

The Health Profile of Students and Teachers in Madrasah Al Ihsan, Kecamatan Ciparay, Kabupaten Bandung

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Abstract

The prevalence of diabetes mellitus and hypertension in Indonesia is increasing both in low- and high-income communities. Therefore, health awareness should be started from a younger age for the prospective future generation. This study, included in a community engagement activity, aims to assess the health profile, in terms of blood pressure (BP) and total cholesterol, of the students (by cross-sectional method) and teachers (by cohort method) of a private madrasah in the rural area of Kecamatan Ciparay, Kabupaten Bandung, West Java. 54 students and 10 teachers participated in this study. Results revealed that the students' average systolic and diastolic BP were 120.23 mmHg and 78.67 mmHg, respectively. The average systolic BP of the teachers in August 2021, January 2022, and August 2022 was 136.8 mmHg, 128.1 mmHg, and 131.9 mmHg, respectively. The average diastolic BP of the teachers in August 2021, January 2022, and August 2022 were 91.6 mmHg, 87.3 mmHg, and 87.1 mmHg, respectively. Moreover, the average cholesterol levels of the students (148.38 mg/dL) and the teachers (190.81 mg/dL) were categorized as normal. Taken together, the health profile of the students and the teachers in Madrasah Al Ihsan is within the normal range. This activity gets positive support from the school and needs sustainability.

Keywords: blood pressure; blood glucose; cholesterol; diastole; hypertension; systole

Introduction

Metabolic disorders occur when there is a malfunction in the metabolism process, which eventually causes an alteration in the body's homeostasis. Metabolic disorders are (1) glucose homeostasis dysfunction or diabetes mellitus; (2) insulin resistance; (3) hypertension; (4) dyslipidemia; and (6) microalbuminuria (urea albumin excretion rate >20 mg/min or albumin/creatinine ratio >30 mg/g). The relationship between metabolic diseases and cardiovascular disorders (CVD) is prominent¹. Metabolic disorders affect various systems in the body. Insulin resistance leads to damage to blood vessels, which eventually causes endothelial dysfunction, vascular resistance, hypertension, and vessel wall inflammation². According to the 2017 American College of Cardiology (ACC)/American Heart Association (AHA) Hypertension Guidelines, hypertension is defined if systolic blood pressure (BP) of >130 mmHg or diastolic BP of >80 mmHg. First-line therapy is lifestyle modification^{3,4}.

Hypercholesterolemia is defined as an elevation of plasma cholesterol levels (>200 mg/dL) with normal plasma triglycerides, an LDL cholesterol >190 mg/dL, or >160 mg/dL with one major risk factor, or >130 mg/dL with two cardiovascular risk factors. The important risk factors include age (male >45 years, female >55 years), hypertension, diabetes mellitus, smoking, and low HDL cholesterol⁵. Hypertension has been known as the silent killer. This disease has been a global burden for decades due to its high mortality rates. Moreover, the prevalence of hypertension is increasing in both low- and high-income communities in Indonesia. Approximately 200,000 patients with hypertension in Kabupaten Bandung were recorded in 2019⁶.

Madrasah Al-Ihsan is located in Kecamatan Ciparay, Kabupaten Bandung. This school has

been accredited B with 24 teachers and proper classrooms to facilitate 219 students. Based on the information provided by the headmistress, this madrasah is a non-profit school that does not take any fees from the students. The students mostly come from lower-income parents, e.g., who worked as pedicab drivers or agricultural laborers, in the surrounding area.

Our concern is that health awareness should be started at a younger age for the future generation. Therefore, this study, included in a community engagement activity, aims to assess the health profile, in terms of blood pressure (BP) and total cholesterol, of the students (by cross-sectional method) and teachers (by cohort method) of Madrasah Al Ihsan, a private madrasah in the rural area of Kecamatan Ciparay, Kabupaten Bandung, West Java. The community engagement activity in Madrasah Al Ihsan is routinely carried out every semester, started in 2021, and has been continuing to present.

Methods

Participants

This study was conducted with a total of 64 participants. The participants for the cross-sectional study were students of grades XI and XII ($n = 54$; aged 16-19 years), and the participants for the cohort study were teachers ($n = 10$; aged 23-60 years). The participants were asked to assemble in a large classroom and were briefed about the procedure of the health examination.

Health examination

Before the health examination, the participants were interviewed about their illness history, eating habits, and smoking habits. They were asked to fill out a registration form and put their signatures on it (Figure 1).

The participants were given health cards with

their names on them and examined their BP using a digital sphygmomanometer. The BP of the participants was measured by following a standard procedure, e.g., the participants were asked to sit for several minutes, and the measurement was done on the upper part of the left arm positioned near the heart^{7,8}. The BP measurement was repeated twice. Eventually, the participants were examined for their blood cholesterol levels using disposable lancets and Autocheck GCU (glucose, cholesterol, and uric acid) devices. After the examination, the participants were encouraged to ask anything related to their health status and medication and were given suggestions about a healthy lifestyle.

Results and Discussion

The cross-sectional study included a community engagement activity at Madrasah Al Ihsan, Kecamatan Ciparay, Kabupaten Bandung Barat, which was attended by students of grades XI and XII ($n = 54$; aged 16-19 years; male 25 and female 29) and teachers ($n = 10$). During physical observation, all the students were confirmed healthy, with an average body weight of 51.22 kg. There was no student with obesity, although 3 students (2 females and 1 male) showed a body weight of more than 65 kg with proportional heights. One student was extremely thin, with a body weight of less than 40 kg. Two male students were smokers, smoking 2-3 cigarettes per day.

The BP measurement of the students revealed an average systolic and diastolic BP of 120.23 mmHg and 78.67 mmHg, respectively. Of those, five students showed high systolic BP, and 14 students had high diastolic BP (Table 1). Students with high systolic BP did not always show high diastole, and vice versa. Fifteen students were categorized as hypertensive by referring to the 2017 ACC/AHA Hypertension Guidelines (depicted as a

darker shade of cells in Table 1).

The BP measurements of the teachers were carried out in three periods: August 2021, January 2022, and August 2022. The average systolic BP of the teachers in August 2021, January 2022, and August 2022 was 136.8 mmHg, 128.1 mmHg, and 131.9 mmHg, respectively. The average diastolic BP of the teachers in August 2021, January 2022, and August 2022 were 91.6 mmHg, 87.3 mmHg, and 87.1 mmHg, respectively (Table 2).

The blood cholesterol assay of the students revealed a normal range (average 144.29 mg/dL); however, one female student was categorized as having hypercholesterolemia with a blood cholesterol level of 202 mg/dL, although her body weight was only 39 kg and she had a normotensive BP (Table 1). Additional data on the blood glucose of the students indicated an average value of 90.20 mg/dL (Table 1); however, one male student with a body weight of 60 kg showed a blood glucose level of 142 mg/dL.

The blood cholesterol assay of the teachers resulted in an average of 190.81 mg/dL, which is categorized as normal, although three teachers had shown high cholesterol levels (Table 2). It is well known that teenagers and young adults have the tendency to consume unhealthy foods, particularly those containing fats, salts, and sugars. A study in the US reported that young adults, aged 12 to 19 years, showed a prevalence of 14% for prehypertension/hypertension, 22% for borderline-high/high LDL cholesterol, 6% for low HDL cholesterol (<35 mg/dL), and 15% for prediabetes/diabetes. It was reported that 80% of CVD can be prevented through diet and lifestyle, and young adolescents are ideal targets for prevention programs because they are in the process of establishing lifestyle habits. Unhealthy diets and a lack

of vegetables and fruits contributed to weight gain and dyslipidemia in this age period ⁹.

A cross-sectional study that assessed coronary heart disease risk in students of the University of New Hampshire aged 18–24 years (n = 1701) resulted in an alarmingly high prevalence of abnormal risk factor profiles, with high rates of overweight, elevated LDL cholesterol, and increased systolic and diastolic BP¹⁰. More interestingly, a previous study on 166 students of the Arabian Gulf University, Kingdom of Bahrain, aged 16-30 years reported that only 15.6% of students indicated hypercholesterolemia and male students have the tendency to show higher total cholesterol levels than females. Another study on 180 students of Baylor University who implemented a sedentary lifestyle proved that male students displayed a high risk of dyslipidemia compared to female students¹¹.

Chinese students aged 15-26 years (n = 3484) indicated normal blood glucose levels (65-110 mg/dL); nevertheless, male Chinese students had higher cholesterol levels¹². A recent study in 2020 published as a thesis at J. William Fulbright College of Arts and Sciences, The University of Arkansas, subjected to 27 students aged 19-27 years, reported a positive correlation between the duration of sleep and LDL levels of the students (each additional sleep time correlated to the increase of LDL 14.3 mg/dL)¹³.

Similar studies on the cholesterol levels and BP of teachers have also been conducted elsewhere 14,15. A cross-sectional study of teachers at SMA Fons Vitae I Jakarta (n = 52) found that 36 teachers (69.23%) had normal blood cholesterol levels and 20 teachers (38.46%) had pre-hypertension status 14. Another study reported the nutritional behavior, lipid profile, and fasting blood glucose of teachers at SMP Negeri Makassar¹⁵.

Interestingly, although there are various ethnic groups in Asia, a study reported that generally, the levels of serum lipids correlate with age 16. A cross-sectional study (n = 46239) on the plasma cholesterol and LDL levels in adult Chinese was also reported as alarmingly high 17,18. Age was positively correlated with total cholesterol, triglyceride, and LDL-cholesterol levels in men ≤ 40 and between 40 and 60 years old and women ≤ 40 and between 60 to 70 years old. The trends in HDL-C levels with age were relatively irregular, although HDL-C levels in women were higher than in men¹⁸.

It was confirmed that routine physical activity can improve lipid status in elderly patients with dyslipidemia^{19,20}. Nonetheless, although it is notable that routine physical activity can benefit health by increasing the body's antioxidant defenses, it should be noted that heavy physical activity may raise the production of reactive oxygen species and result in cell injury ^{21,22}. Moreover, oxidative stress may influence gastrointestinal motility in obese patients²³. Currently, oxidative stress can be predicted by measuring trans-4-hydroxy-2-nonenal (4-HNE) and malondialdehyde (MDA) levels in the blood by employing immunohistochemical and ELISA methods²⁴.

The health profile, in terms of BP and cholesterol levels, of the students and the teachers in Madrasah Al Ihsan, Kecamatan Ciparay, Kabupaten Bandung revealed a good result. However, due to the limited number of participants and different students during each semester of study, the health profile cannot be assessed thoroughly. This activity is routinely carried out every semester, started in 2021, and has been continuing to present.

Conclusion

The cross-sectional study included in a community engagement activity carried out

at Madrasah Al Ihsan, Kecamatan Ciparay, Kabupaten Bandung, revealed that the student's average systolic and diastolic BP were 120.23 mmHg and 78.67 mmHg, respectively. The average systolic BP of the teachers in August 2021, January 2022, and August 2022 was 136.8 mmHg, 128.1 mmHg, and 131.9 mmHg, respectively. The average diastolic BP of the teachers in August 2021, January 2022, and August 2022 were 91.6 mmHg, 87.3 mmHg, and 87.1 mmHg, respectively. Moreover, the average cholesterol levels of the students (148.38 mg/dL) and the teachers (190.81 mg/dL) were categorized as normal. Taken together, the health profile of the students and the teachers in Madrasah Al Ihsan is within the normal range.

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Conflict of Interest

None declared.

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Table 1. Health profile of the students

Age	Gender	Systolic BP (mmHg)	Diastolic BP (mmHg)	Blood glucose (mg/dL)	Blood cholesterol (mg/dL)	Body weight (kg)
16	F	146.5	106.5	86	144	50
16	F	123.5	82	85	142	56
16	M	118.5	80	95	131	54
17	M	128.5	94.5	107	160	60
17	M	115	76	142	150	60
17	M	101.5	65	101	158	51
17	F	118	73.5	111	153	55
17	F	105	65	90	150	48
17	F	135	83	81	152	54
17	F	124.5	78	121	145	43
17	M	106.5	70	94	156	53
17	M	117.5	66	109	140	51
17	M	107.5	64	80	144	48
17	F	127	91	76	141	73
17	F	110	75	82	130	38
17	F	125	75	72	142	56
17	F	101	63	76	142	55
17	F	107	77.5	82	138	40
17	M	97	65	60	131	45
17	M	108	60.5	72	141	48
17	F	113	76.5	74	181	48
17	F	100.5	70.5	99	151	41
17	F	169	122	74	181	69
17	M	115	74.5	118	135	49
17	F	111	71	85	149	43
17	M	136.5	75	105	151	58
17	M	171	122	81	140	54
17	M	129	89	105	119	50

17	M	122.5	65.5	132	129	54
17	M	115	68	97	119	48
17	F	113	75	66	142	49
17	F	116.5	71.5	97	156	42
17	M	126.5	87.5	90	124	62
17	F	123.5	79	95	202	39
18	F	111.5	78	99	180	51
18	M	126.5	83	90	136	54
18	F	103.5	66	102	140	58
18	M	116	74.5	79	140	49
18	F	117	78	77	80	52
18	M	128.5	74.5	69	143	70
18	M	117.5	78	82	165	52
18	M	103	69	54	121	48
18	M	121	81	104	131	48
18	F	115	77.5	69	130	44
18	F	161	110	86	138	45
18	M	145	81	98	154	56
18	M	130.5	73	87	157	63
18	F	126	81.5	97	150	55
18	F	110	81	83	177	41
18	F	106	77.5	82	140	40
18	F	126.5	79	132	132	60
18	M	115	82	78	114	50
19	F	124	93.5	86	142	44
19	F	104.5	72.5	77	153	42

The darker shaded cells indicate a higher or lower value than normal.

Table 2. Health profiles of the teachers

Age	Sex	Systolic BP (mmHg)			Diastolic BP (mmHg)			Blood cholesterol (mg/dL)
		Aug-21	Jan-22	Aug-22	Aug-21	Jan-22	Aug-22	
23	F	122	95	103	83	67	84	196
37	F	116	110	117	80	75	80	188
37	M	150	138	136	107	100	89	233
41	F	111	100	108	80	65	59	239
42	M	127	135	143	75	95	93	197
50	F	120	115	120	85	83	83	206
52	F	130	135	128	95	93	92	169
54	M	128	128	129	88	90	79	178
60	F	192	185	185	125	125	125	195
60	F	172	140	150	98	80	87	193

The darker shaded cells indicate a higher or lower value than normal.



Figure 1. The participants were interviewed about their illness history, eating, and smoking habits while they were filling out the registration forms.