中国初中生超重与肥胖流行趋势及危险因素研究

高利旺  赵莉  孙晓敏  王友发
710061 西安, 西安交通大学全球健康研究院、西安交通大学公共卫生学院 (高利旺、孙晓敏、王友发); 610041 成都, 四川大学华西公共卫生学院 (赵莉)
通信作者: 王友发, E-mail: youfawang@gmail.com
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【摘要】目的 分析中国初中学生肥胖患病情况，探讨影响其流行的危险因素。方法 利用中国教育追踪调查2014、2015、2016年三轮数据 (分别为8616, 8762, 7614人; 11~18岁)，计算中国初中生超重/肥胖患病率并描述其流行趋势，使用线性回归和 Logistic 回归分析模型探索初中生体重指数 (body mass index, BMI) 和肥胖的危险因素。结果 2016年中国初中生超重/肥胖患病率为15.3%（男: 17.9%, 女: 12.6%）。2014-2016年，初中生超重患病率/肥胖患病率表现持续增长趋势。其中男生超重/肥胖患病率表现为先增长后稳定的流行趋势；女生的超重/肥胖患病率表现为持续增长趋势。2016年横断面研究显示，独生子女 (β (SE) = 0.23 (0.10)), 自我评价超重/肥胖 (β (SE) = 2.83 (0.14)) 及户口为非农 (β (SE) = 0.23 (0.11)), 分别是初中生 BMI 增长的独立危险因素; 自我评价超重/肥胖 (OR = 4.20, 95% CI: 2.97~5.40) 与初中生超重肥胖高度相关。结论 2014-2016年中国初中生超重/肥胖患病率持续增加。尤其应当重视对独生子女、城市学生肥胖的预防控制。

【关键词】 青少年; 超重; 肥胖; 危险因素
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Trends and risk factors of overweight and obesity among Chinese middle school students  GAO Li-wang, ZHOU Li, SUN Xiao-min, WANG You-fa
Global Health Institute, School of Public Health, Xi’an Jiaotong University, Xi’an  710061, China (Gao LW, Sun XM, Wang YF); West of China School of Public Health, Sichuan University, Chengdu 610041, China (Zhao L)
Corresponding author: WANG You-fa, E-mail: youfawang@gmail.com

【Abstract】 Objective To investigate the trends and risk factors of overweight and obesity in Chinese middle school students. Methods Data from the China Education Panel Survey conducted in 2014, 2015 and 2016 were used (8 616, 8 762, 7 614; age range 11-18 years old). Overweight and obesity were defined according to Chinese sex-age-specific body mass index (BMI) cutoffs. Relationships between risk factors and BMI, overweight and obesity were tested, using linear regression and logistic regression models. Results The overall prevalence of overweight and obesity in 2016 was 15.3% (17.9% in boys, 12.6% in girls). From 2014 to 2016, the prevalence of overweight and obesity was increasing steadily. After adjusting for age and sex in 2016, being only-child, self-perceived being overweight or obese, or living in urban area were associated with higher BMI (β (SE) = 0.23 (0.10), β (SE) = 2.83 (0.14), β (SE) = 0.23 (0.11), respectively). Self-perceived being overweight or obese was associated with overweight and obesity (OR = 4.20, 95% CI; 2.97-5.40). Conclusions Overweight and obesity rates among Chinese middle school students increased steadily from 2014 to 2016. Efforts should be made on childhood obesity prevention and control, especially target at those being only-child, living in urban
areas.

【Key words】Adolescent; Overweight; Obesity; Risk factors

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In the context of globalization, the prevalence of overweight and obesity among Chinese children has been rapidly increasing[1-2]. The widespread trend of obesity has brought heavy economic burden and significant losses to society, and it also has a profound impact on the physical fitness and health level of children[3-4]. Therefore, understanding the trends of child obesity and studying the influencing factors is particularly important. The sensitive period of childhood and adolescence is a high risk period for the occurrence of obesity, and it is also a key period for preventing overweight and obesity[5]. Secondary school students are in this sensitive period.

However, most studies focused on the regional and small sample research of children and adolescents with obesity in China[6-7]. Based on nationwide representative data, there are few studies that can be conducted to understand the factors that may lead to the increase in the prevalence of obesity among Chinese secondary school students.

Applying the 2014-2016 China Education Panel Survey (CEPS) data, this study analyzed the prevalence of obesity among secondary school students in China and studied the influencing factors, providing the latest basis for strategies and policies on obesity control and prevention among Chinese children and adolescents.

1 Materials and Methods

1.1 Data Sources The CEPS junior school cohort began in 2013-2014. The study design included four stages: stratified random sampling from the entire country, a total of 28 county-level units (distributed across 20 provincial units), 112 schools, 221 classes, and a total of 10,279 Grade 7 (first year of junior high school) students in the baseline survey. The baseline data were complemented by two follow-up surveys in Grades 8 (second year of junior high school) and 9 (third year of junior high school), with sample sizes of 8,618, 8,762, and 7,614, respectively.

1.2 Quality Control The CEPS questionnaire was strictly designed and tested. The surveyors were rigorously trained and followed up regularly to ensure sample quality. The survey also included a standardized test of comprehensive cognitive abilities and basic personality test. Various means and technologies were used to improve data quality.

1.3 Indicators and Definitions The height and weight of children were collected through self-completion questionnaires, and the body mass index (BMI) was calculated. According to the national health standard《体检儿童青少年超重与肥胖筛查》(WS/T568-2018)[9], the BMI values at different ages and genders were used to define overweight and obesity.

1.4 Statistical Methods Stata 15.0 software was used for statistical analysis. BMI was expressed as (X ± s). Risk factors were expressed as percentages. The χ² test was used to compare the differences in overweight/obesity rates among different characteristics. Mixed-effect models were used to test the trend of overweight/obesity based on age. The 2016 cross-sectional data were used for linear regression and logistic regression analysis in controlling age and gender. Given the existence of within-school correlation, the cluster option was used to correct the standard error. The significance level was set at α = 0.05.

2 Results

2.1 2016 Year Chinese junior high school overweight, obesity findings Among the 6,164 students surveyed, the average age was (14.9 ± 0.9) years. Among them, 50.3% were male, 8.4% were ethnic minorities, 57.4% were agricultural household, and 45.7% were only children. The overweight/obesity rate was 15.3%, with a significantly higher rate for male students (17.9% vs 12.6%, χ² = 39.96, P < 0.001). See Table 1.

2.2 2014-2016 China junior high school overweight, obesity trends Over the years from 2014 to 2016, the prevalence of overweight and obesity continued to increase (Z = 8.78, P_trend < 0.001). Male students showed an increasing trend of overweight/obesity; female students showed a steadily increasing trend (Z = 7.02, P_trend < 0.001). See Table 1.

2.3 Different regions in male and female overweight, obesity findings Among non-agricultural areas, the prevalence of overweight and obesity among males was significantly higher than that among females.

Table 1 Trends of BMI and overweight/obesity from 2014 to 2016

<table>
<thead>
<tr>
<th>Year (Year)</th>
<th>BMI (kg/m²)</th>
<th>Overweight (%)</th>
<th>Obesity (%)</th>
<th>Overweight/Obesity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (Rounds)</td>
<td>2014: 18.2 ± 3.0, 19.2 ± 3.6, 20.1 ± 4.3</td>
<td>2015: 8.9, 9.2, 9.7</td>
<td>2016: 3.5, 5.1, 5.6</td>
<td>2014: 12.4, 14.3, 15.3</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18.5 ± 3.2, 19.4 ± 3.9, 20.1 ± 4.0</td>
<td>12.5, 12.0, 11.5</td>
<td>4.5, 6.4, 6.4</td>
<td>17.0, 18.4, 17.9</td>
</tr>
<tr>
<td>Female</td>
<td>17.9 ± 2.7, 19.0 ± 3.3, 20.1 ± 4.6</td>
<td>4.9, 6.1, 7.9</td>
<td>2.5, 3.8, 4.7</td>
<td>7.4, 9.9, 12.6</td>
</tr>
</tbody>
</table>
### 线表 1

<table>
<thead>
<tr>
<th>年份</th>
<th>BMI((kg/m^2))</th>
<th>超重率(%)</th>
<th>肥胖率(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>农业户口</td>
<td>18.1 ± 2.9</td>
<td>18.9 ± 3.5</td>
<td>19.9 ± 4.1</td>
</tr>
<tr>
<td>非农业户口</td>
<td>18.4 ± 3.1</td>
<td>19.5 ± 3.7</td>
<td>20.4 ± 4.6</td>
</tr>
</tbody>
</table>

### 影响因素在超重与肥胖影响因素关联分析

#### 2.4 影响因素在超重/肥胖与非超重/肥胖组间比较

利用2016年调查数据观察组间比较情况：(1) 个体特征在非超重/肥胖组和超重/肥胖组间比较中均存在组间差异(均有\(P < 0.001\))。2014-2016年非农户女、农户女超重/肥胖患病率增长明显，2016年这2个群体的超重/肥胖患病率相比2013年有翻倍趋势。见图1。

#### 2.5 初中生BMI及超重/肥胖影响因素关联分析

利用2016年数据，运用单因素回归模型，对表2中存在组间差异的因素进行分析。结果显示，

![图1](https://example.com/image1.png)
存在明显增长; 此外, 独生子女 (OR = 1.55, 95% CI: 1.32 – 1.81), 自我评价超重/肥胖 (偏胖) (OR = 10.62, 95% CI: 8.35 – 13.51), 非农业户口 (OR = 1.45, 95% CI: 1.22 – 1.71), 父母受教育程度较高的初中生发生超重肥胖的风险较高。见表 3。

表 3 中关联存在统计学意义的因素为自变量量, 运用多元回归模型进行分析。结果显示, 独生子女 (β(SE) = 0.23 (0.10)), 自我评价超重/肥胖 (β(SE) = 2.83 (0.14)) 以及户口为非农业 (β(SE) = 1.449 (0.330)) 是超重/肥胖影响因素的独立影响因素; 此外, 自我评价超重/肥胖 (偏胖) (OR = 4.20, 95% CI: 2.97 – 5.40) 是初中生发生超重肥胖风险的独立影响因素。见表 4。

3 讨论

研究 [10] 表明, 超过 50% 的超重或肥胖儿童可能持续发展为超重或肥胖的成年人。初中学生处于生长发育早期, 同时也处于超重、肥胖发生敏感阶段, 因此及早采取有效干预措施具有重要意义。
段。从儿童青少年发育早期对胖瘦流行予以重视并进行影响因素研究，对肥胖预防具有重要意义。本研究发现2016年中国初中学生的超重/肥胖率为15.3%，其中男生为17.9%，女生为12.6%，相比2014年全国学生体脂调研超重/肥胖率（总19.4%，男24.2%，女14.6%）较低，这可能与本数据为自报身高体重有关。另外，研究发现，超重患病率和肥胖患病率有明显地域差异，其中城市学生是农业学生的1.5倍。这也与其他关于7~18岁学龄儿童流行趋势研究一致，表现为男高于女，城市高于农村。分析2014~2016年年初中学生的超重/肥胖患病率，发现超重患病率一直呈增高趋势，而男生呈先增长后下降趋势。观察不同地域男、女生超重/肥胖患病率一直呈增长趋势，而男生呈先增长后下降趋势。观察不同地域男、女生超重/肥胖患病率一直呈增长趋势。男生的独立影响因素。以往研究发现，超重患病率和肥胖患病率着明显地域差异，其中城市学生是农业学生的1.5倍。这也与其他关于7~18岁学龄儿童流行趋势研究一致，表现为男高于女，城市高于农村。分析2014~2016年年初中学生的超重/肥胖患病率，发现超重患病率一直呈增高趋势，而男生呈先增长后下降趋势。观察不同地域男、女生超重/肥胖患病率一直呈增长趋势，而男生呈先增长后下降趋势。

关于初中生BMI和超重肥胖流行危险因素分析发现，户口类型、是否为独生子女，对体型自我评价等特征是初中学生BMI增长和肥胖患病风险增加的独立影响因素。依据研究发现，学生肥胖患病率高于农村。本研究同样发现，不论男孩，农村户口学生肥胖患病率明显高于农业户口学生。这可能与中国经济发展不均衡，经济水平高于农村有关。

本团队之前研究[12-14]表明中国的独生子女政策与儿童肥胖的快速增加有关，这与本研究的研究结果一致。独生子女的BMI增长快于非独生子女可能与独生子女政策的实施改变了家庭结构和角色有关。这种“小皇帝”的独特家庭结构意味着，中国的父母和祖父母很可能将他们的时间和资源全部投入到他们的独生子女身上，因此过度照顾和过度喂养这个珍贵的孩子[14]。

本研究中将自己评价为微胖或胖的儿童相比评价自己体型为正常的儿童，肥胖患病风险显著增加。一项重复测量研究[15]发现，中国儿童对自己的体型评价与实际测量体型间存在严重不一致，并且追踪发现那些评价自己身体为胖的儿童相比评价自己为正常体型的儿童，BMI平均每年要多增高0.99 kg/m²。即使本身不胖，但认为自己胖的儿童，在成年后肥胖患病风险也会增加[16]。研究[17]发现自认为肥胖的儿童肥胖患病风险增加，可能与儿童社会心理压力增加和自尊心低下伴随增加屏幕时间和抑郁症状有关。

本研究应用具有全国代表性数据，发现中国初中生超重/肥胖患病率仍在持续增加，预防肥胖刻不容缓。此外，一些与中学生肥胖相关的因素，包括户口类型，是否为独生子女，对体型自我评价，为儿童青少年肥胖预防策略的制定提供了重要依据。

利益冲突 无

参考文献

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