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Research Article

Association of Glycemic Control and Chronic Hepatitis C Virus Infection in Patients of Type 2 Diabetes Mellitus

[1]Ayesha Aziz, [2]Huma Afzal,

[3]Ayesha Siddique and [4]Nazia Shuaib

[1] MBBS, UMDC Faisalabad, Pakistan
[2] MBBS, UMDC Faisalabad, WMO at BHU Kot Dina, Sialkot, Pakistan
[3] MBBS, Punjab Medical College, Faisalabad, Pakistan
[4]Nursing Instructor, State College of Nursing, Mirpur, Azad Kashmir.

ABSTRACT

Objectives: Determination of Glycemic control association with HCV infection in the type two patients of diabetes mellitus.

Study Design: Cross Section and Descriptive

Duration and Setting: The research study started in June, 2016 and ended in January, 2017. The venue of the research study was in the Outdoor Patients Department of General Medicine, Mohtarma Benazir Bhutto Medical College Mirpur and PIMS (Pakistan Institute of Medical Sciences), Islamabad.

Methodology: After the approval and permission secured by the ethical committee of the hospital the subject study was completed. This research paper is cross-sectional in nature. The population was taken as 108 patients of diabetes mellitus of type-II in this research paper. Inclusion and exclusion in the study was carried out in the light of third generation ELISA and antibodies of anti-HCV. Anti-HCV antibodies samples were taken and further sent for tests to find out the values of HBA1c and blood sugar. Good rate of Glycemic control was observed in the patients of Type-II diabetes through HbA1c $\leq$ 6.5 % and individuals with > 6.5 % HbA1c reading were taken as Glycemic control of poor nature.

Results:43.5 years was taken as the mean age of the patients; whereas 6.5 years was the SD (Standard Deviation). Female patients included in the study were 59 in number that equals to 54.63 percent. Male proportion in the study was 49 that equals to 45.37 percent of the total number registered for the research paper. Presence of infection HCV was observed in 15 patients (13.89%), these patients were type-II diabetes affected. Poor Glycemic control level was observed in a total of seventy-seven patients that equals to 71.29 percent of the total. Patients of 43.5 years were selected as mean age, whereas SD was 6.8 years. Number of female patients was 59 (54.63%) and male were 49 (45.37%) for the research paper. Fifteen of the patients were diagnosed HCV infection, diabetes type-II that equals to 13.89%. Poor Glycemic control was diagnosed in a large number of patients, almost seventy-seven patients were reported for the same issue, and this number equals about 71.29% of the total. Whereas, on the level of HbA1c level a total of thirty-one patients were reported with good Glycemic control that equals to 28.70 percent. HCV infection ratio was higher when compared to good Glycemic control as there were 33.77% of the poor Glycemic control patients. P-value was 0.2536 shows that the results were not significant in terms of statistical data analysis.

Conclusion: High substantial HCV infection frequency in diabetes type-II patients having Glycemic control of poor nature was observed in comparison to Glycemic control of good level.

Keywords: Glycemic Control, Type 2 Diabetes, HbA1c, HCV.

INTRODUCTION

A sharp and high rate of increasing incidence is observed about mellitus of Diabetes in the world. In the countries that have industrialized themselves this rate is twenty percent, whereas it

is expected that by 2030 in comparison to 2010 the same will raiset a level of sixty percent in the countries still under development. In another estimate about Africa, it is stated that the rate of diabetes in Africa will have almost 18-24 million diabetic patients till 2030. This is alarming situation about the patients of diabetes, it can affects vital organs like pancreas, colorectal, kidney and breast[1].

There is a dramatic increase in the spread of this disease. Diabetes was diagnosed in more than 287 million people back in 2014, whereas it is globally expected that the same number will cross he total of 592 million by the end of 2035. Along with diabetes Hepatitis-C infection is also at increase worldwide. It is estimated that over the globe about 170 million have already been affected by this disease. Chronic infection is noticed in almost eighty percent of the patients. In the world HCV is also considered major mortality and morbidity. Its complication may damage and cause chronic liver and kidney diseases. It also adds to the diseases like liver and cirrhosis cancer. [2] There are many published material available about the mellitus of diabetes and hepatitis-C and relation between them. It is also considered that there are vital chances of diabetes type-II if the patient is suffering from HCV when compared to the patients having non-HCV diagnosis. In the same way if the patient is suffering from mellitus of diabetes type-II than the risk of infection of HCV also increases[2, 3].

Hepatitis-C virus infection is also attributed to the liver and cirrhosis cancer. In the reports and surveys it is reflected that almost a total of three percent HCV infection has affected over 170 million people throughout the world. Liver is not considered the main cause of Hepatitis-C infection, but expressions of extra hepatic nature like porphyriacutaneatarda, sialadenitis and cryoglobulinemia are major attributers of this disease. Studies have also revealed the relationship between infection of HCV and diabetes of type-II. Contradictory outputs have also been notices in few of the research studies about the same relation as mentioned above. The diabetic and non-diabetic rate of type-II in relation with HCV infections.A study conducted in Taiwan reflects about the relation and association of HCV with diabetes type-II, sero-positivity of HCV increases by 2.8 times in the patients of diabetes type-II when compared to non-diabetic. In a study conducted in Italy almost the same results were obtained as the rate was three times higher in this case when contrasted with non-diabetic having the prevalence rate of 2.3 percent in infection of HCV. Pakistani research studies also reflect the same kind of trend as an odd ratio of 3.03 of HCV infection indulgence is noticed in patients of type-II mellitus of diabetes [4].

It is difficult to control the Glycemic level in the patients of diabetes type-II with additional HCV infection, because it raises the resistance of insulin. For effective screaming these results can be utilized for the diabetes type-II patients. For the reduction of mortality and morbidity these finding can best be utilized for better management and diagnosis of HCV infection and related complication in patients of diabetes of type-II. The consent and permission of the ethical committee of the hospital was secured before the conduct of the research study of cross-sectional nature. The population was taken as 108 patients of diabetes mellitus of type-II in this research paper. The research study started in June, 2016 and ended in January, 2017 with a total span over six month. The venue of the research study was in the Outdoor Patients Department of General Medicine, Mohtarma Benazir Bhutto Medical College Mirpur and PIMS (Pakistan Institute of Medical Sciences), Islamabad. Sample size was calculated under the provisions of WHO sample calculation. Parameters of ninety-five percent confidence level were assured including absolute precision of five percent, an anticipated population 7.6% and level of confidence. Selection of the patients was assured for consecutive non-probability sampling after the written and informed consent[5, 6].

The patients were included in the study after fulfilling all the formalities and basic requirements. Both genders patients including male and female having diabetes type-II between the age of 20 years to 60 years were treated and

diagnosed type-II DM for less than fifteen years during the course of research study. Patients with type-I DM and a history of ketoacidotis presentation, body tattooing, transplant of organs, transfusion of blood, intravenous drugs, irregular lipid metabolism, positive B serology of Hepatitis and (ALT >double the normal range) were excluded from the scope of the research study. If the fasting glucose plasma range is greater than 126 mg/dl than it is said the diagnosis of mellitus of diabetes type-II, concentration of random plasma glucose ≥ 200 mg/dL (11.1 mmol/L), if the symptoms are present.Inclusion and exclusion in the study was carried out in the light of third generation ELISA and antibodies of anti-HCV. Anti-HCV antibodies samples were taken and further sent for tests to find out the values of HBA1c and blood sugar. Good rate of Glycemic control was observed in the patients of Type-II diabetes through HbA1c ≤ 6.5 % and individuals with > 6.5 % HbA1c reading were taken as Glycemic control of poor nature. All information was gathered through predesigned Performa's and questionnaires and data was entered andanalyzed through SPSS V.21. Mean and SD were used for the description of qualitative variables. All the data was reflected in tables and graphs in the form of number and percentages for easy and comprehensive understanding and analysis. Chi-square test compared the HCV infection between poor and good Glycemic control with the p-value less than 0.05 as significant considerations[7].

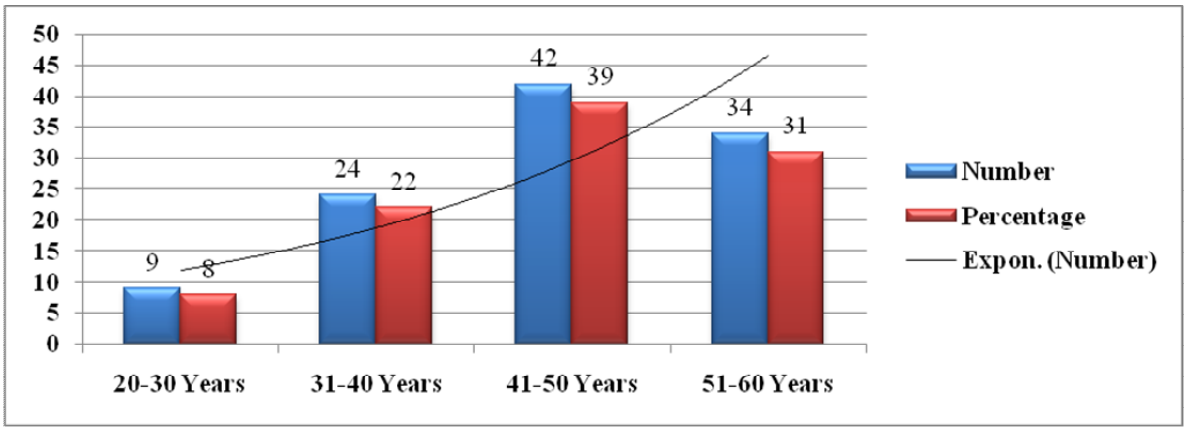
RESULTS

For the research project in hand the population was taken as 108 patients of diabetes mellitus of type-II in this research paper. 43.5 years was taken as the mean age of the patients; whereas 6.5 years was the SD (Standard Deviation). Female patients included in the study were 59 in number that equals to 54.63 percent. Male proportion in the study was 49 that equals to 45.37 percent of the total number registered for the research paper. Presence of infection HCV was observed in 15 patients (13.89%), these patients were type-II diabetes affected. Poor Glycemic control level was observed in a total of seventy-seven patients that equals to 71.29 percent of the total. Patients of 43.5 years were selected as mean age, whereas SD was 6.8 years. Number of female patients was 59 (54.63%) and male were 49 (45.37%) for the research paper. Fifteen of the patients were diagnosed HCV infection, diabetes type-II that equals to 13.89%. Poor Glycemic control was diagnosed in a large number of patients, almost seventy-seven patients were reported for the same issue, and this number equals about 71.29% of the total. Whereas, on the level of HbA1c level a total of thirty-one patients were reported with good Glycemic control that equals to 28.70 percent. HCV infection ratio was higher when compared to good Glycemic control as there were 33.77% of the poor Glycemic control patients. P-value was 0.2536 shows that the results were not significant in terms of statistical data analysis as reflected in table-I for various age groups involved in the research study.

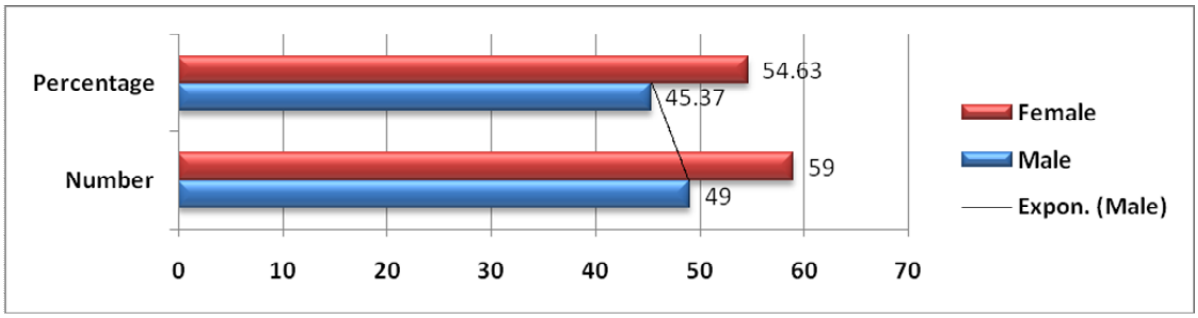
As the results enumerateabout an obvious rate of HCV infection in the poor Glycemic control patients is higher and evident in abundance. The rate of HCV infection is 33.77% when compared to the patients of good Glycemic control on the firm basis of HbA1c. The same incidence of HCV was noticed 22.58 in the patients of good Glycemic control. There is a substantial high incidence of HCV infection in the poorly managed and controlled diabetes patients group. Result was not significant due to the noticed p-value that equals 0.2536 as mentioned in table-II.

Table 1: Distribution of Age, HCV infection and Glycemic control (n=108)

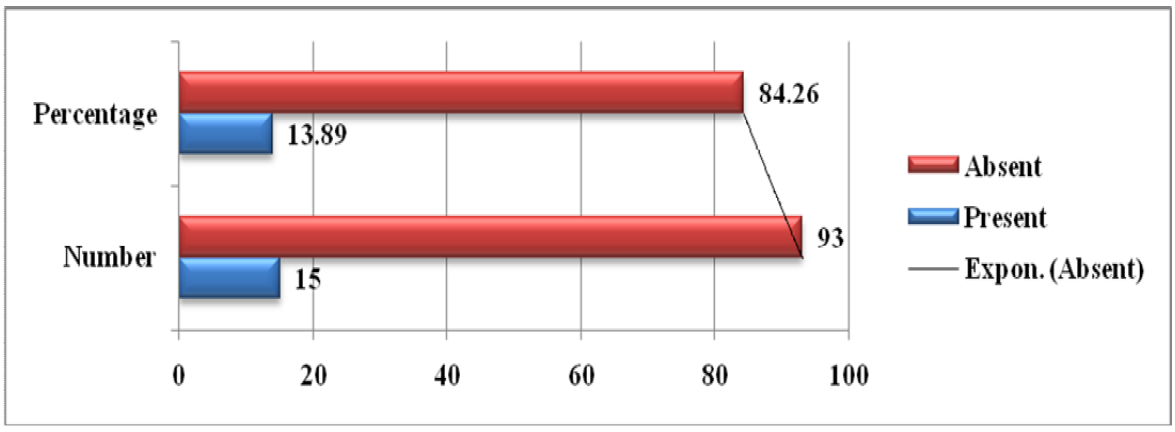
Patient's Age	Number	Percentage
20-30 Years	9	8
31-40 Years	24	22
41-50 Years	42	39
51-60 Years	34	31
Mean ± SD	**43.5±6.8**	



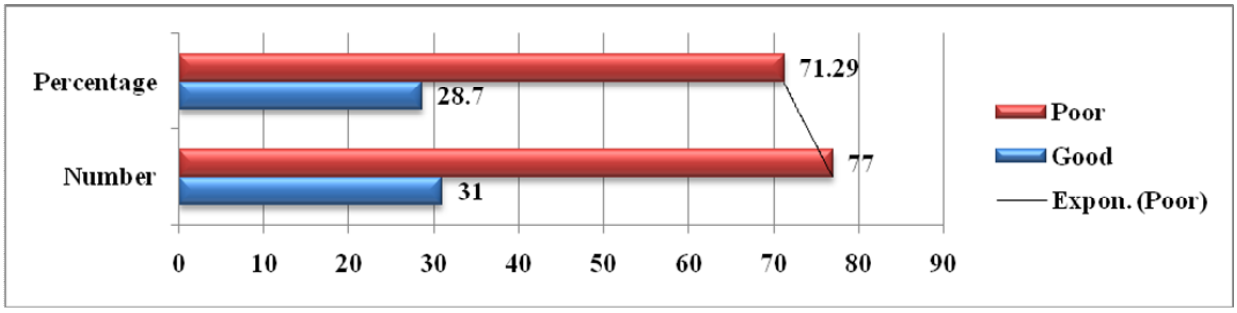
Patient's Gender	Number	Percentage
Male	49	45.37
Female	59	54.63



HCV Infection	Number	Percentage
Present	15	13.89
Absent	93	84.26



Glycemic Control	Number	Percentage
Good	31	28.7
Poor	77	71.29

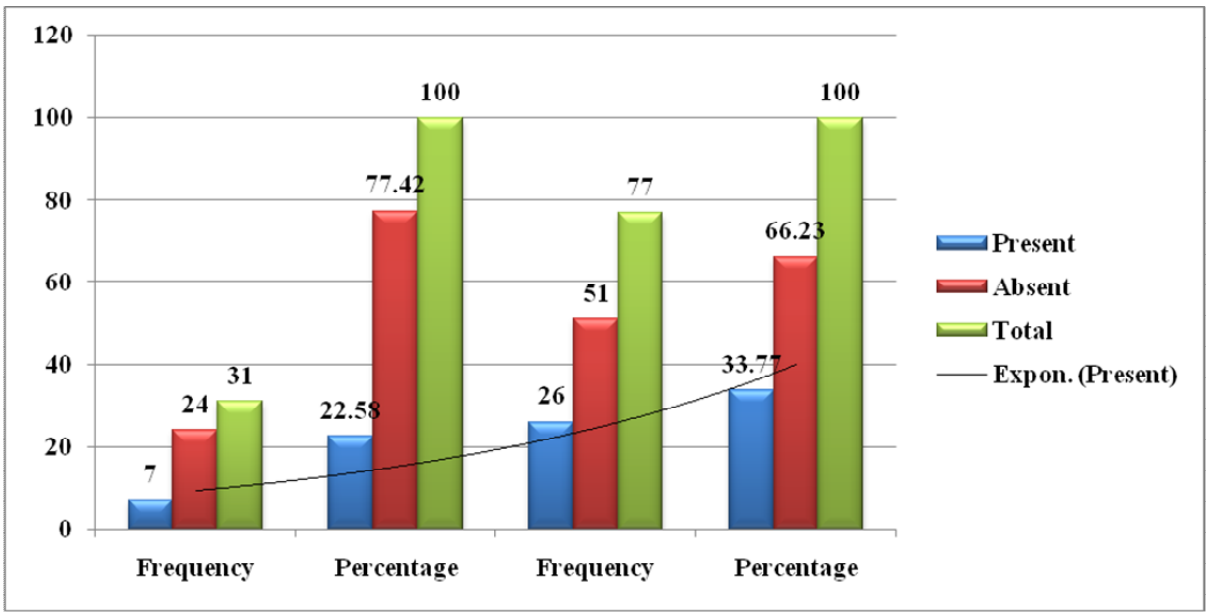


Every tabular data is reflected in graphical data presentation just next to the table.

Table 2: Association of Hepatitis C infection with Glycemic Control

Good Glycemic Control	Poor Glycemic Control	Glycemic
Hepatitis-C	(n= 31)	(n= 77)

Virus	Frequency	Percentage	Frequency	Percentage	P-Value
Present	7	22.58	26	33.77	0.2536
Absent	24	77.42	51	66.23	*
Total	31	100	77	100	-



* At the level of five percent the association is not significant in its level maintenance.

DISCUSSION

In the patients of diabetes type-II and HCV positive there is no clarity of pathogenesis and etiology. It is also pertinent to mention that the relation and function between the fibrosis and resistance of insulin can never be set aside. The mellitus of diabetes type-II is an emerging issue in the world. Obesity, HIV co-infection, ageing, diabetes mellitus in the family history, and disturbed lifestyle are those factors which cause the rapid spread of these problems.In the diabetes patients metabolism is in response to abnormal glucose balancing and homeostasis. Numerous studies reflect that almost 171 million peoples have been the affected of diabetes worldwide. This is not stopping the figure is increasing day after day and he picture is getting worse with the every passing moment. In Pakistan the situation is

not different as 3-7.2 percent of Pakistani population is affected by diabetes mellitus. In the South-Asian courtiers this ratio is estimated about four to six folds in comparison to Europe [11, 12].In hand research study reflects that the higher age factor is contributing a large share in HCV infection when compared to young age groups, related literature also reveals the same estimates [13].Infection has the chances of spread through parental exposure; patients of old age are much exposed to HCV infection than the young age group patients.Another comparison reflects that the HCV infection is also gender specific. Males are much prone to HCV infection than the females and same estimates are valid for diabetes type-II mellitus.

Males have higher rates of indulgence in HCV infection as reflected by the analysis. If there are fifteen positive HCV cases than the nine will be male and it forms the 60 percent of the total population. Whereas, the remaining forty percent that equalssix cases will be female. The ratio between male and female is 60:40. In the male patients the same estimates were noticed by Caronia et al.Males have higher rate of HCV infection as compared to females [14;15;16].Deep interconnection is found in the previousliterature and studies on the subject topic that HCV infection hasa direct relation with diabetes type-II mellitus. Several arguments strengthen the relation of both diseases. For instance, defect in the secretion of insulin has a link with the HCV pathophysiology that directly causes diabetes of type-II. Another reason attributing to this factor is large amount of production of resistance of insulin and hepatic glucose that causes the core-coding in the region of HCV. That makes sufficient insulin resistanceinducing whether in direct or indirect way. There are few other factors also contributing to HCV positive like history of family and aging factor in the patients of diabetes type-II. The present results also match with the previous researches in this regard as HCV infection presence in the patients is (13.89%) for diabetes type-II and ninety-three patients were found negative (84.26%). These results also support the previous records. On the other hand few studies also reflect a higher rate of HCV infection in the patients of diabetes of type-II. Numerous research projects conducted on the lines of sero-prevalence anti-HCV reveal the interconnection betweenthe diabetes type-II and HCV infection. There was a vivid difference among white and black cast patients. As diabetes type-II was in 28% of the black cast and 12% in the white cast patients [18].

According to the research results, poor Glycemic control was diagnosed in a large number of patients, almost seventy-seven patients were reported for the same issue, and this number equals about 71.29% of the total. Whereas, on the level of HbA1c level a total of thirty-one patients were reported with good Glycemic control that equals to 28.70 percent. HCV infection ratio was higher when compared to good Glycemic control as there were 33.77% of the poor Glycemic control patients. As the results enumerate about an obvious rate of HCV infection in the poor Glycemic control patients is higher and evident in abundance. [17] The rate of HCV infection is 33.77% when compared to the patients of good Glycemic control on the firm basis of HbA1c. The same incidence of HCV was noticed 22.58 in the patients of good Glycemic control. There is a substantial high incidence of HCV infection in the poorly managed and controlled diabetes patients group [18].

Mortality and morbidity in the case of diabetes can possibly be minimized with the provision of standard healthcare facilities to general public. If the mellitus of diabetes is managed and controlled at the early stage with effective treatment than the chances of its spread is less. Facilities for the cure of diabetes include the provision and availability of few factors for the less privileged class such as adherence and awareness, provision of insulin injections, HbA1c tests and blood glucose level monitoring system. [19] Numerous studies have also estimated the interconnection between diabetes and HCV infection. This relation still needs proper dissemination and awareness campaign. In the present research paper the relation between the both HCV infection and diabetes type-II is not significantly highlighted.

CONCLUSION

Results of the research paper prove glucoses intolerance in the presence of HCV infection as its considerable high prevalence in the poor Glycemic control patients of diabetes type-II. The study results prove the underline glucose intolerance in HCV patients because the prevalence of HCV was considerably high in type 2 diabetic patients with poor Glycemic control. For instance, defect in the secretion of insulin has a link with the HCV pathophysiology that directly causes diabetes of type-II. Another reason attributing to this factor is large amount of production of resistance of insulin and hepatic glucose that causes the core-coding in the region of HCV. That makes sufficient insulin resistanceinducing whether in direct or indirect way. There are few other factors also contributing to HCV positive like history of family and aging factor in the patients of diabetes type-II. There is an evident deficiency of pathophysiology, whereas the diabetes is complex in nature in the main etiology of diabetes type-II. Further Investigations are required in the relation building of HCV infection and diabetes type-II as both depend on one another if there is a pathogenic relation exists between them.

REFERENCES

1. Takeshita, Y., et al., *Beneficial effect of branched-chain amino acid supplementation on glycemic control in chronic hepatitis C patients with insulin resistance: implications for type 2 diabetes.* Metabolism, 2012. **61**(10): p. 1388-1394.
2. Grimbert, S., et al., *High prevalence of diabetes mellitus in patients with chronic hepatitis C. A case-control study.* Gastroentérologie clinique et biologique, 1996. **20**(6-7): p. 544-548.
3. Romero-Gómez, M., et al., *Insulin resistance impairs sustained response rate to peginterferon plus ribavirin in chronic hepatitis C patients.* Gastroenterology, 2005. **128**(3): p. 636-641.
4. Koga, M. and S. Kasayama, *Clinical impact of glycated albumin as another glycemic control marker.* Endocrine journal, 2010. **57**(9): p. 751-762.
5. Chen, L.-K., et al., *Glucose intolerance in Chinese patients with chronic hepatitis C.* World journal of gastroenterology, 2003. **9**(3): p. 505.
6. Knobler, H., et al. *Increased risk of type 2 diabetes in noncirrhotic patients with chronic hepatitis C virus infection*. in *Mayo Clinic Proceedings*. 2000. Elsevier.
7. Fellay, J., et al., *ITPA gene variants protect against anaemia in patients treated for chronic hepatitis C.* Nature, 2010. **464**(7287): p. 405-408.
8. Arase, Yasuji, et al. "Sustained virological response reduces incidence of onset of type 2 diabetes in chronic hepatitis C." *Hepatology* 49.3 (2009): 739-744.
9. Custro, N., Carroccio, A., Ganci, A., Scafidi, V., Campagna, P., Di Prima, L., & Montalto, G. (2001). Glycemic homeostasis in chronic viral hepatitis and liver cirrhosis. *Diabetes & metabolism*, *27*(4 Pt 1), 476-481.
10. De Franceschi, L., Fattovich, G., Turrini, F., Ayi, K., Brugnara, C., Manzato, F., ... & Corrocher, R. (2000). Hemolytic anemia induced by ribavirin therapy in patients with chronic hepatitis C virus infection: role of membrane oxidative damage. *Hepatology*, *31*(4), 997-1004.
11. Lecube, A., Hernández, C., Genescà, J., Esteban, J. I., Jardí, R., & Simó, R. (2004). High prevalence of glucose abnormalities in patients with hepatitis C virus infection. *Diabetes care*, *27*(5), 1171-1175.
12. Lecube, A., Hernández, C., Genescà, J., Esteban, J. I., Jardí, R., & Simó, R. (2004). High prevalence of glucose abnormalities in patients with hepatitis C virus infection. *Diabetes care*, *27*(5), 1171-1175.
13. Romero-Gómez, M., Fernández-Rodríguez, C. M., Andrade, R. J., Diago, M., Alonso, S., Planas, R., ... & Perez, R. (2008). Effect of sustained virological response to treatment on the incidence of abnormal glucose values in chronic hepatitis C. *Journal of hepatology*, *48*(5), 721-727.

14. Caronia, S., Taylor, K., Pagliaro, L., Carr, C., Palazzo, U., Petrik, J., ... & Alexander, G. J. (1999). Further evidence for an association between non–insulin-dependent diabetes mellitus and chronic hepatitis C virus infection. *Hepatology*, *30*(4), 1059-1063.
15. Hui, Jason M., et al. "Insulin resistance is associated with chronic hepatitis C virus infection and fibrosis progression." *Gastroenterology* 125.6 (2003): 1695-1704.
16. White, Donna L., Vlad Ratziu, and Hashem B. El-Serag. "Hepatitis C infection and risk of diabetes: a systematic review and meta-analysis." *Journal of hepatology* 49.5 (2008): 831-844.
17. Moucari, Rami, et al. "Insulin resistance in chronic hepatitis C: association with genotypes 1 and 4, serum HCV RNA level, and liver fibrosis." *Gastroenterology* 134.2 (2008): 416-423.
18. Hung, Chao-Hung, et al. "Association of inflammatory and anti-inflammatory cytokines with insulin resistance in chronic hepatitis C." *Liver International* 29.7 (2009): 1086-1093.
19. Chehadeh, Wassim, et al. "Risk factors for the development of diabetes mellitus in chronic hepatitis C virus genotype 4 infection." *Journal of gastroenterology and hepatology* 24.1 (2009): 42-48.