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Hyperlipidemia in Childhood Idiopathic Nephrotic Syndrome during Initial Attack, Remission, Relapse.

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Abstract: *The aim of the study was the levels of serum cholesterol, serum triglycerides, HDL, LDL and VLDL at initial attack, remission and follow up period in idiopathic nephrotic syndrome. We established the relationship in between the levels of lipid profile parameters during remission and relapse.*
Patients 2-12 year old child with nephrotic syndrome admitted to R.G.Kar Medical college and hospital fulfilling the inclusion and exclusion criteria were included in the study.The study of 50 patients with idiopathic nephrotic syndrome were studied over period of one year.
Serum HDL level are less important in idiopathic nephrotic syndrome. It is either same or low as previous value. It has no significant value in relapse.
It may be concluded from this study that hyperlipidemia in general at remission, specifically serum total cholesterol, serum triglyceride and VLDL may be regarded as predictor of relapse in childhood idiopathic nephrotic syndrome.
Key Words: *Hyperlipidemia, Lipid profile, childhood idiopathic, nephrotic syndrome*

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I. Introduction

Childhood nephrotic syndrome (NS) is a chronic glomerular disease, characterized by minimal change disease in the majority of cases [1]. Hyperlipidemia is an important characteristic of idiopathic nephrotic syndrome in children and is usually observed during the active phase of the disease and disappears with the resolution of the proteinuria [2]. The persistence and severity of lipid changes in serum correlates well with the duration and frequency of the relapses, even during the remission, which leads to increased risk of atherosclerosis in later life and the development of progressive renal injury [3]. Hence close monitoring of lipid levels during remission of nephrotic syndrome is necessary to select high risk patients and to predict chances of relapses. It has been noted that certain factors like diet, malnutrition, genetic traits are known to alter the frequency and severity of lipid pattern. The Indian patient has a different dietary, constitutional and genetic background. Hence we undertook a study to determine the spectrum of lipid abnormalities (serum cholesterol, serum triglycerides, LDL, VLDL and HDL) in nephrotic syndrome at the onset and during remission and chances of relapses subsequently.

Hyperlipidemia has been recognized as a common finding in nephrotic patients since 1917, when hypercholesterolemia was described as a feature of nephrotic syndrome[4]. Although pathophysiological aspects of hyperlipidemia have not been completely identified, hypoalbuminemia, increased lipoprotein synthesis and decreased lipoprotein lipase activity are described by various workers[5]. Some degree of correlation between lipids and serum albumin has been suggested by Thomas et al.[6]J and between lipedema and oedema by Peters et al.[7].

Generally when oedema regresses, lipid level falls but in some case it may continue to persist even after the oedema has disappeared. Nephrotic syndrome is an important chronic renal disease in children characterized by minimal change disease in the majority.Hyperlipidemia is a common finding in nephrotic syndrome. There is increased level of total cholesterol,LDL,VLDL and triglyceride,but low or normal level of HDL. Hyperlipidemia is usually observed during the active phase of disease and disappears with resolution of proteinuria.but in relapse cases,it may persist during remission and may increase risk of atherosclerosis and glomerular injury in later life,hence close monitoring of lipids levels during remission and follow-up period of nephrotic syndrome is necessary to select high risk patients. The persistence and severity of lipid changes in serum correlates well with the duration and frequency of the relapses,even during the remission in patients of the nephrotic syndrome. Hyperlipidemia is a common finding in nephrotic syndrome .Although pathophysiological aspects of hyperlipidemia have not been completely identified,hypoalbuminemia,increased

lipoprotein synthesis and decreased lipoprotein lipase activity are the most common cause of hyperlipidemia. Although increased serum total cholesterol is the main abnormality in lipid profile. Buttriglyceride, low density lipoprotein, very low density lipoprotein are also increased. High density lipoprotein level is decreased or normal. The aim of the study was the levels of serum cholesterol, serum triglycerides, HDL, LDL and VLDL at initial attack,remission and follow up period in idiopathic nephrotic syndrome. We established the relationship in between the levels of lipid profile parameters during remission and relapse.

II. Material And Methods

Patients 2-12 year old child with nephrotic syndrome admitted to R.G.Kar Medical college and hospital fulfilling the inclusion and exclusion criteria were included in the study.The study was conducted over a period of 1 year (1.10.2014 to 31.9.2015). Nephrotic syndrome is defined as ephrotic range of proteinuria (>50mg/kglday or >40 mg/m21hr or first morning urine protein:creatinine ratio of >2-3: 1 or early morning urine protein of 3+/4+ on dipstick or turbidometry method) and triad of clinical findings associated with large losses of protein:hypoalbiminemia

INCLUSSION CRITERIA

Children in the age group of 2-12 years with typical features of nephrotic syndrome presenting for the first time.

Patients were studied at onset of nephrotic syndrome, during remission and at least 6month follow-up period after remission.

EXCLUSSION CRITERIA

Children with features that make minimal change disease less likely (hematuria, hypertension, renal insufficiency).

Patients with prior history of diabetes mellitus, hypothyroidism and familial hypercholesterolemia. Chidren with liver diseases.oedem due to kwashiorkor, oedema due to CCF , Chidren suffering from kidney diseases other than nephrotic syndrome.

Nephrotic syndrome secondary to systemic disease such as systemic lupus erythematosus,Henoch-Schonlein purpura,malignancy(lymphoma and leukemia) and infections(hepatitis,HIV and malaria)

Statistical Analysis:

For statistical analysis data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS 24.0. andGraphPad Prism version 5. A chi-squared test ($\chi 2$ test) was any statistical hypothesis test wherein the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true. Two-sample t-tests for a difference in mean involved independent samples or unpaired samples. Without other qualification, 'chi-squared test' often is used as short for Pearson's chi-squared test. Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate-value ≤ 0.05 was considered for statistically significant.

III. Result

We found that 7(14.6%) patients had facial swelling followed by generalised swelling, 12(25%) patients had decreased urine output, 6(12.5%) patients had facial and abdominal swelling, 11(22.9%) patients had generalised swelling, 3(6.3%) patients had facial swelling and decreased urine output and 9(18.7%) patients had generalised swelling and decreased urine output.

It was found that in relapse, the mean of urinary protein (mean±s.d.) of the patients was 1.69± 0.27 gm. It was statistically significant (p=0.04). In non relapse, the mean of urinary protein (mean±s.d.) of the patients was 1.57± 0.24 gm and it was statistically significant (p=0. 0.22). In group 1, the mean of urea (mean±s.d.) of the patients was 29.95 ± 5.17 mg/dl. It was statistically significant (p=0.00). In group 2, the mean of urea (mean±s.d.) of the patients was 29.70 ± 3.91 mg/dl. It was statistically significant (p=0.04). In group 1, the mean of creatinine (mean±s.d.) of the patients was 0.68 ± 0.47 mg/dl. It was statistically significant (p=0.00). In group 2, the mean of creatinine (mean±s.d.) of the patients was 0.7 ± 0.48 mg/dl. It was statistically significant (p=0.00). In initial attack under group 1, the mean of total protein (mean±s.d.) of the patients was 4.34 ± 0.53 gm/dl. It was statistically significant (p=0.00). In remission under group 1, the mean of total protein (mean±s.d.) of the patients was 5.18 ± 0.51 gm/dl. It was statistically significant (p=0.00). In initial attack under group 2, the mean of total protein (mean±s.d.) of the patients was 4.4 ± 0.69 gm/dl. It was statistically significant (p=0.000). In remission under group 2, the mean of total protein (mean±s.d.) of the patients was 5.5 ± 0.53 gm/dl. It was statistically significant (p=0.008). In initial attack under group 1, the mean of serum albumin (mean±s.d.) of the patients was 1.89 ± 0.31 gm/dl. It was statistically significant (p=0.00). In remission under group 1, the mean of serum albumin (mean±s.d.) of the patients was 2.34 ± 0.48 gm/dl. It was

statistically significant (p=0.04). It was statistically significant (p=0.00). In initial attack under group 2, the mean of serum albumin (mean±s.d.) of the patients was 2.11 ± 0.27 gm/dl. It was statistically significant (p=0.00). In remission under group 2, the mean of serum albumin (mean±s.d.) of the patients was 2.8 ± 0.42 gm/dl. It was statistically significant (p=0.00). In initial attack under group 1, the mean of serum globulin (mean±s.d.) of the patients was 2.47 ± 0.51 gm/dl. It was statistically significant (p=0.00). In remission under group 1, the mean of serum globulin (mean±s.d.) of the patients was 2.76 ± 0.43 gm/dl. It was statistically significant (p=0.00). In initial attack under group 2, the mean of serum globulin (mean±s.d.) of the patients was 2.4 ± 0.84 gm/dl. It was statistically significant (p=0.001). In remission under group 2, the mean of serum globulin (mean±s.d.) of the patients was 2.7 ± 0.48 gm/dl. It was statistically significant (p=0.000).

We found that in initial attack under group 1, the mean of serum total cholesterol (mean±s.d.) of the patients was 502.47 ± 157.58 mg/dl. It was statistically significant (p=0.001). In initial attack under group 2, the mean of serum total cholesterol (mean±s.d.) of the patients was 336.70 ± 49.51 mg/dl. It was statistically significant (p=0.055). In remission under group 1, the mean of serum total cholesterol (mean±s.d.) of the patients was 373.82 ± 89.73 mg/dl. It was statistically significant (p=0.01). In remission under group 2, the mean of serum total cholesterol (mean±s.d.) of the patients was 195.40 ± 35.01 mg/dl. It was not statistically significant (p=0.50). In initial attack under group 1, the mean of serum triglyceride (mean±s.d.) of the patients was 280.95 ± 113.49 mg/dl. It was statistically significant (p=0.000). In initial attack under group 2, the mean of serum triglyceride (mean±s.d.) of the patients was 184.20 ± 25.79 mg/dl. It was not statistically significant (p=0.132). In remission under group 1, the mean of serum triglyceride (mean±s.d.) of the patients was 200.68 ± 64.32 mg/dl. It was statistically significant (p=0.002). In remission under group 2, the mean of serum triglyceride (mean±s.d.) of the patients was 88.40 ± 18.59 mg/dl. It was not statistically significant (p=0.117). In initial attack under group 1, the mean of HDL (mean±s.d.) of the patients was 59.95 ± 10.46 mg/dl. It was statistically significant (p=0.23). In initial attack under group 2, the mean of HDL (mean±s.d.) of the patients was 56.00 ± 10.24 mg/dl. It was not statistically significant (p=0.154). In remission under group 1, the mean of HDL (mean±s.d.) of the patients was 59.76 ± 10.11 mg/dl. It was not statistically significant (p=0.082). In remission under group 2, the mean of HDL (mean±s.d.) of the patients was 56.20 ± 10.17 mg/dl. It was not statistically significant (p=0.061). In initial attack under group 1, the mean of VLDL (mean±s.d.) of the patients was 57.87 ± 23.02 mg/dl. It was statistically significant (p=0.00). In initial attack under group 2, the mean of VLDL (mean±s.d.) of the patients was 36.90 ± 5.26 mg/dl. It was not statistically significant (p=0.16). In remission under group 1, the mean of VLDL (mean±s.d.) of the patients was 40.13 ± 12.87 mg/dl. It was statistically significant (p=0.002). In remission under group 2, the mean of VLDL (mean±s.d.) of the patients was 17.70 ± 3.71 mg/dl. It was not statistically significant (p=0.119).

IV. Discussion

The study of 50 patients with idiopathic nephrotic syndrome were studied over period of one year. Out of 50 patients,2 patients were not followed up during study follow-up period ,i.e-6 months ,so my study population was 48 patient with idiopathic nephrotic syndrome. Out of 48 patients,38 patients were developed relapse nephrotic syndrome after proper remission during study follow-up period and 10 patients were absolutely normal during study follow-up period.

This study shows obvious female predominance,where female constituted 27(57%) of total study population and male constituted 2l(43%)of total population. Among relapse cases 55.3% were female and among non relapse cases 60% were female .So,female and male ratio was 1:0.8 (approx.).Although Srivastava et al [8] study showed male predominance in India. Another study done in Monitored, Canada showed females predominance with female : male 1 : 0.9 [9].

This study shows predominant age group of idiopathic nephrotic syndrome was 2-6 years (58%).The mean age for relapse cases was 6.25 years ± 2.4 SD and the mean age group for non relapse cases was 5.5 years ± 1.9SD(Table 2).Srivastava et al [8] also showed that most common age group was 2-6 years. Mean age at onset of INS was 7.9+5.1 years in Kumar, J., Gulati, S., Sharma, A.P. et al [10] study.They also proved that 'children under 8 years of age, minimal change disease (J\.ICD) was the most common entity; whereas Focal segmental glomerulosclerosis(FSGS) predominated in children with age at onset greater than 8 years. The age at onset of nephrotic SYndrome was significantly higher in the non-MCD group than the MCD group. MCD remains the most common histopathological subtype in Indian children with idiopathic nephrotic syndrome and onset under 8 years of age. The incidence of membrane proliferative glomerulonephritis(MPGN) continues to be high. MCD can be differentiated from non-MCD subtype by younger age at onset, absence of hypertension, and absence of microscopic hematuria[10].

37 out of 48 patients suffering idiopathic nephrotic syndrome were coming from rural area ,i.e almost 77% and 23% patients were coming from urban area.In relapse cases 78.9% cases were from rural area and 21.1 % cases were urban area.Similarly.in non relapse cases 70% cases were from rural area and 30 % cases were from urban area.

There was various presentation of children with idiopathic nephrotic syndrome during admission. The clinical presentation were generalized swelling ,decreased urine output, facial swelling followed by generalized swelling, generalized swelling and decreased urine output together, facial swelling along with decreased urine output and acial swelling and abdominal swelling(Table 5).Among these Clinical presentation most common was decreased urine output and generalized swelling individual as well as together (66.6%). Facial swelling followed by generalized swelling comprises around 14.6%.Least common clinical presentation of idiopathic nephrotic syndrome was facial swelling and decreased urine output (6.3%).In a study of Sahana K.S[11],puffiness of face and swelling of limbs was noted in 76.6% of cases and decreased frequency and volume of micturation was obtained in 53.9% of cases. So our study follows this study.

One of the diagnostic criteria of nephrotic syndrome was 24 hour urinary protein estimation[12].In our study,range of 24 hrs urinary protein in relapse cases was 1.3-2.5 gms with mean value of 1.69 gm ± 0.27 SD and range of 24 hours urinary protein was 1.3-2.0 gms with mean value of 1.57 gm ± 0.24 SD.So in relapse cases mean value of 24 hour urinary protein was more than non relapse cases (Table 6) and mean value of 24 hour urinary protein in relapse cases was significant (P=0.04). In the study of Sahana K.S[11],urine total protein in timed 24 hour sample the range observed was 0.8-7 gms/24 hour with mean value of 3.67±1.4 gm. 1 24 hour. IyerRs et al[13], found the range of timed 24 hours urine protein to be 1.6-8.6gm/24 hour and a mean value of 4.6/24 hour was observed. So in our study urinary 24 hours protein is low than other study.

According to our study,range of serum urea level in relapse cases was 24-50 mg/dl and in non relapse cases 20-38 mg/dl.Mean value of serum urea in relapse cases was 29.95 mg/dl ± 5.17 SD and in non relapse cases 29.70 mg/dl± 3.91SD (Table 7).Mean value of serum . creatinine in relapse and non relapse cases were 0.68 mg/dl ± 0.41 SD anu \).1 m%fu\ ± \)A~ SD te~\,ect\'1e\~ (rab\~ S). Sahana K.S study[11] shows that range of serum urea was 14-43mg/dl with mean value of 25 mg/dl and range of serum creatinine was 0.3-1.3 mg/dl with mean value of 0.63 mg/dl.So this study supports value of serum urea and creatinine level of our study.

According to our study,mean serum total protein level during initial attack in relapse cases and non relapse cases were 4.34 mg/dl and 4.4 mg/dl respectively(Table 9)0 Mean serum total protein level during remission in relapse cases and non relapse cases were 5.18 mg/dl and 5.5 mg/dl respectively(Table lO}oBoth values were significant. Krishnaswamy D et al [14] shows mean value of serum total protein level was 4.08 mg/dl during admission and 6.74 mg/dl during discharge after remission. According to our study,mean value of serum albumin level during initial attack in relapse cases and non relapse cases were 1.89 mg/dl and 2.11 mg/dl respectively. Mean value of serum albumin level during remission in group 1 and group 2 were 2.34 mg/dl and 2.80 mg/dl respectively. Krishnaswamy D et al study[14] shows mean value of serum albumin level during admission was 1.17 mg/dl ± 0.29 and during discharge after remission was 4.13 mg/dl ± 0.83 .

In our study,mean serum globulin level during initial attack in relapse cases and non relapse cases were 2.47 mg/dl and 2.4 mg/dl respectively and mean serum globulin level during remission in relapse and non relapse cases were 2.76 mg/dl and 2.7 mg/dl respectively (Table 13 & 14).There were no such difference in mean value of serum globulin level in relapse and non relapse cases. Krishnaswamy D et al study shows mean serum globulin during admission was 2.37 mg/dl ± 0.54 and mean serum globulin level during discharge was 2.67 mg/dl ± 0.46.This study supports our tudy. Mean value of serum total cholesterol level during initial attack in relapse cases 502.47 mg/dl ,but in non relapse group it was 336.70 mg/dl(Table 15).1n relapse group ,this value was significant (P=O.OOI) ,but In non relapse group it was not significant(P=O.055).According to Krishnaswamy D et al study mean value of serum total cholesterol level during admission was 377 ± 91mg/dl. Mean serum total cholesterol level during remission in relapse cases was 373.82 mg/dl and in non relapse cases was 195.40 mg/dl(Table 16).In Krishnaswamy D et al study mean serum total cholesterol during remission at discharge was IS1 ± 24 mg/dl. S Mahmud et al study[15] shows among the relapsers, mean cholesterol (334±46 vs. 232±34 mg/dl.; p<O.OS) was significantly higher than that of non-relapsers during remission.In our study, among relpasers,mean cholesterol level during remission (377.82 ± 89.73 vs 19S.40 ± 3S.01 mg/dl ; P=O.Ol) was significantly higher than mean total cholesterol level of non relapsers.

Mean serum triglyceride level during initial attack in relapser was 280.9S±113.49 mg/dl and it was significant.Same in non relapsers was 184.20 ±2S.79 mg/dl (Table 17) and it was non-significant(P=0.13).According to Krishnaswamy D et al study ,mean serum triglyceride level during admission was 424.0±14.3 mg/dl and this value is much higher than our study value. Serum triglyceride during remission in relapsers was 200.68 ±64.32 mg/dl and it was significant (P=0.002).Same in non relapsers was 88.40 ±18.S9 mg/dl (Table 18).Krishnaswamy D et al study shows mean triglyceride value during discharge after remission was 127 ± 39 mg/dl.According to S Mahmud et al study ,among relapsers mean triglyceride level was significantly higher than non relapsers during remission(l82.8±73.83 mg/dl vs 93.31±20.9Smg/dl).In our study also relapsers had significantly more serum triglyceride than non relapsers during remission(200.68±64.32 mg/dl vs 88.40±18.S9 mg/dl).

According to Krishnaswamy D et al mean of serum HDL level during admission in hospital was 48.1±8.5 mg/dl and during discharge after remission was 47.6±8.8 mg/dl .These values were not significant.In

our study .mean serum HDL during initial attack in relapse cases wasS9.95±10.46 mg/dl and it was significant(P=0.02).

In non relapse,it was 56.00±10.24 mg/dl and not significant Table 19).Serum HDL level during remission in relapser was 59.76±10.11mg/dl and non relapser was 5620±10.17 mg/dl.Both were not significant. So,our study shows there are no such difference in serum HDL level during initial attack and remission as well as relapser and non relapser. Other study also supports our finding.

Mean value of serum LDL during initial attack in relapser was 95.71±31.74 mg/dl and in non relapser was 59.60±24.88 mgjdl(Table 21). El-Tigani M A Ali et al study shows serum LDL level in nephrotic syndrome was 145.4±54.45 mg/dl which was significant.Krishnaswamy D et al study shows serum LDL level during admission was 243 ± 2.00 mgjdl which was higher than our study and serum LDL level during remission was 78.8 ± 26.5 mg/dl.ln our study,serum LDL level during remission was 73.13 ±21.67 mg/dl in relapser and 32.30 ±21.28 mg/dl in non relapser. Both are not significant.In a study of S Mahmud et al,serum LDL level was significant during remission in relapser than non relapser (252±101.67 mgjdL vs. I 19. 19±21.33mg/dL; p<O.OOl),but in our study serum LDL level during remission was not significant in relapser(73.13±21.67 mg/dl vs 32.30±21.28 mgjdl;P=0.06).

According to our study,serum VLDL level during initial attack in relapser was significant(57.87±23.02 mg/dl ;P=O.OO) in comparison to non relapser(36.90±5.26 mg/dl;P=0.16)(TabJe 23).In Krishnaswamy et al study,serum VLDL level during initial attack was significant(85.5 ± 29.7) and the value was higher than our study value.In our study,serum VLDL level during remission in relapser was significant than non relapser(40.13±12.87 mg/dl vs 17.70±3.71 mg/dl;P=0.002)(Table 24).In Krishnaswamy et al study, serum VLDL level during remission was 25.3 ± 7.90 mg/dl.S Mahmud study does not mention about the value of VLDL level in relapser and non relapser.So,in our study,serum VLDL level was significant during remission in relapser.

V. Conclusion

~ Serum total cholesterol level is higher than normal in idiopathic nephrotic syndrome.

~ Serum triglyceride is also higher in idiopathic nephrotic syndrome and higher level of serum triglyceride during remission increases chance of relapse in follow up period.

Serum HDL level are less important in idiopathic nephrotic syndrome.It is either same or low as previous value. It has no significant value in relapse.

~ Though serum LDL level is increased during idiopathic nephrotic syndrome.but it has no significant effect in relapse. Higher serum VLDL level during remission has higher chance of relapse.

It may be concluded from this study that hyperlipidemia in general at remission, specifically serum total cholesterol,serum triglyceride and VLDL may be regarded as predictor of relapse in childhood idiopathic nephrotic syndrome.

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Table: Distribution of presentation

		No of cases	Percentage of cases (%)
Presentation	Facial swelling followed by generalised swelling	7	14.6
	Decreased urine output	12	25
	Facial and abdominal swelling	6	12.5
	Generalised swelling	11	22.9
	Facial swelling and decreased urine output	3	6.3
	Generalised swelling and decreased urine output	9	18.7
	Total	48	100

Table: Distribution of mean in all parameters

		Range	Mean	Standard Deviation	P value
Urinary Protein	Relapse (Group 1)	1.3-2.5	1.69	0.27	0.04
	Non Relapse (Group 2)	1.3-2.0	1.57	0.24	0.22
Urea	Group 1	24-50	29.95	5.17	0.00
	Group 2	20-38	29.70	3.91	0.04
Creatinine	Group 1		0.68	0.47	0.00
	Group 2		0.7	0.48	0.00
Total Protein in group 1	Initial attack	3-5	4.34	0.53	0.00
	Remission	4-6	5.18	0.51	0.00
Total Protein in group 2	Initial attack	3-5	4.4	0.69	0.000
	Remission	5-6	5.5	0.53	0.008
Serum Albumin in group 1	Initial attack	1-2	1.89	0.31	0.00
	Remission	2-3	2.34	0.48	0.00
Serum Albumin in group 2	Initial attack	1.6-2.5	2.11	0.27	0.00
	Remission	2-3	2.8	0.42	0.00
Serum globulin in group 1	Initial attack	2-3	2.47	0.51	0.00
	Remission	2-3	2.76	0.43	0.00
Serum globulin in group 2	Initial attack	1.3	2.4	0.84	0.001
	Remission	2-3	2.7	0.48	0.000

Table: Distribution of lipid profile

		Range	Mean	Standard Deviation	P value
Serum total cholesterol during initial attack	Group 1	302-948	502.47	157.58	0.001
	Group 2	250-392	336.70	49.51	0.055
Serum total cholesterol during remission attack	Group 1	250-645	373.82	89.73	0.01
	Group 2	152-252	195.40	35.01	0.50
Serum triglyceride during initial attack	Group 1	160-684	280.95	113.49	0.000
	Group 2	130-222	184.20	25.79	0.132
Serum triglyceride during remission attack	Group 1	120-380	200.68	64.32	0.002
	Group 2	70-130	88.40	18.59	0.117
Serum HDL during initial attack	Group 1	36-80	59.95	10.46	0.023
	Group 2	38-68	56.00	10.24	0.154
Serum HDL during remission attack	Group 1	36-80	59.76	10.11	0.082
	Group 2	38-68	56.20	10.17	0.061
Serum LDL during initial attack	Group 1	41-157	95.71	31.74	0.339
	Group 2	8-92	59.60	24.88	0.346
Serum LDL during remission attack	Group 1	38-124	73.13	21.67	0.066
	Group 2	2-64	32.30	21.28	0.657
Serum VLDL during initial attack	Group 1	32-140	57.87	23.02	0.00
	Group 2	26-45	36.90	5.26	0.16
Serum VLDL during remission attack	Group 1	24-76	40.13	12.87	0.002
	Group 2	14-26	17.70	3.71	0.119

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