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*Original Research Article*

# Modifiable Cardiac Risk Factors in Young Adults of Different Personality Traits

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## ABSTRACT

**Background:** A questionnaire based cross sectional study was conducted at Kathmandu University School of Medical Sciences, Nepal. Among 153 students who participated voluntarily were 67 males and 86 females.
**Aim:** The study was to predict cardiac risk among young adults through modifiable cardiac risk factors of different personality traits.
**Methods and Materials:** Each student was asked to fill a set of standard questionnaires related to personality, physical activity and nutritional status. In addition, their blood pressure, height and weight were measured. Body mass index and basal metabolic rate were calculated. The analysis was done using ANOVA and Independent T-test, to predict the modifiable cardiac risk in young adults of different personality traits.
**Results:** The majority of the students exhibited two key personalities viz: agreeableness (42%) and openness (49%). The mean systolic and diastolic blood pressure of all five personalities ranges between 112-120 mmHg and 70-74 mmHg respectively. The nutritional count revealed 73.2% of the subjects have good nutritional status. Accordingly, 78.43% of the subjects had normal BMI, 10.45% subjects were overweight, 3.26% subjects were stage I obese and 7.84% subjects were underweight. From the independent t-test, nutritional status and personality traits of exercising and non-exercising individuals were found significantly different.
**Conclusion:** Majority of these students are less prone to possible cardiac risk in the near future.

***Index Terms**:* Personality, Exercise, Risk factors, Nutrition, Cardiovascular.

## INTRODUCTION

Personality is a way of describing the way a person has learned to adapt to their life circumstances. Personality affects the individual's emotional state, autonomic stability, immune response, capacity to self-regulate stress, as well as health behavior and response to medical treatments. The empirically derived big five factor personality traits of low Neuroticism and high Conscientiousness have been linked to adaptive health behavior, cardiac health, and longevity. [1] The Big Five Factor Inventory measures the big five factors of personality:

Openness, Agreeableness, Extraversion, as well as Conscientiousness and Neuroticism. [2] People who are high in extroversion tend to seek out social stimulation and opportunities to engage with others. These individuals are often described as being full of life, energy and positivity. People who score high on the dimension of agreeableness tend to believe that most people are honest, decent, and trustworthy. Conscientious people are efficient and organized. It is manifested in characteristic behaviors such as being neat, and systematic; also including such elements as carefulness, thoroughness, self-organization, and deliberation (the tendency to think carefully before acting).

Neurotics are sensitive and respond poorly to all types of stressors, are more likely to interpret ordinary situations as threatening, and minor frustrations as hopelessly difficult and problematic. They typically care about how others perceive them and want to be liked by everybody. Openness involves active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, and intellectual curiosity. Thus, openness can be viewed as a global personality trait consisting of a set of specific traits, habits, and tendencies that cluster together. [2]

Some personality traits, conscientiousness in particular, may improve health because individuals with high conscientiousness are more likely to adopt optimal health behaviors. Other personality traits, such as extraversion, neuroticism and agreeableness, may influence people's emotional and social life, including sensitivity to negative experiences, lack of social support and poorer abilities in adapting to difficult and changing life circumstances. The resulting psychosocial stress may then lead to elevated blood pressure, atherosclerosis, and other physiological risk factors, thereby increasing the risk of cardiovascular mortality. [3]

According to WHO cardiovascular disease is a major cause of disability and premature death throughout the world, and contributes substantially to the escalating costs of health care. The underlying pathology is atherosclerosis, which develops over many years and is usually advanced by the times symptoms occur generally in middle age. [4] The majority of cardiovascular disease (CVD) is caused by risk factors that can be controlled, treated or modified. The modifiable risks factors observed in the study are hypertension, physical inactivity, unhealthy diets and obesity. Physical inactivity can be defined as less than five times 30 minutes of moderate activity per week or less than three times 20 minutes of vigorous activity per week. Insufficient physical activity is the fourth leading risk factor for mortality. High dietary intakes of saturated fat, trans-fats and salt and low intake of fruits, vegetables and fish are linked to cardiovascular risk. The amount of dietary salt consumed is an important determinant of blood pressure levels and overall cardiovascular risk and the WHO recommends a population salt intake of less than 5 grams/person/day to help the prevention of CVD. [5]

WHO defines obesity as "Abnormal or excessive fat accumulation that presents a risk to health." Worldwide, at least 2.8 million people die each year as a result of being overweight or obese. Obesity is measured in terms of body mass index (BMI). BMI is defined as the weight in kilogram divided by square of height in meter ($kg/m^2$). Individual with BMI greater than 30 $kg/m^2$ is categorized as obese individual. Additionally, hypertension plays a significant role in heart attack. [6] The present study examined the five factor personality model and its association with cardiovascular risk and whether these

associations are accounted by modifiable cardiac risk factors mentioned above.

## MATERIALS AND METHODS

The target population of this study included randomly selected students of Kathmandu University School of Medical Sciences and Kathmandu University High School. A cross sectional study was conducted among 153 students of KUSMS and KUHS aged between 17–24 years old. All together 67 males (43.79%) and 86 females (56.20 %) were categorized according to gender, personality traits, physical activity and nutritional status. The ethical clearance was obtained from institutional review committee of KUSMS and was in accordance with the Helsinki Declaration of 1975, as revised in 1983. The study was limited within the vicinity of KUSMS, Dhulikhel, Kavre, Nepal. The data was collected beginning January 2014 to October 2014. Person with known case of diabetes and hypertension or in medication for chronic disease like hypertension and those suffering from psychiatric illness and/ or under medication for such illnesses were excluded in the study.

Before the sampling was started, participants were informed about the purpose of the study and their verbal consent was obtained. All the data were collected in physiology lab of KUSMS. The related tools used were a complete set of standard questionnaire, mercurial sphygmomano-meter, weighing machine and non-stretchable measuring tape.

All the subjects were asked to fill up the information as specified in the questionnaire which contained a set of BFI questionnaires, Nutritional score and Exercise history. Students attending the questionnaire were explained the terms used in the questionnaires. The answers from all the subjects were categorized accordingly on the basis of scoring pattern for BFI questionnaires, Nutritional status and Physical activity respectively.

Blood Pressure was recorded after a rest of 15 minutes on all subjects. Mercury sphygmomanometer was used to record pressure in a sitting posture in all volunteers. At first, subject was asked to take off thick and tight clothes. The cuff was applied firmly on the arm, which was supported at the level of heart. The auscultatory method was performed in each subject. Three consecutive readings were taken at the interval of 4-5 minutes. Finally the mean of three recordings were recorded. Height was measured with a non-stretchable measuring tape by marking the scale on the house wall. Subjects were requested to remove their shoes and then stand upright on the flat floor keeping the heels, the back, and the occiput in touch to the scale looking straight ahead during measurement so that the lower border of the orbit is in the same plane as the external auditory meatus. The height of each participant was measured to the nearest 0.1 cm.

Weight was measured with the help of weighing machine calibrated from 0-130 kg. Each subject was asked to stand on weighing machine with his shoes and heavy clothes removed and eyes gazing forward. Then the upcoming value in the machine was recorded. The process was repeated 2-3 times to ensure the correct value. Body weight was measured in kilograms.

BMI was calculated by dividing weight in kilograms by height in meters ($kg/m^2$). WHO has classified BMI into four different categories. Basal metabolic Rate (BMR) is the minimum energy required while awake to maintain the physiological functions of the body. (Schofield,W.N. 1985). For women, BMR = 655 + ( 9.6 x weight in kilos ) + ( 1.8 x height in cm ) - (4.7 x age in years )

For men, BMR = 66 + (13.7 x weight in kilos) + (5 x height in cm) - (6.8 x age in years)

The statistical analysis of data was carried out using SPSS version 16.0 software. One way analysis of variance (ANOVA) was used for multiple comparison of means whereas Independent T-test was done for exclusive population. The level of significance of all tests were taken at *P<0.05*.

## RESULTS

According to general objectives the purpose was to categorize individuals into various personality traits.

**Table 1: Major personality types of individuals in the study**

| Major Personality Types | Distribution of Major Personality Types Among Subjects |
|---|---|
| Agreeableness | 64 (42%) |
| Concientiousness | 8 (5%) |
| Extraversion | 5 (3%) |
| Neuroticism | 2 (1%) |
| Openness | 74 (49%) |

The maximum number of students in our sample had openness and agreeableness personality respectively. The least percentage had personality type; 'neuroticism'.

Out of 153 samples, 112 subjects had good nutritional status. 14 students were under high nutritional risk and 27 individuals were in moderate risk. According to WHO classification, the BMI value of 120 (78%) subjects was normal. WHO categorization of obesity is said to be underweight if BMI ($Kg/m^2$) is <18.5. Likewise, BMI for normal is (18.50-24.9), Overweight (25-29.9), Obese Stage I (30-34.9), Obese Stage II (35-39.9), and for Obese Stage III is >40 respectively. Among subjects 16 (11%) individuals had overweight, 12 (8%) had underweight and 5 (3%) were stage I obese. None of the subject had stage II and stage III obesity in this study.

Table 2 depicts the mean values of blood pressure in different personality types. The one way analysis of variance was done to compare the systolic BP among five different personalities. The level of significance was taken at $p<0.05$. The $p=0.142$ using ANOVA, meant the systolic blood pressures among the five personality traits were not significantly different. Similarly, the one way analysis of variance to compare the diastolic BP among five different personalities revealed $p=0.394$ which is $p>0.05$, thus the diastolic blood pressure among the five personality traits were not significantly different.

**Table 2: Mean of blood pressure in five different personality types**

| Personality Types | Blood Pressure (Systole) mmHg | Blood Pressure (Diastole) mmHg |
|---|---|---|
| Agreeableness | 112 | 70 |
| Conscientiousness | 116 | 74 |
| Extraversion | 110 | 70 |
| Neuroticism | 120 | 70 |
| Openness | 116 | 72 |

The one way analysis of variance was analyzed to compare the BMI and BMR of five personality traits. For the comparison of BMI among five different personality traits $p=0.549$ was obtained. While comparing BMR among these personalities after ANOVA, $p=0.094$ was obtained. Thus, data revealed $p>0.05$, hence, the BMI and BMR of individuals in five different personality traits were not found to be significantly different.

The nutritional status between males and females were analyzed using independent sample T-test where $p>0.05$ is considered to be insignificant. Since the calculated $p=0.567$ was found, the daily nutrition intake by males and females were not found to be significantly different.

As shown in table 3, the nutritional status of exercising and non-exercising were analyzed using independent sample test where $p<0.05$ was taken as significant. As the significance was found to be 0.002,

which is less than 0.05, the null hypothesis was rejected. This analysis depicted that the feeding habit of exercisers (physically active) to non-exercisers (physically inactive) were significantly different.

The independent sample T-test was used to compare personality types among exercising and non-exercising individuals. Since, p=0.002 was the value obtained which was less than (p<0.05), the personality of exercising and non-exercising individuals was said to be significantly different.

Tables 5 and 6 show that, the mean systolic blood pressure and mean diastolic blood pressure of both males and females lie within the normal range. The independent sample T-test was used to compare basal BP of males and females.

Systolic pressure with p=0.847 and diastolic pressure with p=0.130 for comparison of difference for the basal blood pressure between males and females asserted the lack of significant difference in independent sample T-test.

**Table 3: Comparison of nutritional status of exercising to non-exercising individuals.**

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Nutrition | Equal variances assumed | 9.838 | .002 | -1.543 | 151 | .125 | -.16049 | .10399 | -.36596 | .04498 |
| | Equal variances not assumed | | | -1.519 | 131.601 | .131 | -.16049 | .10567 | -.36953 | .04854 |

The level of significance is taken at P<0.05

**Table 4: Comparison of personality types among exercising and non-exercising individuals.**

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Personality type | Equal variances assumed | 10.163 | .002 | -1.541 | 151 | .126 | -.36574 | .23742 | -.83483 | .10334 |
| | Equal variances not assumed | | | -1.531 | 144.132 | .128 | -.36574 | .23883 | -.83781 | .10632 |

The level of significance is taken at P<0.05

**Table 5: Comparison of systolic BP of males and females**

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Systolic BP | Equal variances assumed | .037 | .847 | 4.450 | 151 | .000 | 6.56578 | 1.47546 | 3.65056 | 9.48099 |
| | Equal variances not assumed | | | 4.640 | 149.670 | .000 | 6.56578 | 1.41504 | 3.76975 | 9.36180 |

The level of significance is taken at P<0.05

**Table 6: Comparison of diastolic BP of males and females**

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Diastolic BP | Equal variances assumed | 2.315 | .130 | 4.351 | 151 | .000 | 6.26362 | 1.43970 | 3.41907 | 9.10817 |
| | Equal variances not assumed | | | 4.281 | 132.098 | .000 | 6.26362 | 1.46315 | 3.36938 | 9.15786 |

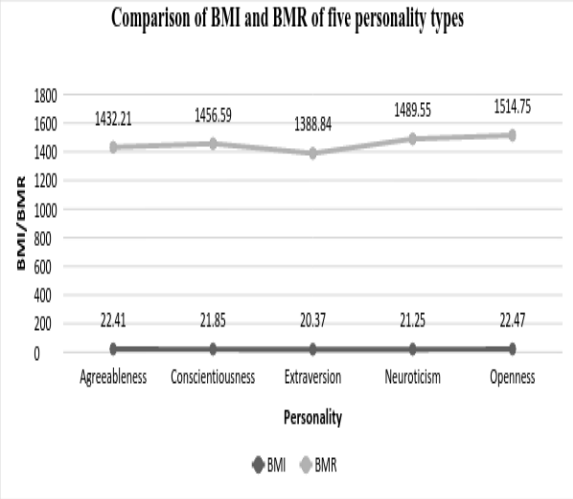


**Figure1: Line chart showing comparison of BMI and BMR of five personality types**

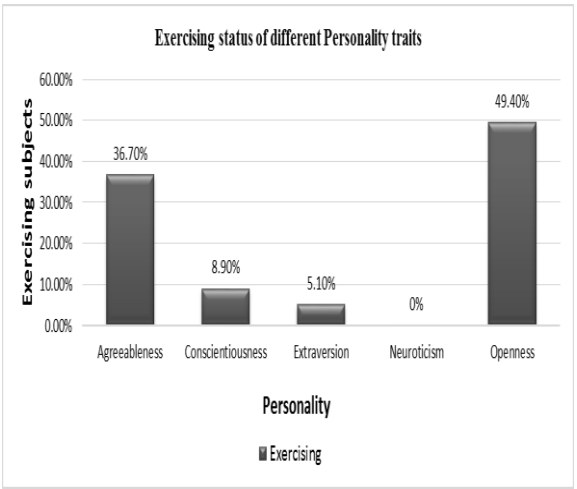


**Figure 2: Bar diagrams representing exercising status of different personality traits**

The line graph in figure 1 illustrates the relation of linearity between BMI and BMR against five different personality traits.

The bar diagrams depicted in figure 2 shows that personality type "openness" have highest percentage of exercisers and personality type "neuroticism" have no exercisers at all.

## DISCUSSION

According to World Heart Federation, the majority of cardiovascular disease (CVD) is caused by risk factors that can be controlled, treated or modified, such as high blood pressure, cholesterol, overweight/obesity, tobacco use, lack of physical activity and diabetes. [5] It has been suggested, that physical training exerts at least a portion of its favorable effect on blood pressure via improved insulin sensitivity. [7] In our study including 153 subjects, the significant number of volunteers show normal blood pressure, BMI, adequate physical activity and good nutritional status. However, after the study it was found that exercising and non-exercising individuals have different personality traits and nutritional status. Physical illness has been attributed to personalities. [8] In this study, 42% are attributed to 'agreeableness' type and 49% are found to have 'openness'.

Physical inactivity and unhealthy diet appears to be associated with cardiac risk. Since the younger generations fall under this risk due to physical inactivity and poor nutrition, this study was designed to find the current status of health targeting the

young population in the Kathmandu University which ensured the mixed population from different regions in the country. However, blood sample for cholesterol and raised blood glucose were not examined in this questionnaire based study. Similarly smoking habit was also excluded in the questionnaire. Though, there was above mentioned limitations in the study, we were able to derive few facts after this study.

A study conducted by Costa and Olive (2012) suggests that extraversion, neuroticism, and agreeableness may be potentially underlying factors in exercise dependence. Result in our study suggests that the exercising individuals and the non-exercising individuals have different personality traits and, among the exercising individuals, 34.7 % of them exhibited "agreeableness". This result is in agreement with the study conducted by Costa. [9] Although the exercise dependence is not accounted in our study, the above mentioned result does demonstrate different personality traits of the exercising individuals in which agreeableness is one of them.

Individuals high in Neuroticism or low in Conscientiousness are vulnerable to being overweight or obese. [10] But, our findings had no significant change in BMI and BMR among different personality traits. This could be due to the fact that least subjects had personality types 'neuroticism' in our study. According to Asian Journal of Clinical Nutrition 2012, nutrition status was found to be high in male compared to female. But our study in university students showed no significant difference in nutritional status among males and females. [11]

According to Miller (1999), participants who scored lower in agreeableness tend to have higher levels of systolic and diastolic blood pressure. Low levels of extraversion were also associated with higher blood pressure. However this discrepancy in both systolic and diastolic BP among the big five personality were not observed in our findings. [12]

Previous evidence published by American Heart Association has shown that the blood pressure is found to be higher in males than in females until menopause. [13] This study also finds that males have higher optimal level of systolic and diastolic blood pressure than in females but there lacks the significant difference.

When exercise or physical work increases, the importance of adequate energy and nutrient intake becomes more critical. [14] Our findings showed that both the exercising and non-exercising subjects shared similar nutritional status. Lastly, expected benefits of this study are summarized. We were able to categorize the personality of student volunteers. We calculated BMI, nutritional status and physical activity of the individuals. This may help to predict their future cardiac risks. Eventually, those individuals who fall under future cardiac risks can be suggested to modify the risk factors which include change in their dietary habits and to remain physically active. Therefore we can conclude that majority of the students of KUSMS do not fall under cardiac risks.

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