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Systematic Review

Prevalence of Weight Disorders in Iranian Children and Adolescents

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Abstract

Introduction: Weight disorders in childhood are considered as a global health problem with several adverse health effects. The objective of this study is to review available studies on the prevalence of overweight, obesity and underweight in Iranian pediatric population.

Methods: Articles published in the international and national journals were collected via the electronic research engines including MEDLINE, Google Scholar, Scopus, Scientific Information Database (SID), and Magiran about the prevalence of childhood overweight, obesity and underweight in all regions of Iran. Only population-based studies were included.

Results: Large variations were documented in the prevalence of weight disorders in children of different age and sex groups living in various regions of Iran. Our findings revealed increasing trend of childhood obesity and overweight, but this change was not very sharp. In addition, underweight is still one of the main nutritional problems in children of some areas including Sistan-va-Baluchistan and Kerman provinces.

Conclusion: Similar to many other developing countries, double burden of nutritional disorders exists in children living in some parts of Iran. While till now most health policies and educational programs related to children's nutrition in Iran had focused on underweight and malnutrition, more attention should be paid to the problem of excess weight.

Keywords: Iran, Obesity, Overweight, Pediatrics, Prevalence, Thinness

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Introduction

Weight disorders including underweight, overweight and obesity are important public health problems, with several adverse effects including developmental and metabolic disorders.[1,2] These nutritional disorders are multi-factorial, and associated with dietary pattern, food habits, physical activity, lifestyle, and genetic.[3-6]

Childhood overweight and obesity increase the risk of obesity in adulthood, which in turn are associated with the burden of some non-communicable diseases (NCDs) that are considered as the main cause of mortality in developing countries.[7-9]

Weight gain occurs in high-, low- and medium income countries and not limited to any age group or gender, ethnic, and socioeconomic groups.[10,11] Urbanization and industrialization has resulted to unhealthy dietary pattern, low physical activity and finally had increased the rate of obesity.[12-15]

The World Health Organization (WHO) in 2010 reported the prevalence of overweight was 6.5% in children worldwide, which has increased from its prevalence of 2% in 1990. Based on information of WHO, a wide range of overweight is reported in preschool children (children aged under 5 years) living in Eastern Mediterranean Region; ranging from 2.3% in Palestine to 17.5% in Syria. Between 2000 and 2013, the worldwide prevalence of overweight in children increased from 32 million to 42 million. It is estimated that by 2025, the prevalence of overweight in preschool children will increase to 11% worldwide.[16,17]

On the other hand, underweight also has adverse effects on quality of life and health status; and is an important problem especially in growing children. Likewise, overweight and obesity lead to serious behavioral and health problems as well as increase morbidity.[18-20] Thus, diagnosis, prevention and treatment of weight disorders should be considered from early life.[21-23]

Providing comprehensive information and updated data in various areas related to the prevalence and trend of weight disorders can help researchers and policymakers to initiate appropriate studies, effective interventions and to implement plans for children's health as well as for

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primordial and primary prevention of NCDs and their complications.[24-27]

We conducted the present literature review to assess the prevalence of weight disorders in Iranian children and adolescents living in different regions of the country to provide a general view on the prevalence of underweight and excess weight for action-oriented health programs as well as for future research studies.

Materials and Methods

In this review, we conducted electronic search in English databases including MEDLINE, Google Scholar, and Scopus, as well as Persian databases including Scientific Information Database (SID), and Magiran. Title, keyword, and abstract of all databases were assessed to identify all relevant papers regarding prevalence of weight disorders of children in various regions of Iran.

The following medical subject headings (MeSH) and keywords were used to search all fields in the abovementioned databases: "obesity", "overweight", "underweight", "thinness", "body mass index", "body weight" "weight status", "BMI", "anthropometric measures", "Iran", "prevalence", "epidemiology", "proportion", "survey", "descriptive", "children", "students", and "adolescents". Moreover, the reference lists of the original and review articles were searched manually to identify other relevant articles.

Studies that reported the prevalence of weight disorders for adults, studies without any data related to the prevalence of weight disorders, intervention studies with diet and physical activity that altered the prevalence data, and studies with duplicate data were excluded. National, provincial, and local surveys in Iranian children and adolescents were included.

Information including name of the first author, year of publication, study region, level of study or study location including national, provincial or local, characteristics of the study population, sample size (total, and stratified by sex), different definitions of overweight or obesity and prevalence rates of underweight, obesity and overweight were extracted.

Results

The prevalence of weight disorders has notable variation in different studies. Different target groups, ages, genders and study regions led to different results in various studies. According to our findings, although the trend of obesity and overweight were escalating, but were not very sharp. However, unhealthy weight gain can be detrimental with harmful effects on children's health status. In addition, underweight is still one of the main nutritional problems in some areas of Iran including Sistan-va-Baluchistan [28] and Kerman provinces.[29] The extracted results of published articles are presented in Table S1 (see Supplementary file 1).

Prevalence of Childhood Obesity and Overweight in Iran from 1990 to 2013

Assessment of studies from 1990 to 2013 showed a large variation of obesity and overweight prevalence in Iranian pediatric population. The range of obesity prevalence was 1% to 16.1% and for overweight was 4.4% to 42.3%.[30]

A meta-analysis study from 1995 to 2010 revealed the prevalence of childhood obesity and overweight were 5.1% (95% CI, 4.4–5.8), and 10.8% (95% CI, 10.2–11.4), respectively. It showed increase in the trend of excess weight in children ages 2- 6 and 7–11 years than in older age groups.[31]

An analysis of data from 1995 to 2011 reported that the rate of obesity in Iranian population aged less than 18 years was estimated 6.1% (CI 95%: 5.46.8).[12]

According to a meta-analysis on 132864 individuals from 1997 to 2007, the overall prevalence of childhood obesity in Iran was 5.5% (CI95% 4.5–6.4) among Iranian children; it was 5.3% (CI95% 4.1–6.4) in boys and 4.8% (CI95% 4.0–5.7) in girls.[32]

Prevalence of Childhood Obesity and Overweight in Iran from 2000 to 2014

Meta-analysis on data from 2000 to 2013 showed the prevalence of obesity and overweight were 5.5% (95% CI, 5.1–6.0) and 15.1% (95% CI, 13.5–17) among Iranian population aged less than 18 years, respectively. The trend of obesity and overweight were escalating from 2000 to 2010, but decreasing from 2011 to 2013.[33]

A review of national studies conducted from 2005 to 2014, showed the prevalence of overweight was 5.0-13.5% (95% CI: 4.5–5.5, 13.4–13.6), and for obesity was 3.2–11.9% (95% CI: 3.0-3.4, 11.3–12.4) in children aged less than 18 years.[34]

According to the findings in all provinces in Iran, the middle school students had the highest frequency of obesity in 2011–2012. Boushehr (19%), Guilan (18.3%), and Mazandaran (18.3%) had the highest prevalence of childhood obesity, and Hormozgan (2.6%) had the lowest prevalence.[35]

Prevalence of Underweight in Children from 1996 to 2017

The prevalence of underweight in Iranian children from 1996 to 2017 was assessed in 26 published articles, which included 142938 children aged 1 month to 12 years. The prevalence of underweight was 15.5% (CI 95%: 12–19.7). The highest prevalence was reported 68.6% (CI 95%: 63.3%–72.9%) in Birjand city (2006) and Zahedan city (2009), and the lowest prevalence was reported as 1.8% (CI 95%: 1.2%–2.9%) in Jahrom (2013).[36]

Discussion

The present study summarized the national and sub-national information related to prevalence of weight disorders by sex, age, and time frame in Iranian pediatric

population. It provides information on double burden of nutritional disorders, but the main point is an alarming trend for increasing weight excess in pediatric age group.

Lifestyle changes with consumption of high-calorie density foods, sedentary lifestyle, excessive screen time, i.e. watching television and playing computer games, as well as globalization, epidemiologic transition, and the problem of stunting, lead to increase the prevalence of overweight and obesity in the pediatric especially in the Middle Eastern population.[37-41]

Assessment the 450 international studies from 144 countries showed the prevalence of obesity and overweight have increased rapidly among preschool children from 1990 to 2010. The prevalence of overweight and obesity have increased from 4.2% in 1990 to 6.7 % in 2010. It is estimated that the excess weight would increase 9% from 2010 to 2020. Results reported that 92 million of worldwide preschool children are at risk of overweight. The highest prevalence has been reported in low- and middle-income countries.[42]

The cause of excess weight in children of developing countries, may be related to nutritional disorders, micronutrient deficiency, low birth weight, and rapid growth spurt during childhood.[43-46]

The comparison of findings between studies is difficult because of the various definitions of childhood overweight and obesity including the cut-points of the Center for Disease Control and Prevention (CDC), the International Obesity Task Force (IOTF), WHO definitions and Iranian national criteria, as well as because of different age groups and the study methods.[47-49] It is documented that among Iranian children, the prevalence of obesity is underestimated and the prevalence of overweight is overestimated by using IOTF and WHO definitions compared with the CDC criteria. A large nationwide study reported that body mass index (BMI) cutoff points were more acceptable in Iranian children when CDC criteria were used.[50, 51]

There are different ethnic groups with various lifestyle habits in Iran, including Persians (majority population), Azerbaijanis, Kurds, Lurs, Mazandaranis and Gilakis, Arabs, Balouch and Turkmens with various food behaviors, environmental factors and socio-economic status that lead to different prevalence rates and wide geographical dispersion of weight disorders.[52-55]

In recent years, the prevalence of underweight is lower than overweight and obesity, because of urbanization, industrialization, lifestyle change, food security and health education. Protein and trace element deficiency have decreased and high- calorie density foods consumption has increased in Middle Eastern and Asian countries.[56-59]

The trend of weight disorders was assessed from 1975 to 2016 in poled analysis of 2416 population-based studies on 128.9 million children, adolescents, and adults in 200 countries. The increasing trend of BMI in pediatric age group has reached a plateau, although it remains at high levels, in many high-income countries, the trend of excess weight has increased in children of many low-income and middle-income countries. The global age-standardized prevalence of obesity has increased from 0.7% in 1975 to 5.6% in 2016 in girls, and from 0.9% in 1975 to 7.8% in 2016 in boys. The prevalence of childhood obesity was reported approximately 20% or more in many countries in the Polynesia and Micronesia, the Middle East and North Africa, the Caribbean, and the United States of America. Meanwhile, the global prevalence of moderate and severe underweight decreased from 9.2% in 1975 to 8.4% in 2016 in girls and from 14.8% in 1975 to 12.4% in 2016 in boys.[3]

A National study (The National Health and Nutrition Examination Survey data) on US children and adolescents, aged 2 to 19 years, showed the trend of obesity from 1999 to 2016. Despite previous findings that reported the increasing trend of weight gain has plateaued,[1] significant increase in trend of severe obesity was found among pre-school aged (2 to 5 years) children since the 2013–2014.[16]

Preventive programs with lifestyle modification, proper nutrition and increasing regular physical activity can be effective in the control and management of the escalating rate of weight disorders in children.[60-64]

In conclusion, while most health policies and educational programs related to children's nutrition in Iran have focused on underweight and malnutrition, the double burden of nutritional disorders, i.e. the co-existence of underweight and overweight should be considered. The trend of excess weight is increasing among Iranian children and adolescents, and should be increasingly considered by policymakers and health care system. Updated information should be provided at national and regional levels for appropriate programs for prevention and control of different aspects of weight disorders in Iranian children and adolescents.

Authors' Contribution

MHB and RK screened titles and abstracts of papers and selected relevant papers. Then, full texts of relevant papers were read and findings were rescreened. MHB and RK collected data on first author's last name, year of publication, study population, study characteristics, outcome measures used, and appropriate statistics.

Conflict of Interest Disclosures

The authors have no conflicts of interest.

Ethical Statement

Not applicable.

Supplementary Materials

Supplementary file 1 contains Table S1.

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