



Original/*Obesidad*

Prevalence of obesity among primary students between 2009 to 2014 in China: a meta-analysis

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Abstract

Background: In recent years, obesity has become the major public health problems worldwide. The detection rate of obesity is alarmingly rising among children and adolescents in China, whose population of 120 million are in range of obesity. It was estimated that 8% of her children are obese.

Methods: Publications between 2009 and 2014 on the obesity prevalence among primary school students in China were retrieved from PubMed, online Chinese periodical full-text databases of VIP, CNKI and Wanfang. Meta Analyst software was used to sum up and analyze the detection rates included in the previously retrieved literatures.

Results: After evaluation of the quality of the articles, 18 papers were finally included in our study, and the total sample sizes on the obesity investigation were 247547, in which 26466 were obesity. Meta-analysis findings showed that the pooled prevalence of obesity in primary school students is 10.0% (95% CI: 7.2%-13.5%).

Conclusion: Our results indicated that the obesity prevalence status in China was still troublesome, for the situation will go worse if we currently fail to take effective and practical measures.

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Key words: Primary students. Obesity. Prevalence. Meta-analysis.

PREVALENCIA DE LA OBESIDAD EN ALUMNOS DE PRIMARIA ENTRE 2009 Y 2014 EN CHINA: META-ANÁLISIS

Resumen

Introducción: En los últimos años, la obesidad se ha convertido en el principal problema de salud pública a nivel mundial. La tasa de detección de obesidad infantil está creciendo alarmantemente entre los niños y los adolescentes en China, cuya población de 120 millones se sitúa en el rango de obesidad. Se calculó que el 8% de los niños son obesos.

Métodos: Se recopilaron publicaciones entre 2009 y 2014 sobre la prevalencia de obesidad entre los alumnos de primaria en China de PubMed, textos completos de bases de datos de periódicos chinos online de VIP, CNKI y Wanfang. Se empleó software de meta-análisis para resumir y analizar las tasas de detección incluidas en la bibliografía previamente obtenida.

Resultados: Después de la evaluación de la calidad de los artículos, finalmente incluimos 18 artículos en nuestro estudio, y los tamaños de la muestra total en la investigación sobre obesidad fueron 247547, donde 26466 presentaron obesidad. Los resultados de los meta-análisis mostraron que la prevalencia de la obesidad en los alumnos de primaria es del 10,0% (IC del 95%: 7,2% - 13,5%).

Conclusión: Nuestros resultados indican que la prevalencia de obesidad en China todavía supone un problema preocupante, dado que la situación será peor si no se toman medidas eficaces y prácticas.

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Palabras clave: Alumnos de primaria. Obesidad. Prevalencia. Meta-análisis.

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Globally, there is rising prevalence of overweight and obesity in both developing and developed countries¹. The rate of obesity has tripled in developing countries over the past 20 years as they rapidly become more urbanized, with increased consumption of high calorie foods and adoption of a more sedentary lifestyle².

Some studies observed that obesity is associated with breast cancer³, asthma^{4,5}, diabetes mellitus^{6,7}, hypertension⁸, coronary artery disease⁹, and dental caries¹⁰⁻¹². Previous study showed that the prevalence of obesity in Chinese children and adolescents was considered to be still relatively low¹³. However, research recently found that rapid increasing of both obesity and overweight, in both urban and rural areas would arouse special attention^{14,15}.

However, there have been little studies documented in literature in this part of China assessing the prevalence of overall obesity. Thus, the purpose of this study was to assess the prevalence of obesity in recently.

Material and methods

Literature retrieval

Related publications on obesity released between 2009 and 2014 were retrieved online from PubMed, Chinese periodical full-text databases of VIP, Wanfang and CNKI in compliance with the key words “obesity, students, primary and China” in Chinese for Chinese database and in English for PubMed. Full-texts eligible were retrieved manually from the previous data.

Criteria

Entry criteria for the literature consisted of 1) papers on the obesity among college or university students in China published between January 2009 and June 2014; 2) articles aimed at discussion of the prevalence of obesity in China primary students. Exclusion criteria included 1) the indicators described in articles with less association or data being incomplete; 2) repeated articles.

Literature screening and Quality assessment in process

Each study was assessed by two investigators independently, and the disagreements were resolved by expert assessment. Blind method was used to ensure quality. The related literatures were retrieved on basis of the key words described previously, and initially selected through the title appraisal and scanning the abstracts. Full-text appreciation was carried out for the primary selections. Data extraction was performed in

papers verified eligibly. Evaluation of the article quality was made as meta-analysis of observational studies in epidemiology proposed Stroup DF, et al¹⁶.

Statistical analysis

Meta Analyst for Windows¹⁷ was used for performing meta-analysis. By heterogeneity test, the random-effect model was applied to merging sets of data and data analysis. The final data were subdivided into several groups for statistical analysis and chart description.

Results

Basic information and quality assessment of the articles

A total of 131 articles were retrieved from online Chinese periodical full-text databases of VIP, Wanfang database and CNKI well as PubMed. Quality assessment was made by Meta-analysis of observational studies in epidemiology¹⁶. Of the 18 articles, the total sample sizes on the obesity investigation were 247547. Figure 1 shows the process of literature screening, and the basic information on the final articles is showed in Table I.

Meta-analysis of the obesity detection rate among primary school students in China

Heterogeneity test was carried out on the obesity detection rate, with a result of $I^2=0.500$, suggesting that the

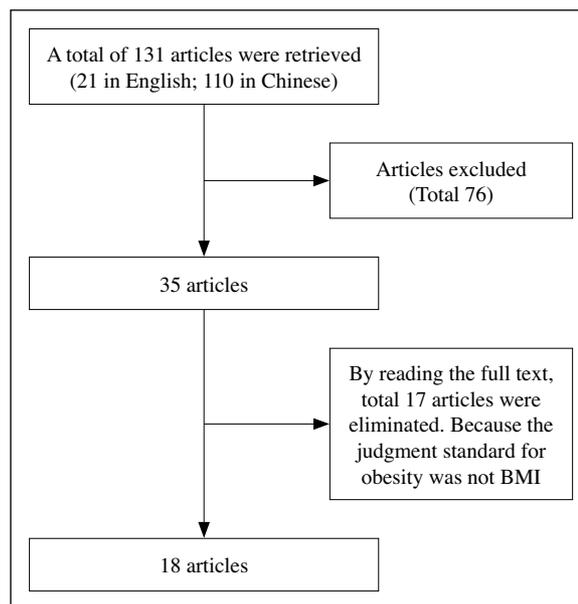


Fig. 1.—Flow Chart for the Literature Screening.

Tabla I
Main Characteristic of the Studies and the Detection Rate of Obesity among Primary School Students in China

First author	Year	Geographical distribution	Prevalence of obesity (%)			Subjects	Age range	Criterion
			Total	Boy	Girl			
Wang HH ¹⁸	2009	Handan	16.01			pupil	7-12	BMI
Yu T ¹⁹	2009	Chengdu	7.00	8.80	5.00	pupil	7-12	BMI
Li L ²⁰	2010	Jinan	17.47	22.27	13.15	pupil	7-12	BMI
Hu YR ²¹	2010	Zhenjiang	8.70	13.40	7.00	pupil		BMI
Liu XH ²²	2010	Linghai	9.60	12.80	6.00	pupil		BMI
Zhang H ²³	2010	Xinyang	6.17	7.50	4.77	pupil	7-12	BMI
Zeng YH ²⁴	2010	Yangchun	4.19	5.91	1.85	pupil		BMI
Zhuang J ²⁵	2011	Chaozhou	10.26	13.58	6.59	pupil	7-12	BMI
Jiang JJ ²⁶	2011	Ji,an	11.20	14.50	8.00	pupil	7-12	BMI
Fu ZJ ²⁷	2011	Shanghai	22.64			pupil	7-12	BMI
Huang JH ²⁸	2011	Beijing	21.00	28.00	14.40	pupil		BMI
Lan FQ ²⁹	2011	Shenzhen	8.98	10.65	7.19	pupil	7-12	BMI
Liu M ³⁰	2012	Yongzhou	13.7	21.2	3.9	pupil	6-12	BMI
Zhu B ³¹	2013	Zhoushan	12.86	15.93	9.51	pupil	7-12	BMI
Jia L ³²	2013	Wenzhou	6.4	7.9	4.6	pupil	6-13	BMI
Zhou H ³³	2013	Dongguan	7.32	5.55	1.77	pupil	7-14	BMI
Gao G ³⁴	2013	Suzhou	11.23	14	7.9	pupil	7-12	BMI
Yao Y ³⁵	2014	Tongling	3.66	5.2	1.8	pupil	5-14	BMI

research results in the 18 papers were heterogeneous. Random-effect model was used for meta-analysis. As is shown by the forest plots (Figure 2), the results suggested that pooled prevalence of obesity in primary school students is 10.0 % (95% CI: 7.2%-13.5%).

Publication bias

Publication bias is a tendency on average to produce results that appear statistical significance on the part of investigator to submit, or the reviewers and editors, to accept manuscripts. Even though a potential threat in meta-analysis, it may be verified with funnel plots, which was applied to modifying the possible bias in our literature selection. Verification by funnel plot (Figure 3) showed that the literatures included were in better symmetry, suggesting less possibility of publication bias on the detection rate of obesity in China primary school students.

Discussion

Our results indicated that the obesity prevalence status in China was still troublesome, the pooled

prevalence of obesity in primary school students is 10.0 % (95% CI: 7.2%-13.5%). The possible explanation for the results may be included as follow: the physiological difference and traditional Chinese thinking that male should be strongest sex in a family, also there are maybe lack healthy lifestyle knowledge and actual healthy behavior among students³⁶. In addition, highly developed economic level in eastern China makes urban children in wealth families enjoy more modern vehicles and sedentary behaviors, thus leading to reduce daily physical activities and a decrease in daily energy expenditure but easy accumulation of body fat, whereas obesity seems less likely in western China, where the economy is relatively under-developed, and growth deficiencies due to poor nutrition occur more often in children rather than being obese. Moreover, the overall prevalence rates of overweight and obesity in northern area were higher than in other areas³⁷.

Although the figure by our meta-analysis with mean 10.% doesn't look so high as previous reports in western nations, the prevalence status in Mainland China is still troublesome, for the situation will go worse if we currently fail to take effective preventive and control measures. this condition tends to be risk factors for mental growth in childhood and even represents social

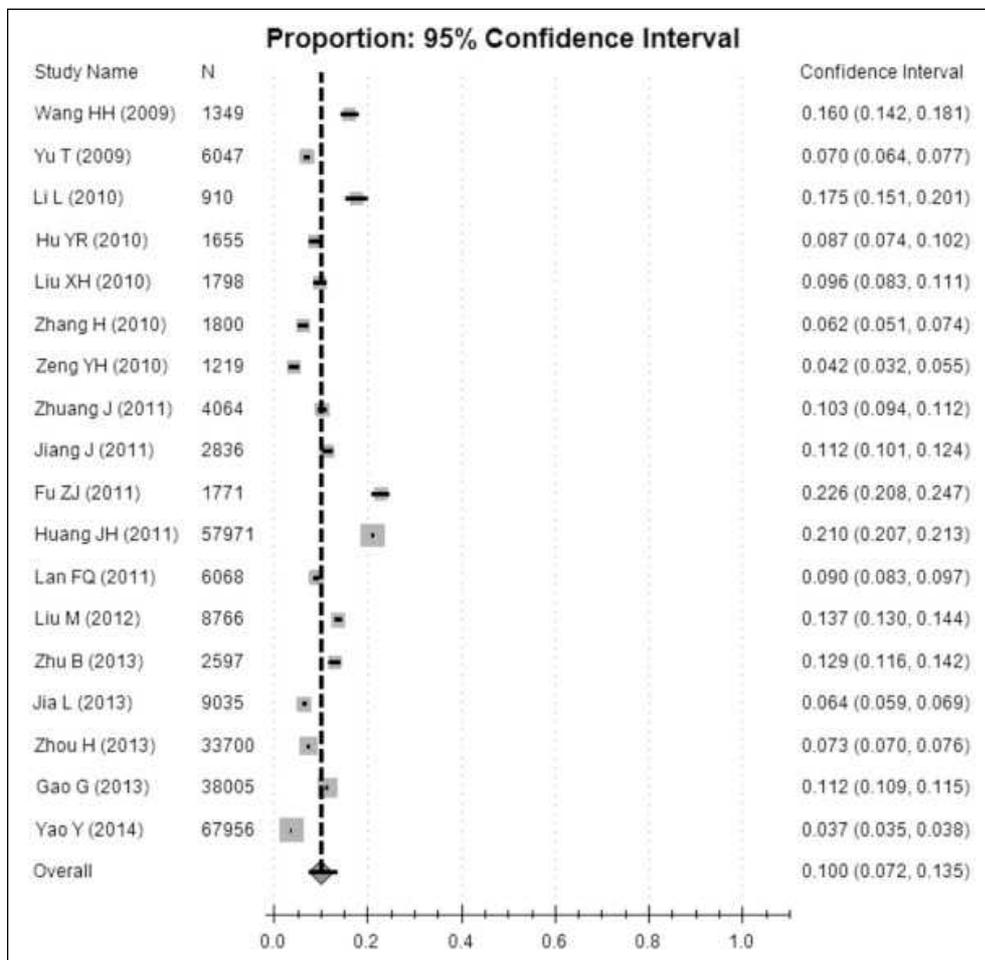


Fig. 2.—Forest Plot of obesity for the overall prevalence in the Meta-analysis.

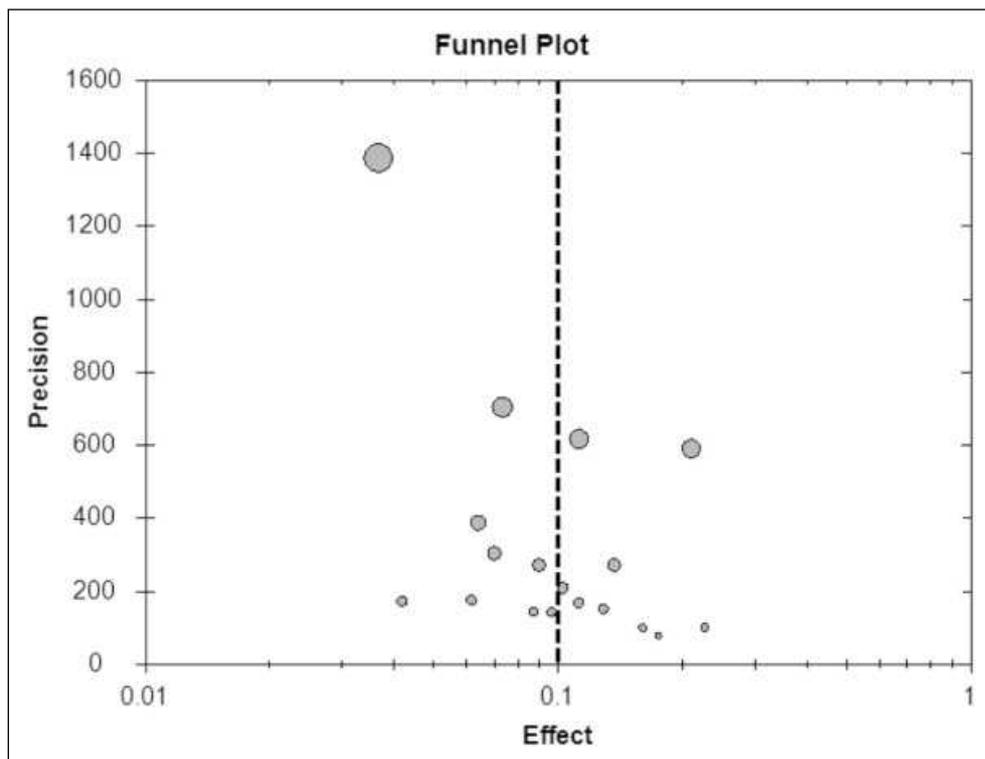


Fig. 3.—Funnel Plot.

dysfunction when they grow up. For the rising childhood obesity in China, we have to be highly aware of the serious situation, and our educational departments and health authorities should jointly take effective and practical measures, such as health education and regular physical examination, to put it under control. Besides, parents should be educated with the importance of healthy eating, while students are encouraged to take more exercise and shape good living habits.

Limitations

This study provides the current status of childhood obesity from 2009 to 2014 in China. Some limitations to our meta-analysis: the data included are from published papers, some publication bias may exist. Relatively smaller sized samples from literatures for subgroups tends to weaken the validity of the results; and 3) failure to exclude the genetic susceptibility as an important risk factor for childhood obesity in China. Therefore, more reliable obesity prevalence in elementary school students in China remains further investigation.

Conclusion

Our results indicated that the obesity prevalence status in China was still troublesome, for the situation will go worse if we currently fail to take effective and practical measures.

Conflict of Interest: None declared.

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