Comparing Cardiovascular Risk Factors Between First- and Fourth-Year Undergraduate Students at Gonzaga University

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Abstract

Purpose: To assess cardiovascular risk factors in first- and fourth-year undergraduate students. **Methods:** From October to November of 2019, 45 first- and fourth-year undergraduate students were screened for various cardiovascular disease risk factors including elevated body mass index (BMI), body fat percentage, blood pressure, plasma lipids, blood glucose, inactivity, smoking, alcohol consumption, and family history of diabetes and coronary disease. Participants' total number of risk factors was compared between first- and fourth-year students. Mean differences between first- and fourth-year students for each risk factor were determined using independent *t*-tests. Trends between lifestyle habits and biometric data were analyzed using Pearson's correlations. **Results:** BMI was significantly greater in fourth-year students (23.9 ± 3.5 kg/m^2) than first-year students (21.7 ± 3.0 kg/m^2), $p = 0.03$. Fourth-year students had double the risk factors than first-year students (1.66 ± 1.46 risk factors, 0.88 ± 0.74 risk factors; $p = 0.02$, respectively). Fourth-year students (5.3 ± 1.8 drinks/week) drank significantly more alcohol per week than first-year students (2.0 ± 1.8 drinks/week), $p < 0.01$. **Conclusion:** The college environment can have a negative impact on the population studied due to exposure to different activities that may increase CVD risk. Young adults should be aware and understand how the choices today may affect their future cardiovascular health. Preliminary results of the current study support follow-up longitudinal studies regarding the changes of college students' cardiovascular health from the beginning to end of undergraduate study.

Introduction

Cardiovascular Disease (CVD) is the leading cause of death in adults globally and affects 48% of adults older than 20 years old in the United States (1). Despite the growing prevalence, young adults are considered a low-risk population for CVD and therefore are not often studied. However, among the young adult population, the incidence of CVD risk factors has increased as opposed to the decreasing trend of CVD in older populations (6). The prevalent CVD risk factors in the young adult population include obesity, drug and alcohol use, inactivity, stress and hypertension (2). Young adults who attend college are known to increase the exposure of their risk to CVD. Students who are knowledgeable of CVD and nutrition are strongly associated with better health (4). Therefore, the study and spread of information regarding the risk factors associated with the development of CVD in the young adult population remains an important yet undervalued aspect of scientific research. To the best of our knowledge, there is a lack of thorough, longitudinal studies assessing the CVD risk factors of undergraduate students. Therefore, the purpose of the current study is to monitor CVD risk factors in undergraduate freshmen and seniors and compare the prevalence of risk factors between the two cohorts.

Methods

Participants:
- Forty-five participants were recruited from first-and fourth-year groups.
- Participants were excluded if they were D1 Athletes, had a history of CVD or diabetes, or exercised more than 7 hours a week regularly

Data Collection:
- Participants completed a Lifestyle Questionnaire
- Blood pressure, height, weight, BMI, and Body fat percentage were collected
- Fasting plasma lipid and glucose profiles were collected using Alere Cholestech LDX.

Data Analysis:
- Microsoft SPSS; statistical significance set at $p < 0.05$
- Means from two groups were compared using independent *t*-tests.
- Pearson's correlations and linear regression models were used to find significant correlations.

CVD Risk Factors were defined as:		
BMI > 25 kg/m^2	SBP > 130mmHg	DBP > 80mmHg
LDL-C > 160 mg/dL	Male HDL-C < 40 mg/dL	Female HDL-C < 50 mg/dL
TC > 240 mg/dL	Blood glucose > 140mg/dL	TRG > 350 mg/dL
1st Degree Family History	Any tobacco Use	< 3 hours a week of physical activity

Results

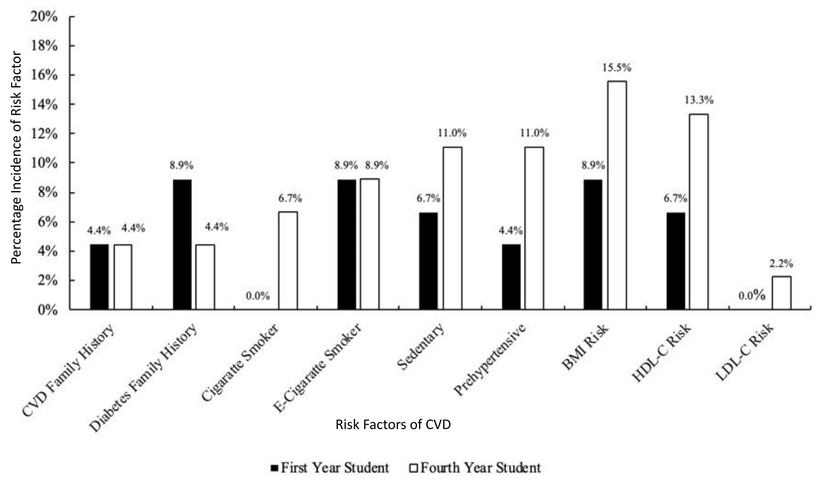

Figure 1 – Cardiovascular Risk Prevalence in First Year Students and Fourth Year Students. Fourth-year students' overall CVD risk score was approximately double compared to first year students (1.66 ± 1.46 risk factors, 0.88 ± 0.74 risk factors; $p = 0.02$, respectively). CVD, Cardiovascular disease; BMI, Body mass index; HDL-C, High-density lipoprotein; LDL-C, Low-density lipoprotein.

	First-Year Students	Fourth- Year Students	*P* value
SBP (mmHg)	117.2 ± 6.8	115.3 ± 6.7	0.36
DBP (mmHg)	74.5 ± 6.7	76.0 ± 6.8	0.46
BMI (kg/m^2)	21.7 ± 3.0	23.9 ± 3.5	0.03*
TC (mg/dL)	159.4 ± 28.4	173.7 ± 24.4	0.09
HDL-C (mg/dL)	57.4 ± 14.6	59.5 ± 20.9	0.7
LDL-C (mg/dL)	83.4 ± 27/7	91.4 ± 27.9	0.37
LDL/HDL	1.61 ± 1.1	1.77 ± 1.1	0.67
TRG (mg/dL)	96.4 ± 40.3	108.3 ± 43.1	0.36

Table 1 – Independent T-Test Results of Biometric Variables (SBP, DBP, BMI, TC, HDL-C, LDL-C, LDL/HDL and TRG) Between First- and Fourth-Year Students. Fourth year students had a significantly greater BMI than that of first year students. TC, HDL-C, LDL-C, and TRG tended to be higher in the fourth-year students when compared to first-year students, although these difference were not statistically significant. *p <0.05.

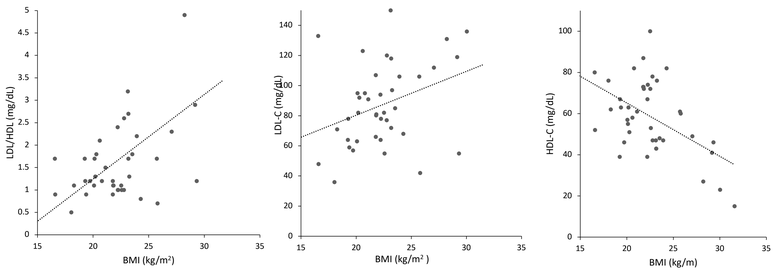

Figure 2 – Correlations between BMI and Lipid Profiles in all participants. BMI had a moderate positive correlation with LDL/HDL ratio ($r = 0.56$, $p < 0.01$), LDL-C ($r = 0.34$, $p = 0.03$), HDL-C ($r = -0.50$, $p > 0.01$) , as well as the number of alcoholic drinks consumed in an average week.

Discussion

Despite few measured variables being significantly different between the first and fourth-year cohorts, the trend of increasing prevalence of risk factors in fourth year students cannot be ignored. The prevalence of overall CVD risk factors in fourth-year students was approximately double compared to first-year students.

Our finding of increased alcohol consumption in fourth year students is similar to a study conducted by Newbury-Birch et. al (8). Alcohol is known to increase systolic and diastolic blood pressure (10). Additionally, heavy consumption of alcohol has shown to increase mortality due to CVD (10). Our findings of elevated BMI are similar to other studies, including a longitudinal study involving 10,000 undergraduate students where over half of the students' BMIs increased during the four years of college (7). However, our study did not examine the amount of lean tissue and therefore the rise in BMI in some individuals could be attributed to an increase in bone or muscle mass. The increased prevalence of CVD risk factors in fourth-year students is thought to be due to the greater amount of time that students are engaging in numerous activities that negatively impact their cardiovascular health, perhaps due to lack of parental control and CVD health knowledge. Therefore, college can be a crucial time to educate students about how to maintain cardiovascular health and decrease risk for CVD later in their life. CVD is difficult to study effectively in such a young population, but our results highlight the negative changes that occur within just four years of young adulthood. These results reveal the importance of increased CVD education and the need for future studies on CVD risk and prevention within the young adult population.

Limitations of this study included a small participant pool size of 45, the lack of detailed body composition analysis, and an uneven gender distribution among participants in both first and fourth-year students.

Conclusion

Our study emphasizes that the college environment can have a negative impact on a student's cardiovascular health. College is a stressful time in a young adult's life and many individuals engage in activities that are specifically harmful to their cardiovascular health including drinking alcohol, increased periods of sedation, lack of quality sleep, dietary changes, and others. Specifically, this study found increased incidence elevated BMI and alcohol consumption in fourth-year undergraduates as compared to first-year undergraduates. It is important for college students to understand how their choices today can impact their long-term cardiovascular health. These preliminary results support a follow-up longitudinal study to be conducted across all four years of college that includes more participants and an even distribution of gender. This would allow for more in depth research on the risk factors in student's lifestyles and could reveal whether the individual risk factors examined in this study are changing across four years of college life.

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