UNIVERSITI PUTRA MALAYSIA

FACTORS ASSOCIATED WITH BLOOD PRESSURE AMONG FEMALE STUDENTS IN GOVERNMENT SCHOOLS, NORTHERN TEHRAN

KOSAR KHAEF

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By

KOSAR KHAEF

Thesis Submitted to the School Of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master of Science

October 2014

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DEDICATION

To my lovely husband, *Ahmad,*

I appreciate for all your endless constant support, encouragement and sacrifices you made during the challenges of graduation.

I am truly thankful for having you in my life and give my deepest expression of love to you**.**

Abstract of thesis presented to the senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

FACTORS ASSOCIATED WITH BLOOD PRESSURE AMONG FEMALE STUDENTS IN GOVERNMENT SCHOOLS, NORTHERN TEHRAN

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KOSARKHAEF

October 2014

Chairman : Professor Mary Huang Soo Lee, PhD
Faculty : Medicine and Health Sciences

This cross-sectional study was conducted to determine the association between socio-demographic factors, dietary intakes, anthropometric status and physical activity with blood pressure among Iranian adolescent school-girls in Northern Tehran. The north part of Tehran was selected because their nutrition habit is closer to western diets and socio-economic level of the families is higher than other districts in Tehran. After listing all five educational districts which were located in north of Tehran, one of them was chosen by using simple random sampling. Then, the names of all government girls' secondary schools in the chosen district were obtained from the education ministry. Finally, only 4 schools among all governmental schools which were located in the district gave permission for the study to be carried out. The secondary school comprises three grades. By random sampling one class was chosen from each level. The participants were selected by using random number through the list of the students that was obtained from registration office in each of the schools. A total of 306 secondary school-girls students aged between 12-14 years old who were not under any medications or intensive diets participated in this study. Weight, height, waist circumference and hip circumference as well as their blood pressure were taken. Dietary intake of the adolescents was determined using 3 days 24-hours dietary (one in the weekend and two weekdays). BMI-for-age was calculated using WHO growth standards. In addition, the participants were requested to fill a set of self-administered questionnaire which appraised physical activity and socio-demographic information. The mean age of respondents was 12.99±0.82 years ranging from 12.0 to 14.0 years, and approximately half of them were studying at the third level of secondary school, 31.4% of respondents were studying at second level and 27.1% were studying at the first level. The mean± SD of BMI among respondents was 21.3±3.8 (kg/m^2) and based on the WHO (2007) growth standards, 30.7% were obese and overweight while 3.9% were underweight. The mean± SD of SBP was 116.7± 0.55 and for DBP was 74.9± 0.36. According to guidelines of IPAQ short form more than half (58.5%) of the adolescents had moderate physical activity, while 22.2% had vigorous activity. On the other hand, the mean± SD of calorie intake, carbohydrate, protein and

fat intake was 2025±565 kcal, 234.50±104.96 gram, 96.69±25.18 gram and 77.85±26.74 gram, respectively. Based on DRI 48% consume more than their dietary recommended intake of sodium. In addition while 66.4% of the 12 and 13 year olds consumed less than their recommended dietary intake of potassium, 32.6% of the 14 year olds were also deficit in their potassium intake less. Based on the JNC 7 complete report, for SBP less than half of the adolescents (19.6%) were pre-hypertensive and hypertensive however with 80.4% being normotensive. Less than one fifth of adolescents (18.3%) were in the range of pre-hypertension and hypertension. But there was significant correlation between family economics with weight ($r=0.130$, $p<0.05$) and height ($r=0.141$, $p=0.01$). The study also found significant positive association between systolic blood pressure and weight ($r=0.542$, $p<0.01$), height ($r=0.365$, $p<0.01$), BMI ($r=0.480$, $p<0.01$), waist circumference ($r=0.418$, $p=0.000$), hip circumference ($r=0.273$, $p<0.01$). Furthermore, there was strong and positive association between diastolic blood pressure and weight ($r=0.297$, $p<0.01$), height ($r=0.187$, $p<0.01$), BMI ($r=0.262$, $p<0.01$), waist circumference ($r=0.296$, $p<0.01$), hip circumference ($r=0.238$, $p<0.01$).There was also positive correlation between daily calorie intake and SBP ($r=0.187$, $p<0.01$) and also DBP ($r=0.152$, $p=0.008$). Beside there was negative relationship between protein intake and only SBP ($r=-0.177$, $p<0.01$). This study determined that association between carbohydrate intake and SBP was positive ($r=0.151$, $p<0.01$) and for DBP ($r=0.159$, $p<0.01$). Furthermore, there was positive association between SBP and daily sodium intake ($r=0.158$, $p=0.006$), however it was negative correlation with potassium intake ($r=-0.206$, $p<0.01$). Meanwhile, the relationship between DBP and sodium intake was positive and strong ($r=0.147$, $p=0.010$), although it was negative correlation with potassium intake ($r=-0.138$, $p<0.01$). In addition, there was only negative association between physical activity level and SBP ($r=-0.117$, $p<0.05$). Additionally, factors which were correlated with SBP were explained by BMI-for-age, WHR ($r^2=0.280$), daily potassium intake ($r^2=0.294$) and calorie intake ($r^2=0.305$). Among these factors, BMI-for-age was the strongest factor that could explain of 21% of variation in systolic blood pressure. BMI-for-age and potassium were factors that contributed towards both SBP and DBP. According to the result the most important factor which was correlated to DBP was BMI-for-age (6%). This study reveals the importance of working with adolescents girls in school to achieve ideal BMI and good nutritional practices in order to prevent the development of others health problems caused by HBP both at this stage of their life or in later years.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

FAKTOR-FAKTOR YANG BERKAITAN DENGAN TEKANAN DARAH DALAM KALANGAN REMAJA PEREMPUAN DI UTARA TEHRAN

Oleh

KOSAR KHAEF

Oktober 2014

Pengerusi : Profesor Mary Huang Soo Lee, PhD
Fakulti : Perubatan dan Sains Kesihatan

Kajian keratan rentas ini telah dijalankan untuk menentukan perkaitan antara pengambilan makanan, status antropometri dan aktiviti fizikal dengan tekanan darah dalam kalangan remaja perempuan berbangsa Iran yang bersekolah di Utara Tehran. Seramai 306 orang pelajar perempuan sekolah menengah berumur antara 12-14 tahun yang tidak mengambil mana-mana ubat-ubatan atau diet yang intensif telah mengambil bahagian dalam kajian ini. Berat badan, ketinggian, lilitan pinggang dan lilitan pinggul serta tekanan darah telah diambil. Pengambilan makanan remaja terbabit telah ditentukan menggunakan 3 hari rekod pengambilan makanan 24 jam (sehari pada hujung minggu dan dua hari pada hari bekerja). Indeks Jisim Tubuh (IJT) untuk-umur dikira menggunakan standard pertumbuhan WHO. Di samping itu, para peserta telah diminta untuk mengisi satu set borang soal selidik yang dijawab sendiri yang menilai aktiviti fizikal dan maklumat sosio-demografi. Purata umur peserta adalah 12.99 ± 0.81 tahun iaitu di antara 12.0 hingga 14.0 tahun dan kira-kira separuh daripada mereka telah belajar di peringkat ketiga sekolah menengah, 31.4% daripada semua pelajar telah belajar di peringkat kedua dan 27.1% telah belajar di peringkat pertama. Min±sisihan piawai IJT dalam kalangan remaja adalah 21.35±3.85 (kg/m^2) dan berdasarkan standard pertumbuhan WHO (2007), 30.7% adalah obes dan berlebihan berat badan manakala 3.9% adalah kurang berat badan. Menurut garis panduan borang soal selidik aktiviti fizikal antarabangsa yang pendek, lebih daripada separuh (58.5%) remaja mempunyai aktiviti fizikal sederhana manakala 22.2% mempunyai aktiviti fizikal yang aktif. Sebaliknya, min±sisihan piawai pengambilan kalori, karbohidrat, protein dan pengambilan lemak masing-masing adalah 2025±565 kkal, 234.50±104.96 gram, 57.19±27.18 gram dan 47.86±26.74 gram. Berdasarkan pengambilan makanan yang dicadangkan, 48% mengambil lebih daripada pengambilan makanan yang dicadangkan untuk natrium. Selain itu, sementara 66.3% daripada remaja berumur 12 dan 13 tahun mengambil kurang daripada pengambilan makanan yang dicadangkan untuk kalium, 32.7% daripada remaja berumur 14 tahun juga kurang mengambil kalium. Berdasarkan laporan lengkap Jawatankuasa Bersama Kebangsaan ke-7, untuk tekanan darah sistolik, kurang daripada separuh (19.6%) remaja adalah pra-darah tinggi dan

darah tinggi namun 80.4% yang normotensif. Kurang daripada satu perlima (18.3%) remaja adalah dalam lingkungan pra-darah tinggi dan darah tinggi. Kajian ini juga mendapati perkaitan positif yang signifikan antara tekanan darah sistolik dan berat badan ($r=0.542$, $p<0.01$), ketinggian ($r=0.365$, $p<0.01$), IJT ($r=0.480$, $p<0.01$), lilitan pinggang ($r=0.418$, $p=0.000$), lilitan pinggul ($r=0.273$, $p<0.01$). Sebagai tambahan, terdapat perkaitan yang kuat dan positif antara tekanan darah diastolik dan berat badan ($r=0.297$, $p<0.01$), ketinggian ($r=0.187$, $p<0.01$), IJT ($r=0.262$, $p<0.01$), lilitan pinggang ($r=0.296$, $p<0.01$), lilitan pinggul ($r=0.238$, $p<0.01$). Terdapat juga perkaitan positif antara pengambilan kalori harian dan tekanan darah sistolik ($r=0.187$, $p<0.01$) dan tekanan darah diastolik ($r=0.152$, $p=0.008$). Selain itu, terdapat perkaitan negatif antara pengambilan protein dan hanya tekanan darah sistolik ($r=-0.177$, $p<0.01$). Kajian ini menentukan bahawa perkaitan antara pengambilan karbohidrat dan tekanan darah sistolik ($r= 0.151$, $p<0.01$) dan tekanan darah diastolik ($r=0.159$, $p<0.01$) adalah positif. Perkaitan antara pengambilan lemak dan tekanan darah sistolik telah dianalisis ($r=-0.019$, $p=0.741$) dan untuk tekanan darah diastolik telah ditentukan ($r=-0.030$, $p=0.600$). Sebagai tambahan, terdapat perkaitan yang positif antara tekanan darah sistolik dan pengambilan natrium harian ($r=0.158$, $p=0.006$), tetapi ia adalah perkaitan yang negatif dengan pengambilan kalium ($r=-0.206$, $p<0.01$). Sementara itu, perkaitan antara tekanan darah diastolik dan pengambilan natrium adalah positif dan kuat ($r=0.147$, $p = 0.010$) walaupun ia adalah perkaitan yang negatif dengan pengambilan kalium ($r=-0,138$, $p<0.01$). Di samping itu, hanya terdapat perkaitan yang negatif antara aktiviti fizikal dan tekanan darah sistolik ($r=-0.117$, $p<0.05$). Tambahan pula, faktor-faktor yang berkaitan dengan tekanan darah sistolik telah dijelaskan oleh IJT-untuk-umur, nisbah pinggang-pinggul (r^2), pengambilan kalium harian (r^2) dan pengambilan kalori (r^2). Antara faktor-faktor ini, IJT-untuk-umur adalah faktor yang paling kuat yang boleh menjelaskan 21% daripada variasi dalam tekanan darah sistolik. IJT-untuk-umur dan kalium adalah faktor-faktor utama yang menyumbang ke arah kedua-dua tekanan darah sistolik dan tekanan darah diastolik. Menurut hasil kajian, faktor yang paling penting yang berkaitan dengan tekanan darah diastolik adalah IJT-untuk-umur (6%). Kajian ini mendedahkan kepentingan bekerjasama dengan remaja perempuan di sekolah bagi mencapai IJT yang ideal dan amalan pemakanan yang baik untuk mengelakkan berlakunya masalah kesihatan lain yang disebabkan oleh kedua-dua tekanan darah tinggi pada peringkat remaja atau pada tahun-tahun kemudiannya.

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Last but not least, I wish to express my upmost and innumerous blessing to my amiable husband. Without his patience, calm spirit, and encouraging words, it had not possible to successfully accomplish this stage of my life.

I certify that a Thesis Examination Committee has met on 31 October 2014 to conduct the final examination of Kosar Khaef on her thesis entitled "Factors Associated with Blood Pressure among Female Students in Government Schools, Northern Tehran" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

Members of the Thesis Examination Committee were as follows:

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Date: 7 July 2015

This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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Date:

Declaration by graduate student

I hereby confirm that:

- this thesis is my original work
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This is to confirm that:

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Signature: _____
Name of Chairman of Supervisory Committee: Mary Huang Soo Lee, PhD

Signature: _____
Name of Member of Supervisory Committee: Chan Yoke Mun, PhD

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
BP	Blood Pressure
CDC	Centers for Diseases Control and prevention
Cm	Centimeters
CVD	Cardiovascular Diseases
DI	Dietary Intakes
DBP	Diastolic Blood Pressure
DRI	Dairy Recommended Intake
G	gram
HC	Hip Circumference
IOTF	International Obesity Task Force
IPAQ	International Physical Activity Questionnaire
JNC	Joint National Committee
Kg	kilogram
mmHg	millimeters of Mercury
MLR	Multiple Linear Regression
NHANES	National Health and Nutrition Examination Survey
NCD	Non-Communicable Diseases
PA	Physical Activity
RDA	Recommended Daily
SBP	Systolic Blood Pressure
SES	Socio Economic Status
UPM	Universiti Putra Malaysia
WHO	World Health Organization
WC	Waist Circumference
WHR	Waist to Hip Ratio

CHAPTER 1

INTRODUCTION

1.1 Background

Hypertension is a complex disease, affecting 972 million people worldwide. It is estimated that the prevalence of hypertension may increase from 26.4% in 2000 to 29.2% in 2025. Hypertension which has become a major global burden of public health is also an important risk factor for cardiovascular disease (CVD).In addition, overweight and obesity are currently recognized as major determinants of hypertension in most areas of the world. In fact Kearney, (2005) aw well as Lawes, Hoorn, & Rodgers, (2008) postulated that the association between obesity and hypertension are part of a fatal relationship between body weight and blood pressure.

Overweight and obesity, taken together is the fifth leading cause for global deaths. Over the last decade, prevalence of obesity has been increasing throughout the world among all age groups. The World Health Organization (WHO) estimated in 2010 that the prevalence of overweight and obesity in childhood was 11.7% and 6.1% in developed and developing countries, respectively. Total overweight and obese children and adolescents are also expected to increase to 60 million by 2020 (Onis et al., 2010). In other words, more than one in ten of adults all around the world were obese. In 2010, around 43 million children under five were overweight. Once considered a developed country problem, overweight and obesity are now on the rise in low and middle-income countries. In fact WHO pointed out that 35 million overweight children were living in developing countries and 8 million in developed countries in 2011 (WHO, 2011).

Depending on where the studies were carried out, prevalence of obesity and overweight among the Iranian population is also high.Azadbakht, Mirmiran, Shiva, & Azizi, (2005) estimated it to be 67% and 29% for women and men, respectively while Rashidi, MohammadpourAhranjani, Vafa, & Karandish, (2005) reported prevalence of overweight and obesity as high as 55% to 75% among women depending on which part of Iran they came from. Adolescence represents a sensitive period in the development of obesity, and obesity in adolescence is known to carry into adulthood when it is associated with several health complications (Laitinen, Power, & Järvelin, 2001; Reilly et al., 2003). According to some studies, obesity is one of the important causes for several chronic conditions including diabetes mellitus, hypertension, coronary heart disease, ischemic stroke, and cardiovascular disease, as well as increased morbidity and mortality risk among obese population (Jia & Lubetkin, 2005; Mokdad et al., 2003). Among overweight and obese patients, the prevalence of hypertension has been reported to be around 50% and is expected to increase further with higher grades of obesity (A Must 1999).

In fact, effective prevention, detection, treatment, and control of HBP are one of the major aims of health policy, public health, and medical care decision makers these days. On the other hand, it is common among adolescents (Erdine & Aran, 2004). Hypertension is known as an important constituent of the metabolic syndrome, which is a risk factor for coronary heart disease (Ishizaka, Ishizaka, Toda, Nagai, & Yamakado, 2005). Generally, increasing blood pressure is a global problem not only in developing countries but in developed countries. It is well established that hypertension is a major risk factor for cardiovascular diseases as well as leading cause of premature death around world (Falkner, Lurbe, & Schaefer, 2010). Besides, the reports by WHO indicated that 62% of cerebrovascular diseases and 49% of ischemic heart diseases can be attributed to pre-hypertension (WHO, 2002). Consequently, hypertension among adolescents can be asymptomatic or may involve subtle symptoms such as epistaxis, shortness of breath, headache, and changes in their behavior or school performances (Falkner et al., 2010).

1.2 Problem Statement

The prevalence of hypertension has been documented to be approximately 50%, among overweight and obese patients, and it increased further with higher grades of obesity (Molarius, Seidell, Sans, Tuomilehto, & Kuulasmaa, 2000). At the same time, more than 70% of hypertensive patients have been known to be overweight and more than 30% being obese. Some of previous studies reported that the probability of insufficient blood pressure control is approximately 50% more in obese patients than in hypertensive patients with normal weight. Unfortunately, there is little evidences on the prevalence and control of hypertension in overweight and obese primary care attendees (Lloyd-Jones et al., 2000).The overall prevalence of high Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and SBP or DBP in Iran was 4.2, 5.4 and 7.7%, respectively, without significant sex differences (Kelishadi, et al., 2006).

Hypertension is approximately twice more prevalent in the obese than in the non-obese individuals. On the other hand, it has been identified as the leading risk factor for mortality, and is ranked the third cause of disability (Ezzati, Lopez, Rodgers, Vander Hoorn, & Murray, 2002). Excess body weight is the sixth most important risk factor contributing to the overall burden of disease worldwide. More than 1 billion adults and 10% of children are now classified as overweight or obese (Haslam & James, 2005). Mohammadpour-Ahranjani, Rashidi, Karandish, Eshraghian, & Kalantari, (2004) and Maddah (2007) cautioned that obesity is now the most prevalent nutritional disease among children and adolescents in Iran. Many studies have documented the impact of adolescent obesity on adult morbidity(Mijailovic, Micic, & Mijailovi, 2001; Park, Falconer, Viner, & Kinra, 2012).Moreover, increase rates of obesity can lead to higher risk of hypertension. According to some epidemiologic evidence, there is close association between obesity and blood pressure (BP) (Bell, Adair, & Popkin, 2002; Brown et al., 2000).

Overall, there is a lack of study on the association between high blood pressure and the factors which are associated with it among Iranian adolescents. Indeed, this study is conducted to determine the association between obesity measured by BMI and high blood pressure. Adolescence is a critical stage in the development of obesity which has short long term complications later in life (Dietz, 1994; Must & Strauss, 1999). At this stage of their development, adolescents form their own eating behaviors and given appropriate information they can form healthy eating behaviors as well as increase their physical activity so that they can reduce risk of being overweight, HBP and NCDs indirectly when they grow old (Krebs et al., 2007). Moreover, according to the CASPIAN study, physical activity correlated with SBP, and lower levels of physical activity increased the risk of high DBP (Kelishadi, et al.2003).

Overall, there is a lack of study on the association between high blood pressure and the factors which effect on it among Iranian adolescents. Indeed, this study is conducted to determine the association between obesity, BMI and high blood pressure. Some evidence determined that adolescence is a critical stage in predicting the development of obesity as well as its short and long term complications later in life (Dietz, 1994; Must & Strauss, 1999). Adolescence presents itself as an important stage of development. They could form their own eating behaviors when located at this stage. On the other hand, when given the appropriate information they can form healthy eating behaviors as well as increase their physical activity so that they can reduce risk of overweight directly, HBP and NCDs indirectly when they grow old (Krebs et al., 2007).Moreover, according to CASPIAN study, physical activity correlated with SBP, and lower levels of physical activity increased the risk of high DBP (Kelishadi, et al.2003).

The strength of BP tracking increases as BMI increases so that BP tracking is strongest in overweight and obese youth. This suggests that excess weight increases, the likelihood that elevated BP will persist from childhood into early adulthood. In a Western Australian cohort, BP and BMI were measured every three years in children between ages 9 and 18 years and again at age 25 years. The prevalence of overweight and obesity increased in boys and girls, from 10 and 8 percent at age 9 years, to 17 and 14 percent at age 18 years, and then to 42 and 32 percent at age 25 years; SBP at age 25 years was significantly higher in overweight or obese youth (Burke, Beilin, Dunbar, & Kevan, 2004).Therefore, by controlling obesity we can reduce the risk of mortality in society. As mentioned before the prevalence of obesity and blood pressure has been increasing worldwide and even more in Asian countries. Therefore it is so important that more emphasis be places on the prevention of obesity through healthy diet and regular physical activity.

1.3 Significance of the Study

The Third National Health and Nutrition Examination Survey (NHANES III) reported that although the prevalence of hypertension was 23.5% and 23.3% for men and women respectively among those who had normal weights, it was 34.2% and 38.8% for overweight individuals, 49.0% and 48.0% for those with first class obesity, 65.5% and 54.5% with second class obesity, and at least 64.5% and 63.2% for third class obesity in men and women, respectively (Cutler et al., 2008).Such research findings imply While adolescence is a time of change it is also a window of opportunity for authorities especially those involved with in-school children to introduce nutrition education so that adolescents can adopt healthy lifestyle practices that can have life lasting benefits. A study such as this will be able to generate data on the nutritional status, physical activity as well as hypertension and their possible relationship among adolescents in Tehran. So that more directed programs can be organized to take advantage of this little window of opportunity (while they are still in school). The findings can be served as baseline for future studies. The results of the study can be very valuable information for policy makers, parents and programs planners to capitalize on the fact that it is the most appropriate age to promote healthy behaviors. Furthermore most Iranian adolescents are in school. Therefore they are a captive audience for programs that can save the country from having to spend millions to take care of NCDs in the future

1.4 Study Objectives

1.4.1 General Objective

To determine factors associated with blood pressure among Iranian female students aged 12-14years attending government schools in Second district, Northern Tehran.

1.4.2 Specific Objectives

1. To determine socio-demographic status (age, grade level, parents' job, parents' education level, number of siblings, living situation, pocket money of participants, family economic situation) among Iranian adolescents.
2. To determine their blood pressure.
3. To determine their anthropometric status.
4. To determine their dietary intakes.
5. To determine their physical activity level.
6. To determine the association between socio-demographic factors and blood pressure.
7. To determine the association between anthropometric status and blood pressure.
8. To determine the association between physical activity and blood pressure.

9. To determine the association between dietary intake and blood pressure.
10. To determine the contribution of dietary intake, anthropometric status, BMI-for-age, physical activity and socio-demographic factors toward blood pressure.

1.5 Null Hypothesis

$H_0$1 There is no significant association between socio-demographic factors and blood pressure.
$H_0$2 There is no significant association between anthropometric status and blood pressure.
$H_0$3 There is no significant association between physical activity and blood pressure.
$H_0$4 There is no significant association between dietary intake and blood pressure.
$H_0$5 There is no significant contribution of anthropometric status, dietary intakes, physical activity and socio-demographic factors towards blood pressure among Iranian adolescents.

1.6 Conceptual Framework

According to this study, independent variables included socio-demographic factors, physical activity, dietary intakes and anthropometric status. Socio-demographic factors consist of adolescent's age, level of education, parent's education level, parent's occupation, living situation, family economic level and pocket money per week of adolescents. Dietary intakes were assessed by using three day 24-hour recall. To determine their intake of carbohydrate, protein, fat, sodium, potassium intakes were reported. Physical activity was categorized according to intensity level by using International Physical Activity short form. At the same time, anthropometric status included height, weight, hip circumference, waist circumference, WHR and BMI-for-age. Previous studies revealed that there is strong and positive association between prevalence of obesity and blood pressure (Behjati, Barkhordari, & Loukzadeh, 2006;Hosseini et al.,2010; Yipu shi, 2012). On the other hand, the dependent variable of this study is blood pressure. Accordingly, the association between all independent variables and blood pressure was assessed during this research. Figure 1.1 presents the conceptual framework of this study.

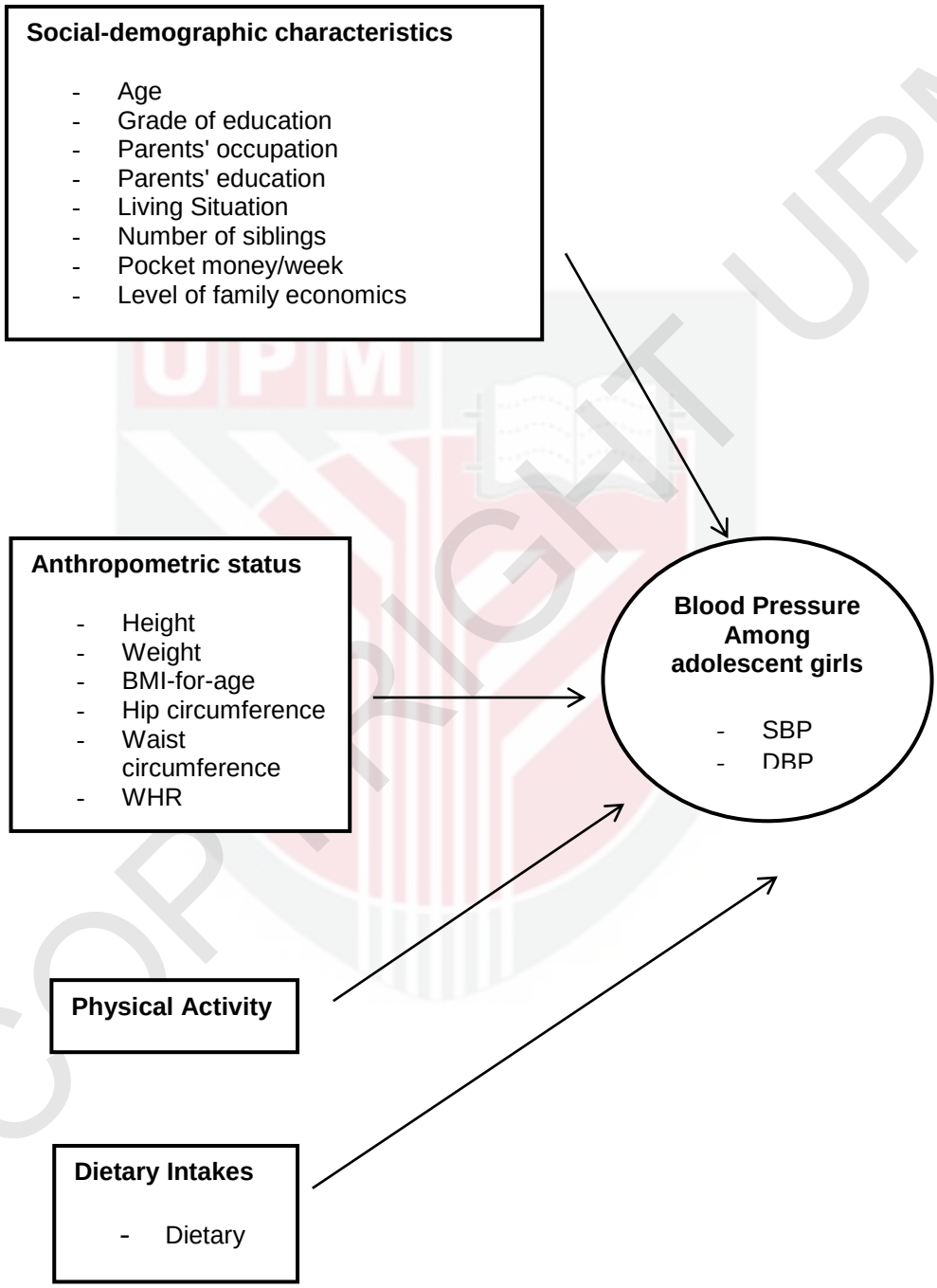

Figure 1.1: Conceptual Framework

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