HHS Public Access

Author manuscript

J Natl Med Assoc. Author manuscript; available in PMC 2016 January 17.

Published in final edited form as:

J Natl Med Assoc. 2011 ; 103(0): 922–925.

On the Frontline: Pediatric Obesity in the Emergency Department

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Abstract

Obesity among children is rising at an alarming rate. This study examines pediatric emergency department visits for children aged 2 to 17 years to determine the prevalence of normal, overweight, and obesity as well as to characterize discharge diagnosis and level of service among the different groups. The electronic emergency department medical record and billing service data were used in the review process. Body mass index (BMI) and percentiles were calculated using the Centers for Disease Control formulas with overweight being defined as BMI between 85th and 94th sex- and age-specific percentiles and obesity as greater than 95th sex- and age-specific percentile. The study was reviewed and approved by the institutional review board. Of the 596 patients meeting inclusion criteria, there was a predominance of African American and Hispanic patients. Approximately 53% (313) of patients were classified as normal weight, while 46% (272) of patients were either overweight or obese. The percentages of overweight and obesity were similar across racial/ethnic classifications, with a slight predominance of obesity among minority groups (30% and 35%, respectively, in minority groups vs 28% and 25%, respectively, in nonminority groups). There were no statistically significant differences between discharge diagnosis and level of service among the different weight categories. Rates of overweight and obesity in this predominately minority pediatric population were significantly greater than the published national rates. The impact of the epidemic of childhood obesity mandates the need for innovative strategies of weight control and reduction. Emergency departments routinely treat high-risk pediatric populations and can therefore serve as a resource for screening and early referral that has been previously untapped in combating childhood obesity.

Keywords

children/adolescents; obesity; body weight; emergency department; minority health

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INTRODUCTION

Pediatric Obesity

Obesity is a major public health concern. Obesity amongst children is rising at an alarming rate. Data from the most recent National Health and Nutrition Examination survey (NHANES), 2007–2008, indicate that, of children and adolescents aged 2 to 19 years, 11.9% and 16.9% were at or above the 97th and 95th percentiles, respectively, of the 2000 body mass index (BMI) for age growth charts.[1]

Childhood obesity is associated with significant health problems affecting cardiovascular system (hyper-cholesterolemia, and dyslipidemia), the endocrine system (impaired glucose tolerance and type 2 diabetes), and mental health (depression and low self-esteem).[2] Most importantly, overweight and obese children are at risk for adult obesity with its associated morbidity and mortality.[3]

A policy statement from the American Academy of Pediatrics indicates that anticipatory guidance and/or treatment intervention before obesity becomes severe has a higher likelihood for success.[4] The scope of the childhood obesity epidemic has been well documented in both community and outpatient settings, thus establishing a framework for future interventions.[5] Although the emergency department (ED) serves as a common entry point for many pediatric patients, the epidemic of pediatric obesity has not been well documented in this setting.

Statement of the Problem

The purpose of this research was to study ED visits for children aged 2 to 17 years and determine the prevalence of normal, overweight, and obesity in this population, and to characterize discharge diagnosis and billing levels of service among the different groups. More specifically, answers to the following questions were sought:

- How do the prevalence rates of obesity in a predominately minority pediatric ED population compare with national averages?
- Is there a difference between the discharge diagnosis of overweight and obese children as compared to normal-weight children?
- Do overweight and obese children require more resources or incur more costs during their ED visit?

PATIENTS AND METHODS

Data Collection

A single-center, retrospective chart review was conducted on a convenience sample of 893 pediatric ED visits from January 1, 2008, to December 31, 2008. All pediatric patients evaluated in the ED during the study time frame were eligible for inclusion in the study. Approximately 50 pediatric visits during the first week of each month and 25 visits during the last week of each month were randomly selected using a random number generator and manually reviewed. Pediatric patients less than 2 years of age were excluded from final data

analysis because BMI is not considered a valid measure of adiposity below this age. Five hundred eighty-nine pediatric ED visits were eligible for study after exclusion criteria were applied. The data were entered in an electronic database. The study was reviewed and approved by the University of Illinois institutional review board.

Data collected from the electronic medical record included demographics, height and weight measurements, discharge diagnosis, and triage level. Height and weight measurements were physically obtained by the triage nurse. Estimates by the patient or a family member were not used. Data collected from the ED billing provider included billing level of service for each patient encounter. BMI and percentiles were calculated using the Centers for Disease Control formulas, with *overweight* being defined as BMI between 85th and 94th sex- and age-specific percentiles and *obesity* as greater than 95th sex- and age-specific percentiles.[6]

Setting

The ED is located in a tertiary care, academic institution in a largely African American and Hispanic neighborhood. The ED serves both pediatric and adults patients with an annual pediatric volume of 8500. The ED is staffed by board-prepared and board-certified emergency medicine physicians with residents from emergency medicine, family medicine, and pediatrics.

Statistical Analysis

Clinical characteristics and race/ethnicity were compared using χ^2 test/Fisher exact tests for categorical variables. For all tests performed, percentages were reported and p value < .05 was considered significant. SAS version 9.1 (SAS Institute Inc, Cary, North Carolina) was used for statistical analysis.

RESULTS

A total of 893 pediatric ED patient records were reviewed. Two hundred ninety-seven (33%) patients were aged less than 2 years and were excluded from final analysis. In addition, there were 7 patients with incomplete data, leaving a total of 589 pediatric patients for the study population. Only the initial ED visit was included for those patients with multiple ED encounters. The majority of the patients were African American and Hispanic. Asians, American Indians, and Native Americans represented 2% of the study population (Table 1). There were nearly equal proportions of males and females (53% vs 46%).

Fifty-three percent (n = 313) of patients were classified as normal based on the BMI calculation. Forty-six percent (n = 272) of patients were classified as overweight or obese. Specifically, 17% (n = 99) were overweight and 29% (n = 173) were obese. The percentages of overweight and obesity were similar across gender lines. Fewer than 1% (n = 4) of patients were classified as underweight and therefore excluded from data analysis.

When testing the association between ethnicity and BMI classification, there was no significant difference on the distribution of race among normal, overweight, and obese groups (p = .93) using Fisher exact test (Table 2).

When testing the association between discharge diagnosis and BMI classification, there was no statistically significant discharge diagnosis distributed differently among normal, overweight, and obese groups ($p = .22$) using χ^2 test (Table 3). The top 3 discharge diagnoses among the 3 BMI classifications were as follows: (1) obese: cardiovascular (56%, n = 96), infectious disease (41%, n = 71), genitourinary (35%, n = 60); (2) overweight: endocrine (40%, n = 40), neurologic (32%, n = 32), gastrointestinal (24%, n = 24); (3) normal weight: general (66%, n = 207), respiratory (63%, n = 197), dental (62%, n = 194).

When testing the association between billing level of service and BMI classification, there was no statistically significant difference between overweight/obese and normal-weight children (Table 4). The majority of pediatric ED visits were level 3 (83%, n = 491), which is consistent with national averages for ED pediatric visits.[7]

DISCUSSION

This study found that the rates of overweight and obesity in this predominately minority pediatric population were significantly greater than the published national rates for the general pediatric population. Recent numbers from the Centers for Disease Control (2008) found that 16.9% of children aged 2 to 17 years were obese.[8] This study found a prevalence rate that was nearly double the national average, 29%. Interestingly, there was no association between ethnicity and BMI classification. This is significant because it demonstrates a need for intervention that is not limited by ethnicity or gender.

In addition, while there were no statistically significant differences in discharge diagnoses among the different BMI classifications, there were greater percentages of cardiovascular- and endocrine-related diagnoses (56% and 40%, respectively) in obese and overweight children, respectively. Obesity is associated with many well-recognized medical conditions.[9,12] The incidence of type 2 diabetes being diagnosed within the pediatric population is increasing and parallels the increased prevalence of pediatric obesity.[2] This study found endocrine-related complaints to be the most frequent complaint among the overweight children.

Finally, there were no statistically significant differences among billing level of service for normal-weight, overweight, and obese pediatric patients. Consistent with this study's findings (majority of ED visits level 3), a recent report found that the majority of EDs visits by children were for various nonemergent or primary care-treatable diagnoses, therefore providing a window for screening.[10,11,13]

As the prevalence of pediatric obesity continues to increase, interventional efforts have traditionally been limited to outpatient areas despite an increasing presence of high-risk patients in other health care settings, such as EDs.[5,6]

In 2005, the US Preventive Services Task Force released guidelines for screening and interventions for childhood obesity. Central to the strategy is the call for collaboration between the various medical and public health communities. EDs have been shown to be an integral component of the health care system by serving as connectors between acute care and preventive/outpatient management.

Study Limitations

This study is a retrospective review conducted at a single academic ED. To confirm and generalize the results, a multicenter review is needed. Nonetheless, this study found rates consistent with high-risk populations and confirms the magnitude of the childhood obesity epidemic.

CONCLUSION

The ongoing epidemic of childhood obesity has placed an unprecedented burden on pediatric health and will impact future health care costs, thus mandating the need for innovative strategies aimed at maximizing positive outcomes. EDs will continue to serve as important sources of emergent and nonemergent pediatric care in the United States and routinely treat at-risk/high-risk pediatric populations. They can therefore serve as an important and previously untapped resource for screening and early referral for childhood obesity.

Acknowledgments

Funding/Support: The statistical analysis was supported by the University of Illinois at Chicago Center for Clinical and Translational Science award UL1RR029879 from the National Center for Research Resources.

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Table 1

Demographics of Pediatric Study Population

Race	No.	%
African American	343	58
Caucasian	20	3
Hispanic	214	36
Other (Asian, Native American, American Indian)	12	2

Table 2

Ethnicity and Body Mass Index Classification[a]

Variables	%		
Ethnicity	**Normal Weight (n = 313)**	**Overweight (n = 99)**	**Obese (n = 173)**
African American	52%	18%	30%
Caucasian	57%	15%	28%
Hispanic	45%	20%	35%
Other	58%	17%	25%

[a]Testing the association between ethnicity and body mass index classification (p = .93) using Fisher exact test.

Table 3

Discharge Diagnosis and Body Mass Index Classification[a,b]

Variable	%		
Discharge Diagnosis	**Normal-Weight Group (N = 313)**	**Overweight Group (N = 99)**	**Obese Group (N = 172)**
Cardiovascular	33%	11%	56%
Dermatology	53%	13%	33%
Endocrine	60%	40%	0%
Dental	63%	13%	25%
General	67%	0%	33%
Gastrointestinal	58%	24%	18%
Genitourinary	43%	22%	35%
Head, ears, eyes, nose, throat	55%	14%	31%
Infectious disease	47%	12%	41%
Musculoskeletal	44%	23%	33%
Neurologic	50%	32%	18%
Psychiatric	46%	23%	31%
Respiratory	63%	9%	28%

[a] Testing the association between discharge diagnosis and body mass Index classification ($p = .22$) using χ^2 test.

[b] The rows equal 100% but the columns do not because multiple diagnoses may be assigned to 1 visit.

Table 4

Billing Level of Service and Body Mass Index Classification[a]

	%		
Level of Service	**Normal-Weight Group (N = 317)**	**Overweight Group (N = 99)**	**Obese Group (N = 173)**
Billing level I and II	46%	22%	32%
Billing level III	55%	17%	29%
Billing level IV and critical care	52%	14%	34%

[a]Testing the association between billing level of service and body mas index classification ($p = .77$) using χ^2 test.