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ASSESSMENT OF RISK FOR CORONARY HEART DISEASE BASED ON ADULT TREATMENT PANEL III

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Abstract: Identification and management of risk is essential for preventing coronary heart disease in asymptomatic individuals by primary prevention and for preventing recurrent events in patients with established disease by secondary prevention. The aim of the present study is to assess the risk of coronary heart disease by studying the known risk factors like lipoprotein patterns, hypertension, fasting blood sugar taking age and sex into consideration according to NATIONAL CHOLESTEROL EDUCATION PROGRAM- ADULT TREATMENT PANEL-III (NCEP-ATP-III). **Materials and methods**: Materials and methods used are, men who were normotensive with normal cholesterol levels as controls(20) and cases of hypercholesterolemia as 1 group(20) and hypertensive as 2nd group(20). Fasting blood sugar and lipid profile is estimated for cases and controls by colorimetric test using vitros DT 60 module. Blood pressure is recorded for all. **Results:** For Controls, The Average risk of development of heart disease is 2.80 with S. D. ± 1.16. For Group-I Cases of Hyperlipidemia, The Average risk of development of heart disease is 11.36 with S. D. ± 2.18. For Group-II Cases of Hypertension, The Average risk of development of heart disease is 17.25 with S. D. ± 4.70. Patients without manifestations of CHD who have a 10 year risk for MI of greater than 20% are at high risk. Conclusion: So, our study shows that there will be increase in risk of development of heart disease with increase in number of risk factors. Assessment of the risk of heart disease helps in prevention of heart disease, so the management of modifiable risk factors by taking necessary preventive measures and life style modifications can help in decreasing the mortality and morbidity of heart disease in the early stages itself.

Keywords: Metabolic syndrome, NCEP-ATP-III risk factors, Coronary heart disease, Hypertension and Hyperlipidemia

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INTRODUCTION

Coronary Heart Disease (CHD) is the most common form of heart disease and the single most important cause of death in many countries. The overall examination of the incidence, prevalence, mortality, natural history and risk factors of cardiovascular disease suggests the greatest benefits will be from a preventive approach. A multifactorial approach to risk reduction offers the best opportunity for saving patients at high risk and preventing the development of high risk status in the first place. Identification and management of risk factors are the essential for preventing CHD in asymptomatic individuals. The 27th Bethesda conference proposed a classification scheme, according to the strength of evidence that risk factor intervention favorably affects outcome. Some important fixed risk factors of CHD are age, male sex and family history and other modifiable risk factors are smoking, hypertension, lipid disorders, diabetes mellitus, haemostatic variables, sedentary life style, obesity and otherogenic diet. Framingham scores are used to estimate the absolute risk for the development of CHD over next decade. The prevalence of the metabolic syndrome currently exceeds 20% of individuals > 20 years of age and 40% of the population > 40 years of age. The risk for CHD is positively correlated with the serum total cholesterol level. Risk rises exponentially at higher cholesterol levels. In populations that have very low total cholesterol, risk for CHD likewise is low, even when other CHD risk factors like cigarette smoking, hypertension and diabetes are common. Chronic hyperlipidemia, particularly hypercholesterolemia may directly impair endothelial cell function through increased production of oxygen free radicals that deactivate No, the major endothelial - relaxing factor. With chronic hyperlipidemia, lipoproteins accumulate within the intima at sites of increased endothelial permeability. Chemical change of lipids induced by free radicals generated in macrophages on endothelial cells in the arterial wall yields oxidized LDL. Oxidized LDL is ingested by macrophages through the scavenger receptor, distinct from LDL receptor, thus forming foam cells. It increases monocyte accumulation in lesions and stimulates the release of growth factors and cytokines. It is cytotoxic to endothelial cells and smooth muscle cells.

Systemic arterial hypertension is a major independent risk factor for CHD. Hypertension accelerates atherosclerosis directly by way of increased blood pressure and also by associated hormonal changes, including generation of angiotensin II by systemic and local renin angiotensin systems. Insulin resistance syndrome or metabolic syndrome is I Stimulated glucose uptake and compensatory hyperinsulinemia are the common metabolic bases for a cluster of coronary risk factors, particularly hypertension, diabetes, hypertriglyceridemia, low HDL, predominance of small dense LDL and a prothrombotic state with elevated levels of plasma fibrinogen, plarminogen activator inhibitor - 1 (PAI - 1) and factor VII. This clustering has been called the insulin resistance syndrome or the metabolic syndrome.

Classification of Metabolic Syndrome:

The ATP -III criteria were used to classify study participants as being with or without the metabolic syndrome based on the presence or absence of three (3) of the following factors.

1. Waist circumference > 88 cm,
2. Fasting triglycerides > 150 mg/dl,
3. HDL cholesterol (HDL-C) < 150 mg/dl,
4. Hypertension (Systolic Blood Pressure 130 mm Hg, diastolic blood pressure 85 mm hg, or use of anti-hypertensive therapy) and
5. Fasting glucose 110 mg / dl.

ATP - III identified 6 components of the metabolic syndrome that relate to CVD.

1. Abdominal obesity,
2. Atherogenic dyslipidemia,
3. Raised Blood Pressure,
4. Insulin resistance glucose intolerance,
5. Proinflammatory state, Prothrombotic state.

MATERIALS AND METHODS:

Men who were normotensive with normal cholesterol levels as controls(20) and cases of hypercholesterolemia as 1group(20) and hypertensive as 2nd group(20). Fasting blood sugar and lipid profile is estimated for cases and controls by colorimetric test using vitros DT 60 module in central laboratory of government general hospital, Guntur. Blood pressure is recorded for all. Assessment of CHD risk is done for all cases according to NCEP-ATP-III guide lines with Framingham scoring points for risk facors. *National Cholesterol Education Project* under Adult Treatment Panel III : gave guidelines for cholesterol screening in all adults > 20 yrs. The screen should include a fasting lipid profile which includes total cholesterol, triglycerides, LDL - Cholesterol and HDL cholesterol, repeated every 5 years. The ATP - III guide lines strive to match the intensity of treatment to an individual risk. The first step in applying these guidelines is to count individuals risk factors. Individuals with fewer than two risk factors fall into group where preventive intervention is needed. In those with two (or) more of these risk factors, the next step involves a simple calculation of an estimate of the 10 year risk of developing coronary

heart disease. *Framingham Global Coronary Heart Disease Risk Assessment :* The prospective, community based Framingham heart study provided rigorous support for the concept that hyper cholesterolemia, hypertension and other factors correlated with cardiovascular risk. The patient was first evaluated with the office based Framingham Global Coronary Heart Disease risk assessment, which takes into account the following factors: age, sex, cigarette smoking, blood lipid levels, blood pressure, presence (or) absence of diabetes mellitus. The risk factors are weighted and summarized using a score sheet to produce a 10 year cardiac event risk assessment. *American Heart Association (AHA)*: American Heart Association approach to assessment of patients at risk.

It classified as follows. Stage Criteria & Treatment:

I Õ. Office based global CAD risk assessment.

II A Õ. No CAD risk factor encourage heart healthy life styles or behaviors,

II B Õ.2 CAD risk factor or type II DM. Intensive life style modification.

II C Õ.1 CAD risk factor or low levels of several risk factors and consider additional risk assessment.

III Õ. Previous history of CAD. Treatment along with risk management.

Results:

S. No.	Age	Total Cholesterol	HDL	S.B.P.	Smoking	FBS	Risk (%)
1	50	180	42	110	-	70	3
2	44	162	44	112	-	68	1
3	46	158	45	110	-	66	1
4	52	148	48	108	-	60	2
5	54	170	50	110	-	65	4
6	48	168	46	112	-	62	2
7	50	150	50	110	-	70	2
8	46	170	45	112	-	72	2
9	56	182	52	110	-	67	5
10	54	160	50	114	-	68	4
11	52	158	48	110	-	72	3
12	48	160	45	108	-	68	2
13	50	170	48	110	-	65	3
14	52	152	50	108	-	60	3
15	46	172	46	110	-	68	2
16	49	168	52	106	-	70	2
17	52	174	48	110	-	66	3
18	50	170	44	110	-	70	3
19	54	164	50	112	-	72	4
20	56	170	46	110	-	68	5

Average	165.05	47.74	110.10	-	67.35	2.80
SD±	9.44	2.60	1.82	-	3.60	1.16

Hyperlipidemia

S. No.	Age	Total Cholesterol	HDL	S.B.P.	Smoking	FBS	Risk (%)
1	54	260	32	122	-	88	12
2	50	272	34	120	-	85	10
3	48	280	30	118	-	90	10
4	46	254	32	120	-	86	7
5	56	248	30	118	-	88	13
6	58	270	28	110	-	86	16
7	50	265	32	116	-	84	10
8	46	270	30	118	-	90	8
9	54	258	31	110	-	86	11
10	52	240	32	114	-	85	9
11	50	256	30	116	-	82	10
12	53	272	30	110	-	84	12
13	50	260	28	114	-	85	10
14	54	250	32	118	-	80	11
15	57	235	31	120	-	88	13
16	58	248	30	110	-	82	13
17	52	272	33	120	-	87	12
18	54	258	32	118	-	90	12
19	56	270	30	114	-	82	14
20	58	264	31	110	-	84	14

Average	260.10	30.90	115.80	85.60	11.36
SD±	11.80	1.52	3.90	2.87	2.18

Hypertension + Hyperlipidemia

S. No.	Age	Total Cholesterol	HDL	S.B.P.	Smoking	FBS	Risk (%)
1	53	252	28	140	-	108	19
2	46	234	30	180	-	110	10
3	49	272	32	142	-	109	15
4	50	252	25	140	-	111	17
5	59	237	31	140	-	109	21
6	54	248	28	138	-	102	19
7	48	256	32	140	-	105	12
8	47	262	26	142	-	103	15
9	59	244	32	140	-	110	21
10	48	265	26	142	-	108	16
11	58	257	27	140	-	109	25
12	46	253	29	140	-	108	11
13	46	250	31	140	-	115	10
14	57	239	28	138	-	110	21
15	51	248	29	138	-	98	15
16	58	234	30	140	-	110	20
17	59	258	26	140	-	107	27
18	52	236	28	140	-	98	16
19	50	280	25	140	-	106	21
20	46	266	27	142	-	98	14

Average	**252.15**	**28.50**	**140.60**	**106.70**	**17.25**
SD±	12.82	2.32	2.52	4.34	4.70

Control verses group 1 (hyperlipidemia)

Total cholesterol	**HDL**	**SBP**	**FBS**
P<0.001	0.001	0.01	0.001

Controls verses group II (hypertensive)

Total cholesterol	**HDL**	**SBP**	**FBS**
P<0.001	**0.001**	**0.001**	**0.001**

DISCUSSION:

Scott, M. Grundy stated that ATP-III criteria provide a practical tool to identify patients at increased risk for cardiovascular disease. He stated that the target of therapy for the prevention of metabolic syndrome is by treating obesity and insulin resistance mainly along with other metabolic risk factors (30).*Gerald M. Reaven* has hypothesized that insulin resistance

impairs glucose uptake and compensatory hyperinsulinemia are the common metabolic basis for a cluster of coronary risk factors, particularly hypertension, diabetes, hypertriglyceridemia, low HDL predominance of small dense LDL and a prothrombotic state with elevated levels of plasma fibrinogen, plasminogen activator inhibitor 1 (PAI-1) and factor VII (71). *Noel Bairey Merz* stated that emerging role of non - invasive testing modalities in preventive cardiology said that various risk assessment scoring systems and imaging modalities can add diagnostic and prognostic value to cardiovascular evaluation (73).A comprehensive life style approach is required to address the cluster of risk factors related to insulin resistance. Weight loss and physical activity are clear goals because they counteract insulin resistance. Insulin resistance is present in the majority of people with metabolic syndrome, which strongly associates with other metabolic risk factors and correlates invariably with CVD risk. Patients with long standing insulin resistance frequently manifest glucose intolerance, another emerging risk factor. When glucose intolerance evolves into diabetes, hyperglycemia constitutes a major, independent risk factor for CVD. Elevated blood pressure strongly associates with obesity and commonly occurs in insulin - resistant persons. Hypertension thus commonly is listed among metabolic risk factors. However, some investigators believe that hypertension is less metabolic than other metabolic syndrome components. Hypertension is multifactorial in origin. Increasing arterial stiffness contributes significantly to systolic hypertension in the elderly. Blood pressure can be lowered by weight loss, exercise, salt restriction and avoidance of alcohol. Dietary interventions should be the initial step in the treatment of dyslipidemia, hypertension, diabetes and obesity. For a patient with hyperlipidemia, less than 7% of calories from saturated fat and less than 200 mg of dietary cholesterol per day are suggested. Mono unsaturated fats and omega-3 fatty acids from fish may be a beneficial source of calories, as compared with carbohydrate (85). The current dietary recommendations emphasize a well balanced diet low in saturated fat, cholesterol and sodium which are rich in fruits and vegetables.

CONCLUSION: Risk factor measurements of total cholesterol, HDL, systolic blood pressure, fasting blood sugar are done in the present study which can be used as screening tools for assessing the level of risk of development of coronary heart disease in coming future as per NCEP ATP-III. In the present study parameters of cases of hypertensives and hyperlipidemia are taken along with control and their risk is assessed. Hypertensive cases show increased levels of total cholesterol, decreased HDL - cholesterol levels and FBS level are in high normal range. Their risk for CHD is moderate of Average of 17.25 with S. D. ± 4.70. Hypercholesterolemia cases show increased levels of total cholesterol, decreased HDL - cholesterol and normal range of SBP & FBS. The risk of development of coronary heart disease in future is of Average of 11.35 with S. D. ± 2.18. Controls showed a little risk of development of heart disease of Average of 2.80 with S. D. ± 1.16 which may be due to their age and male sex.

So, our study shows that there will be increase in risk of development of heart disease with increase in number of risk factors. Assessment of the risk of heart disease helps in prevention of heart disease, so the management of modifiable risk factors by taking necessary preventive measures and life style modifications can help in decreasing the mortality and morbity of heart disease in the early stages itself.

REFERENCES:

1. Christopher Hoslett, Edwin R. Chilvers, Nicholas A. Boon, Nicki R. Colledge, John A. A. Hunter. Davidson, 19th Edition, pp. 422 - 424.

2. National Centre for Health Statistics, U. S., 1993 - 1997. http//www.cdc.gov/nchswww.

3. Grundy S. M. Pasternak. R., Green Land, P. Assessment of Cardiovascular risk by use of multiple Risk - Factor Assessment Equations Circulation. 1999 : 34 : 1348 - 1349.

4. Fuster, V. Pearson T. A. 27th Bethesda Conference; Matching the Intensity of Risk Factor Management. J Am Coll Cardiol 1996; 27 : 957.

5. Enos WFJ, Beyer, J. C., Holmes, R. H. Pathogenesis of Coronary Disease in American Soldiers Killed in Korea. JAMA: 1995; 58 : 912.

6. Castelli, W. P. Framingham Study, Am J. Med. 1984; 76 : 4.

7. Law M. R., Wald, N. J., Thompson, S. G., BMJ 1994 ; 308 : 367.

8. Goldstein, J. L., Kita, T., Borwn, M. S., N. Engl. J. Med, 1983; 309 : 288.

9. Robins - 5th Edition, Chapter - 11, page : 523.

10. Miller, N. E. HDL - Major Risk Factor for Coronary Atherosclerosis.

11. Solbeng, L. A., Strong J. A. Risk Factors and Atherosclerotic Lesions. 1983, 3 : 187 - 198.

12. Roberts, W. C. Preventing and Arresting Coronary Atherosclerosis. Am Heart J. 1995, 130 : 580 - 600.

13. Van Den Hoogen, P. C. W., Feskens E. J. M., Nagelkerke, N. J. D. et. al. N. Engl. J. Med. 2000, 342 : 1 - 8.

14. The Heart - HURSTS - 10th Edition, Chapter 38 - pp. 1131.

15. Harrison's – Principles of Internal Medicine, 16th Edition.