# Potential Risk Factors of Cardiovascular Diseases among Adolescent Students at Two Selected Schools in Yangon

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A cross-sectional descriptive study was conducted at the No. 2 State High School, North-Okkalapa Township and No. 4 State High School, Ahlone Township, Yangon in 2016. Of 230 students, 108 and 122 students were from North-Okkalapa and Ahlone, with the mean age of $14.24\pm 1.05$ years were recruited to determine the proportion of selected cardio-vascular disease (CVD) risks and the relationship between students' background characteristics and cardiovascular risks. Data were collected on students' background characteristics and lifestyle related CVD risks. Anthropometric measurements, blood pressure and venous blood sample were taken using standard procedures. Regarding the CVD risks, the most prevalent risks were having of inappropriate diet like fried snack and fast food (about 95%, each), followed by salty food preference (77.4%) and physical inactivity (51.7%). Overall, 28% and 15% of students had high blood pressure and overweight/obesity, respectively. About 3.5% of the students had high serum total cholesterol and no one had high blood sugar as a CVD risk. Relationships were found between salty food preference and gender ($p<0.05$), students whose mothers are less educated and dependants ($p<0.05$). Smoking/betel chewing practice was significantly associated with parents education ($p<0.05$) and gender ($p<0.01$). Having fried snacks were significantly related to students whose mother are less educated ($p<0.05$) and father are working outside ($p<0.01$). The most prevalent risks are modifiable, therefore, changing lifestyles play an important role in the prevention of CVDs in their later life. School-based educational intervention are required to increase knowledge and awareness of students regarding about CVDs risks for reducing the burden of CVDs.

*Key words:* Adolescent, CVD, Risks

## INTRODUCTION

Globally, prevalence of non-communicable diseases (NCDs) is increasing and cardio-vascular diseases (CVDs) play a major role in these NCDs.[1] In low-income and middle-income countries, CVDs are the leading causes of mortality and morbidity, and are one of the main contributors to economic burden.[2, 3] Family history, age, sex, smoking, raised blood cholesterol and glucose, high blood pressure, physical inactivity, excessive alcohol consumption, overweight and obesity are the related risk factors to develop CVDs.[4] CVDs may not be only due to one factor but a combination of many which may originate through behavioral and lifestyle factors. Prevention of these factors has positive effects on reducing NCD rates and mortality.[5, 6] It was reported that up to 80% of deaths due to heart disease, stroke, and type 2 diabetes could be prevented by eliminating known lifestyle risk factors.[7] Although CVDs typically occur in middle age or later, the development of these risks starts early in life.[8-11]

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During adolescence, teenagers start to make individual choices and develop personal lifestyles, and many of lifestyle choices are related to risk factors for CVDs. Therefore, it is better to inculcate healthy behaviors at a younger age rather than to modify behaviors at later ages or after the onset of disease, as for the primary prevention of CVDs.

Several studies have reported the prevalence of CVDs risk factors but the majority of them have been conducted among adults.[12, 13] Likewise, studies on the CVDs risk factors in Myanmar have been done among adults rather than adolescents. Despite differences in the individual risk factors, the prevalence of the metabolic abnormalities was high among the study population in Myanmar.[14, 15] Adolescents in developing countries consume more high fat, energy dense foods and are less engaging in physical activity, which mimic the lifestyle of developed countries.[16] In Myanmar, owing to the advertisements on media and changing lifestyle, adolescents are expected to be exposed to the unhealthy foods and lifestyle factors. It was reported that adolescents lacked knowledge regarding the risk of CVDs and did not perceive themselves at risks for CVDs.[17] Therefore, detection of CVD risk factors is needed among adolescents. Early identification of these risks may help to prevent the burden of CVDs in future.

The objectives of the study were to determine the proportion of students with some CVD risk factors at the selected schools in Yangon, and to find out the relationship between the cardiovascular risks and students' background characteristics.

## MATERIALS AND METHODS

*Subject recruitment*

A cross-sectional, descriptive study was conducted among students (13-18 years) at No. 2 State High School, North-Okkalapa Township and No. 4 State High School, Ahlone Township, Yangon in 2016. Of all

eligible students, both sexes from each school who agreed to participate were randomly selected till the required sample size was obtained.

*Data collection and procedure*

Face-to-face interview method was used. Data was collected on background characteristics (age, sex, parental education and occupation) and students' lifestyle related risk factors (smoking, unhealthy food, physical activity, etc.) by using the pretested structured questionnaire.

Heights and weights were taken to calculate BMI as weight (kg)/height (m$^2$). Waist and hip circumference measurements were taken using standard procedures. The blood pressure was taken on the right arm of subjects seated and at rest for at least 5 minutes using mercury sphygmomanometer. BP measurement was done twice and the mean value was taken.

Venous blood was taken from the arm under aseptic conditions for random blood sugar and total cholesterol measurements. Serum cholesterol was measured by enzymatic colorimetric method using spectrophotometer. Glucometer and test strips (Glucocard II, Japan) were used to measure blood glucose.

Student with BMI ≥85th and <95th percentile, and BMI ≥95th percentile for age and sex were considered overweight and obese.[18] Hypertension is considered when average systolic and/or diastolic blood pressure are at or above the 95th percentile (based on age, sex and height).[19] High cholesterol was defined as random serum cholesterol ≥200 mg/dl.[20] High blood glucose was interpreted if random blood sugar was ≥200 mg/dl.[21]

Student who smoked any number of cigarette in last 30 days was considered current smoker. Students who ate unhealthy food for ≥3 days per week were recognized as at risk for CVDs. Physical inactivity was defined as <30 minutes of moderate activity per day on at least five days per week.[22]

*Statistical analysis*

Data were analyzed with the Statistical Package for Social Studies (SPSS) for window version 16.0. Mean and standard deviation were used for continuous data. Categorical variables were expressed as percentage. Chi square and Fisher exact tests were used to determine the association between the selected cardiovascular risks and students' background characteristics. A 'p' value <0.05 was considered statistically significant.

*Ethical consideration*

This proposal was submitted to the Ethics Review Committee, Department of Medical Research for approval. Before the study, informed consents and assents were taken from student and their parents. Students were allowed to quit during the study if they did not wish to participate.

## RESULTS

Of 230 students, 108(47%) and 122(53%) students were from No. 2 State High School, North-Okkalapa Township and from No. 4 State High School, Ahlone Township, respectively. Among them, 108(47%) were boys and 122(53%) were girls with the mean age of 14.24±1.05 years. Regarding prevalence of the CVD risk factors, the most prevalent risk factors were having inappropriate diet

like fried snack and fast food (about 95%, each), followed by preference of salty food (77.4%) and physical inactivity (51.7%). Overall, about 28% and 15% of students had high blood pressure and overweight or obesity, respectively. About 3.5% of the students had high serum total cholesterol and no one had high blood sugar level as a risk for CVD (Table 1).

Table 1. Prevalence of cardiovascular risk factors among students (n=230)

| Risk factors | No (%) |
|---|---|
| *Behavioral risks* | |
| Betel chewing | 9(3.9) |
| Smoking | 17(7.4) |
| Preference of salty food | 178(77.4) |
| Having fast food | 218(94.8) |
| Having fried snack | 219(95.2) |
| *Physical risks* | |
| Overweight and obesity | 35(15.2) |
| Hypertension | 64(27.8) |
| Physical inactivity | 119(51.7) |
| *Biological risks* | |
| Raised blood cholesterol | 8(3.5) |
| Raised blood sugar | 0 |

Relationships were found between girls and preference of salty food like fish-paste, dried fish, dried prawn (p<0.05). Students whose mothers were less educated and dependants also had more preference of salty food (p<0.05). Smoking/betel chewing practice was found in boys compared to girls (p<0.01) and students whose parents were less educated was associated with their smoking practice (p<0.05). The significant

Table 2. Relationship between selected CVD risk factors and students' background characteristics

| Risk factors | Gender | | Father's education | | Mother's education | | Father's occupation | | Mother's occupation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Boy (n=108) | Girl (n=122) | ≤High school (n=162) | >High school (n=68) | ≤High school (n=156) | >High school (n=74) | No (n=27) | Yes (n=203) | No (n=126) | Yes (n=104) |
| | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Smoking | 17(100)** | - | 16(94.1)* | 1(5.9) | 16(94.1)* | 1(5.9) | 3(17.6) | 14(82.4) | 11(64.7) | 6(35.3) |
| Betel chewing | 9(100)** | - | 8(88.9) | 1(11.1) | 8(88.9) | 1(11.1) | - | 9(100) | 4(44.4) | 5(55.6) |
| Fried snack | 104(47.5) | 115(52.5) | 154(70.3) | 65(29.7) | 145(66.2)* | 74(33.8) | 20(9.1) | 199(90.9)** | 121(55.3) | 98(44.7) |
| Fast food | 100(45.9) | 118(54.1) | 151(69.3) | 67(30.7) | 145(66.5) | 73(33.5) | 26(11.9) | 192(88.1) | 119(54.6) | 99(45.4) |
| Preference of salty food | 77(43.3) | 101(56.7)* | 128(71.9) | 50(28.1) | 127(71.3)* | 51(28.7) | 20(11.2) | 158(88.8) | 106(59.6)* | 72(40.4) |
| Physical inactivity | 58(48.7) | 61(51.3) | 80(67.2) | 39(32.8) | 75(63) | 44(37) | 12(10.1) | 107(89.9) | 71(59.7) | 48(40.3) |
| Overweight & obesity | 17(48.6) | 18(51.4) | 22(62.9) | 13(37.1) | 24(68.6) | 11(31.4) | 4(11.4) | 31(88.6) | 17(48.6) | 18(51.4) |
| Hypertension | 33(51.6) | 31(48.4) | 44(68.8) | 20(31.2) | 43(67.2) | 21(32.8) | 5(7.8) | 59(92.2) | 34(53.1) | 30(46.9) |
| Raised blood cholesterol | 2(25) | 6(75) | 3(37.5) | 5(62.5) | 4(50) | 4(50) | - | 8(100) | 6(75.0) | 2(25.0) |

*=p<0.05, **=p<0.01

relationship was found between fried snack eating and students whose mother were less educated (p<0.05), and father worked outside (p<0.01). High serum cholesterol, BP and BMI of students were not found in relationship with their background characteristics (Table 2).

## DISCUSSION

In the present study, the proportion of selected CVD risk factors was assessed among students at two schools from urban and sub-urban areas. Most students (about 95%) were eating unhealthy food and for those whose mothers were less educated and fathers worked outside. This result was consistent with the study conducted in Western India (94%)[23] and in Parkistan (over 80%).[24] In United States, the prevalence of soft drink consumption among children and adolescents increased from 37% to 56% in a 20-year period.[25] It may be due to easily available fast food, eating out practices, affordable prices and market appeal. Restriction of available unhealthy food outlets, especially in the school compound. Advertisement of fast food should be prohibited. Not only students but also parents should be educated to replace fast food with more nutritious food and drinks in order to have correct dietary knowledge so that they can adopt healthy eating habits.

Hypertension is an important risk factor for heart disease and stroke. Approximately, 28% of students from this study had high blood pressure although they were relaxed to reduce stress as much as possible. The proportion of high blood pressure from this study was found to be a half of the Myanmar National (Adult) prevalence of hypertension (57%)[15] and coincided with the previous study conducted among adolescent students.[26] It was similar to Malaysia study (27.8%)[27] but lower than Portugy study (34%).[28] The possible causes for high blood pressure were that BP was measured on single visit whereas hypertension should be based on reading taken on several visits. However, most other epidemiological studies of BP in children also relied on single-visit readings.[29-32]

This finding should be viewed with much concern because of the tendency of high blood pressure may track into later adult life,[33] and also because of the possibility of secondary hypertension in this age group.[34] Regular BP measurement in younger age groups should be considered to detect hypertension in early age and for BP control in their later life. By doing so, it can reduce the further development of CVD risk.

The prevalence of salty food preference was found in 77% of students in this study. Salt has dose response relationship with hypertension. Data from household budget survey for Brazil population also reported increasing consumption of food with high salt content.[35] Significant relationships were also found between preference of salty food with girls and students whose mothers were less educated and dependants in this study. It might be the fact that they have insufficient knowledge regarding harmful effects of salty food. Moreover, mothers' behaviors were likely to influence their children' eating habit due to the close link between them, in general.

In this study, about 52% of students were physically inactive and it is consistent with the study from Pakistan (54%).[24] It could be the fact that teenagers spent more time in front of television, social media and computer games. Another possible reason is being stress by lessons in the school and, even at home, that lead to physical inactivity. Physical training and activity classes also tend to be on the wane in schools due to competing subjects. Hence, physical activity and sports should be restored in school curriculum. Parental role modeling of physical activity behaviors is important to promote physical activity behaviors of offspring. Thus, parents' encouragement to the children for doing physical activities is advised and limiting sedentary behaviors should be provided.

The prevalence of overweight or obese (15.2%) observed in this study is lower than the previous studies conducted in Yangon (23%).[26, 36] It is also higher and slightly lower than the studies conducted in Philippines (4.8%)[37] and in Thailand (16.6%),[38] respectively. It might be explained by the fact that today's generation of young people prefer low body weight.

It was noticed that 7.4% of students had admitted having smoked and 3.9% of them reported having betel chewing. The prevalence of smoking and that of betel chewing were lower than the findings observed in Global Youth Tobacco Survey, 2016 in Myanmar (8.3% of current cigarette smoking and 5.7% of current smokeless tobacco use).[39] In this study, including only students in Yangon may be the possible reason for difference in the prevalence rate of tobacco use.

Moreover, smoking status may be under-reported because data were collected at schools where smoking is banned in school environment. The students who tried to smoke would have the high risk to become regular smokers leading to an increase risk of CVDs in their later life. Smoking practice of students was significantly associated with gender (p<0.001) and parental education (p<0.05) in this study. Higher prevalence of smoking was found in boys whose parents were less educated. It is clear that parents' rearing practice and education are important to children for building up healthy habits.

The findings from this study revealed that the most prevalent risk factors are modifiable, therefore, changing lifestyles play an important role in the prevention of CVDs in their later life. Healthy behaviors and attitudes formed during childhood lay a strong foundation for lifetime health related behavior patterns. Thus, educational interventions are required for not only children but also for parents to increase knowledge and awareness about CVDs risk factors in order to reduce the burden of CVDs.

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