dental caries, poorer oral hygiene, and higher incidence of trauma in visually impaired children.
Ameer et al. 2012	India	14-17	Visually impaired, intellectually disabled, deaf and dumb and physically challenged	150	150	Dental plaque (Sillness and Loe), gingivitis/periodontitis (CPI) and oral hygiene (Greene and Vermillion). Also evaluated usage of dentifrice, oral hygiene aids and deleterious habits.	Disabled groups showed poor oral hygiene and higher incidence of periodontal disease, which may be attributed to the lack of coordination, understanding, physical disability or muscular limitations. The visually impaired and deaf and dumb had better oral hygiene compared with other disability groups.
Ozenen et al. 2012	Turkey	6-10	Blindness	50	50	Dental caries (DMFT), gingivitis (Sillness and Loe), dental plaque (Sillness and Loe) and oral hygiene (Greene and Vermillion)	This study revealed that the caries and periodontal index values of the children who were blind were significantly higher than were those of the sighted children, even though both groups live in the same socioeconomic district in Istanbul.

Jain et al. 2013	India	6-18	Visual impairment	142	142	Gingivitis and calculus (CPI) and oral hygiene (Greene and Vermillion) Also evaluated oral hygiene practices.	The visually impaired had been found to have better oral hygiene practices, a nonsignificant difference of oral hygiene scores, but a significantly high value for bleeding scores as compared to sighted students.
Solanki et al. 2013	India	6-15	Visual impairment	354	350	Dental caries (DMFT) and oral hygiene (WHO)	Not only did children with disabilities tend to have more decayed teeth when compared to children without disabilities, they also had more missing teeth and higher incidences of poor gingival health. In general, the oral hygiene of the children and young adults examined in the present study was rather poor.
Bimstein et al. 2014	USA	2-21	Visual (VI) and hearing (HI) impaired	35	Caries assessment = 95 Gingival/Calculus Dental Plaque assessment = 100	Dental caries (DMFS), gingivitis, periodontitis and oral hygiene (indices uninformed). Also evaluated dependence on caretakers.	When controlling for age, there was no statistically significant difference between the children and adolescents with no systemic disease or impairments attending a dental university clinic and the deaf or blind children and adolescents (DBC) regarding caries prevalence. A significantly higher proportion of DBC children had gingival inflammation. Visually impaired patients had a statisticaily higher level of dependence on caretakers and higher gingivitis and plaque scores than the auditorily impaired.
AlSadhan et al. 2017	Saudi Arabia	6-12	Visual impairment	79	83	Dental caries (DMFT/DMFS), dental plaque (Loe's 1967), gingival Index (Nanda's 1990) and oral hygiene (James et al., 1960). Also evaluated systemic diseases, oral health knowledge, dental visits and oral hygiene habits.	The visually impaired children had more medical conditions (systemic diseases) and poorer oral health status (plaque accumulation, gingivitis, DMFS score and oral hygiene) compared to their sighted peers.
Kumar et al. 2020	India	6–14	Visual impairment	210	210	Dental caries (DMFT), gingivitis (Sillness and Loe) and oral hygiene (Greene and Vermillion)	The finding of this study showed that the dental caries and gingival disease were less prevalent in visually impaired children than normal healthy children, but the OHI-S index was found to be greater in visually impaired children. Visually impaired children required more treatment needs than normal healthy children.
Puteri et al. 2020	Indonesia	6-16	Visual impairment	34	34	Dental caries (Caries Index). Also evaluated oral health knowledge, atitude towards oral health and oral hygiene practice	Visually impaired children were shown to have a low caries index (CI) of 1.5. A Spearman's statistical test showed that, while knowledge significantly affected the CI of visually impaired children ($P < .05$), attitude ($P = .98$), or practice ($P = .42$) did not. The nonvisually impaired group was observed to have low CI at 1.7, but there was no statistically significant difference in CI between the two groups.

Rajput et al. 2020	India	7-15	Differently-abled children - mentally retarded (MR), with Down syndrome (DS), cerebral palsy (CP), visual impairment (VI), speech and hearing impairment (S&H), and poliomyelitis	50	300	Dental caries (DMFT), TDI - analysis per subgroup not performed (WHO 2013), gingivitis - analysis per subgroup not performed (Pilot T et al., 1994)	Oral health inequalities exist for differently-abled children. In the study group, 52.7% had gingival bleeding compared to 41.0% in the control group. Within the study group, children who belonged to the lower middle class (aOR = 2.02) were more likely to have caries experience whereas visually impaired children (aOR = 0.32), speech and hearing impaired children (OR = 0.10), children suffering from polio (aOR = 0.80), and those with cariesfree in deciduous dentition (aOR = 0.42) were less likely to have caries experience in permanent teeth ($p < 0.05$).
Rathore et al. 2021	India	9-16	Visual impairment	121	356	TDI (Ellis and Davey)	Dental trauma appeared to be more frequent in visually impaired compared to sighted children (P = 0.000). The unmet treatment need for children with TDI was very high.

PI: periodontal index; OHI: oral hygiene index; TDI: traumatic dental injuries; DMFT: sum of the number of Decayed, Missing due to caries, and Filled Teeth in the permanent dentition; WHO: World Health Organization; dmft: sum of the number of Decayed, Missing due to caries, and Filled Teeth in the primary dentition; CPI: community periodontal index; OHI-S: oral hygiene simplified index; aOR: adjusted odds-ratio

Table 4. Results of quality appraisal and risk of bias of included studies (JBI)

Studies	Checklist for cross sectional studies								Authors' side notes regarding outcome measurement
	1. Were the criteria for inclusion in the sample clearly defined?	2.Were the study subjects and the setting described in detail?	3.Was the exposure measured in a valid and reliable way?	4.Were objective, standard criteria used for measurement of the condition?	5.Were confounding factors identified?	6.Were strategies to deal with confounding factors stated?	7.Were the outcomes measured in a valid and reliable way?	8.Was appropriate statistical analysis used?	
Anaise, 1979	no	no	yes	yes	yes	yes	no	yes	• Periodontitis (yes): Russell's Periodontal Index (PI) • Oral hygiene (yes): OHI-S (Greene and Vermillion) • Calculus (yes): Calculus Index Simplified (CI-S) component of OHI-S • Does not mention calibration of the examiners
AlSarheed et al., 2003	no	no	yes	no	yes	yes	yes	yes	• TDI (yes): Trauma index recommended by the British Association for the Study of Community Dentistry (BASCD) • Mentions calibration of the examiner
Al-Alousi et al., 2009	no	no	yes	yes	yes	yes	no	yes	• Dental caries (yes): DMFT • TDI (yes): WHO 1997 • Gingival Index (yes): Gingival index (GI) of Löe and Sillness (1963) • Dental calculus (yes): (Cal) was assessed according to calculus index component of the OHI-S - Greene and Vermillion (1964) • Does not mention calibration of the examiners
Bhat et al., 2011	yes	yes	yes	yes	yes	yes	yes	yes	• TDI (yes): Andreasen's classification • Mentions calibration of the examiners
Reddy and Sharma, 2011	no	no	yes	yes	yes	yes	no	no	• Dental caries (yes): DFMT • TDI (no): Ellis and Davey (1960) • Oral hygiene (no): uninformed • Does not mention calibration of the examiners
Ameer et al., 2012	no	no	yes	yes	no	no	yes	yes	• Dental plaque (yes): Plaque Index (Sillness and Loe) • Gingivitis/Periodontitis (yes): CPI (WHO) • Oral hygiene (yes): OHI-S (Greene and Vermillion) • Mentions calibration of the examiners

Ozenen et al., 2012	unclear	no	yes	yes	yes	yes	no	yes	• Dental caries (yes): DMFT • Gingivitis (yes): Silness and Loe Gingival Index (GI) • Dental plaque (yes): Sillness and Loe Plaque Index (PI) • Oral hygiene (yes): OHI-S • Does not mention calibration of the examiners
Jain et al., 2013	no	no	yes	yes	yes	yes	yes	yes	• Periodontal index (yes): CPI (WHO) • Oral hygiene (yes): OHI-S (Greene and Vermillion) • Mentions calibration of the examiners
Solanki et al., 2013	no	yes	yes	unclear	no	no	no	no	• Dental caries (yes): DMFT • Oral hygiene (yes): WHO basic oral health survey 1997 criteria • Does not mention calibration of the examiners
Bimstein et al., 2014	no	no	yes	yes	yes	no	no	yes	• Dental caries (yes): DMFS • gingivitis, periodontitis and oral hygiene (no): Indices uninformed • Does not mention calibration of the examiners (data extracted from hard copy dental records)
AlSadhan et al., 2017	yes	yes	yes	yes	yes	yes	yes	yes	• Dental caries (yes): DMFT • Dental plaque (yes): Loe's (1967) plaque index • Gingival Index (no): GI by Nanda (1990) • Oral hygiene (no): OHI by James et al. (1960) • Mentions calibration of the examiners
Kumar et al., 2020	yes	yes	yes	yes	no	no	unclear	yes	• Dental caries (yes): DMFT • Gingival Index (yes): gingival index (GI) given by "Loe and Sillness" • Oral hygiene (yes): OHI-S • Does not mention calibration, but "The examiner was standardized in interpreting and recording dental caries, OHI-S and GI"
Puteri et al., 2020	yes	yes	yes	unclear	no	no	no	unclear	• Dental caries (no): Caries Index - severity of dental Caries • Does not mention calibration of the examiners
Rajput et al., 2020	yes	yes	yes	yes	yes	yes	yes	yes	• Dental caries (yes): DMFT • TDI (yes): WHO Oral Health Assessment Form 2013 • Gingival Index (no): Pilot T et al., 1994 • Mentions calibration of the examiners
Rathore et al., 2021	yes	yes	yes	yes	yes	yes	no	yes	• TDI (no): Ellis and Davey • Does not mention calibration of the examiners

Yes = Low risk of bias No = High risk of bias Unclear = Unclear risk of bias

PI: periodontal index; GI: gingival index; OHI: oral hygiene index; TDI: traumatic dental injuries; DMFT: sum of the number of Decayed, Missing due to caries, and Filled Teeth in the permanent dentition; WHO: World Health Organization; dmft: sum of the number of Decayed, Missing due to caries, and Filled Teeth in the primary dentition; CPI: community periodontal index; OHI-S: oral hygiene simplified index

APPENDIX S2
SUPPLEMENTARY FIGURES

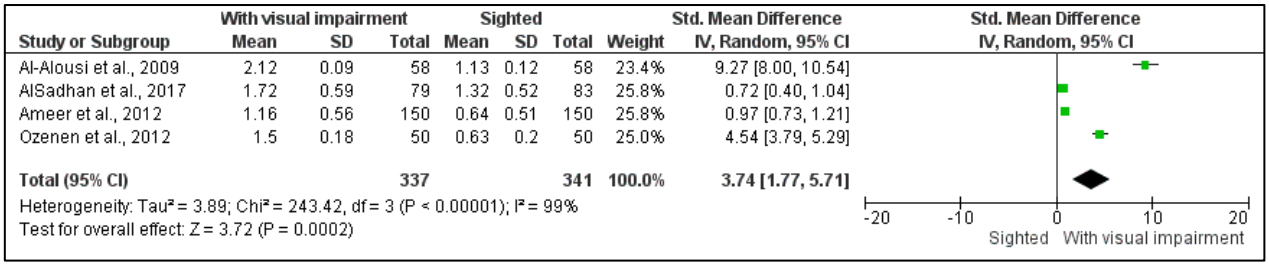

Figure S2. Forest plot of meta-analysis for the studies evaluating dental plaque in children and adolescents with and without VI with different indices.

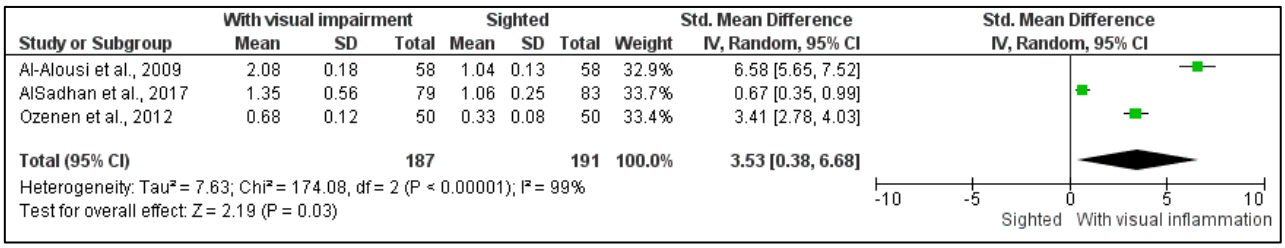

Figure S3. Forest plot of meta-analysis for the studies evaluating gingival inflammation in children and adolescents with and without VI with different indices.

5 CONSIDERAÇÕES FINAIS

A desigualdade em saúde bucal afeta indivíduos com deficiência visual, que precisam enfrentar diversas barreiras (físicas, socioeconômicas, comunicacionais), muitas vezes inexistentes para indivíduos sem deficiência. Os achados dessa revisão sistemática e metanálise evidenciaram que crianças e adolescentes com DV apresentaram 3.86 vezes mais chances de sofrerem traumatismos dentários do que aqueles sem DV. Além disso, apresentaram também piores índices de placa, índices gengivais, de cálculo dentário, de higiene oral e de cárie dentária por superfície em dentes permanentes. Os achados evidenciam o impacto da condição visual sobre os desfechos bucais. Assim, torna-se importante e necessária a atuação de profissionais de saúde bucal juntamente com os responsáveis para que os cuidados bucais sejam mais efetivos e presentes na vida desses indivíduos. Uma vez que, sabidamente, as condições bucais desfavoráveis afetam negativamente na qualidade de vida relacionada à saúde bucal.

Hipóteses para estes achados foram levantadas. A deficiência visual pode impactar o equilíbrio e a coordenação motora, o que poderia contribuir para a ocorrência de quedas e acidentes. Assim, estratégias preventivas (como pisos antiderrapantes, pavimentos táteis e ambientes livres de obstáculos) devem ser implementadas para diminuir o risco de traumas dentários nessa população, bem como o encorajamento do envolvimento de cuidadores através da educação para prevenção e manejo imediato em caso de traumas dentários. Além disso, a falta de visualização do sangramento gengival durante a higienização ou do cálculo dentário e placa dentária, poderia colaborar para uma pior saúde bucal. A compreensão do que cada um desses sinais significa para a saúde oral fica prejudicada quando a criança não consegue enxergá-los, por isso uma abordagem de educação em saúde bucal individualizada e voltada para as necessidades de cada indivíduo é necessária. Ademais, o papel dos cuidadores torna-se fundamental para que o cuidado bucal possa ser efetivado na prática e rotina do indivíduo com DV.

Crianças e adolescentes com deficiência visual, geralmente, não apresentam síndromes ou deficiências associadas que limitam sua destreza manual, assim, são capazes de realizar sua higienização bucal, mas precisam receber instruções adequadas para isso. Métodos de evidenciação de placa, modelos visuais ou falar-mostrar-fazer não podem ser utilizados da mesma forma em que são com crianças e/ou adolescentes sem DV, pois não são igualmente efetivos. Assim, é essencial que os cirurgiões-dentistas e equipes de saúde bucal desenvolvam um relacionamento com estas crianças e/ou adolescentes e busquem utilizar uma combinação de diferentes métodos que sejam adaptados a cada indivíduo, como recursos áudio-táteis (por exemplo, uso de tecnologias assistivas) (QUADRO 2). Tecnologia Assistiva é um campo de estudos interdisciplinares que promove a produção de produtos, métodos, estratégias, práticas e serviços com o objetivo de aumentar a capacidade funcional com a participação de pessoas com deficiências. Além disso, há possiblidade de aumentar a sua autonomia, independência, qualidade de vida e inclusão social (Amorim *et al*., 2009). A avaliação constante do desempenho e participação nas consultas de acompanhamento também deve ser realizada, bem como o reforço de conceitos e motivação para estimular bons hábitos de saúde.

Quadro 2 — Orientações de atendimento e manejo odontológico para pessoas com deficiência visual

ORIENTAÇÕES DE ATENDIMENTO E MANEJO ODONTOLÓGICO PARA PESSOAS COM DEFICIÊNCIA VISUAL	
Cuidados com o ambiente	• Atenção e cuidado no trajeto dentro do consultório, desde a recepção até a cadeira odontológica • Oferecer ao paciente o braço como guia ao sentar, indicando o local correto • Ter atenção na troca de móveis, especialmente para pacientes que irão fazer consultas de retorno • Instalar pisos antiderrapantes e/ou pavimentos táteis e manter o ambiente livre de obstáculos tanto quanto possível

Cuidados relacionados à comunicação	• Sempre avisar ao se afastar do paciente • Passar orientações de forma detalhada e assertiva • Valorizar a capacidade tátil (ex.: modelos que possam ser manuseados e que sejam em alto-relevo) e lançar mão de explicações que envolvam o reconhecimento sensorial (ex: comparar superfície lisa e áspera dos dentes, identificar o gosto de sangue após o uso do fio dental) • Enriquecer as orientações com explicações audiodescritivas

Fonte: Elaborado pela autora, 2021.

De acordo com a Portaria nº 1.060, de 5 de junho de 2002, a inclusão das pessoas com deficiência na rede de serviços do Sistema Único de Saúde (SUS) foi assegurada por meio da Política Nacional de Saúde da Pessoa com Deficiência. A garantia de um atendimento odontológico qualificado e resolutivo a todas as pessoas com deficiência é proposta pela Rede de Cuidados à Saúde da Pessoa com Deficiência, que deve ser iniciado na Atenção Primária à Saúde e posteriormente, o encaminhamento deve ser feito para o nível secundário (Centro de Especialidades Odontológicas - CEO) ou terciário (atendimento hospitalar) apenas quando demandarem uma maior complexidade no atendimento. Essa política reforça a necessidade do preparo do cirurgião-dentista, desde a graduação, para que esteja apto a atender indivíduos com deficiência de maneira qualificada no atendimento primário, visando à redução das desigualdades em saúde bucal para este grupo.

É necessário ressaltar que, mesmo que os achados desta revisão e metanálise tenham mostrado diferença estatística significativa, são necessários estudos mais robustos relativos à essa temática, que sejam amplamente detalhados e realizados com metodologia mais rigorosa no que tange à seleção de participantes, calibração de examinadores, uso de índices padronizados e controle das variáveis de confusão (análises estatísticas com modelos multivariados). Dados de prevalência são importantes para o planejamento da atenção e assistência na esfera da saúde pública, porém são insuficientes para representatividade da população se considerarmos

apenas estudos com amostras de conveniência, como ocorre com a maioria dos trabalhos envolvendo indivíduos com deficiência. Estudos multicêntricos realizados em diferentes instituições que ofereçam atendimento a este grupo específico devem ser encorajados, para que se alcance validade externa e se possa ter uma noção mais fidedigna da prevalência de problemas bucais e sua associação com a deficiência visual.

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ANEXO A – Quality appraisal tool for the cross-sectional studies according to Joanna Briggs Institute

JBI Critical Appraisal Checklist for Analytical Cross Sectional Studies

Reviewer_____Date_____

Author _____Year_____Record Number_____

	Yes	No	Unclear	Not applicable
1. Were the criteria for inclusion in the sample clearly defined?	☐	☐	☐	☐
2. Were the study subjects and the setting described in detail?	☐	☐	☐	☐
3. Was the exposure measured in a valid and reliable way?	☐	☐	☐	☐
4. Were objective, standard criteria used for measurement of the condition?	☐	☐	☐	☐
5. Were confounding factors identified?	☐	☐	☐	☐
6. Were strategies to deal with confounding factors stated?	☐	☐	☐	☐
7. Were the outcomes measured in a valid and reliable way?	☐	☐	☐	☐
8. Was appropriate statistical analysis used?	☐	☐	☐	☐

Overall appraisal: Include ☐ Exclude ☐ Seek further info ☐

Comments (Including reason for exclusion)

_____

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ANEXO B – Normas de formatação para o periódico *Community Dentistry and Oral Health Epidemiology*

MANUSCRIPT FORMAT AND STRUCTURE

Community Dentistry & Oral Epidemiology now offers Free Format submission for a simplified and streamlined submission process.

Before you submit, you will need:

- Your manuscript: this should be an editable file including text, figures, and tables, or separate files – whichever you prefer. All required sections should be contained in your manuscript, including abstract, introduction, methods, results, and conclusions. Figures and tables should have legends. Figures should be uploaded in the highest resolution possible. References may be submitted in any style or format, as long as it is consistent throughout the manuscript. Supporting information should be submitted in separate files. If the manuscript, figures or tables are difficult for you to read, they will also be difficult for the editors and reviewers, and the editorial office will send it back to you for revision. Your manuscript may also be sent back to you for revision if the quality of English language is poor.
- An ORCID ID, freely available at https://orcid.org. *(Why is this important? Your article, if accepted and published, will be attached to your ORCID profile. Institutions and funders are increasingly requiring authors to have ORCID IDs.)*
- The title page of the manuscript, including:
    - Your co-author details, including affiliation and email address. *(Why is this important? We need to keep all co-authors informed of the outcome of the peer review process.)*
    - Statements relating to our ethics and integrity policies, which may include any of the following *(Why are these important? We need to uphold rigorous ethical standards for the research we consider for publication):*
        - data availability statement
        - funding statement
        - conflict of interest disclosure
        - ethics approval statement
        - patient consent statement
        - permission to reproduce material from other sources
        - clinical trial registration

If you are invited to revise your manuscript after peer review, the journal will also request the revised manuscript to be formatted according to journal requirements as described below.

Main Text File

Manuscripts can be uploaded either as a single document (containing the main text, tables and figures), or with figures and tables provided as separate files. Should your manuscript reach revision stage, figures and tables must be provided as separate files.

The main manuscript file can be submitted in Microsoft Word (.doc or .docx) format.

Your main document file should include:

- A short informative title containing the major key words. The title should not contain abbreviations
- The full names of the authors with institutional affiliations where the work was conducted, with a footnote for the author's present address if different from where the work was conducted
- Acknowledgments
- Abstract
- Up to seven keywords
- Main body
- References
- Tables (each table complete with title and footnotes)
- Figures: Figure legends must be added beneath each individual image during upload AND as a complete list in the text

4.1. Word Limit and Page Charges

Articles should be limited to 3,700 words (including references) and 6 Tables or Figures; alternatively, 4,000 words and 5 Tables or Figures may be used. This equates to seven published pages, **and authors are strongly encouraged to stay within those limits.** The Methods and Results sections are usually where the word count can "blow out", and authors are encouraged to consider submitting heavily detailed material for inclusion in a separate online Appendix to their article (at no cost). **Articles exceeding seven published pages are subject to a charge of USD 300 per additional page. One published page amounts approximately to 5,500 characters (including spaces) of text but does not include Figures and Tables.**

4.2. Format Language

All submissions must be in English; both British and American spelling conventions are acceptable. Authors for whom English is a second language must have their manuscript professionally edited by an English speaking person before submission to make sure the English is of high quality. It is preferred that the manuscript is professionally edited. A list of independent suppliers of editing services can be found at http://wileyeditingservices.com/en/. All services must be paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

Font: All submissions must be 1.5 spaced using a standard 12-point font size, and preferably in the Times Roman font.

Abbreviations, Symbols and Nomenclature: Authors can consult the following source: CBE Style Manual Committee. Scientific style and format: the CBE manual for authors, editors, and publishers. 6th ed. Cambridge: Cambridge University Press, 1994

4.3. Structure

All manuscripts submitted to *Community Dentistry and Oral Epidemiology* should follow the structure guidelines below.

Title Page: the names and institutional affiliations of all authors of the manuscript should be included.

Abstract: All manuscripts submitted to *Community Dentistry and Oral Epidemiology* should use a structured abstract under the headings: Objectives – Methods – Results – Conclusions.

Main Text of Original Articles should include Introduction, Methods, Results and Discussion. Subheadings are not encouraged.

Introduction: this should be focused, outlining the historical or logical origins of the study and not summarise the findings; exhaustive literature reviews are not appropriate. It should close with an explicit statement of the specific aims of the investigation.

Methods must contain sufficient detail such that, in combination with the references cited, all studies reported can be fully reproduced. As a condition of publication, authors are required to make materials and methods used freely available to other academic researchers for their own use.

Results should not focus overly on P values – we concur with recent calls for less emphasis on statistical significance (see Amrhein et al, Nature 2019; 567: 305-307). In the Results section, have one paragraph of text per Table, and do not repeat Table data in that Results text; instead, draw the reader's attention to the highlights/important parts of the Table. Avoid "compared to" - use 'than' instead.

Discussion: See Docherty and Smith, BMJ 1999; 318: 1224-5 for how to structure a Discussion section. That structure is encouraged. The section should end with a brief conclusion and a comment on the potential clinical program or policy relevance of the findings. Statements and interpretation of the data should be appropriately supported by original references. In the Discussion and conclusion, use the term 'findings' rather than 'results'.

4.4. References

Authors are required to cite all necessary references for the research background, methods and issues discussed. Primary sources should be cited. Relevant references published in CDOE are expected to be among the cited literature.

The list of references begins on a fresh page in the manuscript. All references should be numbered consecutively in order of appearance and should be as complete as possible. In text citations should cite references in consecutive order using Arabic superscript numerals. Sample references follow:

Journal article:

1. King VM, Armstrong DM, Apps R, Trott JR. Numerical aspects of pontine, lateral reticular, and inferior olivary projections to two paravermal cortical zones of the cat cerebellum. *J Comp Neurol* 1998;390:537-551.

Book:

2. Voet D, Voet JG. *Biochemistry*. New York: John Wiley & Sons; 1990. 1223 p.

Please note that journal title abbreviations should conform to the practices of Chemical Abstracts.

For more information about AMA reference style - AMA Manual of Style

4.5. Tables, Figures and Figure Legends

Tables are part of the text and should be included, one per page, after the References. Please see our Guide to Tables and Figures for guidance on how to lay these out. All graphs, drawings, and photographs are considered figures and should be sequentially numbered with Arabic numerals. Each figure must be on a separate page and each must have a caption. All captions, with necessary references, should be typed together on a separate page and numbered clearly (Fig.1, Fig. 2, etc.).

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Figure Legends: All captions, with necessary references, should be typed together on a separate page and numbered clearly (Fig.1, Fig. 2, etc.).

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