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PREVALÊNCIA DE OBESIDADE INFANTIL NO BRASIL: REVISÃO SISTEMÁTICA E META-ANÁLISE

PREVALENCE OF CHILDHOOD OBESITY IN BRAZIL: SYSTEMATIC REVIEW AND META-ANALYSIS

CAMPINAS

2020

CAROLINA MULLER FERREIRA

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Dissertação apresentada à Faculdade de Ciências Farmacêuticas da Universidade Estadual de Campinas como parte dos requisitos exigidos para a obtenção do título de Mestra em Ciências, na área de Ciências Farmacêuticas – insumos farmacêuticos naturais, biotecnológicos e sintéticos.

ORIENTADORA: PROFA. DRA. TAÍS FREIRE GALVÃO

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A Ata da defesa assinada pelos membros da Comissão Examinadora, consta no SIGA/Sistema de Fluxo de Dissertação/Tese e na Secretaria do Programa da Unidade.

Este exemplar corresponde à redação final da Dissertação de Mestrado defendida pela aluna **Carolina Muller Ferreira**, aprovada pela Comissão Julgadora em **17 de novembro de 2020**.

Dedico este trabalho aos meus pais Walter e Patrícia, aos meus irmãos Otávio e Geovana, e meus amigos Maisa, Rafael, Fabiana, Mariana, Rebeca e vários outros amigos que indiretamente sempre apoiaram na minha formação pessoal e profissional.

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RESUMO

Contexto: Faltam estimativas representativas da obesidade infantil no Brasil. Objetivo é estimar a prevalência de obesidade infantil no Brasil. Métodos: Realizamos uma revisão sistemática (protocolo: CRD42018091713) e pesquisamos estudos de base populacional realizados no Brasil que avaliaram a obesidade em crianças <10 anos. Pesquisadores emparelhados selecionaram e extraíram os dados dos estudos. A meta-análise de prevalência e intervalo de confiança (IC95%) foi calculada, ponderada pelos tamanhos da população usando a transformação de arco-cosseno duplo de Freeman-Tukey. A heterogeneidade (I^2) foi investigada por meta-regressão. Resultados: 53 estudos foram incluídos (n = 122.395), realizados de 1986-2015, e limitados principalmente devido a taxas de resposta inadequadas. A prevalência de obesidade foi de 8,2% ([IC 95%]: 8,1-8,4%, I^2 = 98,5%). Prevalências mais altas foram observadas em meninos (9,7% [9,4-9,9%], I^2 = 97,4%) do que em meninas (7,3% [7,1-7,5%], I^2 = 96,1%). A prevalência aumentou de acordo com a década (1990: 6,5% [6,0-7,0%], I^2 = 96,8%; 2000: 7,9% [7,7-8,0%], I^2 = 98,8%; 2010: 12,0% [11,5-12,6%], I^2 = 95,8%), e região brasileira (Nordeste: 6,4% [6,2-6,7%], I^2 = 98,1%; Norte: 6,7% [6,3-7,2%], I^2 = 98,8%; Sudeste: 10,6% [10,2-11,0 %], I^2 = 98,2%; Sul: 10,1 [9,7-10,4%], I^2 = 97,7%). A heterogeneidade foi afetada pela idade e região ($p < 0,05$) e o viés de publicação foi descartado ($p = 0,746$). Conclusão: Para cada 100 crianças brasileiras, mais de oito apresentam obesidade. Prevalências maiores ocorreram em meninos, nas últimas décadas e em regiões brasileiras mais desenvolvidas.

Palavras-chave: Obesidade Pediátrica, Brasil, Prevalência, Revisão Sistemática, Meta-análise.

ABSTRACT

Background: Representative estimates of childhood obesity in Brazil are lacking. Objective is to estimate the prevalence of childhood obesity in Brazil. Methods: We conducted a systematic review (protocol: CRD42018091713) and researched population-based studies conducted in Brazil that assessed obesity in children <10 years old. Paired researchers selected and extracted data from the studies. The meta-analysis of prevalence and confidence interval (95% CI) was calculated, weighted by population sizes using the Freeman-Tukey double cosine transformation. Heterogeneity (I^2) was investigated by meta-regression. Results: 53 studies were included (n = 122,395), carried out from 1986-2015, and limited mainly due to inadequate response rates. The prevalence of obesity was 8.2% ([95% CI]: 8.1-8.4%, I^2 = 98.5%). Higher prevalence were observed in boys (9.7% [9.4-9.9%], I^2 = 97.4%) than in girls (7.3% [7.1-7.5%], I^2 = 96.1%). The prevalence increased according to the decade (1990: 6.5% [6.0-7.0%], I^2 = 96.8%; 2000: 7.9% [7.7-8.0%], I^2 = 98.8%; 2010: 12.0% [11.5-12.6%], I^2 = 95.8%), and the Brazilian region (Northeast: 6.4% [6.2-6.7 %], I^2 = 98.1%; North: 6.7% [6.3-7.2%], I^2 = 98.8%; Southeast: 10.6% [10.2-11.0%] , I^2 = 98.2%; South: 10.1 [9.7-10.4%], I^2 = 97.7%). Heterogeneity was affected by age and region ($p < 0.05$) and the publication bias was discarded ($p = 0.746$). Conclusion: For every 100 Brazilian children, more than eight have obesity. Higher prevalence occurred in boys, in the last decades and in more developed Brazilian regions.

Key words: Pediatric Obesity, Brazil, Prevalence, Systematic Review, Meta-analysis.

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1. Introdução

A obesidade é um acúmulo anormal ou excessivo de gordura que apresenta risco à saúde.[1] [2] A identificação da criança com obesidade é influenciada pela idade, sexo, status de puberdade, raça e etnia, sendo definida a partir de pontos de corte do índice de massa corporal e sua relação com as curvas de crescimento oficiais.

Apesar de comum, há diferentes hipóteses sobre a etiologia da obesidade. A mais aceita é o resultado de desequilíbrio entre o consumo de calorias e o gasto energético,[3] associado ao alto consumo de carboidratos[4] e alimentos ultra-processados,[5] podendo ser tratada com uma dieta balanceada e atividade física.[6] Outra teoria aborda uma possível relação hormonal, por meio da ação da grelina e a leptina e suas cascatas hormonais bem como suas atuações por *feedback*.[7] Esses hormônios atuariam desreguladamente, induzindo por vezes a hiperleptinemia, um processo de invasão de macrófagos que contribuem para as reações pró-inflamatórias, favorecendo a hiperplasia e hipertrofia do tecido adiposo e o estado de adipogênese.[7] O cortisol, hormônio ligado ao estresse, também pode estar envolvido.[8] Esse hormônio é normalmente estimulado pela privação de sono e manutenção do estado de alerta, onde uma duração do sono menor que 6 horas é significativamente associada a um ganho de peso e obesidade.[9]

A hiperinsulinemia e a resistência à leptina é um achado comum entre pessoas com obesidade.[10] Não se sabe ao certo como ocorrem as cascatas hormonais e suas ligações, mas estima-se que essa resistência à leptina impeça a transdução normal do sinal da leptina, que como consequência gera uma ingestão calórica contínua e a obesidade.[10] Além disso, a obesidade pode advir de causas genéticas, ambientais e socioeconômicas, sendo caracterizada como uma patologia multicausal.[11]

A oferta de alimentos ultraprocessados com menor preço e facilidade de acesso que alimentos in natura e pouco processados influencia o estabelecimento de preferências alimentares na infância.[12] A definição de preferências nessa fase tem papel determinante nas escolhas e hábitos no futuro, tornando difícil a aquisição de hábitos considerados saudáveis na idade adulta.[12] Aliado a trabalhos menos operacionais e mais sedentários parecem favorecer o aumento de peso na vida adulta.[13] Em contrapartida, trabalho mais operacionais geram menores salários, o que não são atrativos e não favorecem economicamente.[12]

Em países de baixa e média renda, o aumento da obesidade em crianças pode gerar consequências quando na fase adulta, favorecendo a ocorrência de doenças crônicas não

transmissíveis como diabetes, hipertensão, problemas cardiovasculares, gastrintestinais, renais e imunológicas.[7]

A carga de doenças associadas afeta o sistema de saúde e a sociedade, além de efeitos psicológicos ao indivíduo. Entre eles estão os preconceitos e estigmas sociais, associados à degradação social por meio de atitudes negativas dirigidas a uma pessoa com base em seu peso[14]. Os estereótipos podem levar a preconceitos, rejeição social, tratamento injusto ou discriminação aberta, bem como problemas psicossociais irreversíveis. O *bullying* com base no peso e como uma forma de escapar desse estigma, gera crinças que evitam a escola e afetam o desempenho acadêmico e as oportunidades socioeconômicas futuras.[15]

A obesidade é reconhecidamente de difícil manejo e muitas práticas clínicas são estimuladas na tentativa da solução em curto ou longo prazo. O estímulo à atividade física, – dentro e fora da escola –, melhoria na alimentação, seja por meio de dietas de baixo teor de carboidrato[16], com alto conteúdo de proteína ou gordura, refeições em menor frequência, com jejum intermitente, são exemplos de tratamento.[16] [17] Outras formas associadas são o acompanhamento psicológico, avaliação genética, recomendação de cirurgias e terapias medicamentosas. [7] [11]

O gasto médico anual atribuído a um indivíduo com obesidade representou cerca de 150 bilhões de dólares nos Estados Unidos.[18] No Brasil, cerca de 3 a 5% das internações em adultos de 20 a 60 anos no Sistema Único de Saúde, foram atribuídas a de doenças relacionadas à obesidade em 2001.[19] Os gastos individuais também parecem ser afetados pelo excesso de peso ou obesidade no domicílio, tendo maior carga econômica em domicílios pobres devido sua contribuição com gastos em medicamentos relacionados com a obesidade.[20]

A definição de políticas públicas e instituição de incentivos financeiros setoriais influenciam nessa dinâmica. Nos Estados Unidos, um exemplo são os subsídios para o milho e soja, que promovem o uso excessivo desses produtos pelos produtores e aumento do consumo de alimentos de menor custo e menor valor nutricional.[12] Revisar políticas anteriores para identificar falhas e potenciais de atuação são estratégias para reduzir a obesidade infantil,[12] incluindo restrições da influência de mídias e propaganda.[21] [22]

Em todo o mundo, a prevalência de sobrepeso e obesidade na infância aumentou de apresentou aumento relativo de 60% entre as décadas de 1990 e 2020.[7] Ao longo de 22 anos, a prevalência de sobrepeso e risco de sobrepeso aumentou quase linearmente. [23] A tendência de aumento é prevista ao longo das próximas décadas.[7] [24]

O último inquérito populacional realizado no Brasil em 2008-2009 observou que 17% dos meninos e 12% das meninas até 10 anos apresentaram obesidade, prevalência maior que o observado nas décadas de 1980 e 1990.[25] A obesidade foi estimada em 19% dos adultos brasileiros em 2017 e 20% em 2018, conforme a pesquisa de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico.[26] Dentre os inquéritos nacionais (domiciliares, escolares e telefônicos) realizados de 1974 a 2014 há carência de estimativas recentes acerca da obesidade infantil.[27]

Na ausência de estimativas nacionais, a síntese dos estudos individuais é uma alternativa para estimar e monitorar a obesidade infantil. As revisões sistemáticas disponíveis na área apresentam limitações por incluir estudos primários sem representatividade populacional,[28-32] critério de obesidade obsoleto ou não oficial[28 33] e ausência de critério de qualidade metodológica dos estudos incluídos.[28 30 33]

A presente pesquisa foi realizada para preencher essa lacuna, em atendimento a uma demanda do Ministério da Saúde para embasar políticas públicas na área. O objetivo desta pesquisa foi estimar a prevalência da obesidade infantil no Brasil por meio de revisão sistemática com meta-análise.

2. Artigo submetido a periódico – *Prevalence of childhood obesity in Brazil: a systematic review and meta-analysis* [APÊNDICE A].

Introduction

Obesity affects 5% of children worldwide and increased by 20% from 1980 to 2015, with the highest prevalence in economically disadvantaged settings.[34] This health risk accounted for 4 million deaths in 2015, mainly due to cardiovascular disease, and has a high rate of associated morbidity in adult life.[34] Measuring the prevalence of childhood obesity is crucial to track the trends of this health risk and establish public policies.

In Brazil, which has an emerging economy marked by high inequality, nationwide surveys to assess obesity, especially in the pediatric population, have irregularly frequency. Discrepancies between Brazilian regions as well as effects of skin color and income were associated with the prevalence of childhood obesity in the most recent nationwide survey in 2009.[35] Since then, local studies have been carried out in different Brazilian cities and states,[27] but no summarized representative estimates are available.

A systematic review with a meta-analysis is a valuable tool in this scenario. Although some reviews to summarize the obesity prevalence in Brazilian children by these methods have been conducted, the findings have limited validity, mainly due to the lack of representativeness,[28-32] absence of quality assessment of primary studies,[28 30 33] and obsolete or irregular criteria for childhood obesity.[28 33] We aimed to assess the national prevalence of childhood obesity in Brazil by means of a systematic review and meta-analysis of representative studies.

Methods

Protocol and registration

The protocol containing the detailed methods of this systematic review was registered in the International prospective register of systematic reviews (www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42018091713)[APÊNDICE B].

Eligibility criteria

Observational or experimental representative studies that employed population or school-based sampling of children under 10 years old in Brazil were eligible. The prevalence of obesity in eligible studies relied on measured height and weight: studies with self-reported obesity were not eligible. Studies restricted to a particular ethnicity or social class were excluded.

Information sources

We searched the MEDLINE, EMBASE, Scopus, Web of Science, CINAHL, LILACS, SciELO, and Brazilian nationwide theses and dissertations (Brazilian Coordination for the Improvement of Higher Education Personnel and repositories of Brazilian universities with a postgraduate program of collective health and nutrition) databases.

There were no language or publication status restrictions. We screened the references of relevant publications to identify additional potentially eligible studies.

Search

The following search strategy was used for MEDLINE (via PubMed) and adapted for the other databases: ((children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood) AND (obesity OR overweight OR obese) AND (prevalence OR prevalencia) AND (Brazil OR Brasil)), following the Peer Review of Electronic Search Strategies guidance [APÊNDICE C].[36] The search results in compatible formats were imported into the Covidence platform (www.covidence.org), for removing duplications and further review's steps. Searches were held in January 2018 and updated in September 2019.

Study selection

Independent paired researchers selected studies by screening titles and abstracts and then performing a full text assessment using the Covidence platform. A third reviewer arbitrated disagreement. For theses and dissertations, one reviewer screened the search results and eligibility was confirmed by a second researcher, using an Excel spreadsheet.

Data collection process

Data were extracted by two reviewers and independently confirmed by another using a standardized spreadsheet. Disagreements were resolved by a third reviewer. Study authors were contacted to obtain additional data if relevant data were not available in the reports or to clarify conflicting information included in different reports on the same study.

Data items

We extracted study data (author, data collection year, study design, sampling frame, publication type, and research location), population characteristics (age, sex, and number of children), and childhood obesity data of the total population and in each group, according to the World Health Organization (WHO) criteria for obesity in children from 0 to less than 5 years old[37] and from 5 to less than 10 years old.[38] For eligible studies that assessed obesity by different criteria, we either recalculated the prevalence from the original studies' datasets using the WHO growth criteria[37 38] or obtained new estimates that were as supplied by the authors.

Risk of bias in individual studies

Paired and independent researchers and confirmed by another, assessed the methodological quality of included studies using the checklist for prevalence data from the Joanna Briggs Institute,[39] consisting of the items: (i) sample frame (official source), (ii) sampling (probabilistic or universal sampling), (iii) sample size (statistically calculated), (iv) setting and participants description (appropriately described), (v) coverage of data analysis (adequate coverage for different age and sex subgroups), (vi) methods for outcome measurement (WHO growth criteria),[37 38] (vii) standardization of outcome measurement (weight and height measured by validated instruments), (viii) statistical analysis (analysis adjusted or with sample weighting), and (ix) response rate (low rate of refusals and losses). Reviewers assigned 1 point for each item attended by the studies, with a maximum score of 9 per study.

Summary measures

The primary outcome was the prevalence of childhood obesity and 95% confidence intervals (95% CIs). Secondary outcomes included the prevalence of childhood obesity in girls, boys, age groups, decade and Brazilian geographic regions (North, Northeast, Midwest, Southeast and South).

Synthesis of results and additional analyses

We used Stata (version 14.2) for all statistical analysis. Meta-analysis of proportions were calculated with Freeman-Tukey double arcsine transformation[40] (metaprop command, ftt option) and weighted according to the official population size obtained from the Brazilian Institute of Geography and Statistics for each period and location of the primary studies. Heterogeneity was estimated by the assessment of inconsistency between studies (I^2) and chi-squared tests, with a significance level of $p<0.10$.

Publication bias was assessed by funnel plot asymmetry evaluation and Egger's test (significance level of $p < 0.05$).[41] Meta-regressions were calculated using the modified Knapp-Hartung method[42] to investigate the effects of independent variables (age, region, year, and quality score) on the variability of obesity prevalence between studies.

Results

Study characteristics

Out of 9,394 retrieved records, 567 were assessed in full text, and 143 reports from 53 studies were included in the analysis (Figure 1).[43-93] The references of all reports of included studies

is listed in Supplementary Material Appendix 1 and the reason for exclusion of the 222 studies assessed for data extraction is listed in Supplementary Material Appendix 2.

In total, 122,395 children were assessed in studies conducted between 1986 and 2015. Most of the studies were cross-sectional and school-based, conducted in the South and Southeast regions, and included children aged 6-9 years old (Table 1). Studies were limited mainly due to inadequate response rates, poor subject description and inappropriate statistical analyses. The quality assessment score ranged from 3 to 9 with a median of 7. The individual characteristics of each included studies is depicted in Supplementary Material Appendix 3. Upon our request from authors, 36 studies sent additional data to allow proper quantitative synthesis.

Childhood obesity prevalence

The prevalence of childhood obesity was ([95% CI]: 8.1-8.4%, I^2 = 98.5%), and lower in girls (7.3% [7.1-7.5%], I^2 = 96.1%) than in boys (9.7% [9.4-9.9%], I^2 = 97.4%). Increasing trends in the obesity prevalence according to decade and age group were observed (Figure 2).

The highest prevalence rates of obesity were noted in the South (10.1% [9.7-10.4%], I^2 = 97.7%) and Southeast (10.6% [10.2-11.0%], I^2 = 98.2%) regions. Slightly lower obesity prevalence was observed in cross-sectional studies than in cohort studies, as well as in population-based studies than in school-based studies (Table 2).

Investigation of heterogeneity and publication bias

The variability in the obesity prevalence was significantly affected by the children's age group ($p < 0.001$; residual I^2 = 56.4%), Brazilian region ($p = 0.018$; residual I^2 = 63.4%), but not by the year of research ($p = 0.051$; residual I^2 = 71.2%), and the methodological quality score of the studies ($p = 0.256$; residual I^2 = 72.6%) (Figure 3). A symmetric distribution was noted in the funnel plot, without evidence of a small studies effect on childhood obesity (p = 0.746) (Figure 4).

Discussion

For every 100 Brazilian children, more than eight children are obese according to this systematic review and meta-analysis of representative studies. Obesity was slightly more frequent in boys than in girls, and all estimates had high heterogeneity. The prevalence increased with age, decade, and Brazilian regions, partially explaining the high variability across studies.

The results were highly inconsistent among studies, which is a common limitation in meta-analysis of prevalence.[94] Subgroup analyses according to factors that significantly affected

heterogeneity did not led to more homogeneous estimates. Estimates were calculated from studies with population representativeness that used the same official criteria for assessing obesity in the Brazilian pediatric population.[37 38]

Boys had a slightly higher prevalence of obesity than girls in Brazil; this pattern was similar to those in Latin American and Caribbean regions in 2016, with 13% of obesity in boys and 10% in girls aged 5 to 19 years,[95] and in countries with a high-middle sociodemographic index according to the worldwide burden of obesity in 2015; however, this pattern was not observed in the overall childhood estimate.[34] An inverse association was observed in a systematic review of Australian studies conducted between 1967 and 2012, with a higher prevalence of combined overweight and obesity in girls (21%) than in boys (18%) aged 2 to 18 years.[96]

The age-standardized mean body mass index of children and adolescents increased globally from 1975 to 2016 (an increase of 0.32 kg/m² per decade for girls and 0.40 kg/m² per decade for boys).[97] Projections of global childhood obesity estimated that 5.4 % of the population aged 5-18 years will be obese by 2025, a 0.5% increase relative to 2013.[98] This trend seems to be influenced by human development in the region. Inverse associations between socioeconomic status and overweight and obesity were observed in a systematic review of 30 studies.[99] In Spain, a cohort study including 1.1 million children showed a slight reduction in childhood excess weight, from 42% in 2006 to 40% in 2016,[100] indicating the possible lower influence of time in highly developed regions.

The highest obesity prevalence was observed in the most economically developed Brazilian region, which also comprised the largest number of investigations. A bibliometric analysis of scientific obesity research studies from 1988-2007 revealed this tendency in few publications from Latin America in relation to more developed countries.[101] A positive association between a high obesity prevalence and the number of publications was observed and may explain our findings.[101] The nutritional transition to the consumption of ultra-processed foods, which accounted for approximately 40% of the total daily intake in children aged 6 years in a birth cohort in southern Brazil,[102] compared to a cohort in the city of São Luís (Northeast region), estimated in 26% of total calories of children up to 3 years old in 2007.[103]

Cohort studies reported a higher prevalence rates than cross-sectional studies, even though the latter were more frequent. Cohort studies are expensive due to the time required for follow-up and the large sample size, a possible explanation for lower number of studies included, and are more prone to losses of follow-up than other types of studies.[104]

School-based studies had a higher prevalence and were more common than population-based studies, possibly due to more convenient logistic in recruiting and data collection of children. Absenteeism during data collection in school-based research studies may explain higher prevalence observed. An analysis of 1,069 students in fourth to sixth grade in nine public elementary schools in Philadelphia in a published 2007, reported that children with obesity were absent (12.2 ± 11.7 days) more frequently than healthy children (10.1 ± 10.5 days),[105] showing a possible difference in school attendance that could result in selection bias. In Brazil, absenteeism and the lack of universal education for children can effect economic crises and increasing poverty, and resulted in an increase in male child labor in 2015 compared to 2013 in both in rural and urban areas.[106]

Conclusion

Over eight out of every 100 Brazilian children up to 10 years old had obesity in this comprehensive analysis of representative studies. Obesity was higher in boys than in girls and increased with age, decade, and in more developed Brazilian regions. Further investigation should take into account underling factors such as dietary patterns and inequalities across Brazilian regions.

Conflict of interest statement

No conflict of interest was declared.

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Figures

Figure 1. Process of selection and inclusion of studies in the systematic review [APÊNDICE D e E].

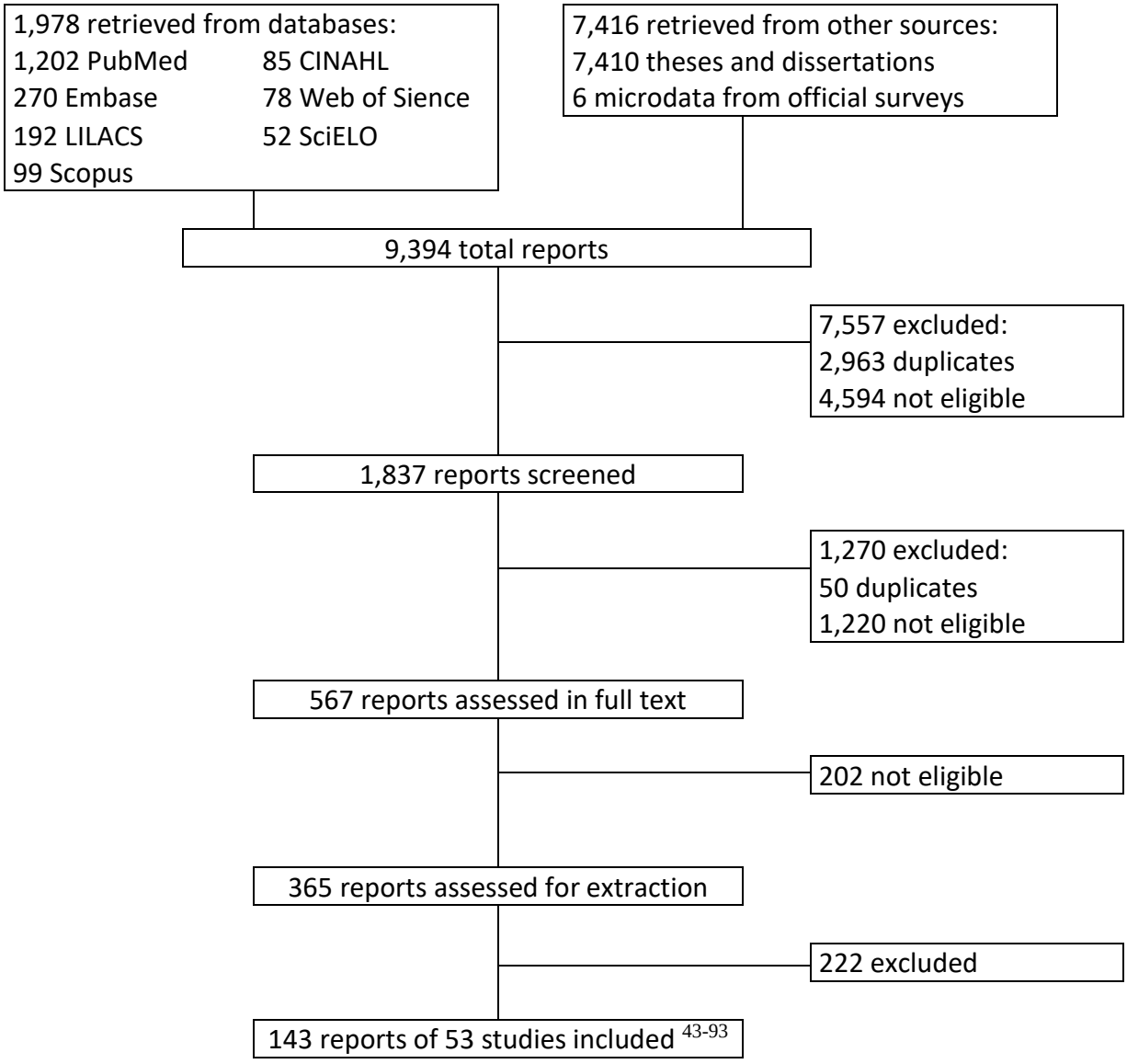


Figure 2. Prevalence of obesity in total and by sex, decade and aged group

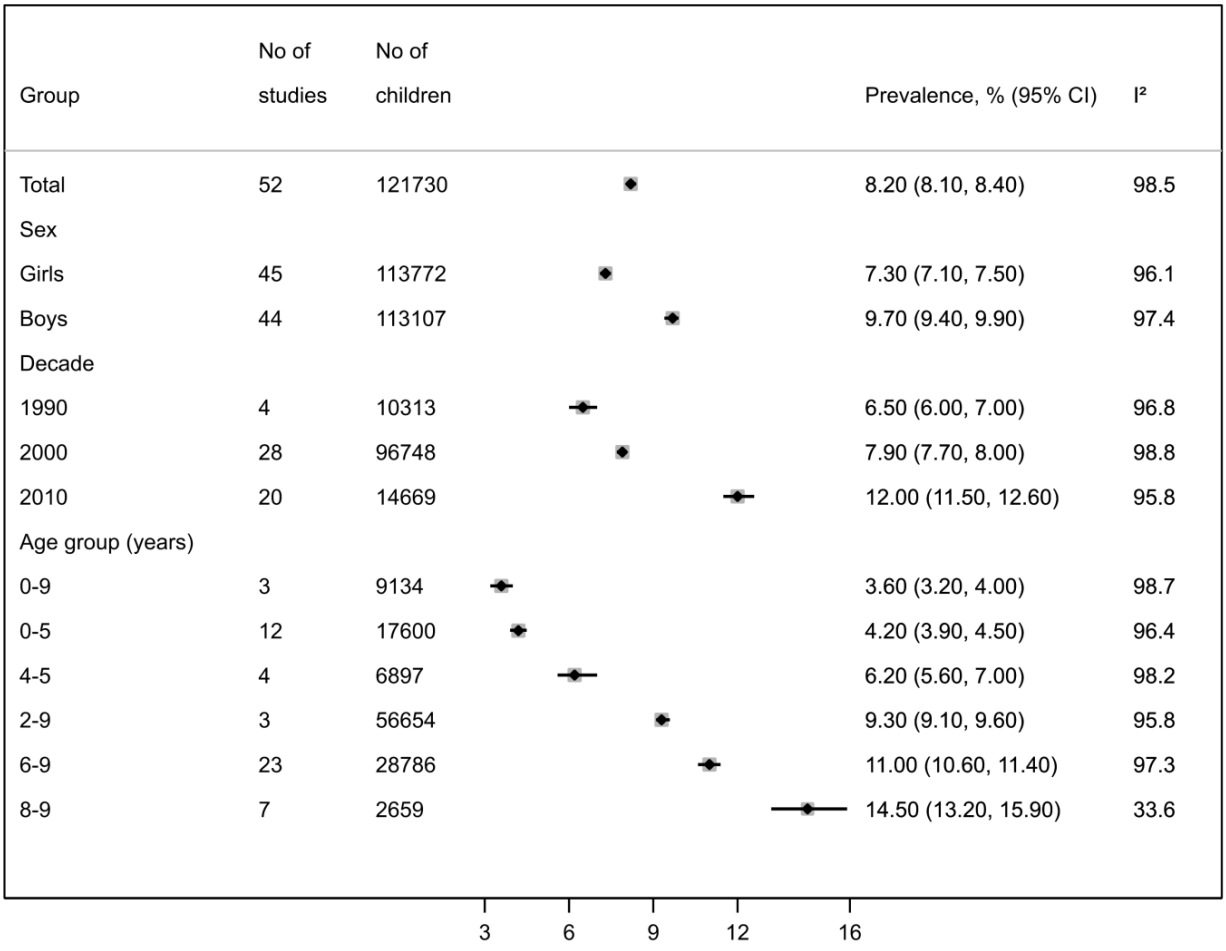


Figure 3. Prevalence of obesity in included studies by children age group, Brazilian region, year of research and quality score (study size is represented by the circle size)

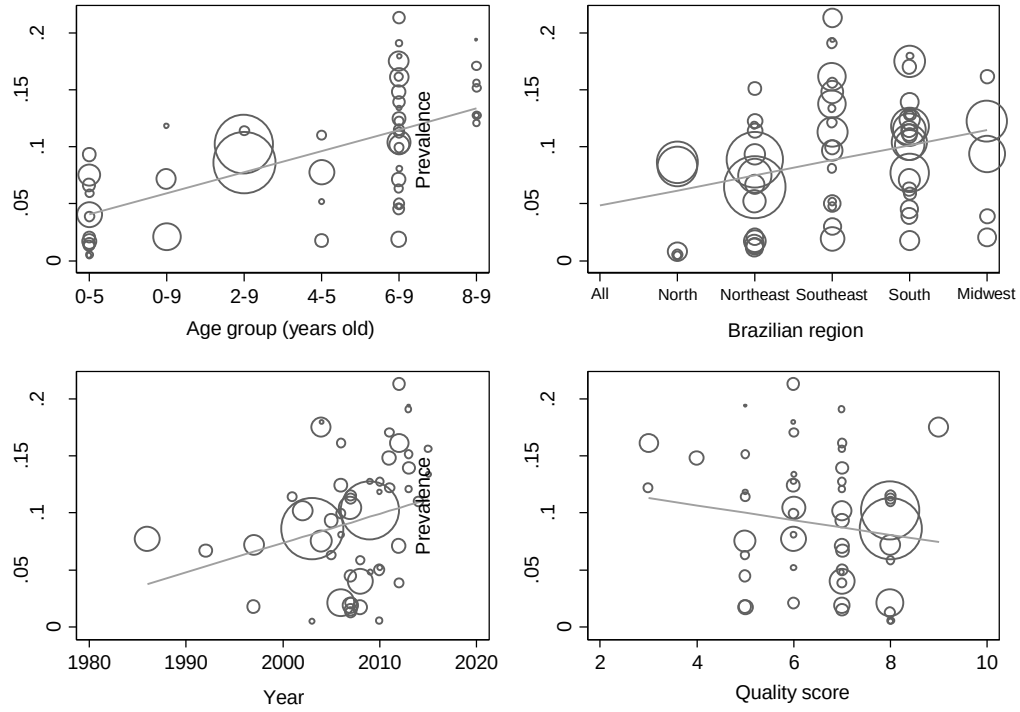
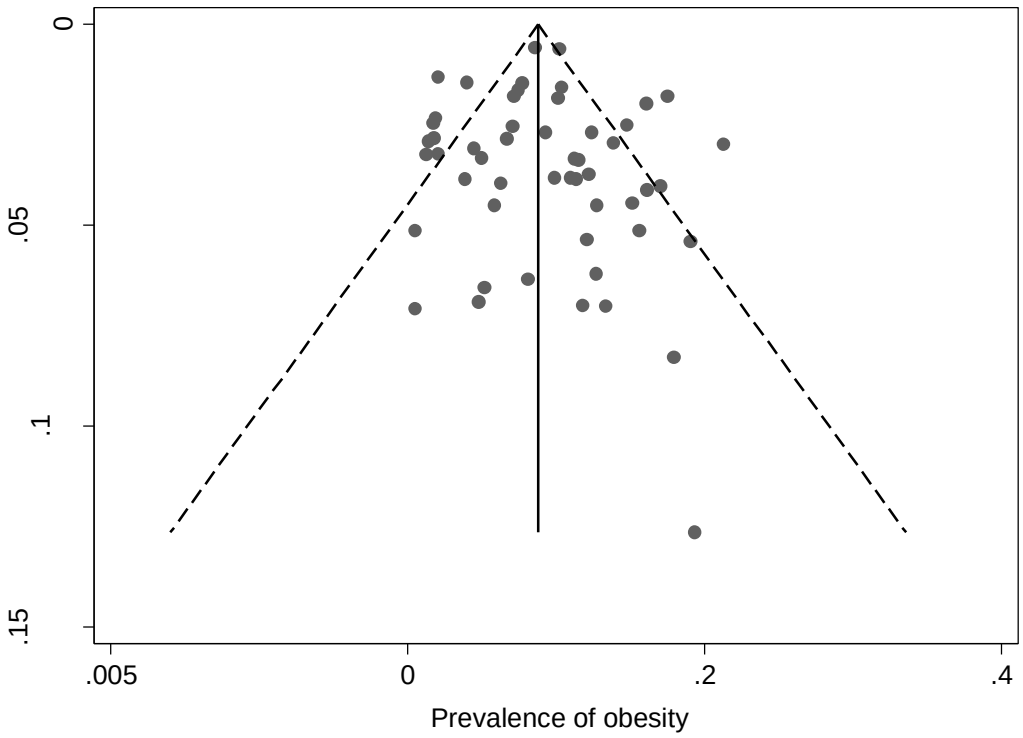


Figure 4. Prevalence of obesity in each study distribuited according to the standard error of the prevalence



Tables

Table 1. Characteristics of included studies

Characteristics	No of studies	No of children
Total	53	122,395
Age group (years)		
0-9	3	9,134
0-5	12	17,600
4-5	4	6,897
2-9	3	56,654
6-9	23	28,786
8-9	8	3,324
Study		
Cross-sectional	49	112,688
Cohort	4	9,707
Sample source		
School-based		
Public and private	26	27,530
Public	7	6,421
Population-based		
Household	15	78,505
Maternity	5	9,939
Region		
Brazil	5	69,713
North	2	577
Northeast	11	13,147
Southeast	14	10,711
South	19	26,985
Midwest	2	1,262
Decade		
1990s [a]	4	10,313
2000s	29	97,413
2010s	20	14,669
Limitations in methodological quality		
Sample frame	1	1,640
Sampling	11	10,390
Sample size	6	4,687
Setting and participants description	30	40,278
Coverage of data analysis	12	8,992
Method for outcome measurement	16	23,355
Standardization of outcome measurement	1	713
Statistical analysis	17	20,191
Response rate	42	112,279

[a] includes one study held in 1986

Table 2. Prevalence of childhood obesity, 95% confidence interval (CI) and heterogeneity (I^2) according to the study design, sample source and region of studies

Subgroup	No of studies	No of children	Prevalence, % [95% CI]	I^2 (%)
Study desing				
Cross-sectional	48	112,023	8.1 [7.9-8.2]	98.3
Cohort	4	9,707	9.7 [8.9-10.6]	99.2
Sample source				
School-based				
Public and private schools	25	26,865	9.7 [9.3-10.1]	97.0
Public schools	7	6,421	12.6 [11.7-13.4]	93.0
Population-based				
Household	15	78,505	7.3 [7.1-7.5]	99.0
Maternity	5	9,939	9.5 [8.7-10.4]	99.0
Region[a]				
North	5	12,443	6.7 [6.3-7.2]	98.8
Northeast	15	38,193	6.4 [6.2-6.7]	98.1
Southeast	18	18,497	10.6 [10.2-11.0]	98.2
South	21	35,230	10.1 [9.7-10.4]	97.7
Midwest	5	11,805	9.7 [9.1-10.2]	98.1

[a] the analysis included disaggregated data from each region if available in a nationwide study

Supplementary Material Appendix

Supplementary Material Appendix 1. List of reports of the included studies (n=143)

Study	References
Alexius 2012[43]	1. Alexius SL, Olinto MTA, Henn RL, Pattussi MP. The association between self perceptions of psychological well-being and overweight in Brazilian children. Maternal & child nutrition. 2012;8(2):267-74. 2. Alexius SL. Prevalência de excesso de peso e fatores associados em crianças do município de Medianeira-PR. 2008.
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[a] One publication reported results of two studies, held in 1992 and 2005.
[b] One publication reported results of two studies, held in 2003 and 2010.

Supplementary Material Appendix 2. Reason for exclusion of reports assessed for data extraction (n=222).

Study did not report all needed data and/or did not sent enough data after request (n = 109)

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Lack of sample representativeness (n = 100)

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Supplementary Material Appendix 3. Characteristics of the included studies (n = 53).

Study	Year	Study design	Location (city, state or country)	Age group (year)	Sample source	Sample coverage	Population (n)	Quality score
Alexius 2012[43]	2007	Cross-sectional	Medianeira, PR	6-9	School-based	Public and private	1,047	5
Andaki 2017[44]	2009-2011	Cross-sectional	Uberaba, MG	6-9	School-based	Public and private	1,583	4
Ataide 2015[45]	2008-2010	Cross-sectional	João Pessoa, PB	0-9	Population-based	Household	203	5
Barbosa 2009[46]	2008-2009	Cross-sectional	Diamantina, MG	7-9	School-based	Public and private	209	7
Barbosa Filho 2016[47]	2012	Cross-sectional	Colombo, PR	6-9	School-based	Public and private	1,537	7
Barreto 2007[48]	2004	Cross-sectional	Natal, RN	2-6	School-based	Public and private	3,714	5
Bernardo 2012[49]	2007	Cross-sectional	Florianópolis, SC	7-9	School-based	Public and private	898	8
Berria 2013[51]	2006	Cross-sectional	Cascavel, PR	8-9	School-based	Public and private	665[a]	5
Bertin 2010[50]	2009	Cross-sectional	Indaial, SC	8-9	School-based	Public	259	6
Borges 2007[52]	2004-2005	Cross-sectional	Ponta Grossa, PR	6-9	School-based	Public	637	5
Castilho 2014[53]	2010-2012	Cross-sectional	Campinas, SP	7-9	School-based	Public and private	1113	6
Chagas 2013[54]	2006-2007	Cross-sectional	São Luis, Imperatriz, Caxias, Codó, São José de Ribamar e Timon, MA	0-5	Population-based	Household	1,176	7
Coelho 2012[55]	2006	Cross-sectional	Ouro Preto, MG	6-9	School-based	Public and private	247	6
Costa 2015[56]	2012-	Cross-	Florianópolis, SC	7-9	School-	Public and	1,138	7

Study	Year	Study design	Location (city, state or country)	Age group (year)	Sample source	Sample coverage	Population (n)	Quality score
	2013	sectional			based	private		
Dallabona 2010[57]	2007-2008	Cross-sectional	Balneário Camboriú, SC	0-6	School-based	Public and private	493	8
Dumith 2010[58]	2004	Cross-sectional	Rio Grande, RS	7-9	School-based	Public and private	145	6
Feltrin 2015[59]	2007-2008	Cross-sectional	Blumenau, Jaragua do Sul, Lages, Criciúma, Florianópolis, Joinville, Chapecó e Joaçaba, SC	6-9	School-based	Public and private	4,086	6
Fernandez 2017[60]	2010	Cross-sectional	Pelotas, RS	8-9	School-based	Public and private	494	7
Ferrari 2015[61]	2012-2013	Cross-sectional	São Caetano do Sul, SP	9	School-based	Public and private	62	5
Ferreira 2010[62]	2007	Cross-sectional	20 cities, AL	0-5	Population-based	Household	948	8
Ferreira 2013[63]	1992	Cross-sectional	20 cities, AL	0-5	Population-based	Household	1,228	7
Ferreira 2013[63]	2005	Cross-sectional	20 cities, AL	0-5	Population-based	Household	1,384	7
Ferreira 2015[64]	2012-2013	Cross-sectional	Maceió, AL	9	School-based	Public and private	502	5
Fraiz 2019[65]	2014	Cross-sectional	Curitiba, PR	4-5	School-based	Public	683	8
Freitas 2015[66]	2011-2012	Cross-sectional	Goiânia, GO	0-5	Population-based	Household	673	7
Gigante 2013[67]	1986	Cohort	Pelotas, RS	4	Population-based	Maternity	4,739	6
Guedes 2011[68]	2007	Cross-sectional	Vale do Jequitinhonha, MG	6-9	School-based	Public and private	1,839	7
Heleno 2017[69]	2014-	Cross-	Divinópolis, MG	6-9	School-	Public	202	6

Study	Year	Study design	Location (city, state or country)	Age group (year)	Sample source	Sample coverage	Population (n)	Quality score
	2015	sectional			based			
Justo 2012[70]	2009-2010	Cross-sectional	Santa Maria de Jetibá, ES	7-9	School-based	Public and private	901	7
Kupek 2016[71]	2007	Cross-sectional	Florianópolis, SC	7-9	School-based	Public and private	876	8
Leal 2017[72]	2002	Cross-sectional	Florianópolis, SC	7-9	School-based	Public and private	2,936	7
Menezes 2007[73]	1997	Cohort	Pelotas, RS	4	Population-based	Maternity	1,243	5
Moreira 2012[74]	2007	Cross-sectional	Região semi-árida, AL	0-5	Population-based	Household	963	6
Muller 2014[75]	2008	Cross-sectional	Urban areas of 100 municipalities in the 5 regions	0-5	Population-based	Household	4,804	7
Nobre 2013[76]	2009-2010	Cross-sectional	Diamantina, MG	5	Population-based	Maternity	232	6
Nogueira 2014[77]	2012	Cross-sectional	Ourinhos, SP	6-9	School-based	Public	2,572	3
Oliveira 2003[78]	2001	Cross-sectional	Feira de Santana, BA	4-9	School-based	Public and private	676	5
Oliveira 2015[79]	2011	Cross-sectional	Feira de Santana, BA	5-9	School-based	Public and private	713	3
Opptiz 2014[80]	2008	Cross-sectional	Anísio de Abreu e Caracol, PI	0-5	Population-based	Household	1,640	5
PNDS 2006[93]	2006	Cross-sectional	Brasil	0-9	Population-based	Household	5,828	8
POF 2003[92]	2003	Cross-sectional	Brasil	2-9	Population-based	Household	29,437	8
POF 2009[91]	2009	Cross-sectional	Brasil	2-9	Population-based	Household	26,541	8

Study	Year	Study design	Location (city, state or country)	Age group (year)	Sample source	Sample coverage	Population (n)	Quality score
PPV 1997[90]	1997	Cross-sectional	Brasil	0-9	Population-based	Household	3,103	8
Pretto 2014[81]	2011	Cohort	Pelotas, RS	8	Population-based	Maternity	616	6
Ramalho 2013[82]	2003	Cross-sectional	Assis Brasil, AC	0-5	Population-based	Household	199	8
Ramalho 2013[82]	2010	Cross-sectional	Assis Brasil, AC	0-5	Population-based	Household	378	8
Rocha 2019[89]	2015	Cross-sectional	Viçosa, MG	8-9	School-based	Public and private	378	7
Salomons 2007[83]	2006	Cross-sectional	Arapoti, PR	6-9	School-based	Public	1,384	6
Santos 2019[84]	2004	Cohort	Pelotas, RS	6	Population-based	Maternity	3,109	9
Silva 2018[85]	2012-2013	Cross-sectional	Uberaba, MG	5-9	School-based	Public and private	341	7
Strufaldi 2011[86]	2006	Cross-sectional	Embu das Artes, SP	6-9	School-based	Public	684	6
Travi 2012[87]	2006	Cross-sectional	Campo Grande, MS	6-9	School-based	Public and private	589	7
Villa 2014[88]	2012-2013	Cross-sectional	Viçosa, MG	8-9	School-based	Public and private	348	7

[a] Study included only girls.

3. Conclusão

A cada 100 crianças até 10 anos de idade, 8 apresentaram obesidade de acordo com pesquisas representativas realizadas no país. A obesidade foi maior em meninos do que em meninas, entre a faixa etária de 6 a 9 anos, nas regiões Sul e Sudeste do Brasil, principalmente entre as décadas de 2000 e 2010. A obesidade infantil aumentou nos últimos anos, nas regiões mais desenvolvidas do País ao longo dos anos e nas crianças mais velhas. Uma investigação mais aprofundada de cada fator subjacente, como padrões alimentares, desigualdades entre as regiões brasileiras e fatores sociais, pode explicar as variações observadas. As estimativas não apresentam suspeita de ausência de estudos publicados (viés de publicação) e possivelmente refletem a estimativa mais fidedigna disponível para embasar políticas públicas do Sistema Único de Saúde.

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Apêndice A. Comprovante da submissão do artigo

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Confirm co-authorship of submission to Jornal de Pediatria

Jornal de Pediatria <em@editorialmanager.com> 16 de setembro de 2020 09:04
Responder a: Jornal de Pediatria <assessoria@jped.com.br>
Para: Carolina Muller Ferreira <cmf.muller@gmail.com>

*This is an automated message. *

Journal: Jornal de Pediatria
Title: Prevalence of childhood obesity in Brazil: a systematic review and meta-analysis
Corresponding Author: Prof. Tais F Galvao
Co-Authors: Carolina Muller Ferreira, BPharm, MSc candidate; Natália Dutra dos Reis, BPharm; Andresa de Oliveira Castro, BPharm student; Dorotéia Aparecida Hofelmann, RD, MSc, PhD; Kátia Kodaira, BPharm, MSc, PhD candidate; Marcus Tolentino Silva, BPharm, MSc, PhD
Manuscript Number: JPEDIATRIA-D-20-00255

Dear Carolina Muller Ferreira,

Prof. Tais F Galvao submitted this manuscript via Elsevier's online submission system, Editorial Manager, and you have been listed as a Co-Author of this submission.
Elsevier asks Co-Authors to confirm their consent to be listed as Co-Author and track the papers status. In order to confirm your connection to this submission, please click here to confirm your co-authorship:

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If you did not co-author this submission, please contact the Corresponding Author directly at taisgalvao@gmail.com

Thank you,

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In compliance with data protection regulations, you may request that we remove your personal registration details at any time. (Use the following URL: https://www.editorialmanager.com/jpediatria/login.asp?a=r). Please contact the publication office if you have any questions.

Apêndice B: Protocolo da pesquisa registrado no PROSPERO

NIHR | National Institute for Health Research

PROSPERO

International prospective register of systematic reviews

Prevalence of childhood obesity in Brazil: a systematic review and meta-analysis

Tais Galvao, Carolina Muller, Andresa Castro, Raisa Gusmao, Natalia Reis, Doroteia Aparecida Höfelmann, Marcus Tolentino Silva

Citation

Tais Galvao, Carolina Muller, Andresa Castro, Raisa Gusmao, Natalia Reis, Doroteia Aparecida Höfelmann, Marcus Tolentino Silva. Prevalence of childhood obesity in Brazil: a systematic review and meta-analysis. PROSPERO 2018 CRD42018091713 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42018091713

Review question

What is the prevalence of child obesity in Brazil by age groups and macro-regions?

Searches

We will search the following electronic bibliographic databases: MEDical Literature Analysis and Retrieval System Online (MEDLINE), Excerpta Medica Database (EMBASE), Scopus, Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), Scientific Electronic Library Online (SciELO).
No restrictions will be applied on publication date, language or status.
Available Microdata from National Studies/Statistics that resulted from age groups of interest will also be searched, for example, Pesquisa de Orçamentos Familiares (POF), Pesquisa Nacional de Demografia e Saúde (PNDS) and others studies identified through manual searches and contact with specialists.

The references from the included studies and relevant publications in the area of this review will be scrutinized to identify potentially eligible studies. Grey literature will be identified through the search of repositories of thesis and dissertations.

A prior search strategy was elaborated in MEDLINE (via PubMed): ("pediatric obesity"[MeSH] OR ((obesity OR overweight OR obese) AND (children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood))) AND (prevalence OR prevalencia) AND (Brazil OR Brasil).
The strategy approved following Peer Review of Electronic Search Strategies (PRESS) recommendation was adapted for the other bases described in the project.

Types of study to be included

We will include observational or experimental studies population-based or school-based with regional or/and national representativeness.

Condition or domain being studied

Childhood obesity as defined by the World Health Organization.

Participants/population

We will include studies that report prevalence of obesity and overweight of Brazilian children aged from 0-10 years old. There are no restrictions on demographic characteristics.

Intervention(s), exposure(s)

The focus of the review is to determine the prevalence of childhood obesity in Brazil.

Comparator(s)/control

There is no control group in this review.

Context

Studies must have been conducted with representative sampling and must have the definition of childhood obesity derived from weight and height measurement (reporting of weight and height of the child will not be

considered). Assessment of child obesity in the studies should have been performed according to World Health Organization (WHO) and adopted by the Ministry of Health for the Brazilian population. Studies using other criteria whose microdata are available will be eligible since they allow classification of individual data according to the adopted standard. Studies related to other diseases but that have data eligible for this research (height and weight measurements) will be included. Adult cutoff points of Body Mass Index (weight [kg]/square height [m^2]), adiposity assessment by skinfold measurements and other body fat measurements and percentiles from Centers for Disease Control and Prevention will not be considered for reasons of validity and reproducibility.

Main outcome(s)

Prevalence of childhood obesity.

Additional outcome(s)

Prevalence of childhood obesity in Brazil by age groups, macro-regions and sex. Time trend of childhood obesity in Brazil.

Data extraction (selection and coding)

Abstracts of studies retrieved using the search strategy and from the additional sources mentioned in Searches will be screened by team members trained in pairs, who will independently select the studies based on the eligibility criteria. Duplicate articles will be identified and removed. Next, full texts will be screened by two review team members. Disagreements will be resolved by a third researcher, the project coordinator. The Covidence platform (www.covidence.org) will be used at this stage.
Data will be extracted in a previously standardized Excel's worksheet. Extraction will be performed by a reviewer and confirmed by another. Discordances will be solved by consensus. Any missing or additional required data will be requested from the corresponding authors on the individual studies.
Data extracted will be:
(1) Characteristics of the study: author, design, year and place of the research;
(2) Characteristics of the population: age group included, sociodemographic variables, total of participants and proportion by sex and age;
(3) Outcome: criterion used for assessing obesity, number of participants with obesity in total and in each group (sex and age), denominator of each obesity assessment.

Risk of bias (quality) assessment

We will use the Joanna Briggs Institute critical evaluation checklist of studies with prevalence data. One reviewer will assess and another will confirm the quality assessment. Discordances will be solved by consensus.
This tool consists of 9 critical evaluation items:
(1) Has the source of the sampling list been appropriate to address the target population?
(2) Were the study participants adequately sampled?
(3) Was the sample size adequate?
(4) Were the study participants and context described in detail?
(5) Was the data analysis conducted with sufficient coverage of the identified sample?
(6) Were valid methods used to identify the outcome?
(7) Was the outcome measured in a standardized and reliable manner for all participants?
(8) Was the statistical analysis appropriate?
(9) Was the response rate adequate and, if not, was it adequately managed?

Strategy for data synthesis

We plan to use aggregate participant data and a quantitative synthesis approach. Results will be presented with 95% confidence intervals and meta-analysis to estimate prevalence of childhood obesity in the Brazilian population.
Prevalence of time intervals of 5 to 10 years of publication (or relevant intervals according to the availability of extracted data) will also be calculated to assess the time trend of childhood obesity.
Stata statistical software version 14.2 will be used to analyze data by two approaches: (1) metaprop command to group proportions of studies in meta-analysis, with score-based or exact binomial CI, assuming that population and sample sizes of the studies are correlated. (2) Transformation of Freeman-Tukey double arccosine to stabilize variances.
Heterogeneity will be evaluated through the $?^2$ test, adopting the level of significance of $p<0.10$.
The I^2 statistic will also be used to evaluate the degree of heterogeneity between studies. The sources of inconsistency between the results of the studies will be explored through meta-regressions and subgroup analyzes. Meta-regressions will be calculated by the modified Knapp-Hartung method.
Socioeconomic characteristics of the region in which each study was conducted will be obtained and explored in meta-regressions, including indicators of inequality and development.
The presence of effects from small studies will be observed through asymmetry of the funnel graph and calculation of the Egger test, adopting the level of significance of $p<0.05$.

Analysis of subgroups or subsets

In the subgroup analyzes, only studies with similar characteristics in the variables available for evaluation in the change of prevalence and heterogeneity will be included in the meta-analysis. We plan to examine estimates of prevalence stratification by:
- Age groups (0-23 months, 2-5 years, 5-9 years and other ranges according to the availability of data);
- Sex (male and female);
- Brazilian macro regions (North, Northeast, Midwest, Southeast and South).

Contact details for further information

Tais Galvao
taisgalvao@gmail.com

Organisational affiliation of the review State University of Campinas
http://www.unicamp.br/unicamp/

Review team members and their organisational affiliations

Professor Tais Galvao. State University of Campinas Ms Carolina Muller. State University of Campinas Ms Andresa Castro. State University of Campinas Ms Raisa Gusmao. State University of Campinas
Ms Natalia Reis. State University of Campinas
Professor Doroteia Aparecida Höfelmann. Federal University of Parana Professor Marcus Tolentino Silva. Federal University of Amazonas

Type and method of review

Meta-analysis, Systematic review, Other

Anticipated or actual start date

08 January 2018

Anticipated completion date

01 December 2019

Funding sources/sponsors

Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), grant number: 440865/2017-4

Conflicts of interest

Language

Portuguese-Brazil (there is not an English language summary)

Country

Brazil

Stage of review

Review Ongoing

Details of final report/publication(s) Subject index terms status

Subject indexing assigned by CRD

Subject index terms

Brazil; Humans; Overweight; Pediatric Obesity; Prevalence

Date of registration in PROSPERO

02 August 2018

Date of publication of this version

02 August 2018

Details of any existing review of the same topic by the same authors

Stage of review at time of this submission

Stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	No
Data extraction	Yes	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

Versions

02 August 2018

PROSPERO

This information has been provided by the named contact for this review. CRD has accepted this information in good faith and registered the review in PROSPERO. The registrant confirms that the information supplied for this submission is accurate and complete. CRD bears no responsibility or liability for the content of this registration record, any associated files or external websites.

Apêndice C. Formulário de revisão da estratégica de busca

***PRESS Guideline* — Search Submission & Peer Review Assessment**

SEARCH SUBMISSION: THIS SECTION TO BE FILLED IN BY THE SEARCHER

Searcher: Carolina M.	Email:; cmf.muller@gmail.com
Date submitted:	Date requested by: 02/01/2018 *[Maximum = 5 working*

Systematic Review Title:

Prevalência da obesidade infantil por faixa etária e regiões brasileiras: revisão sistemática e meta-análise

This search strategy is …

X	My PRIMARY (core) database strategy — First time submitting a strategy for
	My PRIMARY (core) strategy — Follow-up review NOT the first time submitting a strategy for search question and database. If this is a response to peer
	SECONDARY search strategy— First time submitting a strategy for search
	SECONDARY search strategy — NOT the first time submitting a strategy for search question and database. If

Database (i.e., MEDLINE,CINAHL…): *[mandatory]*

Medline

Interface (i.e., Ovid, EBSCO…): *[mandatory]*

Pubmed

Research Question

(Describe the purpose of the search) *[mandatory]*

Qual a prevalência de obesidade infantil (crianças menores de 10 anos) no Brasil e macrorregiões do País?

PICO Format

(Outline the PICOs for your question — i.e., Patient, Index test, Reference standard, Outcome, and Study Design — as applicable)

P	Crianças (menores de 10 anos)
I	Obesidade, sobrepeso
C	-
O	Prevalência no Brasil e macrorregiões
S	Estudos de base populacional ou de base escolar com representatividade regional

Inclusion Criteria (List criteria such as age groups, study designs, etc., to be included)

[optional]

Pacientes com obesidade infantil (<10 anos) pela análise da relação peso e altura, avaliados em estudos de base populacional e escolar com representatividade regional e/ou nacional com foco restrito no Brasil.

Exclusion Criteria (List criteria such as study designs, date limits, etc., to be excluded)

[optional]

Pacientes adolescentes e adultos, cujo reporte de obesidade não é realizado por aferição de peso e altura. Exclusão de estudos nos quais se encaixem como casos reportados, e que analisam a relação da obesidade com adiposidade cutânea. Também serão desconsiderados estudos que não demonstrem a prevalência e que sejam como em outros Paises/Regiões.

Was a search filter applied?

Yes [ ] [x] No

If YES, which one(s) (e.g., Cochrane RCT filter, PubMed Clinical Queries filter)?

Provide the source if this is a published filter. *[mandatory if YES to previous question — textbox]*

Other notes or comments you feel would be useful for the peer reviewer? ***[optional]***

Sinônimo que pode ser inserido: Newborn

Please copy and paste your search strategy here, exactly as run, including the number of hits per line. ***[mandatory]***

Search	Add to builder	Query	Items found
#12	Add	Search **((((children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood) AND (obesity OR overweight OR obese))) AND ((prevalence OR prevalencia))) AND ((Brazil OR Brasil))**	970
#11	Add	Search **(Brazil OR Brasil)**	316588
#10	Add	Search **(prevalence OR prevalencia)**	2352996
#7	Add	Search **(children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood)**	2936533
#5	Add	Search **(obesity OR overweight OR obese)**	311268

PEER REVIEW ASSESSMENT: THIS SECTION TO BE FILLED IN BY THE REVIEWER

Reviewer:	Email:	Date completed:
Marcus Tolentino	marcusts@gmail.com	22/01/2018

1. TRANSLATION

A --- No revisions	X
B --- Revision(s) suggested	
C --- Revision(s) required	

If "B" or "C," please provide an explanation or example:

-

2. BOOLEAN AND PROXIMITY OPERATORS

A --- No revisions	X
B --- Revision(s) suggested	
C --- Revision(s) required	

If "B" or "C," please provide an explanation or example:

-

3. SUBJECT HEADINGS

A -- -No revisions	X
B --- Revision(s) suggested	
C --- Revision(s) required	

If "B" or "C," please provide an explanation or example:

-

4. TEXT WORD SEARCHING

A ---No revisions	X
B --- Revision(s)suggested	
C --- Revision(s) required	

If "B" or "C," please provide an explanation or example:

-

5. SPELLING, SYNTAX, AND LINE NUMBERS

A ---No revisions	X
B --- Revision(s)suggested	
C --- Revision(s) required	

If "B" or "C," please provide an explanation or example:

-

6. LIMITS AND FILTERS

A ---No revisions	X
B --- Revision(s) suggested	
C --- Revision(s) required	

If "B" or "C," please provide an explanation or example:

-

OVERALL EVALUATION (Note: If one or more "revision required" is noted above, the response below must be "revisions required".)

A ---No revisions	X
B --- Revision(s) suggested	
C --- Revision(s) required	

Additional comments:

-

Apêndice D. Estratégia de busca adotada em cada base bibiográfica e resultado da última busca

Base	Estratégia	Quantidade de artigos
Pubmed	(children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood) AND (obesity OR overweight OR obese) AND (prevalence OR prevalencia) AND (Brazil OR Brasil)	1202
Embase	('child'/exp OR 'infant'/exp OR 'baby'/exp OR 'newborn'/exp OR 'childhood'/exp) AND 'obesity'/exp AND 'prevalence'/exp AND 'brazil'/exp AND [embase]/lim	270
Scopus	TITLE-ABS-KEY (children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood) AND TITLE-ABS-KEY (obesity OR overweight OR obese) AND TITLE-ABS-KEY (prevalence OR prevalencia) AND TITLE-ABS-KEY (brazil OR brasil) AND NOT INDEX (medline) AND NOT INDEX (embase)	99
Web of Science	TI=(children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood) AND TI=(obesity OR overweight OR obese) AND TS=(prevalence OR prevalencia) AND TS=(Brazil OR Brasil)	78
CINAHL	(children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood) AND AB (obesity OR overweight OR obese) AND AB (prevalence OR prevalencia) AND AB (Brazil OR Brasil)	85
LILACS	(children OR child OR pediatric OR infant OR kid OR baby OR neonate OR childhood) [Palavras do resumo] and obesity OR overweight OR obese [Palavras do resumo] and (prevalence OR prevalencia) AND (Brazil OR Brasil) [Palavras do resumo]	192
Scielo	(ab:((children OR child OR pediatric OR infant* OR kid OR baby OR neonat* OR childhood OR criança))) AND (ab:((obesity OR overweight OR obes* OR sobrepeso))) AND (ti:((prevalence OR prevalencia))) AND (ti:((Brazil OR Brasil)))	52
Total		**1978**

Apêndice E. Resultado da busca e seleção em repositórios de teses e dissertações

Universidade	Sigla	Estratégia	Resultado	Potencialmente elegíveis	Confirmados
Universidade Estadual de Campinas	UNICAMP	Filtro geral de busca: Obesidade infantil. Adicionado Filtro (Obesidade- campo assunto)	269	16	4
Pontifícia Universidade Católica de Campinas	PUC-CAMP	Filtro geral de busca: Obesidade infantil	2	0	0
Universidade Federal de Pelotas	UFPEL	Filtro geral de busca: Obesidade infantil	493	3	3
Universidade Católica de Pelotas	UCPEL	Filtro geral de busca: Obesidade infantil	1	0	0
Universidade Federal de Juiz de Fora	UFJF	Filtro geral de busca: Obesidade infantil	589	2	1
Universidade Federal de Ouro Preto	UFOP	Filtro geral de busca: Obesidade infantil	2	1	1
Universidade de São Paulo	USP	Filtro: Obesidade AND Infantil (palavra-chave)	46	10	2
Universidade Federal de Santa Catarina	UFSC	Filtro geral de busca: Obesidade infantil	150	3	0
Universidade Federal do Paraná	UFPR	Filtro geral de busca: Obesidade infantil	297	3	1
Universidade Federal do Rio Grande do Sul	UFRGS	Filtro geral de busca: Obesidade infantil: (("Obesidade") AND ("Infantil")) AND ((mimetype:[A TO Z]))	670	11	7

Universidade	Sigla	Estratégia	Resultado	Potencialmente elegíveis	Confirmados
Universidade do Estado de Santa Catarina	UDESC	Filtro geral de busca: Obesidade infantil	67	1	0
Universidade Presbiteriana Mackenzie	Mackenzie	Filtro geral de busca: Obesidade infantil	2	0	0
Universidade Estadual do Centro-Oeste	UNICENTRO	Filtro geral de busca: Obesidade infantil	10	0	0
Universidade Estadual de Londrina	UEL	Filtro geral de busca: Obesidade infantil	117	3	1
Universidade Católica de Pernambuco	UNICAP	Filtro geral de busca: Obesidade infantil	2	0	0
Universidade Federal de Viçosa	UFV	Filtro geral de busca: Obesidade infantil	933	11	6
Universidade Federal da Bahia	UFBA	Filtro geral de busca: Obesidade infantil	1.011	4	3
Universidade Federal do Pernambuco	UFPE	Filtro geral de busca: Obesidade	989	23	11
Universidade Federal da Paraíba	UFPB	Filtro geral de busca: Obesidade infantil	1	0	0
Universidade Federal de Minas Gerais	UFMG	Filtro geral de busca: Obesidade infantil	6	4	1
Universidade Federal de Goiás	UFG	Filtro geral de busca: Obesidade infantil	3	1	0
Faculdade de Medicina de São José do Rio Preto	FAMERP	Filtro geral de busca: Obesidade infantil	3	0	0

Universidade	Sigla	Estratégia	Resultado	Potencialmente elegíveis	Confirmados
Universidade Estadual do Rio de Janeiro	UERJ	Filtro geral de busca: Obesidade infantil	3	0	0
Universidade Estadual de Pernambuco	UEPB	Filtro geral de busca: Obesidade infantil	6	0	0
Universidade de Brasília	UnB	Filtro geral de busca: Obesidade	740	9	2
Universidade Federal do Piauí	UFPI	Filtro geral de busca: Obesidade infantil	133	1	0
Universidade Federal do Ceará	UFC	Filtro geral de busca: Obesidade infantil	8	0	0
Fundação Osvaldo Cruz	FIOCRUZ	Filtro geral de busca: Obesidade infantil	2	0	0
Pontifícia Universidade Católica de Goiás	PUC-GO	Filtro geral de busca: Obesidade infantil	7	0	0
Universidade Federal de São Paulo	UNIFESP	Filtro geral de busca: Obesidade infantil	2	0	0
Universidade Nove de julho	UNINOVE	Filtro geral de busca: Obesidade infantil	1	0	0
Universidade Estadual de São Paulo	UNESP	Filtro geral de busca: Obesidade infantil	8	0	0
Universidade de São Carlos	UFSCAR	Filtro geral de busca: Obesidade infantil	16	0	0
Universidade Federal do Rio Grande do Norte	UFRN	Filtro geral de busca: Obesidade	701	4	4
Pontifícia Universidade Católica do Paraná	PUC-PR	Filtro geral de busca: Obesidade infantil	1	0	0

Universidade	Sigla	Estratégia	Resultado	Potencialmente elegíveis	Confirmados
Universidade de Santa Maria	UFSM	Filtro geral de busca: Obesidade infantil	1	0	0
Pontifícia Universidade Católica de São Paulo	PUC-SP	Filtro geral de busca: Obesidade infantil	1	0	0
Unisagrado	USC	Filtro geral de busca: Obesidade infantil	1	0	0
Universidade Federal de Uberlândia	UFU	Filtro geral de busca: Obesidade infantil	1	0	0
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Universidade do Vale do Rio dos Sinos	UNISINOS	Filtro geral de busca: Obesidade infantil	1	1	1
Pontifícia Universidade Católica do Rio Grande do Sul	PUC-RS	Filtro geral de busca: Obesidade	2	1	0
Universidade Federal da Fronteira do Sul	UFFS	Filtro geral de busca: Obesidade infantil	111	0	0
Total			**7.410**	**112**	**48**

Anexo 1. Instruções aos autores da revista *Jornal de Pediatria*

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Official Publication of the Brazilian Society of Pediatrics

ELSEVIER

AUTHOR INFORMATION PACK

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DESCRIPTION

Jornal de Pediatria is a bimonthly publication of the Brazilian Society of Pediatrics (Sociedade Brasileira de Pediatria, SBP). It has been published without interruption since 1934. *Jornal de Pediatria* publishes original articles and review articles covering various areas in the field of pediatrics. By publishing relevant scientific contributions, *Jornal de Pediatria* aims at improving the standards of pediatrics and of the healthcare provided for children and adolescents in general, as well to foster debate about health.

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SciELO - Scientific Electronic Library Online
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GUIDE FOR AUTHORS

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Original articles include reports on controlled and randomized studies, screening and diagnostic studies, and other descriptive and intervention studies, as well as reports on basic research carried out with laboratory animals (see section **Results of Clinical Trials**). Manuscripts in this category should not exceed 3,000 words (excluding front page, references and tables), 30 references and four tables and figures. Please access http://www.equator-network.org/ for further information on how to publish this type of article.

Review articles are meta-analysis, systematic or critical assessments of the literature concerning topics of clinical relevance, with emphasis on aspects such as cause and prevention of diseases, diagnosis, treatment, and prognosis. Review articles should not exceed 6,000 words (excluding front page, references and tables) and a minimum of 30 up-to-date references should be cited. Usually, professionals of recognized expertise are invited to write review articles. Meta-analyses are included in this category. Jornal de Pediatria will also consider unsolicited review articles. Please contact assessoria@jped.com.br to submit a draft to the Editorial Board before sending the full review article. Please access http://www.equator-network.org/ for further information on how to publish this type of article.

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Authorship

All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

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The main text in **original articles** should contain the following sections, indicated by a subtitle: Introduction, Methods, Results, and Discussion.

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g) the specific contribution of each author to the study;

h) statement of conflicts of interest (write "nothing to declare" or clearly disclose any financial or other interests which could cause embarrassment if revealed after the publication of the article);

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Summary of the findings: State the main quantitative or qualitative findings.

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3. Organization as author:

Mercier CE, Dunn MS, Ferrelli KR, Howard DB, Soll RF; Vermont Oxford Network ELBW Infant Follow-Up Study Group. Neurodevelopmental outcome of extremely low birth weight infants from the Vermont Oxford network: 1998-2003. Neonatology. 2010;97:329-38.

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Books

Blumer JL, Reed MD. Principles of neonatal pharmacology. In: Yaffe SJ, Aranda JV, eds. Neonatal and Pediatric Pharmacology. 3rd ed. Baltimore: Lippincott, Williams and Wilkins; 2005. p. 146-58.

Academic studies

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