

The Determination of Blood Pressure, Anger Expression and Body Mass Index in Adolescents in Turkey: A Pilot Study

Banu Albayrak¹ and Yasemin Kutlu²

¹ Istanbul University, Health Sciences Institution, Psychiatric Nursing Department, Istanbul, Turkey

² Istanbul University, Florence Nightingale College of Nursing, Psychiatric Nursing Department, Istanbul, Turkey

ABSTRACT

This study was planned to determine whether there is a correlation between blood pressure, anger expression and body mass index of 16–18 year-old-adolescents. A descriptive-correlation design was used in this study. The study population comprised 276 students from 4 public high school. A questionnaire form and Anger Expression Inventory were used, and measures of systolic and diastolic blood pressure, height and weight measures were noted to the questionnaire form. The systolic blood pressure of 3.3% of the adolescents and the diastolic blood pressure of 4.7% of the adolescents was found hypertensive. Anger-in score was 15.42 ± 3.78 ; anger-out score was 17.70 ± 4.55 and anger-control score was 19.39 ± 4.53 . Body mass index of 67.8% of the adolescents was found within the normal range and 7.6% of students were obese. A positive correlation was found between anger-control and systolic blood pressure ($r=0.13$; $p<0.05$), body mass index and systolic blood pressure ($r=0.24$; $p<0.01$), body mass index and diastolic blood pressure ($r=0.16$; $p<0.01$) and anger-in and body mass index ($r=0.17$; $p<0.01$) of adolescents. As a conclusion, this study provided findings related to the importance of determination of blood pressure, anger expression and body mass index in school health studies.

Key Words: adolescence, anger expression, blood pressure, body mass index

Introduction

Hypertension is an important public health challenge in both economically developing and developed countries and the prevalence of hypertension varies around the world. The systematic review of Kearney et al. has reported the lowest prevalence in rural India and the highest prevalence in Poland¹. The total hypertension prevalence rate in adults was found to be 31.3%, and at least 65 million adults had hypertension in 1999 to 2000 in the United States². According to the results of the research conducted by the Turkish Society for Hypertension and Kidney Diseases, the prevalence of hypertension in Turkey was found to be 31.8%³.

Epidemiological studies show that high blood pressure (BP) values in childhood have effect on hypertension seen in adult life. Thus, it is argued that early identification and evaluation of high BP values in childhood, determination of the causes and taking the necessary measures may reduce the long-term cardiovascular risks⁴.

According to the results of some researches conducted in school age children, the prevalence of hypertension was varied 0.6%–4.5%^{5–7}. There are various risk factors in the development of childhood hypertension. These may be related to socioeconomic factors, familial factors, obesity or stress. Body weight and body mass index (BMI) are strongly linked with the risk of hypertension in childhood⁸. One of the basic factors in essential hypertension is stress. In studies, it is well known that some persons in anger have an acute rise in BP levels through the activated sympathetic nervous system. The number and sensitivity of beta-adrenergic receptors are reduced. This situation causes the sympathetic activation. Thus hypertension or ischemic heart disease may occur^{9,10}.

Adolescence is a difficult period for the developing children, and adolescents demonstrate variable emotional reactions. One of the most common emotional reactions in adolescents is anger; and failure to express anger

in an appropriate way as well as experiencing long-lasting and intensive anger increases susceptibility to psychosomatic diseases accompanied by exhaustion, stress and anxiety. Given that anger is considered to be the most remarkable emotion in essential hypertension, which is regarded as a psychosomatic disorder^{4,11}.

The relationship of BMI and BP of adolescents has been demonstrated in different studies^{5,12–17}, but there are few studies about the relationship between BP and anger expression^{4,18,19}. Additional, although the relationship of BMI and blood pressure has been demonstrated in our country^{6,7} but the relationship between anger expression, BMI and BP is unknown in our country. We thought a study conducted to determine the BP values, the anger expression and BMI of the adolescents would contribute to the literature.

The aim of this pilot study is to determine BP, anger expression and BMI of 16–18 year-old-adolescents, and whether there is a relation between BP, anger expression and BMI.

Research Questions:

- What are the systolic and diastolic BP values of the adolescents?
- What is the anger expression level of the adolescents?
- What is the BMI of the adolescents?
- Is there a relationship between the anger expression, BMI and the BP values of the adolescents?

Materials and Methods

Design and setting

A descriptive-correlation design was used in current study. The research setting was Istanbul, which is located in line Europe and Asia and is the biggest city of Turkey. Research was carried out in a four public high school.

Sample

The study population comprised 276 students from four public high school. The selection criteria for students were being 16 to 18 years and willingness to participate in the interview. The age range of participants are 16–18 years ($X=17.3$; $SD=0.48$). The number of girls completed the study (57.2%) was slightly higher than the number of boys (42.8%).

Measures

Questionnaire form: A questionnaire form was used to determine the characteristics of each participant. Physiologic measurements (BP, height, weight) were recorded on this form.

Anger Expression Scale (AES): We used the AES to measure anger expression, developed by Spielberg et al. (1985). The scale was adapted to Turkish by Ozer (1994). The Turkish version of AES contains 24 items, scored on a 4-point Likert scale with three sub-scales designed to measure the patterns of anger expression (anger-in; an-

ger-out) as well as the frequency of an individual attempting to control anger (anger control). Anger-in measures the extent to which people hold things in or suppress anger when they are angry or furious. Anger-out describes the extent to which a person expresses her emotional experience of anger in an outwardly manner. Anger-control involves expenditure of energy to monitor and control the physical or verbal expression of anger. Possible scores on the three independent sub-scales range from 8–32; a high score on each of these scales represents a high tendency or frequency to express that mode of anger. The Cronbach α values of Turkish version were .84 for »anger control«, .78 for »anger out«, and .62 for »anger in«¹⁸. The Anger Expression Scale has demonstrated good internal reliability and validity based on results from a variety of samples and cultures^{11,21}. Cronbach's α for the Anger Expression scale was .76 in a current study (anger in=.64; anger out=.79; anger control=.81).

Blood Pressure (BP): Adolescent BP in this study was classified as normal (<90th percentile), pre-hypertension (>90th and <95th percentile), and hypertension (>95th percentile- Stage 1: 95th–99th percentile; Stage 2: >99th percentile), based on gender-specific age and height tables^{20,21}. Data of the students who have hypertension were evaluated as a whole, without classification according stage 1 and stage 2 and they were referred to physician for further investigation. We used BP percentile references for Turkish children that developed by Tumer et al.²⁴.

Body Mass Index (BMI): BMI for age is used to determine obesity in adolescent. According to the Centers for Disease Control and Prevention, BMI for children aged 2–20 years is gender and age specific and is expressed as a percentage. We used BMI references for Turkish children that developed by Bundak et al.²⁵.

Ethics

Following the approval from the Institutional Review Board, the researchers visited the senior classrooms to give explanatory information relating to the study. The students willing to participate were given a written explanation of the study and a parental consent form. Students willing to participate and who had the parental consent signed were requested to sign an Informed Consent prior to data collection. The confidentiality and anonymity of findings were preserved.

Procedure

Data collection began with the principal researcher determining BP readings (Time 1) and then measuring height and weight to calculate the BMI. The participants were then asked to complete the AES. One month later, the BP measurement was repeated. Time 1 and Time 2 BP readings were averaged for data analysis. Automated sphygmomanometers were used in the BP screening. The BP measurement was assessed while students sitting, and before the lunch and physical activity. All physiologic measures were obtained in a private room in the school. All data were kept confidential with only participant numbers recorded on any of the data collection forms.

TABLE 1
THE SYSTOLIC AND DIASTOLIC BLOOD PRESSURE VALUES OF SAMPLE (N=276)

	SBP						DBP					
	Normal		Prehypertension		Hypertension		Normal		Prehypertension		Hypertension	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Girl	153	(96.8)	3	(1.9)	2	(1.3)	150	(95)	4	(2.5)	4	(2.5)
Boy	85	(72)	22	(18.6)	11	(9.3)	109	(92.4)	4	(3.4)	5	(4.2)
Total	238	(86.2)	25	(9.1)	13	(4.7)	259	(93.8)	8	(2.9)	9	(3.3)

SBP – Systolic Blood Pressure, DBP – Diastolic Blood Pressure

Data analysis

First, descriptive statistics were used to describe the sample (N=276). Spearman’s Rho Correlation Test to determine the relationship between the parameters was used. Statistical analyses were performed using SPSS 15.0.

Results

Demographic characteristic and descriptive statistics for sample

The average age of the population was 17.30 (SD=0.48) and 158 (57.2%) of the sample were girls, and 118 (42.8%) were boys.

According the systolic BP, 13 (4.7%) of participants were found that have the hypertensive range: 11 (9.3%) of the boys, and 2 (1.3%) of the girls. According the diastolic BP, 9 (3.3%) of participants were found that have the hypertensive range: 5 (4.2%) of the boys, and 4 (2.5%) of the girls (Table 1).

According AES, the anger control mean scores of the students were 19.39 (SD=4.53). One hundred and eighty-seven students (67.8%) had a body mass index within normal limits. Only 21 (7.6%) were obese (Table 2).

Correlation analysis

When the relationship between BP, anger expression and BMI of the students were examined, a significant

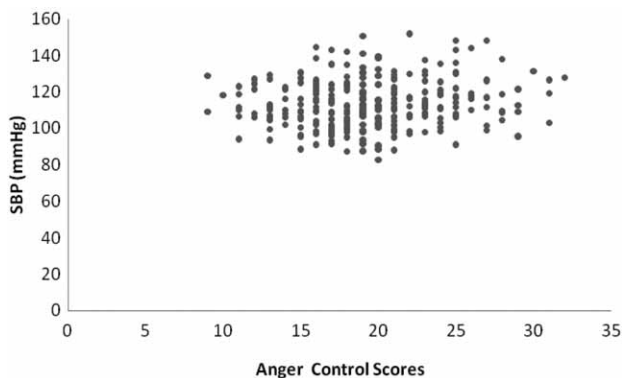


Fig. 1. Correlation between anger control scores and systolic blood pressure. SBP – Systolic Blood Pressure.

TABLE 2
THE DISTRIBUTION OF ANGER EXPRESSION SCALE SCORES AND BODY MASS INDEX (N=276)

	N	(%)	X	SD	Range
AES Anger-In	–	–	15.42	3.78	8–30
Anger-Out	–	–	17.70	4.55	9–30
Anger Control	–	–	19.39	4.53	9–32
BMI Underweight	27	(9.8)	–	–	–
Normal weight	187	(67.8)	–	–	–
Overweight	41	(14.9)	–	–	–
Obese	21	(7.6)	–	–	–

BMI – Body Mass Index, AES – Anger Expression Scale

positive correlation was found between anger control and systolic BP ($r=0.13$; $p<0.05$, Figure 1). Also, a significant positive correlation was found between anger-in and BMI ($r=0.17$; $p<0.01$, Figure 2). In addition, a positive correlation was found between BMI and systolic BP ($r=0.24$; $p<0.01$, Figure 3) and between BMI and diastolic BP ($r=0.16$; $p<0.01$, Figure 4).

Discussion

The aim of this pilot study is to determine BP, anger expression and BMI of 16–18 year-old-adolescents, and

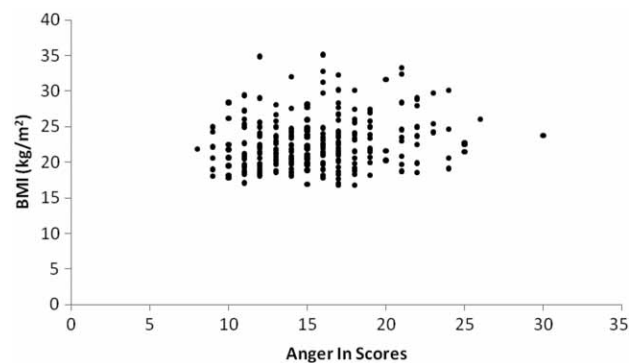


Fig. 2. Correlation between anger-in scores and body mass index. BMI – Body Mass Index.

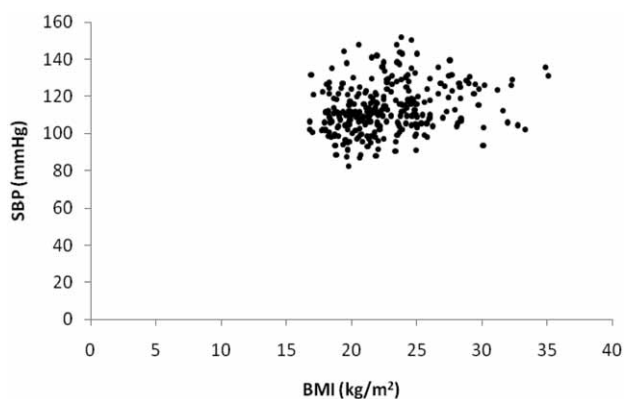


Fig. 3. Correlation between body mass index and systolic blood pressure. SBP – Systolic Blood Pressure, BMI – Body Mass Index.

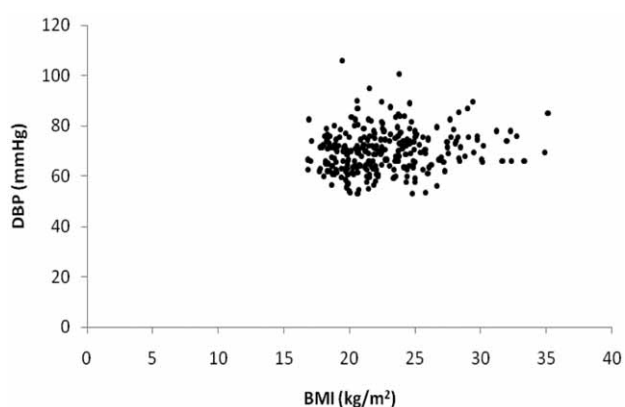


Fig. 4. Correlation between body mass index and diastolic blood pressure. DBP – Diastolic Blood Pressure, BMI – Body Mass Index.

whether there is a relation between BP, anger expression and BMI.

In a study conducted on 610 primary school students (6–17 age) in Turkey by Bayat et al. the systolic hypertension rate was reported as 3.8% for girls and 3.1% for boys, while diastolic hypertension rate was 3.2% and 1.9% for girls and boys, respectively; the prevalence of overall hypertension was 2.9% in girls and 1.9% in boys. Overall hypertension rate in all students was found to be 2.44%⁷. In the study conducted by Sorof et al. the prevalence of elevated BP after first, second and third screening was found to be 19.4%, 9.5% and 4.5%, respectively⁵. In a study of Androque and Sinakio, the prevalence of systolic hypertension was reported as 2.8% for girls and 2.7% for boys, the prevalence of diastolic hypertension was 2.7% for girls and 1.3% for boys¹³. In a study conducted on 8820 children in Turkey by Pac et al. the prevalence of hypertension was determined to be 0.6%⁶. In the study conducted by Starner and Peters 27% (10) of the girls, and 65% (17) of the boys were hypertensive⁴.

In our study, the only significant positive relationship was between anger control and systolic BP. In the study of Hauber et al. revealed significant inverse relationships between anger suppression and diastolic BP and anger

reflection and control and both diastolic and systolic BP. As anger suppression increased, diastolic BP decreased. As anger reflection and control increased, both systolic and diastolic BP decreased¹⁸. Mueller et al. was found that BP were unrelated to anger expression¹⁹. In a study of Starner and Peters, no significant relationship was found between anger expression patterns and either systolic BP or diastolic BP when the entire sample was examined. However, gender differences were noted. For girls, both total anger expression and anger-in were found to have a moderate, significant correlation with systolic BP, whereas anger-out had a weak, significant correlation with systolic BP. In addition, a moderate, inverse significant correlation between anger control and systolic BP was noted for girls⁴.

In current study, obesity prevalence was 7.6% for the overall sample group. In the study of Tarlton determined that the prevalence of obesity was 21% for overall population (Hispanic and non-Hispanic)¹⁷. In the study of Sorof et al., the prevalence of overweight was highest among Hispanics (31%), followed by African Americans (20%), whites (15%) and Asians (11%)⁵. The findings of these studies are not similar to the findings of current study. The reason for this dissimilarity was considered to be due to the relatively racial and ethnic composition of samples included in the other studies. In the study which was revised the prevalence of overweight and obesity in Lithuanian children and adolescents, 1985–2002 by Tutkuvienė (2007), the prevalence of overweight was higher among younger schoolchildren in comparison with older adolescent. Overweight was lower among the older girls in comparison with the older boys: 4.60%–11.50%/4.80%–13.62% in the 7–13 years girls/boys versus 1.5%–6.60%/3.90%–9.50% in the 14–18 years old girls/boys²⁶. In our country, in the study of Ari and Suzek was found that the obesity rate is 13%²⁷.

In current study, the significant positive correlation was found between anger-in and BMI. As anger-in increased, BMI increased. There isn't found a similar study in literature. In addition, a positive correlation was found between BMI and systolic BP and between BMI and diastolic BP of adolescents. Hypertension is just one health issue that has been linked with obesity; however it is often thought of as something that only adults face. The prevalence of high BP in children and adolescents is a research topic that has recently emerged with the growing prevalence of obesity. Results of Tarlton's study confirm the presence of elevated BP and obesity in all population groups, with an elevated risk for both among Hispanic population¹⁷. In study of Sorof et al. it was found that the prevalence of hypertension increased progressively as the BMI percentile increased from <5th percentile (2%) to >95th percentile (11%)⁵. In another study of Sorof et al. a three fold higher hypertension rate was observed in obese children than normal children¹⁵. Lurbe et al. found that obese children had higher BP than no obese children and BP was positive correlated with their height and weight¹⁴. The findings of these studies are not similar to the findings of current study. The reason for this dissimi-

larity was considered to be due to the relatively BMI range of samples included in the current study.

Conclusion

This study provided us with findings related to the importance of determination of BP, anger expression and BMI in school health studies. The five percent (5%) of the adolescents in this group were found to be hypertensive, and under the risk of cardiovascular diseases. Furthermore, since the systolic BP values were high in students with high levels of anger control, it is considered that the students may benefit from initiatives relating to anger management and healthy expression of anger.

Hypertension is a major public health problem. Given the evidence that elevated BP in childhood is likely to track into adulthood. To screen BP of adolescents is an important consideration for school health worker. The adolescence period is an important time to learn healthy

lifestyle behaviors. School health worker are in a position to influence the development of those behaviors through education and counseling programs. Intervention programs can be constructed to educate adolescents on risk factors (high BMI, anger expression patterns i. e) leading to high BP and health care worker can be constituted the programs targeting lifestyle modification and anger management.

This study is limited due to sample size. Future studies should be planned with a larger, more heterogeneous sample. A larger sample would enhance the discriminative abilities of the research variables, as well as allow generalizations of the findings to a larger population. Although the limitations of current study, there was a relationship between anger control and systolic BP and between BMI and BP in this study. Therefore, it can be argued that it is important to develop a healthy eating behavior and healthy expression of anger in school health studies.

REFERENCES

1. KEARNEY PM, WHELTON M, REYNOLDS K, WHELTON PK, HE J, J Hypertens, 22 (2004) 11. — 2. FIELDS LE, BURT VL, CUTLER JA, HUGHES J, ROCCELLA EJ, SORLIE P, Hypertens, 44 (2004) 398. — 3. ALTUN B, ARICI M, NERGIZOGLU G, DERICI U, KARATAN O, TURGAN C, SINDEL S, ERBAY B, HASANOGLU E, CAGLAR S, J Hypertens, 23 (2005) 1817. — 4. STARNER TM, PETERS RM, J School Nurs, 20 (2004) 335. — 5. SOROF JM, LAI D, TURNER J, POFFENBARGER T, PORTMAN R, Pediatrics, 113 (2004) 475. — 6. PAC FA, GULCAN H, YAKINCI C, KARABIBER H, BALBAY D, Journal of Medical Faculty, 8 (2001) 107. — 7. BAYAT M, ERDEM E, BARIK O, KORKMAZ Z, KAYA Z, Res J Bio Sci, 2 (2007) 538. — 8. CANDAN C, CALISKAN S, Turkish Archives of Pediatrics, 40 (2005) 15. — 9. LARKIN KT, ZAYFERT C, J Psychosom Research, 56 (2004) 113. — 10. SCHUM JL, JORGENSEN RS, VERHAEGHEN P, SAURO M, THIBODEAU R, J Behav Med, 26 (2003) 395. — 11. SCHWENKMEZGER P, HODAPP V, Z Klin Psychol Psychother Psychosom, 39 (1991) 114. — 12. AGYEMANG C, REDEKOP WK, OWUSU-DABO E, BRUIJNZEELS MA, BMC Public Health, 5 (2005). — 13. ANDROGUE HE, SINAKIO AR Am J Hypertens, 14 (2001) 412. — 14. LURBE E, ALVAREZ V, LIAO Y, TACONS J, COOPER R, CREMADRES B, TORRO I, REDON J, Am J Hypertens, 11 (1998) 418. — 15. SOROF J, DANIELS S, Hypertens, 40 (2002) 441. — 16. SUGIYAMA T, XIE D, GRAHAM-MAAR R, INOUE K, KOBAYASHI Y, STETTLER N, J Adolesc Health, 40 (2006) 166. — 17. TARLTON P, J School Nurs, 23 (2007) 47. — 18. HAUBER RP, RICE MH, HOWEL CC, CARMON M, Appl Nurs Res, 11 (1998) 2. — 19. MUELLER WH, GRUNBAUM JA, LABARTHE DR, Am J Human Bio, 13 (2001) 531. — 20. OZER AK, Türk Psikoloji Dergisi, 9 (1994) 26. — 21. ECKHARDT CI, KASSINOVE H, TSYTSAREV SV, SUKHODOLSKY DG, J Pers Asses, 64 (1995) 440. — 22. NATIONAL HIGH BLOOD PRESSURE EDUCATION PROGRAM WORKING GROUP ON HYPERTENSION CONTROL IN CHILDREN AND ADOLESCENTS, Pediatrics, 98 (1996) 649. — 23. NATIONAL HIGH BLOOD PRESSURE EDUCATION PROGRAM WORKING GROUP ON HYPERTENSION CONTROL IN CHILDREN AND ADOLESCENTS, Pediatrics, 114 (2004) 555. — 24. TUMER N, YALCINKAYA F, INCE E, EKIM M, KOSE K, CAKAR N, KARA N, OZKAYA N, ENSARI C, ONDER S, Pediatr Nephrol, 13 (1999) 438. — 25. BUNDAK R, FURMAN A, GUNOZ H, DARENDELILER F, BAS F, NEYZI O, Acta Pediatr, 95 (2006) 194. — 26. TUTKUVIENE J, Coll Antropol, 31 (2007) 109. — 27. ARI Z, SUZEK H, Adnan Menderes University, J Medical Faculty, 9 (2008) 11.

Y. Kutlu

Istanbul University, Florence Nightingale College of Nursing, Psychiatric Nursing Department, Abide-i Hurriyet cad, 34381 Istanbul, Turkey
e-mail: kutluy@istanbul.edu.tr

ODREĐIVANJE KRVNOG TLAKA, EKSPRESIJE BIJESA I INDEKSA TJELESNE MASE U TURSKIH ADOLESCENATA: PILOT STUDIJA

SAŽETAK

Cilj studije je odrediti postoji li povezanost između krvnog tlaka, izražavanja bijesa i indeksa tjelesne mase kod adolescenata od 16 do 18 godina. U ovoj studiji korištena je deskriptivna korelacija. Uzorak obuhvaća 276 učenika iz četiri državne srednje škole. Upitnik je preuzet iz »Anger Expression Inventory«, a mjerenja sistoličkog i dijastoličkog tlaka, visine i težine pribilježena su spomenutom upitniku. Sistolički krvni tlak 3,3% adolescenata i dijastolički krvni

tlak 4,7% adolescenata pokazao se hipertenzivan. Rezultati mjerenja pokazivanja bijesa iznose $15,42 \pm 3,78$; bez bijesa $17,70 \pm 4,55$ i kontroliranog bijesa $19,39 \pm 4,53$. Indeks tjelesne mase 67,8% adolescenata spada unutar prosjeka, a 7,6% je pretilo. Pozitivna korelacija pokazala se između kontroliranog bijesa i sistoličkog krvnog tlaka ($r=0,13$; $p<0,05$), indeksa tjelesne mase i dijastoličkog krvnog tlaka ($r=0,16$; $p<0,01$) te pokazivanja bijesa i indeksa tjelesne mase ($r=0,17$; $p<0,01$) adolescenata. U zaključku, ova studija donosi važna otkrića povezana s određivanjem krvnog tlaka, izražavanja bijesa i indeksa tjelesne mase u školskim zdravstvenim studijama.