

Total-Cholesterol Vs HDL-Cholesterol

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ABSTRACT

Niacin, a B vitamin, has long been used to increase high-density lipoprotein (HDL), the "good" cholesterol which helps sweep up low-density lipoprotein (LDL), or "bad" cholesterol, in bloodstream. Boosting HDL level can be just as important as lowering LDL cholesterol. Taking niacin, either by itself or along with other cholesterol-lowering medication helps to control serum total cholesterol level. The research study was conducted in Jinnah Hospital Lahore from January 2010 to June 2010. It was single blind placebo-controlled research study. When 3 grams of niacin was used daily in divided doses in 50 hyperlipidemic patients for three months, it reduced LDL-Cholesterol 19.59%, total serum cholesterol 19.10 % and HDL-Cholesterol increased 17.37%. Biostatistically changes in all parameters of lipid profile are highly significant. It was concluded from the research work that Niacin increases good cholesterol (i.e., HDL-Cholesterol) and decreases bad cholesterol (i.e., LDL-Cholesterol) which results in making LDL-Cholesterol/HDL-Cholesterol ratio to lower margins/levels that is good indicator for prevention of heart diseases.

Key words: Serum total cholesterol, low-density lipoprotein cholesterol, HDL cholesterol

INTRODUCTION

Cholesterol levels are not a disease and need to be taken into consideration with other risk factors for heart disease¹. According the Harvard Medical School Family Health Guide, the ratio of total cholesterol to HDL is important. You get this number by dividing total cholesterol level by HDL level. Small ratios are better. For example, if you have total cholesterol of 200 and an HDL of 60, the ratio is 3.3. But if your HDL were 35 instead of 60, the ratio is 5.7, and you are considered at higher risk for heart disease². Total cholesterol includes both HDL (high-density lipoprotein) cholesterol, and the so-called bad cholesterols (mostly low-density lipoprotein (LDL) and very-low-density lipoprotein (VLDL). HDL is called the good cholesterol because it takes cholesterol from blood vessel walls and delivers it to the liver for body to get rid of³. According to the American Heart Association, a total cholesterol level of less than 200 mg/dL is desirable. A level of 200 to 239 mg/dL is considered borderline high risk, and over 240 mg/dL is high risk⁴. Higher HDL levels are better. Men who have HDL less than 40 mg/dL and women who have less than 50 mg/dL are considered at higher risk for heart disease. HDL level of 60 mg/dL or higher is considered desirable for some protection against

heart disease⁵. Niacin, a B vitamin, has long been used to increase high-density lipoprotein (HDL), the "good" cholesterol⁶. HDL cholesterol helps sweep up low-density lipoprotein (LDL), or "bad" cholesterol, in bloodstream. Although niacin is readily available and effective, it hasn't gotten much attention compared to other cholesterol drugs⁷. A lot of the attention regarding cholesterol has been focused on lowering low-density lipoprotein (LDL), or "bad" cholesterol. That's still an important goal. But boosting HDL level can be just as important as lowering LDL cholesterol. Taking niacin, either by itself or along with other cholesterol-lowering medication help control total cholesterol level⁸.

MATERIAL AND METHOD

Jinnah Hospital, Lahore was place of this research and duration of research was 90 days, starting from January 2010 to June 2010. One hundred patients of primary hyperlipidemia were enrolled for the research. Male and female primary hyperlipidemic patients of 20 to 65 years old were selected from Cardiology department of the Hospital. Alcohol addiction, hypothyroidism, peptic ulcer, diabetes mellitus, renal disease, hepatic disease were exclusion criteria for the research. Written consent was obtained from all patients. Fortnightly follow up visit was advised to all patients. The general information required, like name, age, sex, occupation, address, previous medication, date of follow up visit and laboratory investigations, etc of each patient was recorded on a proforma. All the base line

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assessments were taken on the day of inclusion (Day-0) in the study and a similar assessment was taken on Day-90 of research period. After fulfilling the inclusion criteria patients were randomly divided in two groups, i.e.; fifty patients on drug-1, i.e., Tab: Niacin 500 grams, 2 tablets after breakfast, 2 tablets after lunch and 2 tablets half an hour after dinner, and fifty patients on drug-2, i.e; Placebo-group. For placebo group, placebo capsules, containing equal amounts of partly grinded wheat were given to patients and they were advised to take 2 capsules as hypolipidemic agent half an hour after each meal, i.e; 2 capsules thrice daily for the period of 90 days. All participating patients were advised to come at hospital every month for physical examination, routine investigations and discussion/counseling on drug compliance. Serum total cholesterol was estimated by the enzymatic calorimetric method as described by Kush D et al⁹, using Kit Cat# 303113050, provided by Eli Tech Diagnostics, France. Serum triglycerides level was estimated by the enzymatic calorimetric method, using Kit Cat # 304710050 provided by Eli Tech Diagnostics, France. Serum HDL-cholesterol was determined by using Kit Cat # 303210040, provided by Eli Tech Diagnostics, France. Serum LDL-cholesterol was calculated by Paolini JF et al¹⁰ formula (LDL-Cholesterol = Total Cholesterol-(Triglycerides/5 +HDL-Cholesterol). Data were expressed as the mean ± Standard Deviation and paired “t” test was applied to determine statistical significance of the results. For significant to highly significant results P-value <0.01 and <0.001

respectively was applied in the research work. For non significant results P-value >0.05 was used.

RESULTS

After three months treatment with 3 grams of Niacin, given in divided doses in 50 patients serum total cholesterol decreased from 248.61±2.11 mg/dl to 201.11±1.21mg/dl. In percentage this difference is - 19.10%, and biostatistically it is highly significant change in the parameter. At day-0 low density lipoprotein cholesterol in these patients was 191.86±2.32 mg/dl, which reduced to 154.27±2.08 mg/dl at the end of research period; i.e; in 3 months. Biostatistically it is highly significant change from day-0 to day-90. In percentage this decrease in the parameter is 19.59%. High density lipoprotein cholesterol at day-0 was 34.39±3.01 mg/dl, which increased to 41.62±2.99 mg/dl after three months when these patients were treated with three grams of Tablet niacin. In percentage this is 17.37% increase in the parameter. Biostatistically it is significant difference in the result. In placebo group total cholesterol at day zero was 195.41±2.11mg/dl, which reduced to 189.11±2.91mg/dl. It is non-significant change in the parameter. At day-0 LDL-Cholesterol in placebo group was 148.98±1.11 mg/dl which reduced to 147.69±2.84 mg/dl at day-90. In percentage it is 0.87 % decrease in the parameter. HDL-Cholesterol increased from 32.91±1.00 to 33.18±2.87 mg/dl, which is 0.02% increase in the parameter. All change in these parameters is non-significant, biostatistically. Results of both groups are tabulated in table 1 and 2.

Table 1: Effects of 3 grams Niacin, daily for 90 days on lipid profile (n=50)

Parameter	Day-0	Day-90	% Change	P-value
T-C	248.61 ± 2.11	201.11 ± 1.21	-19.10	< 0.001
LDL-C	191.86 ± 2.32	154.27 ± 2.08	-19.59	< 0.001
HDL-C	34.39 ± 3.01	41.62 ± 2.99	+17.37	< 0.001

Table 2: Effects of Placebo, given TID, for 90 days on lipid profile (n=50)

Parameter	Day-0	Day-90	% Change	P-value
T-C	195.41 ± 2.11	± 2.91	-3.22	>0.05
LDL-C	148.98 ± 1.11	147.69 ± 2.84	-0.87	>0.05
HDL-C	32.91 ± 1.00	33.18 ± 2.87	+0.81	>0.05

KEY: T-C= total cholesterol, LDL-C=low density lipoprotein cholesterol, HDL-C=high density lipoprotein cholesterol, ± is standard deviation of mean values, - stands for decrease in value, + stands for increase in value, P-value <0.001 indicates significant difference or results, >0.05 indicates non-significant difference, all lipid parameters mentioned are measured in mg/dl, and figure in parenthesis

DISCUSSION

Among all hypolipidemic agents, Niacin have been scientifically proved very effective drug to increase HDL-Cholesterol and decrease serum total and LDL-Cholesterol. In this concern serum total cholesterol or LDL-Cholesterol/HDL-Cholesterol ratio is decreased, which is good indicator regarding low risk of heart disease. In this research 3 grams of Niacin when

given in fifty hyperlipidemic patients for three months, it has increased HDL-C 17.37%, decreased total cholesterol 19.10 % and LDL-C decreased 19.59 %. Results of our research match with results of research work conducted by Kush D et al¹¹ who observed same effects of Niacin on lipid profile of 155 hyperlipidemic patients, when they were treated by 2.225 grams of Niacin for the period of 6 months.

They proved 20.21%, 22.00% decrease in total and LDL-Cholesterol respectively. HDL was increased 18.78 % in their patients. Almost same changes were observed when Guyton JR¹² conducted research by giving 3 grams of Niacin daily in divided doses in 17 hyperlipidemic patients. LDL-C was decreased by 21.43%, total cholesterol was reduced from 218.61±2.22 mg/dl to 182.49±3.33 mg/dl. This change was highly significant (P-value <0.001). HDL-Cholesterol increased from 39.87±30mg/dl to 44.90±1.10mg/dl, in five months of treatment period in their study. Our results coincide with results of research conducted by Fazio S et al¹³ who did observe 18.11 % increases in HDL-Cholesterol and 20% decrease in total cholesterol, which are near to our results. Our results are in contrast with results of effects of niacin on lipid profile when Cziraky MJ et al¹⁴ conducted research study on Lipid Lowering Agents. They used 3 grams of Niacin in divided doses for 4 months in 44 hyperlipidemic male and female patients and observed that HDL-Cholesterol was increased only 9.23% and LDL-C, total cholesterol was reduced 13.04%, 15.88% respectively, by the same drug as we used. Difference in these results may be due to restricted diet they used for their patients in Lipid Research Hospital, during their stay in the hospital. Our results do not match with research results of Karas RH et al¹⁵ who proved Only 3.99% increase in HDL-C and LDL decreased only 5.00%, when they used Niacin 2 grams daily for 2 weeks in 40 primary hyperlipidemic patients. Total cholesterol decreased 10.01% in these patients. This much difference in results are due to small sample size, duration and dose of drug used. Maccubbin D et al¹⁶ have described in detail about mechanism of action of niacin when used in very high doses for treating hyperlipidemia. They have mentioned in their research that low dose of the drug, small sample size of patients and low duration of drug used for hyperlipidemia can change research results biostatistically.

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