

## ASSESSMENT OF SELECTED CORONARY RISK FACTORS IN ADULTS OF UKHRUL DISTRICT IN MANIPUR, INDIA

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### ABSTRACT

Adults from Ukhrul district, Manipur were studied to assess selected coronary risk factors. Anthropometric, biochemical, clinical and dietary assessment was done. Statistically higher mean BMI was found in women ( $24.1 \pm 1.8 \text{ kg/m}^2$ ) compared to men ( $23.7 \pm 2.1 \text{ kg/m}^2$ ). Fasting plasma glucose levels was found to be higher in men ( $117.9 \pm 54.2 \text{ mg/dl}$ ) compared to women ( $100.5 \pm 26.2 \text{ mg/dl}$ ). The total cholesterol, LDL-C, VLDL-C and triglyceride levels were higher in men and with regard to the blood pressure, men were found to be suffering with stage II hypertension, whereas, female subjects were pre-hypertensive. The subjects were found to have 'Impaired fasting glucose' which increased their risk of developing diabetes and CHD.

**KEYWORDS:** Coronary heart disease, Ukhrul district, Pre-hypertension, Impaired fasting glucose.

### INTRODUCTION

Ukhrul is a district in the North-eastern state of Manipur in India. It is about 84 km to the North-east of Imphal. The Tangkhul Nagas constitute the major bulk of the population of Ukhrul district of Manipur, which is a mountainous region and isolated from the neighboring States by a chain of hill ranges.<sup>[1]</sup> The main occupation of the Tangkhul was farming and the sources of income of the people were agriculture in which both terrace and wetland farming are practiced along with small scale industries, animal husbandry, forest wealth and river wealth.<sup>[2]</sup>

Cardiovascular disease (CVD) is the leading cause of death and disability in the world. An estimated 17.3 million people died from CVDs in 2008 and over 80 per cent of CVD deaths take place in low and middle income countries. By 2030, almost 23.6 million people will die from CVDs.<sup>[3]</sup> The average age for cardiovascular death was 65 years, and 50 per cent of coronary heart disease related deaths in India occur in people <70 years of age, whereas, only 22 per cent of coronary heart disease related deaths occur in western countries in this age group.<sup>[4]</sup>

Age is the most significant risk factor of developing heart disease, followed by gender, family history coupled with ethnic background, smoking, obesity, lack of exercise, high blood pressure, diabetes and high blood cholesterol.<sup>[5]</sup> Mean systolic and diastolic blood pressure was higher among subjects with elevated BMI and older subjects. Changing socio-economic environment intensifies the prevalence of overweight, obesity and hypertension among the Tangkhul Nagas men. The risk of hypertension was higher among populations who were overweight.<sup>[6]</sup>

A clinical study reported that 40 per cent of patients with type 2 diabetes mellitus had diabetic cardiomyopathy, of which, 67 per cent had left ventricular diastolic dysfunction, 20 per cent left ventricular systolic dysfunction and 13 per cent had both. The serum cholesterol, triglyceride and LDL cholesterol levels are higher and serum HDL cholesterol is lower among the diabetics with cardiomyopathy compared with those without cardiomyopathy.<sup>[7]</sup>

The north-east section of India, especially the Ukhrul district of Manipur is unaware of the fact that coronary heart disease is the leading cause of natural mortality and its associated risk factors. The purpose of the present study is to identify 'AT RISK' individuals and to implement appropriate intervention such as change in dietary habits, increased physical activity and spreading awareness to prevent and delay the onset and incidence of CVD and its associated risk factors.

## MATERIALS AND METHODS

The study was designed to assess the presence of selected coronary risk factors in adults of Ukhrul district of Manipur and the impact of a nutrition education programme. The subjects were selected based on simple random sampling technique. The total sample size of the study was 50 adults, of which, an equal number were men (n=25) and women (n=25). The study

was carried out for a period of 30 days. All subjects in the age group of 25-50 years were selected from the Ukhrul district of Manipur.

An interview schedule was administered to elicit demographic and dietary details of the subjects. Height, body weight, body mass index and waist circumference of all the subjects were measured. Serum lipid profile, fasting plasma glucose and blood pressure levels of all the subjects were analyzed at Comprehensive Health Service Research and Centre at Ukhrul district, Manipur, India.

## RESULTS AND DISCUSSION

A major proportion of subjects (92%) were involved in sedentary activity (housewives, teachers, lecturers, government employees) which increases the risk associated with CHD. Regular physical activity which reduces the risk of chronic diseases was reported by a higher proportion of female subjects (44%) compared to that of male subjects (36%). Walking briskly for 30 minutes, 5 times per week, was associated with a 30 per cent reduction in vascular events during a 3.5-year follow-up period.<sup>[8]</sup> Studies have also shown that even 15 minutes a day or 90 minutes a week of moderate-intensity exercise may be beneficial.<sup>[9]</sup>

A higher proportion of male subjects were found to indulge in habits like smoking (40%), of which, 16 per cent of male subjects smoked 5 cigarettes per day and a smaller percentage (12%) smoked less than 2 cigarettes per day. Heavy smokers have 10-15 times the rate of fatal heart attacks than non-smokers (Suzanne 2012). Male subjects were found to indulge more in habits of chewing tobacco leaves (48%) and alcohol consumption (52%) compared to that of female subjects. Persons who consume more than 20 cigarettes daily have a 2 to 3 fold increase in the incidence of heart disease. Continued smoking is a major risk factor for recurrent heart attack.<sup>[10]</sup> There is an increased risk of CHD in smokers which is 25 per cent higher in women than in men.<sup>[11]</sup> An appreciable proportion of the subjects had a personal history of diabetes (4%) and male subjects (4%) had personal history of hypertension and obesity.

Regarding the dietary habits, all the subjects in both the groups were non-vegetarians. Majority of the subjects in both the groups had two meals per day and skipped breakfast. Male subjects (88%) were found to consume 3-4 tsp of salt daily compared to that of female subjects (56%) who consumed less than 1tsp of salt daily. Reduction of salt consumption by 3g per day reduces the annual cases of CHD, stroke and myocardial infarction.<sup>[12]</sup> A higher

proportion of female subjects consumed fried foods (52%) and sweets (24%) compared to that of male subjects (44% and 20%).

The staple cereal for north eastern states of India is rice. All the subjects were found to consume rice every day. Bengal gram, red gram dal, soybean and green peas were the major pulses found to be consumed by both the subjects. A variety of vegetables obtained from the market like mint leaves, mustard leaves, pumpkin leaves, passion fruit leaves, cabbage, celery, coriander, cauliflower, French beans, bamboo shoots and wild vegetables obtained from the forest are consumed by both the subjects. Gooseberry which is a good source of vit.C were consumed by majority of female subjects (32%) than male subjects (4%). Other fruits like grapes, guava, papaya, orange, lemon and pineapple were consumed occasionally by the subjects.

Egg yolk is a rich in cholesterol. One egg yolk contains 210mg/dl of cholesterol. Egg was consumed by 32 per cent of female subjects and 28 per cent of male subjects at least 3-4 times a week. Most of the subjects use mustard and sunflower oil for cooking purposes. Studies have reported that use of sunflower oil was not associated with coronary heart disease or with all-cause mortality.<sup>[13]</sup>

The mean BMI, serum lipid profile, fasting plasma glucose, and blood pressure levels of the subjects are shown in table I.

**Table I**

Parameter	Male Mean $\pm$ SD	Female Mean $\pm$ SD	't' value	Level of significance
BMI ( $\text{kg/m}^2$ )	23.7 $\pm$ 2.1	24.1 $\pm$ 1.8	0.64	NS
Fasting plasma glucose (mg/dl)	117.9 $\pm$ 54.2	100.5 $\pm$ 26.2	1.44	NS
Total cholesterol (mg/dl)	191.6 $\pm$ 42.8	182.0 $\pm$ 48.5	0.73	NS
Triglycerides (mg/dl)	185.1 $\pm$ 77.8	127.6 $\pm$ 45.3	3.18	p < 0.01
LDL-C (mg/dl)	105.4 $\pm$ 47.0	111.2 $\pm$ 50.5	0.41	NS
HDL-C (mg/dl)	49.0 $\pm$ 16.3	44.0 $\pm$ 20.0	0.79	NS
VLDL-C (mg/dl)	37.0 $\pm$ 15.5	25.5 $\pm$ 5.9	3.19	p < 0.01
TC:HDL	4.3 $\pm$ 1.7	4.4 $\pm$ 1.7	0.19	NS
TG:HDL	4.2 $\pm$ 2.2	3.1 $\pm$ 1.3	2.17	p < 0.05
Systolic blood pressure (mmHg)	138.8 $\pm$ 13.3	127.3 $\pm$ 13.2	3.05	p < 0.01
Diastolic blood pressure (mmHg)	100.0 $\pm$ 16.7	84.0 $\pm$ 10.0	4.10	p < 0.01

**Mean BMI, fasting plasma glucose, serum lipid profile, and blood pressure levels of the subjects**

A slightly higher mean BMI was reported in the female subjects ( $24.1 \pm 1.8 \text{ kg/m}^2$ ) compared to that of the male subjects ( $23.7 \pm 2.1 \text{ kg/m}^2$ ). The American Heart Association points out that men have a greater risk for heart disease than women and also acquire the disease earlier in life.<sup>[14]</sup>

### **Fasting plasma glucose and serum lipid profile**

The mean fasting plasma glucose levels of the male subjects was found to be higher ( $117.9 \pm 54.2 \text{ mg/dl}$ ) than that of the female subjects ( $100.5 \pm 26.2 \text{ mg/dl}$ ). Both male and female subjects had a higher fasting plasma glucose compared to the normal value of  $< 100 \text{ mg/dl}$ . The subjects are found to be in pre-diabetic state ( $100\text{--}125 \text{ mg/dl}$ ) and have a higher chance of developing diabetes ( $126 \text{ mg/dl}$ ). Patients with diabetes are 2-8 times more likely to experience future cardiovascular events than age-matched and ethnically matched individuals without diabetes.<sup>[15]</sup>

The mean serum total cholesterol levels of the male subjects was found to be higher ( $191.6 \pm 42.8 \text{ mg/dl}$ ) than that of the female subjects ( $182.0 \pm 48.5 \text{ mg/dl}$ ). The mean serum triglyceride levels of the male subjects ( $185.1 \pm 77.8 \text{ mg/dl}$ ) was found to be higher than that of the female subjects ( $127.6 \pm 45.3 \text{ mg/dl}$ ) and it was statistically significant ( $p < 0.01$ ). A number of research studies like the Helsinki Heart study and the Nurses' Health study have reported a 14 per cent increment in the CHD risk for every 1 mg/dl rise in the serum triglyceride level in men.<sup>[16]</sup> Regular activity is a proven way to lower circulating levels of triglyceride.<sup>[17]</sup> An 88 mg/dl increase in triglyceride level increases the CAD risk by 30 per cent in men and 75 per cent in women.<sup>[18]</sup>

The mean serum LDL-C of female subjects was found to be higher ( $111.2 \pm 50.5 \text{ mg/dl}$ ) compared to that of the male subjects ( $105.4 \pm 47.01 \text{ mg/dl}$ ). Increased level of serum LDL-C is a significant risk factor of CHD. The higher the level of serum LDL-C, higher is the risk of CHD. The female subjects are at higher risk of developing CHD compared to that of the male subjects. Serum LDL-cholesterol levels ranging from around 80 mg/dl to 200 mg/dl were positively associated with increased risk of CHD in a Japanese population.<sup>[19]</sup>

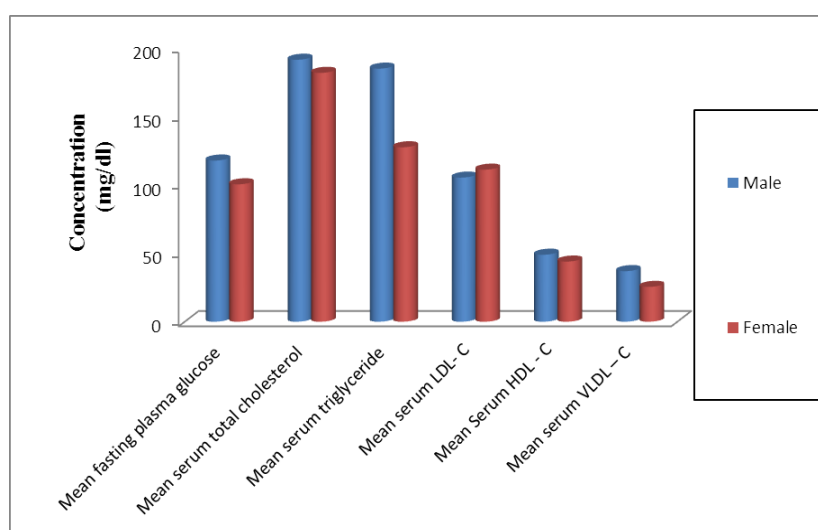
The mean serum HDL-C of male subjects was found to be higher ( $49.0 \pm 16.3 \text{ mg/dl}$ ) than that of the female subjects ( $44.0 \pm 20.0 \text{ mg/dl}$ ). The HDL-C levels should be greater than 40 mg/dl in men and 60 mg/dl in women. One per cent increase in serum concentrations of HDL-C can decrease cardiovascular risk by 2 per cent to 3 per cent.<sup>[20]</sup>

Appropriate dietary and lifestyle intervention is necessary to increase the HDL-C levels, especially in women in-order to reduce their risk of developing CHD. It is evident that the mean serum VLDL-C levels of the male subjects ( $37.0 \pm 15.5$ mg/dl) was higher than that of the female subjects ( $25.5 \pm 5.9$  mg/dl).

Results indicated a slightly higher mean TC: HDL-C ratio in women ( $4.4 \pm 1.7$ ) compared to that of men ( $4.3 \pm 1.7$ ).The high value of TC: HDL ratio indicates high risk of CHD. It is evident from the statistical data that both the male and female subjects are at the borderline-risk of developing CHD. Individuals with TC: HDL ratio above 5 have 2 per cent increased risk of CHD when compared with those individuals whose TC: HDL ratio is below 5.<sup>[23]</sup> If the subjects do not take care of their lifestyle and dietary habits they have a high chance of developing heart disease.

The mean TG: HDL ratio of the male subjects ( $4.2 \pm 2.2$  mg/dl) was found to be higher than that of the female subjects ( $3.1 \pm 1.3$ mg/dl).Lifestyle changes like quitting smoking and alcohol consumption can bring about a significant reduction in the TG: HDL-C ratio levels and thereby reduce the risk of CHD in these men. The risk of CHD increases by 63.6 per cent in those with TG: HDL ratio above 6.9 and 3 per cent increased risk for those with TG: HDL ratio above 2.8.<sup>[24]</sup>

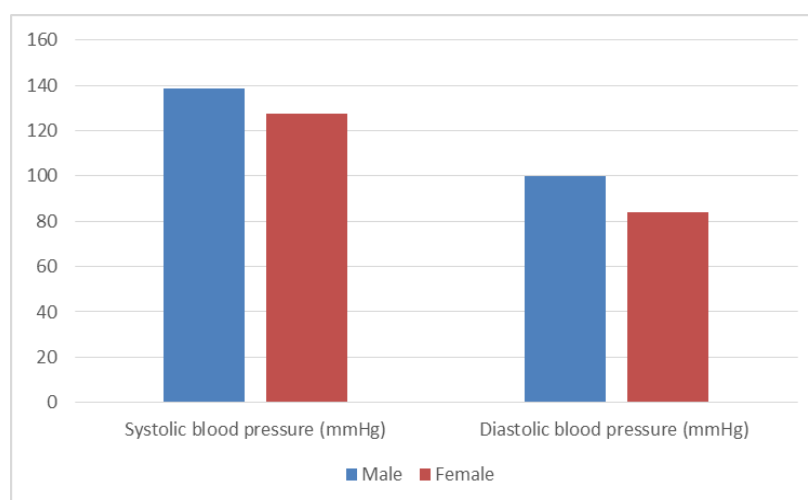
The biochemical parameters on serum lipid profile and fasting plasma glucose, is graphically presented in **Fig.1**.



**Fig.1.** Mean fasting plasma glucose and lipid profile of the male and female subjects  
Blood pressure

The mean systolic blood pressure of the male subjects ( $138.8 \pm 13.3$  mm Hg) was slightly higher than that of the female subjects ( $127.3 \pm 13.2$  mm Hg) and was statistically significant ( $p < 0.01$ ). The mean diastolic blood pressure of the male subjects ( $100.0 \pm 16.7$  mmHg) was higher than that of the female subjects ( $84.0 \pm 10.0$  mmHg) and was statistically significant ( $p < 0.01$ ). Studies have reported that people who have high blood pressure during middle age have associated higher lifetime risk for cardiovascular diseases.<sup>[21]</sup>

A number of clinical trials have reported that pre-hypertensive subjects have a higher risk of developing hypertension.<sup>[22]</sup> The male subjects have a higher risk of developing CHD as well as stroke compared to that of the female subjects. The mean blood pressure of the subject is graphically presented in **Fig.II**.



**Fig. II. Mean blood pressure of the male and female subjects**

## CONCLUSION

The results of the present study indicated that the subjects had certain risk factors which can increase their risk of developing CHD. The need of the hour is to take appropriate steps in order to control the various risk factors which can predispose these subjects to CHD and choose a healthy lifestyle to prevent any premature disability.

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