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Study of serum lactate dehydrogenase and lipid profile in patients with chronic cough

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Abstract

Background: Lactate dehydrogenase (LDH) enzyme is found in almost every tissues of the body and its level is increased in serum in many tissue damaging pathological disorders. Patients with chronic cough mostly have history of cigarette smoking and prone to airway inflammation. Documentary studies shows cigarette smoking is associated with altered lipid profile.

The aim of the present study is to assess whether there is alteration in the concentration of serum lactate dehydrogenase and lipid profile in patients with chronic cough by estimation of lactate dehydrogenase level and lipid profile in serum.

Material and Methods: It is a case control study consisting of 50 cases with chronic cough compared with 50 healthy controls. Serum level of lactate dehydrogenase, total cholesterol, and triglyceride, LDL, VLDL and HDL were estimated in both the study groups. Statistical analysis was done by using unpaired t test. Values were expressed as means and standard deviation (SD).

Results: Statistically significant increase in the levels of LDH was found in patients with chronic cough as compared to controls. Serum levels of LDL were increased significantly in cases as compared to controls. Serum levels of cholesterol, triglyceride VLDL and HDL were not altered in cases as compared to control.

Conclusion: Serum LDH level was increased in patients with chronic cough which may be due to respiratory tract inflammation commonly caused by smoking. Increased level of LDL in patients with chronic cough is significantly correlated with smoking.

Keywords: Chronic cough, Lactate dehydrogenase, Lipid profile, Smoking.

Introduction

An occasional cough is normal as it helps clear irritants and secretions from lungs and prevents infection. A chronic cough is a cough that persists eight weeks or longer in adults and four weeks in children.(1) A chronic cough is more than just an annoyance and it can interrupt sleep and leave you feeling exhausted. Severe cases of chronic cough can cause light headedness, vomiting and even rib fractures.(2) Smoking and tobacco chewing is leading risk factor for chronic cough.(3,4) Chronic cough is generally associated with airway inflammation leading to respiratory tract epithelial cell and lung tissue damage.(5,6)

Lactate dehydrogenase (LDH) is an intracellular cytoplasmic enzyme found in all tissues of the human body. There are five LDH isoenzymes present in blood, which are classified according to their electrophoretic movement. LDH-1 moves faster while LDH-5 is the slowest one. Elevated LDH isoenzymes levels indicate the organ specific origin of disease such as LDH-1, LDH-2 in heart, kidneys, erythrocytes and brain; LDH-3 in lungs, thyroid, pancreas, adrenals, spleen, thymus, lymph nodes and leukocytes; LDH-4 in skeletal muscles and the LDH-5 in hepatic system.

Normal concentration LDH in the serum is due to normal tissue breakdown which increases significantly after tissue damage. LDH being a cytoplasmic cellular enzyme if increased in serum serve as indicator suggestive of disturbance of cellular integrity induced by pathological conditions.(7) LDH is raised in number of pathological conditions like hematological disorders, acute myocardial infarction, liver diseases and several respiratory conditions. Respiratory conditions include bronchial asthma, bronchopneumonia, pulmonary tuberculosis, chronic obstructive pulmonary disease (COPD). All these conditions have inflammation, cell damage or both as underlying pathological mechanism.(8-10)

Chronic cough patients have smoking as a major risk factor and because of this these patients may have altered lipid profile. Serum concentration of cholesterol and triglyceride is higher and HDL is lower in smoker than in non-smoker.

We didn't find any study in Indian population showing evaluation of LDH and lipid profile in chronic cough patients. Hence an attempt was made to estimate the levels of LDH, cholesterol, triglyceride, very low density lipoprotein (VLDL), low density lipoprotein (LDL) and high density lipoprotein (HDL) in patients with chronic cough.

Material and Methods

The study was conducted in Department of Biochemistry, GMERS Medical College and Hospital, Valsad. It is a case control study of 100 subjects divided into two groups including 50 healthy controls and 50 cases of chronic cough. Any patient with cough lasting more than eight week and/ or history of exposure to risk factors for this symptom was included in the study. Patients with history of respiratory infection, pneumonia, chronic bronchitis, pulmonary tuberculosis, bronchial asthma, COPD, coronary heart

disease, heart failure, and neuromuscular disease, renal and hepatic dysfunction were excluded. 50 non-smoker healthy adults were selected as control group. All participants gave written informed consent and this protocol was approved by the Institutional research committee and human ethics committee.

Overnight fasting blood samples were taken by venipuncture in plain vaccutainer. Grossly hemolysed and lipemic samples were excluded. All the samples were analysed by Microlab RX 50 diagnostic equipment. Serum LDH, Triglyceride, cholesterol, LDL and HDL parameters were estimated by Meril diagnostic kits. VLDL was calculated by Friedewalds equation, VLDL = Triglyceride/5

Statistical analysis: The data was analysed by Graph pad prism software version 7. Students unpaired 't' test was applied for the comparison of variables between controls and cases. P value <0.05 was considered as statistically significant.

Results

Table 1 shows age and gender wise distribution of controls and cases. Male female ratio in cases and control group was 4:1 with 40 males and 10 females subjects in both group. Out of 40 male cases, we found 26 were cigarette smoker, 12 were tobacco chewer and two were bidi smoker. We found exposure of female cases to smoke of burnt fuel in kitchen. Duration of smoking ranged from 5 smoke years to 40 smoke years. (It is calculated by no. of packs of cigarette smoked per day {1 pack=10 cigarettes} multiplied by no. of years of exposure). Most of the cases were between 25-35 pack years of exposure.

Table 1: Age and gender wise distribution of controls and cases

S. No.	Variable	Age of controls in yrs.		Age of Cases in yrs.		't' value	P value	Significance
		Mean	SD	Mean	SD			
1	Male (n=40)	43.68	2.921	43.15	3.325	0.75	0.45	Non-significant
2	Female(n=10)	43.6	4.033	43.9	4.095	0.165	0.87	Non-significant

Table 2: Comparison of variable in controls and cases

Sr. No.	Variable	Controls		Cases		't' value	P value	Significance
		Mean	SD	Mean	SD			
1.	Serum LDH (U/l)	291.4	35.86	486.5	36.51	26.9	<0.001	Significant
2.	Cholesterol (mg/dl)	175.1	21.24	180.2	28.37	1.03	0.306	Non-Significant
3.	Triglyceride (mg/dl)	119.3	24.38	122.3	39.59	0.45	0.654	Non-Significant
4.	VLDL (mg/dl)	25.12	6.53	24.42	6.145	0.55	0.582	Non-Significant
5.	LDL (mg/dl)	87.2	16.8	120	17.7	9.45	<0.001	Significant
6.	HDL(mg/dl)	60.94	6.072	59.06	4.876	1.7	0.091	Non-significant

Table 2 shows statistically significant increased value of serum lactate dehydrogenase in cases as compared to control group with p value<0.001. We also found statistically significant decreased level of serum LDL in cases as compared to controls. Serum cholesterol, triglyceride, VLDL and HDL levels were within normal limits and statistically non-significant in cases as compared to controls.

Discussion

Pulmonary system related disorders as possible sources of serum LDH abnormalities have been underreported, and isoenzyme patterns are seldom measured. This is the first study of its own kind in India to assess serum LDH level and lipid profile in patients with chronic cough. We found significant increase in Serum LDH level in the patients with chronic cough. This elevation is because of a predominant increase in serum LDH 3 isoenzymes which is released from cells of lung and airway origin.[11] Airway mucosal changes consisting of increased broncho-alveolar mast cells, mononuclear phagocytic cells and epithelial shedding have been observed in chronic cough. In patients with chronic cough, a homogenous rise in cellular markers of inflammation has been observed in the bronchoalveolar lavage fluid.[12,13]

Even though Physio-pathological Mechanism of cough is still unclear, recent study showed airway wall remodelling with increase in sub-basement membrane thickness. Chronic cough patients have increased smooth muscle area, goblet cell area and vascularity. Heightened cough sensitivity in coughers was related to the goblet cell hyperplasia and epithelial cell shedding. Cough reflex may be heightened by increased production of growth factors which may be enhanced by the physical effects of cough on the airways.[14-16]

It is possible that persistent coughing may itself induce a degree of inflammation because of the trauma of the lining epithelium of the respiratory tract as well as that of the lung parenchyma. It is likely that the inflammatory process in patients with chronic cough is the cause of the increase in LDH.

In the present study, statistically significant increased LDL levels were found in cases when compared with controls. All other lipid parameters such as cholesterol, triglycerides, VLDL, and HDL were within normal range when compared to controls. Smoking being the major risk factor for chronic cough and also found in our study cases can cause changes in lipid profile. Smoking affects lipid profile in such a way that it increases LDL, cholesterol, VLDL, triglyceride and decreases HDL.[17,18] Nicotine stimulates adrenal gland which releases adrenaline from the adrenal medulla leading to increased serum concentration of free fatty acids which stimulates hepatic synthesis and secretion of cholesterol as well as hepatic secretion of VLDL and in turn increased LDL formation. It has been described that nicotine contained in cigarette increases the circulatory pool of atherogenic LDL through accelerated transfer of lipids from HDL and impaired clearance of LDL from plasma compartment.[19,20]

Our study showed non-significant values of cholesterol, triglyceride, VLDL and HDL in chronic cough patients as compared to healthy control. We did not find any studies on lipid profile in chronic cough patients to compare and evaluate our findings. If we consider smoking as major risk factor in chronic cough, these findings are not correlated with other studies[21,22] which reported dyslipidemia in smoking and needs further evaluation.

Conclusion

Rise in serum LDH levels, though known to occur in many respiratory conditions, has not been studied in depth. Based on our study results, we have proved that patients with chronic cough have raised serum LDH levels. This is likely to be due to respiratory inflammation associated with chronic cough. Although not important in the management of an individual patient, this finding is important in the context of clinical studies in chronic cough. We have not studied specific isoenzymes of LDH in present research, so we recommend further studies for serum electrophoretic analysis of LDH and its isoenzymes. Analysis of these isoenzymes can be good diagnostic and prognostic tool in specific clinical conditions. Other than LDL, rests of the parameters of lipid profile are normal in chronic cough and needs further detailed evaluation.

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Conflict of interest: Nil.

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