Journal of Islamabad Medical & Dental College (JIMDC); 2016:5(4):168-171

Original Article

Correlation of Duration of Hepatitis C Infection with Triglycerides and Total Cholesterol

Muhammad Imran Khan Almani[1], Ahsan Kazmi[2], Imtiaz Haider[3], Tariq Afzal[3], Muhammad Ammar Khan[4], Rahat Farwa[5], Aziz Bangish[6], and Imran Haider[7]

[1] Blood Unit, Benazir Bhutto Hospital Rawalpindi.
[2 ,3&7]Department of Pathology Rawalpindi Medical College Rawalpindi.
[4.]Department of Pathology Sargodha Medical College Sargodha.
[5]. Department of Medicine Nishtar Medical College Multan.
[6.]Shaheed Zulfiqar Ali Bhutto Medical University, PIMS G-8 Islamabad

Abstract

Objective: To study the correlation of duration of chronic HCV infection with total cholesterol and triglycerides.

Patients & Methods: In this cross-sectional observational study we recruited 37 HCV infected patients who were diagnosed at least 6 months ago. Seven patients were excluded due to hyperglycemia. Patients suffering from metabolic disorders affecting total cholesterol and triglycerides were also excluded. Serum triglycerides, total cholesterol, and plasma glucose were measured by enzymatic method. Data was entered on SPSS version 16. Mean, standard deviation was calculated for numerical data. Pearson correlation was used to find association of duration of HCV with Total Cholesterol and Triglycerides.

Results: Mean age of 30 subjects was 39.9±9.5 years, duration of HCV infection was 4.1±3.4 years and mean fasting plasma glucose was 81.7±6.4mg/dl. Total cholesterol and triglycerides were 107±30mg/dl and 72.3±23.5mg/dl respectively. Triglycerides showed a significant correlation with duration of HCV infection (p=0.024) and total cholesterol (p=0.001).

Conclusion: There is a significant correlation of triglycerides with duration of HCV infection (p=0.024) and total cholesterol (p=0.001).

Key words: Chronic hepatitis C, total cholesterol, triglycerides and correlation

Introduction

Hepatitis C virus (HCV) was identified and was named as non-A Non-B hepatitis in 1970 and as HCV in 1989. [1, 2] Chronic Hepatitis C virus (CHCV) infection is an important cause of hepatitis causing liver cirrhosis and end stage liver disease.[3] Prevalence rate of HCV infection ranged from 0.1% to 12%, in different populations.[1] Globally estimated carrier state rate has been reported 3% (175 millions).[1] About 200 million people (3.3% of the world's population) were infected with HCV worldwide in 2009.[2] In one study, about 10 million people (5% of worldwide HCV infected patients) have been reported in Pakistan.[2] In developing countries overuse and unsafe injection practices causes 2 to 5 million hepatitis C virus infections and these infections lead to high burden of chronicity, disability and death.[4] Liver is a vital organ and plays a key role in metabolism and synthesis of serum lipoproteins.[5] Impaired lipid metabolism is closely associated with chronic liver disease which result in low levels of total cholesterol (TC) and low density lipoprotein cholesterol (LDL) regardless of degree of fibrosis.[5] Several mechanisms have been proposed to alter cholesterol homeostasis in HCV infected patients. One of the proposed mechanism is through its interference with the mevalonate pathway, resulting in decreased cholesterol synthesis. This diminished synthesis may then subsequently upregulate LDL-receptor expression, ultimately lowering LDL levels.[6-8] Hepatitis C viral proteins have also been shown to directly activate the PI3-K/AKT sign align pathway, resulting in activation of the master regulator sterol response element binding protein (SREBP), which plays a critical role in activation of genes essential to fatty acid and cholesterol biosynthesis.[9-12] Additionally, infection with HCV is associated with reduced microsomal triglyceride transfer protein (MTTP), an enzyme critical for VLDL synthesis, and whose inhibition results in decreased circulating LDL and cholesterol levels.[13]Hypolipidemias have thus been found associated with CHCV infection through several mechanisms.[14] Very few studies have been conducted in our setup, on the correlation of metabolic variables like total cholesterol and triglycerides in CHCV patients. Present study was planned

Corresponding author:
Muhammad Imran Khan Almani
Email: imran_almani@yahoo.com.
Received: May 28, 2016; Accepted: Dec 29,2016

to study the correlation between duration of CHCV infection and serum total cholesterol and triglycerides.

Patients and Methods

This cross-sectional study was conducted at Pathology department Holy Family Hospital. About 37 anti-HCV antibodies positive patients of both genders and all ages, who were in fasting state were enrolled in the study. Sampling was done by non-probability convenience sampling. Only diagnosed cases of HCV with at least 6 months' post-diagnosis were included. Patients with known hyperlipidemias, dyslipidemia, diabetes mellitus or hyperglycemia, endocrine disorders affecting lipid metabolism and myocardial infarction were excluded from this study.Out of 37 patients 7 were excluded due to fasting hyperglycemia. Informed consent was obtained from each patient prior to enrolment in this study. Fasting venous blood sample collected in a gel tube for total cholesterol and triglycerides and into sodium fluoride tube for plasma glucose measurement. Samples were centrifuged after about half an hour. We analyzed these samples for serum triglycerides (TG), serum total cholesterol (TC) and fasting plasma glucose (FPG). TC, TG and glucose were measured by enzymatic method. Statistical package for social sciences (SPSS) version 16 was used for statistical analysis. Mean, standard deviation (SD), variance and skewness of, duration of HCV infection after diagnosis, with T.C, and TG were measured. Duration of HCV (DHCV) infection was considered by the time when the patient came to know about his infection first time after that the patient got advise to screen himself for viral hepatitis and was declared reactive for anti HCV antibodies by either immunochrmatography, enzyme linked immunosorbent assay (ELISA), or polymerase chain reaction (PCR). Pearson's correlation was applied to see the correlation between duration of HCV infection, triglycerides, and total cholesterol. P. Value less than 0.05 was considered significant.

Results

Baseline characteristics of total 30 patients are presented below in Table 1.Age of these patients ranged from 22-60 years with mean of 38.90 years$\pm$9.488SD. Mean duration of HCV infection was 4.13 years$\pm$3.431 SD. Mean fasting plasma glucose was 81.7mg/dl±6.4 SD. Total cholesterol and triglycerides were 107±30 mg/dl and 72.3±23.5mg/dl respectively. As shown in table 2, TG showed a significant correlation with duration of HCV infection (P=0.024), however correlation of cholesterol with duration of HCV was not significant (p value.606) The correlation between TG and TC was also significant (P=0.001).

Table 1: Statistical Analysis of biographic and biochemical Variables (n=30)

Variable	Mean	SD
Age (in years)	38.90	9.488
Duration of HCV (in years)	4.13	3.431
FBS (mg/dl)	81.70	6.439
Total Cholesterol(mg/dl)	107.30	30.268
Triglycerides (mg/dl)	72.30	23.511

Table 2: Correlations different variables with duration of hepatitis C infection (n=30)

	Pearson Correlation	**P value**
Total Cholesterol (TC)	0.098	0.606
Triglycerides (TG)	0.412	0.024
TC vs TG	0.581	0.001

Correlation is significant $\leq$ 0.05.

Discussion

Lipoproteins are closely connected to the process of hepatitis C virus (HCV) infection. In our study Triglycerides were low in majority of the patients and showed a significant correlation with duration of HCV infection (P=0.024).Our results are comparable with findings of the Perlemuter, et al, who also reported that the levels of triglycerides in HCV infected patients were moderately low.[15] In 2006, D. Siagriset al. reported Serum TC ($P < 0.0005$), HDL-C ($P < 0.0005$) and LDL-C ($P < 0.0005$) were lower in chronic hepatitis C patients compared with controls. They also reported that this finding is more pronounced in patients infected with HCV genotype 3a. Patients with HCV genotype 3a had significantly lower levels of TC, HDL-C, LDL-C, higher viral load and higher frequency of hepatic steatosis than those with other genotypes. They proposed that further studies are needed to define the pathophysiology of the relationship between lipid metabolism and HCV infection.[16] In a study done by Corey KE et al, it was observed hepatitis C is associated with decreased cholesterol and LDL levels. This hypolipidemia resolves with successful hepatitis C treatment but persists in nonresponders.[08]Other studies have also reported that Hepatitis C virus infected patients with HCV viremia have significantly low serum TG and cholesterol levels.[17,18] Single nucleotide polymorphism in interleukin 28B gene have been found and reported in

HCV positive patients with lower levels of triglycerides.[19] Skowroński et al observed that there was a significant correlation of duration of HCV infection with total cholesterol which is in agreement with our study. [20] In the same study Skowroński et al. found that there was no significant correlation of duration of HCV infection with triglycerides,[20] while in our study we observed that there is significant correlation of duration of HCV infection with triglycerides. Circulating lipid levels are altered in patients with HCV, regardless of the duration of infection. In a cohort of patients with acute HCV, early infection was associated with reduction in LDL and total cholesterol levels and following successful anti-HCV treatment, the lipids of these patients returned to pre-infection levels.[7]Patients with CHC also have also demonstrated reduced levels of circulating LDL, apolipoprotein B100 (apoB) and total cholesterol, compared to healthy controls and seem to resolve after successful clearance of CHC, supporting the hypothesis that HCV has a direct cytopathic effect upon host lipid metabolism. The presence and degree of hypocholesterolemia carries important prognostic implications for patients with CHC. Elevated LDL and high-density lipoprotein (HDL) levels have thus been associated with improved rates of sustained virologic response.[6]

Conclusion

Serum triglycerides have a significant correlation with the duration of HCV infection. Chronic HCV infection is associated with hypotriglyceridemia.

Limitations and Recommendations

This was a small sample sized study and included only triglycerides and total cholesterol as target variables in our study. It is thus suggested that studies may be conducted with large sample size and other variables of lipid profile like very low-density lipoprotein (VLDL), low-density lipoprotein (LDL) and high-density lipoprotein cholesterol (HDL). Moreover it is suggested that studies are conducted to find out various mechanisms leading to Hypolipidemias, association with genotypes and effect of their treatment response.

Conflict of Interest

This study has no conflict of interest as declared by any author.

References

1. Houghton,M. The long and winding road leading to the identification of the hepatitis C virus. Journal of Hepatology. 2009;**5:** 939–948.
2. Waheed, Y., Shafi, T., Safi, S.Z. and Qadri, I. Hepatitis C virus in Pakistan: A systematic review of prevalence, genotypes and risk factors. World J Gastroenterol. 2009;15:5647-5653.
3. Kumar, .V, Abbas, A.K., Fausto, N, Mitchell, R.N. 2007. Liver, Gallbladder and Biliary Tract. In: Robin Basic Pathology, 8th ed. Delhi: Elsevier India private limited 643-644.
4. Bosan, A., Qureshi,H., Bile, K.M., Ahmad, I. and Hafiz,R. A review of hepatitis viral infections in Pakistan. J Pak Med Assoc. 2010;60(12):1045-1058.
5. Guindy, A.E., Emein, A.A. and Ghoraba, H. Serum lipid, steatosis and fibrosis in patients with chronic hepatitis C Genotype 4. Tanatamediical Science Journal.2007; 2(2):90-97.
6. Lambert JE, Bain VG, Ryan EA, Thomson AB, Clandinin MT. Elevated lipogenesis and diminished cholesterol synthesis in patients with hepatitis C viral infection compared to healthy humans. Hepatology. 2013;57:1697–704.
7. Corey KE, Mendez-Navarro J, Barlow LL, Patwardhan V, Zheng H, Kim AY, et al. Acute hepatitis C infection lowers serum lipid levels. J Viral Hepat. 2011;18:e366–71.
8. Corey KE, Kane E, Munroe C, Barlow LL, Zheng H, Chung RT. Hepatitis C virus infection and its clearance alter circulating lipids: implications for long-term follow-up. Hepatology. 2009;50:1030–7.
9. Kim SS, Peng LF, Lin W, Choe WH, Sakamoto N, Kato N, et al. A cell-based, high-throughput screen for small molecule regulators of hepatitis C virus replication. Gastroenterology. 2007;132:311–20.
10. Oem JK, Jackel-Cram C, Li YP, Zhou Y, Zhong J, Shimano H, et al. Activation of sterol regulatory element-binding protein 1c and fatty acid synthase transcription by hepatitis C virus non-structural protein 2. J Gen Virol. 2008;89:1225–30.
11. Su AI, Pezacki JP, Wodicka L, Brideau AD, Supekova L, Thimme R, et al. Genomic analysis of the host response to hepatitis C virus infection. Proc Natl AcadSci U S A. 2002;99:15669–74.
12. Schaefer EA, Chung RT. HCV and host lipids: an intimate connection. Semin Liver Dis. 2013;33:358–68.
13. Mirandola S, Realdon S, Iqbal J, Gerotto M, Dal PF, Bortoletto G, et al. Liver microsomal triglyceride transfer protein is involved in hepatitis C liver steatosis. Gastroenterology. 2006;130:1661–9.
14. Nashaat, E.H. Lipid profile among chronic hepatitis C Egyptian patients and its levels pre and post treatment. Nature and Science. 2010; 8(7):83-89.
15. Perlemuter, G., Sabile, A., Letteron, P., Vona, G., Topilco, A., Tien, Y.C., Koike, K., Pessayre, D., Chapman, J., Barba, G. and BreChot, C. 2002. Hepatitis C virus core protein inhibits microsomal triglyceride transfer protein activity and very low-density lipoprotein secretion: a model of viral-related steatosis. The FASEB Journal, **16:** 185-194.
16. Siagris, D., Christofidou, M., Theocharis, G. J., Pagoni, N., Papadimitriou, C., Lekkou, A., Thomopoulos, K., Starakis, I., Tsamandas, A. C. and Labropoulou-Karatza, C. 2006. Serum lipid pattern in chronic hepatitis C: histological and virological correlations. Journal of Viral Hepatitis. 2006, 13: 56-61.
17. Dai, C.Y., Chuang, W.L., Ho, C.K., Hsieh, M.Y., Huang, J.F., Lee, L.P., Hou, N.J., Lin, Z.Y., Chen, S.C., Hsieh, M.Y., Wang, L.Y., Tsai, J.F., Chang, W.Y. and Yu M.L. 2008. Associations between hepatitis C viremia and low serum triglyceride and cholesterol levels: A community-based study. Journal of Hepatology 49 (2008) 9-16.

18. Simon, T.G. and Butt, A.A. 2015. Lipid dysregulation in hepatitis C virus, and impact of statin therapy upon clinical outcomes. World J Gastroenterol. 2015; 21(27): 8293-8303.
19. Li JH, Lao XQ, Tillmann HL, Rowell J, Patel K, Thompson A, Suchindran S, Muir AJ, Guyton JR, Gardner SD, McHutchison JG, McCarthy JJ. Interferon-lambda genotype and low serum low-density lipoprotein cholesterol levels in patients with chronic hepatitis C infection. Hepatology 2010; 51: 1904-1911 [PMID: 20235331 DOI: 10.1002/hep.23592]
20. Skowroński, M., Ziółkiewicz, D.Z., Juszczyk, J. and Wysocka, B.W. 2009. Intermediate clinical manifestation of diabetes in patients with hepatitis C virus infection. E&C Hepatology, 5: 34-39.

..

Authorship Contribution:

Author 1: Conception, Synthesis and Planning of the research, Active participation in active methodology Interpretation, analysis and discussion

Author 2: Conception, Synthesis and Planning of the research, Active participation in active methodology Interpretation, analysis and discussion

Author 3: Conception, Synthesis and Planning of the research, Interpretation, analysis and discussion

Author 4,5,6: Active participation in active methodology, Interpretation, analysis and discussion