Prevalence of blood pressure among students in Jiangsu Province, China

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ABSTRACT
Aim: Obesity and Blood Pressure (BP) is a serious public health issue. The study aims to assess the prevalence of BP and the factors associated with High Blood Pressure (HBP) among student in Jiangsu Province, China. Methods: A cross-sectional epidemiological study. A total of 101886 students (62,065 boys and 39,821 girls) aged from 7-22 years were recruited in 2010-2013. Anthropometric measurements and BP prevalence were measured, and in addition, body mass index (BMI) was calculated. We assess the prevalence of BP according to the National Blood Pressure Reference for Chinese Han children and adolescents. Results: A significant difference was observed in HBP prevalence in terms of student gender, region, age and BMI (P<0.001). Overweight and obesity were significantly associated with HBP (P<0.001). Conclusions: The findings convey an important message to the parents, health institutions that urgent action is needed to enhance effective control of HBP among the overweight and obese students, and among those are living in a rural area.

Key words: Blood Pressure (BP), Jiangsu Province, Student, Body Mass Index (BMI)

INTRODUCTION
Obesity is a global health problem. The prevalence was significantly increased in all countries. Approximately 2.8 million people were dying each year because of overweight. Body Mass Index (BMI) was commonly used for screening overweight and obese in clinical practice and population survey. High blood pressure (hypertension) was significantly increased among Chinese recently. Obesity is a risk factor for diabetes, stroke, cardiovascular diseases and their complications. Ten million persons in the world die annually with BP. Childhood BP is a significant predictor of adulthood BP. The trend of BP prevalence was reported among Chinese children and adolescents. However, little is known about their association with gender, age, region and BMI level among student in Jiangsu Province. The province, is located in eastern-central coastal of China, covered 102,600 km² and total population 80,400,000 in 2018. The aim was to assess the prevalence of HBP and NBP among students.

METHODS
A cross-sectional study was carried out during September 2010 to September 2013. The study subjects includes male and female students aged 7-22 years enrolled in Students Physical Fitness and Health
Surveys (SPFHS). The study population were randomly selected from 10 universities and 82 schools in Jiangsu Province, resulting in an estimated sample of, 101,886 students (62,065 boys and 39,821 girls). Data were collected by trained health staff and physician from Jiangsu Center for Disease Prevention and Control health team.

Students BP was assessed using a portable digital monitors OMRON HEM 705 CP (OMRON, Kyoto, Japan), and blood pressure was measured on the right arm twice, in the morning and, no less than 30 minutes after breakfast, when children had empty bladders, after at least 5 minutes of rest, sitting with back support and feet on the ground, without moving or talking.  

Normal Blood Pressure (NBP) was defined as anyone with Systolic Blood Pressure 120 -129 (mmHg), and Diastolic Blood Pressure is <80 (mmHg). High Normal Blood Pressure for anyone with Systolic Blood Pressure 130-139 (mmHg) or Diastolic Blood Pressure is 80-89 (mmHg). The average value of three BP readings was recorded. HBP and NBP prevalence were evaluated, and update of the age and gender-specific BP cutoffs for Chinese children and adolescents reference. Student body Mass Index (BMI) was calculated from height and weight. BMI cut-off recommended by Working Group on Obesity in China. The study protocol was approved by the Institutional review board of School of Public Health Southeast University, Nanjing. A written informed consent was obtained from each participant's parent for those in primary school. A total of 101,886 students were agreed to complete anthropometric measurement. All analyses were performed using SPSS version 25.0 for Windows (IBM SPSS, Chicago, IL, USA).

RESULTS AND DISCUSSION
There was a significant difference in the prevalence of BP between gender, region, age groups and BMI categories, respectively (P<0.001). BMI level had a higher BP among overweight and obese groups (Figure 1). BP was significantly (P<0.001) associated with the rural area, age 12-14, age 15-17, and BMI level, including overweight, and obese group (Table 1)

The study confirmed that obesity could lead to serious health problems, there was a significant dif-
ference in BP prevalence within the overweight and obese groups compared with the normal weight. Age, region and BMI level were significantly associated with the risk of HBP, similar to study reported in China. In conclusions, the prevalence of BP was recorded high in females as compared to males. Results suggest that high BP is attributed mainly to a residential area (urban vs. rural), age groups and BMI level (Overweight and obese). Nevertheless, the risk of overweight and obesity are considered the significant risk factor associated with BP rate. In a public health point of view, early action is needed to reduce blood pressure and to control the factors related to high BP towards student health in the future.

ABBREVIATIONS
BP: Blood Pressure
BMI: Body Mass Index
HBP: High Blood Pressure
NBP: Normal Blood Pressure
SPFHS: Students Physical Fitness and Health Surveys

AUTHORS’ CONTRIBUTIONS
Idea and study designed: THM
Acquisition of data: WL, TA, THM
Analysis and interpretation of data: LW, THM
Drafting of manuscript: TA, HHM
Study supervised: PW

FUNDING
The study was funded by Jiangsu Provincial Social Science Foundation, grant number 13TYA001.

ACKNOWLEDGMENT
The authors thank P.W and the staff of Jiangsu Health Literacy Promotion and Research Office for providing access to the student health data for analysis.

REFERENCES