PLATELET AGGREGATION AND LIPID PROFILE IN OFFSPRINGS OF YOUNG ISCHEMICS

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Objective: *To study the platelet aggregation and lipid profile in offsprings of young ischemic parents. Design: Cross sectional. Setting: Hospital based.* ***Methods:*** *40 adults under 45 years of age with proven CHD and their 50 offsprings comprised the study group. In the control group, 40 age matched adults with normal maximal treadmill test and their 50 off springs were included. All were screened for lipid profile and platelet aggregation. Results: Platelet aggregation was significantly elevated in adults with CHD (44.0 ± 25.5%) compared to controls (32.22 ± 9.1%). Children of CHD adults also had significantly elevated aggregation (34.9 ± 12.5%) compared to control offsprings (27.8 ± 9.9%). Adult CHD subjects had significantly elevated serum cholesterol, LDL-cholesterol (LDL-C) and atherogenic index compared to control adults. The children in both groups had similar lipid profiles.* ***Conclusion:*** *Platelet aggregation is enhanced in offsprings of young ischemics. The potential of this index as a marker for early development of CHD needs to be explored.*

Key words: *Coronary heart disease, Platelet aggregation, Lipoproteins, Atherosclerosis.*

THERE is a global increase in the incidence of coronary heart disease (CHD). Several studies have observed a strong association between CHD and risk factors such as hypertension, obesity and abnormal serum lipid profiles. These risk factors also appear to have a familial predisposition(1). High cholesterol and increased platelet aggregation have been implicated in the pathogenesis of atherosclerosis. There is a long prodrome (probably decades) before atherosclerosis manifests itself clinically. Therefore, it must have its origins in early childhood(2). The present study examined the platelet aggregation and lipid profile in offsprings of CHD subjects.

Subjects and Methods

The study material comprised 40 adults (under 45 years of age) with proven CHD (at least one episodes of myocardial infarction) and 50 of their offsprings between 5-16 years of age. The sex ratio in adults was 29 males to 11 females. The control group comprised 40 age matched normal adults with treadmill tests and 50 of their children in the age group 5-16 years. A detailed history of cardiovascular disease, hepatic or renal disorders and diabetes mellitus in the family and antiplatelet therapy was obtained from all. This was followed by a detailed physical examination, anthropometry and investigations to exclude systemic illnesses. Fasting venous

blood samples were collected from all subjects for evaluating platelet aggregation and lipid profile. In subjects receiving antiplatelet therapy, the drug was withdrawn for 48 hours prior to blood sampling.

Processing of Blood Specimens

Platelet Aggregation: Five ml blood sample was collected in sodium citrate vial in the ratio of 9:1 and the concentration of sodium citrate was 3.8%. The platelet rich plasma (PRP) was prepared by differential centrifugation at 250 gr at room temperature for 15 minutes and platelet poor plasma (PPP) was prepared by the centrifugation at 3000 gr for 15 minutes at room temperature. Five hundred microliters each of PRP and PPP were pipetted into two cuvettes and then were put in the chronolume aggregometer and the baseline was set to 10 and 90. To the PRP cuvette was then added 20 microliter ADP (final concentration 8 microliter) and the recorder was started to record the aggregation by luminescene aggregometry(3) till the peak was reached. The values were obtained from the recorded graph and expressed as a percentage.

Lipid Profile: Five ml of blood was collected in glass tubes with 0.5 ml sodium citrate. Each blood specimen was centrifuged in a Remi Lab centrifuge, R-8, at the speed of 3000 rpm for 5 minutes to separate plasma. Plasma thus obtained was then divided into two portions. One portion was analyzed using Olympus Auto-Analyzer analytical system for measurement of total plasma cholesterol and plasma triglyceride (TG). From the second portion, HDL were separated after precipitating other lipoproteins by the addition of 0.1 ml after precipitating other lipoproteins by the addition of 0.1 ml of 4% phosphotungstic acid and 0.025 ml of 2M $MgCl_2$ in 1 ml of plasma. The solution was mixed, incubated for 15 minutes at room temperature and then centrifuged for 30 minutes at 3000 rpm. HDL-cholesterol (HDL-C) levels were measured in the supernatant using Olympus Auto-Analyzer analytical system. LDL-Cholesterol (LDL-C) was calculated as:

LDL-cholesterol = Total cholesterol — (HDL-C+TG/5)

Statistical Analysis: The group means were compared using T test. A 5% probability was considered significant.

Results

Platelet Aggregation: The mean platelet aggregation was significantly ($p < 0.001$) higher in adults with CHD (44.0 ± 15.5%) compared to controls (32.2 ± 9.1%). Even children of CHD subjects had significant ($p < 0.01$) higher platelet aggregation (34.9 ± 12.5%) than control children (27.8 ± 9.9%).

Lipid Profile: Table I provides the lipid profile in CHD and non-CHD adults and their offsprings. Serum cholesterol and LDL-cholesterol (LDL-C) were significantly elevated in CHD subjects compared to controls. The lipid profiles were comparabal e in children of both CHD and non-CHD adults.

The mean atherogenic index (defined as ratio of LDL/HDL) was significantly ($p < 0.001$) higher in CHD adults (4.1 ± 1.2) as compared to controls (3.1 ± 0.4). The index was, however, comparable amongst children of these adults.

Discussion

Coronary heart disease is the leading cause of death in developed countries and now the developing countries are also experiencing an increase in this condition. Atherosclerosis is the hall mark of CHD. As atherosclerosis is, known to begin in childhood, it is postulated that early initiation of preventive measures can substantially de-

TABLE I–*Lipid Profile [Mean (SD)] in CHD and Controls.*

Lipid Profile	Adults		Children	
	CHD	No CHD	CHD	No CHD
S. Cholesterol (mg/dl)	196.5* (29.9)	168.2 (27.2)	131.5 (28.7)	124.9 (26.3)
Plasma triglyceride (mg/dl)	104.9 (28.2)	108.2 (24.8)	90.5 (26.9)	80.7 (26.2)
LDL Cholesterol (mg/dl)	139.7* (29.4)	109.3 (55.0)	76.3 (27.6)	73.5 (23.9)
HDL Cholesterol (mg/dl)	35.1 (4.4)	35.0 (6.1)	35.9 (7.6)	35.7 (7.3)

* p <0.001 (between adults with and without CHD).

crease the incidence of CHD in adulthood. In this co ntext, till date cholesterol has b een the main focus(4 -6). Other factors such as platelet aggre gation may also originate early in life and warrant investigation. Platelet function are likely to be of particular interest in prevention of CHD. However, platelet hyperac tivity has not been demonstra ted in general po pulation in relation to CHD. The role of hemostasis in ischemic heart dise ase is a developing area of research(7) and the role of platelets in thrombogenesis needs further elucidation. It was obs erved in the pres ent study that both adults with CHD and their asymptom atic children had a signifi cantly higher platelet aggregation as compared to controls. However, while the lipid profil e was altered in adults with CHD, there were no signific ant alterations in their children. Since there are no comparable studies, it is not possible to comment on the role of lipid profiles in childhood and adult CHD. While lipid profile indices have been used as markers of CHD risks(5,6), its value in childhood remains uncertain.

There is need for large cohort studies to evaluate the profile of platelet aggregation and lipids in childhood in relation to evolution of adu lt CHD. Docum enting a causal association between alteration in platelet aggregation in childhood and later development of CHD may open new interventional avenues such as the role of antiplatele t aggregation agents in risk subjects to prevent CHD.

It is concluded that platelet aggregation is enhanced in offsprings of young ischemics whereas lipid profile is compara bale to controls. The potential of platelet aggregation to act as a marker for early development of CHD needs to be explored.

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