

Myocardial Infarct in Young Malaysian Men Forty Years and under: A Retrospective Analysis of Risk Factors

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Summary

MYOCARDIAL INFARCT in Malaysia men forty years and under, is discussed by illustration of clinical cases with reference to risk factors which are analysed retrospectively. Comparison is made with risk factors of Caucasian males in other studies which are discussed to show similar and contrasting characteristics.

It is hoped that preliminary communications such as these may lead to further the understanding that Myocardial Infarct in young men in rapidly developing countries is not uncommon and that prevention programmes could be undertaken to reduce the preventable risks and hence salvage the wastage of valuable man-power at its prime.

Coronary heart disease is known to be common among the three major ethnic groups of Chinese, Malay and Indian in Malaya ((Khaira 1961). In fact, Myocardial Infarct in Malaysian men forty years and under are not unusual. This may be due to the fact that Malaysia is rapidly becoming more industrialised and exposed to a more western type of culture and standard of living.

In neighbouring Singapore, Gwee et al (1970) pointed out, that of a total of 183 cases of Myocardial Infarct admitted unselectively to a medical unit over a period of one year, there were only 9 cases falling into the age bracket of 31-40 years i.e. 4.9%; comprising all males. This paper records a personal observation of five cases of "premature" Myocardial Infarct occurring over a period of 20 months and reviews retrospectively their coronary profile of risk factors especially that of age and sex,

smoking, serum lipid levels, blood pressure, family history of cardiac disease, stress, obesity, diet and other observable physical characteristics and abnormal biochemical findings.

The risk factors in young adults under 40 sustaining Myocardial Infarct in Caucasian countries are well documented [(Blacket & Leelarthae-pin 1972) (Valentine et al, 1972) (Oglesby & Seigal, 1972)]. Our preliminary communication is aimed at analysing these risk factors, to determine whether the same factors are present in such young men in the context of an urban area in a rapidly developing country.

Subjects and Methods

The patients selected had confirmed Myocardial Infarct and were 40 years and under.

Confirmation of Myocardial Infarct was made according to the criteria used by Burns-Cox et al (1969) slightly modified for our study, namely:-

- (1) History of retrosternal pain at rest accompanied by pathological Q wave in the ECG.
- (2) A history of at least one hour's pain at rest accompanied by S.T. segment abnormalities and subsequent evolution; with one or more ancillary evidence of myocardial damage:-
 - (a) A WCC of over 11,000/cu. mm.
 - (b) ESR greater than 20 mm. per hour (Westgren)
 - (c) A temperature rise over 100°F

- (d) Characteristic changes in serum Aspartate Aminotransferase (SGOT) showing a rise over 40 Sigma Frankel units and resultant fall to normal of below 28 units.

Cases 1, 2, 3 and 5 were admitted to Our Lady's Hospital between 21/2/71 to 29/10/72. Case 4 was admitted to another hospital but followed up by one of us. All fulfilled the criteria required. During their stay in hospital and after, relevant features of the study comprising history, physical attributes and biochemical investigations were recorded.

Clinical Cases

Clinical cases with details are summarised in Table I, II, III.

Discussion

Myocardial Infarct and Coronary Heart Disease mortality in the younger age groups in affluent countries have shown real percentage increase (W.H.O. 1967). It would be expected that there will be a similar increase of such trends in young men under 40 in Malaysia as the standard of living, dietary habits, economic and cultural changes of the more affluent members of the community are approaching that of its western counterparts. An attempt is made in our small series to observe such risk factors individually, rather than present a statistical analysis.

The definition by the American Heart Association of a Coronary Risk Factor is a "finding associated with at least doubling the risk" (Stamler et al, 1969) or so simply stated (Leading Article BMJ, 1973) that given a set of circumstances "a person will develop a disease in a given period of time" which in this case is Myocardial Infarct.

Numerous risk factors have been cited in premature coronary heart disease, working singly or in conjunction (Blacket et al, 1972). Risk factors implicated have been age and sex, smoking, diastolic hypertension, hypercholesterolaemia, hypertriglyceridaemia, family history of heart disease, diet and obesity, stress, corneal arcus, abnormal glucose and other biochemical abnormalities. These have all been discussed in the Framingham Study (Dawber et al, 1962) and recent prospective studies (Mulcahy et al, 1969).

In considering the age, premature arteriosclerosis in males is considered to have appeared when symptoms and signs have appeared at age 40 and under (National Heart Foundation of New Zealand, 1971). It may be inferred that the subjects in our series have premature heart disease and most likely premature arteriosclerosis as the end stage of their presymptomatic disease state is the development of a myocardial infarct.

Table I

Case No	Sex	Race	Age	Site of Infarct	Previous Cardiac Disease or Hypertension	Family History of Heart Disease	Smoking Habits	Weight in lbs (Ideal weight) (for height) (and build)	Corneal Arcus + = Present	Xanthomas Xanthelasmas
1.	M	Chinese	40	Antero-septal	Nil	Father died of "enlarged heart" age 52	60-70/day	145 lbs (141)	+	Nil
2.	M	Indian	34	Antero-Lateral	Nil	Father died of Coronary Thrombosis (67) Mother died of Cerebral Thrombosis (58)	20-25/day	190 lbs (174)	+	Nil
3.	M	Chinese	35	Posterior Lateral	Nil	Mother died of "Heart Attack"	Nil	148 lbs (141)	+	Nil
4.	M	Chinese	33	Posterior Lateral	Nil	Father had Myocardial Infarct age 60, 1 month previous to Propositus	20/day	148 lbs (137)	+	Nil
5.	M	Chinese	40	Anterior	Nil	Paternal uncle died of "Heart Attack"	20/day	170 lbs (133)	+	Nil

Table II

Case	Occupation During Infarct	Previous Occupation	Months after Promotion to Myocardial Infarct	Possible Predisposing Stress or Psychological Factors	Clinical Features
1.	Manager of Milk and Food Company	Executive (No Managerial responsibilities)	6	For 2 days previous to infarct unusually vigorous exercise in sports, culminating in heavy Chinese meals. Emotional stress of separation from family life 6 months previously due to shifting to another town. Stress of increased responsibility from promotion.	Woke up on day of Infarct with severe praecordial pain with radiation to neck plus sweating. SGOT 148 units. ECG confirmed Infarct.
2.	Manager of Motor Vehicle Firm	Executive (No Managerial responsibilities)	30	Sedentary worker For 1 week previously, drove long distances up and down Peninsula Malaysia on working holiday. Consumes excess cigarettes and alcohol.	After return, complained of moderate epigastric pain which was detected by SGOT (80 units) and ECG findings of Infarct.
3.	Manager	Executive (No Managerial responsibilities)	10	Sedentary manager; for 2 weeks prior to infarct, made compulsory annual trip to business clients around Malaysia. Increased stress from more responsibilities of new job.	During return trip, noticed praecordial pain but ignored it. Collapsed the next day but recovered well. SGOT (94 units) and ECG confirmed Infarct.
4.	Sales Supervisor of Liquor Firm	Salesman	3	Psychological stress, father had Myocardial Infarct 1 month previously. Stress of trying to keep up sales figure since promotion and physical stress of excessive travelling to check on his salesmen.	Classical retrosternal chest pains with ECG findings of Infarction and SGOT of 60 units.
5.	Manager of Logging Firm	Clerk	9	Sedentary worker hired to form a logging firm, involving extensive travelling in jungles of Indonesia and under pressure to start the company on schedule.	Typical retrosternal pain not relieved by rest. SGOT 200 units and ECG confirmed infarct.

Table III

Case	Fasting Cholesterol (mg%) (Normal 150-250mg%)	Fasting Tryglyceride (mg%) (Normal 30-150mg%)	Fasting Glucose mg/100ml (Normal 80-110mg%)	Glucose Tolerance Test (50 G Oral Glucose Load)	Uric Acid (mg%) (Normal 2-7mg%)	Urea Mg% (Normal 20-40mg%)
1.	303	228	104	Normal	9.3	26
2.	360	223	89	Normal	5.7	40
3.	293	88	72	Slightly abnormal 215mg% at 1 hour	7.1	32
4.	348	297	93	Normal	7.2	15
5.	288	230	88	Slightly abnormal 200mg% at 1½ hour	10.0	40

All the subjects are male which fits in with the concept that in younger adults with arteriosclerotic heart disease, the male to female ratio is higher as supported by the World Health Statistic Report (1969), with a male to female ratio of 5 to 1 in younger adults as shown in New Zealand. Various reasons are given for the difference but are beyond the scope of this paper.

Cigarette smoking is considered as one of the 3 "Cardinal Risks" (Stamler, 1971) and may operate by itself as one of the prime factor (Doyle et al, 1964) or in conjunction with other cardinal factors, taking on a multiple increase in risk (Dick and Stone, 1973). This is correlated to the quantity of cigarettes smoked and to a certain extent the amount of inhalation (National Heart Foundation of New Zealand, 1971).

Four of the propositi smoked more than 15 per day (Table I) and one smoked 60 - 70 per day. All are inhalers and started at an early age. Case 3 does not smoke even for social reasons. The Framingham Study (Kannel et al, 1967) found that the risk for manifestation of coronary heart disease including mortality increases with the amount smoked. In assessing the risk, the depth of inhalation may also be significant (Hammond, 1966). Nicotine and carbon monoxide both have effects on the heart and blood vessels, and their actions have been summarised by the Report of An Expert Group appointed by Action on Smoking and Health (1973). It is apparent that our cases who smoked were exposed to such risks pre-infarct.

Elevation of blood cholesterol is part of the coronary profile and a good predictive index of coronary heart disease (Kannel, 1967). In prospective studies Kannel (1971) pointed out that in men aged 35 - 44, all things being equal, there was $5\frac{1}{2}$ times more risk in developing coronary heart disease in those with cholesterol above 265mg/100ml. than in those with figures below 220mg/100ml. The mean value of serum cholesterol in Chinese, Indian and Malay in Malaysia is around 190mg% (Chong et al, 1971). The cholesterol values of our cases are above the national average and above that cited by Kannel, and therefore would fall into the category of increased risk.

Independently raised levels of serum tryglyceride is considered a risk towards development of coronary heart disease, a point which has been raised in the Stockholm prospective studies over a nine year period (Carlson et al, 1972). However combination with high cholesterol carries a greater risk linearly. Elevated blood tryglycerides was found in $2/3$ of the cases of myocardial infarct aged

under 40 in the report by Oglesby and Siegel (1972). Except for one, all the 4 cases (Table III) have high fasting tryglyceride levels, above 200mg% and would fit into the coronary profile of young myocardial infarct.

One of the three cardinal risk factors in Western countries is raised diastolic blood pressure (Stamler, 1971). It is one of the best discriminating factor of predisposing causes (Cotton et al, 1972). None of our subjects had hypertension as they had to undergo a pre-employment medical examination nor their blood pressure was high during or after the myocardial infarct. In some populations such as Japan, hypertension and not coronary heart disease is common (Keys, 1970) and hypertension alone is not a causative factor in such places but is a risk only when combined with other factors.

A family history of coronary heart disease (Leading Article BMJ, 1972). In table I, developing the same the family history of all the cases are positive. This correlates well with Blacket et al's (1972) study that half of their young men with coronary heart disease had a positive family history usually ending in death before the age of 65. There is also some evidence that myocardial infarct may occur at an earlier age in those sons whose father had coronary heart disease (Thomas et al, 1964).

Stress is defined as "synonymous with force and pressure exercised upon a person" (National Heart Foundation of New Zealand, 1971). It is a subjective risk but there is evidence to support that psychological and social stimuli contribute to the coronary prone behaviour pattern (Jenkins, 1971). In our cases, there is a distinct relationship between the months in acquisition of the promotion and the myocardial infarct (Table III) which may be due to the psychological and social stress from the new job with more responsibilities. The fact that these people possess driving ambitious personalities may have contributed to the stress mechanism.

Dietary factors in epidemiological studies are linked to coronary disease, by exerting an influence in blood lipid levels especially the quantity of saturated fat eaten (Morris et al, 1969) and to excess carbohydrate consumed which increases in the liver of tryglyceride rich lipoproteins (Fredrickson et al, 1967). Affluent Malaysian indulge in excessive carbohydrate intake and high saturated fat diet with usage of pork oil, peanut and coconut oil for their cooking. In retrospect all five profess to such a diet pre-infarct.

Obesity by itself may not be an independent risk factor (Leading Article BMJ, 1972) but acts as

an adjuvant or secondary risk factor together with excess consumption of food and physical inertia in acting on the primary risk factors of age, blood pressure and cholesterol (Leading Article BMJ, 1973). In table I, cases 2 and 5 are in excess of their ideal weight for that height and the rest are close to normal. Obesity therefore plays a relatively minor role except when it combines with more important risk factors.

Corneal arcus below the age of 50 is one of the observable physical signs in the index of discrimination between patients with coronary thrombosis and those without (Cotton et al, 1972). It may not only be associated with premature manifestation of coronary heart disease but also be seen in normal people (Hickey et al, 1970). However corneal arcus associated with a high cholesterol especially those with a Type II Hyperlipoproteinaemia may be a more valuable predictive tool. All five of the young men have corneal arcus and significantly related to a high cholesterol level, perhaps making this sign a good predictive factor in our case.

None of our subjects had xanthelesma or xanthomas. This is only a valuable sign if associated with hyperlipoproteinaemia. By itself it may be a normal feature and of no serious predictive value.

Overt diabetes is known to increase the risk of incurring a myocardial infarct (Baily, 1968). However impaired glucose tolerance occurs more in frequency in those with coronary heart disease (Wahlberg et al, 1968) and may be related to the development of premature arteriosclerosis. Only two of the subjects (Table III) have borderline abnormal glucose tolerance tests. None has a family history of diabetes.

No clinical gout was seen but the uric acid was high in two and borderline high in another two (Table III). Serum uric acid was noted to be higher in men under 40 with coronary diseases and this "hyperuricaemia was related to corpulence and hypertryglyceridaemia" (Blacket et al, 1972) especially Type IV & V. There may be an increased risk of coronary arteriosclerosis in hyperuricaemia without gout (Framingham study).

Conclusion

From this preliminary observation of a small series, there seems to be a pattern of risk factors in our young Malaysian males which fall similar to that of Caucasians. These factors in Caucasians have been proven to be of use for their predictive value in assessing the risk for a coronary and would we feel hold true for young Malaysians as well.

However certain risk factors are more important on the predictive scale namely the cardinal risk factors of smoking, hyperlipoproteinaemia and hypertension (Stamler, 1971) and would be serious if present singly or worse if in combination. These factors have been shown to play a major role in causation of a coronary and our Malaysian subjects share these features to a certain extent except for hypertension. Besides the cardinal factors, the secondary risks factors although not so important, are also present in our subjects in varying degrees. Together, the cardinal and secondary factors form a basis for total assessment of the coronary profile, both for young Caucasians as well as for Malaysian men. It thus seem that exposure to similar environmental risk factors would bring the same risk for a coronary to different racial and geographical groups.

Certain of these factors can be altered; primarily smoking cholesterol, tryglyceride, obesity, diet, physical inertia and to a certain extent stress can all be reduced.

If the predictive values are reasonably accurate and can even be worked out as a mathematical calculation, (leading Article BMJ 1973) then this will enable an energetic and effective prevention programme to be worked out. This will be especially more urgent in young men of developing countries in reducing the wastage of skilled men in morbidity and mortality.

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