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ANTHROPOMETRIC AND BIOCLINICAL PARAMETERS IN PATIENTS OF CORONARY ARTERY DISEASE

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Abstract: The economic burden of CAD on any country is tremendous. It is expected that the rate of CAD will accelerate in the next decade. The obstructive impairment and number of vessels affected can interfere with the therapeutic strategy. Selective coronary angiography is the clinical diagnostic test for evaluating the coronary anatomy. Therefore, we can presume that if anthropometric values and biochemical parameters are predictive of the degree of anatomical impairment on coronary angiography, it will potentially be able to influence the decision of a strategy on invasive investigation in patients with ACS.

Our project is hence an Endeavour to study the anthropometric and bioclinical profile of the patients with coronary artery disease and assessing them in relation to their angiographic severity.

Methods: 100 Patients with established CAD were divided into 4 groups based on the angiography &clinical severity. Body mass index (B.M.I.), Waist circumference& Waist – hip ratio, HBA1c, urine albumin and ankle brachial ratio was noted. Data collected was then analyzed using SPSS *(*Statistical Package for the Social Sciences*)*. P value of less than 0.05 was considered as statistically significant.

Result: There was no statistical significance when different types of coronary angiographic findings were compared with anthropometric and bioclinical parameters. 80% of the coronary artery disease patients were having multiple risk factors. Nobody was exempted from risk factor.

Conclusion: Clinicians should look for possible risk factors in a given patient and manage them aggressively.

Key words: CAD, angiogram, anthropometric bioclinical, ankle brachial ratio.

Introduction: The importance of coronary artery disease in contemporary society is attested to by the almost epidemic number of persons afflicted. The economic burden of CAD on any country is tremendous. It is expected that the rate of CAD will accelerate in the next decade.

Chronic coronary artery disease is most commonly due to obstruction of the coronary arteries by atheromatous plaque[1]. Atherosclerosis also plays heterogeneity in time, being a disease with both chronic and acute manifestations. Some of the conventional risk factors for atherothrombotic disease are – smoking, hypertension, diabetes, dyslipidemia, and obesity[2]. Some of the emerging risk factors include – microalbuminuria[3] and ankle-brachial index[4].

Not all coronary events occur in individuals with multiple traditional risk factors, and in some individuals' isolated abnormalities of inflammation, haemostasis and thrombosis appear to play critical roles. The obstructive impairment and number of vessels affected can interfere with the therapeutic strategy. Therefore, we can presume that if anthropometric values and bioclinical parameters are predictive of the degree of anatomical impairment on coronary angiography, it will potentially be able to influence the decision of a strategy on invasive investigation in patients with ACS.

Selective coronary angiography is the clinical GOLD STANDARD[5] for evaluating the coronary anatomy. By performing a series of intra-coronary injections of contrast agents in carefully chosen angulated views using current high resolution X –Ray imaging, it is possible to define all portions of the coronary arterial circulation down to vessels as small as 0.3 mm, free of any artifact.

Both animal data and human data show that, a stenosis that reduces the lumen diameter by 50 %, hence reducing the cross-sectional area by 75 %, is hemodynamically significant[5].Our project is hence an endeavour to study the clinical and biochemical profile of the patients with coronary artery disease and assessing them in relation to their angiographic severity.

Materials and methods: This study was done from the period of December 2008 to August2010 in a tertiary care private hospital in Mangalore in accordance with the ethical standard laid down in the declaration of Helsinki.

Case group: 100 patients out of which 82 were males&18 were females were enrolled in the case group for our study.

Inclusion criteria: Patients with established coronary artery disease, as diagnosed by coronary angiogram. Their prior informed consent was taken for the study.

Exclusion criteria: Patients with normal coronaries, patients having – 1.Urinary tract infection 2.Fever 3.Ketonuria& Pregnant patients.

Control group: 100 age and sex matched members without any cardiovascular complaints were included in the control group.

Study protocol:

Patients were then divided into 4 groups[5] based on the number of coronary vessels with significant stenosis i.e. more than 50 % block[5]:1.minor coronary artery disease: No vessel had significant stenosis.2.single vessel disease: Only 1 vessel with more than 50 % stenosis.3.double vessel disease: 2 vessels with more than 50 % stenosis.3.triple vessel disease: All 3 vessels with more than 50 % stenosis. Patients were then interviewed and specifically enquired about the past history of diabetes, hypertension and cigarette or beedi smoking. Body mass index (B.M.I.): Patient's weight was recorded, in kilograms, to the nearest whole number. Their height was recorded, in meters. B.M.I. was then calculated as Weight (in kgs)/ Height ^{2} (in mt). Patients having B.M.I>25 are under high risk group of CAD. Waist circumference: In the mid – axillary line, patient's iliac crest and the lowest margin of the costal cartilage was noted. Then the mid point between these two points was marked on the either side, and at this level waist circumference was measured at the end of expiration using a non stretchable measuring tape. On the basis of waist circumference, patients were graded as normal or having central obesity, as per International Guidelines[6], for males: $\geq$ 90 cm as having central obesity.

Females: $\geq$ 80 cm as having central obesity were considered in high risk group for CAD.

Waist – hip ratio: Waist circumference was calculated as described. Hip circumference was calculated at the level of greater trochanter of the femur and the most prominent part of the gluteal region using a non stretchable measuring tape. Waist – hip ratio was then calculated by waist circumference / hip circumference. On the basis of waist – hip ratio, patients were divided as normal or altered as follows[6] -

Males: > 0.90 as altered Females: > 0.85 as altered.

Urine albumin estimation: Urine spot sample was sent to ISI accredited laboratory where quantitative estimation of urine albumin was done by an autoanalyser. On the basis of urine albumin excretion, patients >20 mg/L are under high risk group.

Patients were considered diabetics – if they were already diagnosed as having diabetes and were on anti diabetic medication or if FBS was more than 126 mg/dL after 8 hours of fasting.[7] An HbA1c level of more than 7 % were considered unsatisfactory glycaemic control[8]. For patients with CAD, a LDL Cholesterol level of over 100 mg/dL was considered high, as per guidelines.[9]

Statistical analysis:

Data collected was then analyzed in relation to the angiographic severity and the anthropometric, biochemical parameters using Pearson's chi square test and Analysis of Variance, using SPSS (Statistical Package for the Social Sciences*)*. P value of less than 0.05 was considered as statistically significant.

Result: Age group distribution of patients with coronary artery disease is shown in table1.Highest members were seen in 50-70 years of age both in case and control group. Waist circumference and waist hip ratio is significantly high in coronary artery disease in relationship with control group ($p<0.05$). Ankle brachial ratio, HbA1c and urine albumin are also significantly high in case group compared with control group .Even though the Body mass index is high in case group, statistically it is not significant(P=O.60&0.80).All these are shown in table2.

There was no statistical significance when different types of coronary angiographic findings were compared with anthropometric and bioclinical parameters which is shown in table3. As shown in table4, most of the coronary artery disease patients (80%) were having multiple risk factors. 20% were having two risk factors. Nobody was exempted from risk factor.

Discussion:

Coronary artery disease is an emerging illness in the modern society. In our present study, our effort is whether the anthropometric and bioclinical parameters can assess the severity of coronary artery diseases. The prevalence of risk factors is important to know because primary prevention, early detection and timely intervention can influence disease outcome.

Age is a very important influencing factor .In our present study, we found that majority of the patients were between 50-70 years of age group(table1) which appears to be in accord with the earlier studies[10]. Previous studies have shown that incidence of coronary artery disease incidence rises consistently with increasing age [10].In our present study, we found out that there was male preponderance with a male to female ratio 4.55:1 and only 1 female out of 18 females was below 50 years of age. These findings are in accordance with the previous studies[10]. Male gender is a recognized risk factor. This disease is not common in premenstrual females. However, after menopause risk becomes equal.

Waist circumference and waist hip ratio is significantly high in coronary artery disease in relationship with control group (table2). Similar results were shown by Lawrence de et al[11]. They demonstrated that the risk of incident of coronary vessel disease increases in men and women with elevations in waist circumference or waist hip ratio.[11] Even though the Body mass index is high in case group, statistically it is not significant(table2) .But Beverley Balkau et al, revealed that BMI and waist circumference were both strongly linked to cardiovascular diseases [12].Ankle brachial ratio, HbA1c and urine albumin are also significantly high in case group compared with control group(table2) .Similarly, Elizabeth Selvin et al concluded that that HbA1c levels is an independent risk factor for CAD in persons with and without diabetes[13].A study carried out by Keiichiro Kosuge et al showed that there was significant differences in HbA1c and BMI between the CAD patients and controls[14]. James Dilley et al found that HbA1c levels had a strong association with CAD [15].

Table-I: Frequency distribution of cases and controls in different class intervals of age.

Age	Cases(n=100)	Controls(n=100)
31-40	5	7
41-50	12	8
51-60	41	45
61-70	29	33
>70	13	7

n=sample size

Table-II: Anthropometric values in case and control group:

Parameters	**Cases(mean)**	**Controls(mean)**	**P values**
BMI(kg/m^2)	23.86	23.76	0.60^{ns}
WC(cm)	91	87.11	0.04^{*}
W/H RATIO	0.94	0.90	0.03^{*}
Ankle brachial ratio	1.06	0.90	0.04^{*}
LDL cholesterol(mg/dl)	103	101	0.80^{NS}
HbA1c	6.9%	6.5%	0.02^{*}
Urine albumin	76.3mg/dl	18	0.01^{**}

**high significant;*significant; ns: not significant

Table-III: Anthropometric values and bioclinical parameters verses angiographic severity in patients of coronary artery diseases:

	Angiographic severity				
parameters	minor	single	double	triple	p value
BMI(kg/m^2)	23.26	23.84	23.59	24.34	0.65^{ns}
WC(cm)	89.08	89.29	88.95	88.86	0.99^{ns}
W/H	0.95	0.96	0.95	0.94	0.36^{ns}
Ankle brachial ratio	1.04	1.07	1.03	1.05	0.73^{ns}
LDL cholesterol(mg/dl)	100	105	104	104	0.27^{ns}
Hbic(%)	7%	8	8	9	0.32^{ns}
Urine albumin(mg/L)	75.4	76.2	76.3	76.3	0.42^{ns}

ns:not significant

TABLE-V: Combined risk factors.

No of risk factors	No of patients
0	0
UP TO 2	20
Multiple	80

"Copenhagen City Heart Study" demonstrated that even very low levels of microalbuminuria may be associated with increased cardiovascular risk.[16]In another similar study done by Ricardo Periera Silva et al recorded that microalbuminuria was present in a significant number of patients with coronary artery disease which is in agreement with our study[17]. Beth D Weatherley et al revealed that the CHD risk increased exponentially with decreasing ankle–brachial index in all race-gender groups[4] Anand V. Doobay et al concluded that the specificity of a low ankle– brachial index can predict future cardiovascular outcomes[18] .

There was no statistical significance when different types of coronary angiographic findings were compared with anthropometric and bioclinical parameters which is shown in table3. Hence, in our study, we found that it was difficult to predict angiographic severity based on anthropometric measurements. But Penalva R.A.et al showed that there were higher LDL cholesterol values in patients with triple vessel and double vessel group than compared to single vessel group[19].

As shown in table4, 80% of the coronary artery disease patients were having multiple risk factors. 20% were having two risk factors. Nobody was exempted from risk factor.This is in agreement with the previous study of Venugopal et al[20].

In the present study, when we analyzed all the risk factors put together, it was observed that a majority of the patients i.e. 80 %, in study group had more than 2 risk factors. 58 % of the patients had 4 and more risk factors for Coronary Artery Disease. But no particular clinical or biochemical data could predict the angiographic severity with much precision. In view of such high prevalence of risk factors, it seems appropriate that we, as clinicians, should look

for possible risk factors in a given patient and manage them aggressively to control the clinical manifestation of coronary artery disease, which at times are catastrophic.

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