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Determination of IL-7 serum levels on hepatitis-C progression in HCV infected patients

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***Abstract*---**This study includes 100 total samples divided into 40 control, 60 patients suffering from HCV infection from Al-Saddar Medical City in Najaf governorate from December 2020 to May 2021, aging (20-70) years old and has shown higher frequency of hepatitis C infection in males 35sample (58 %), also the age group of (40-50) years more frequency. Moreover, it was observed that the concentration of Interleukin 23 (IL-23) (pg/ml) in (60) patients with diabetic foot ulcer infection was increase significantly over (P value was (< 0.0001)

***Keywords*---**HCV, interleukin 7, serum level, hepatitis-C.

Introduction

HCV infection is a global health problem that affects >184 million people worldwide. HCV is associated with several hepatic and extrahepatic disorders, including several malignancies. The burden of HCV-related disorders is influenced by the number of new and existing cases, number of existing cases and the natural history of the infection. The natural history of HCV is affected by several demographic, virological, clinical and lifestyle factors (Thrift, et al., 2017). Hepatitis C virus (HCV) is a hepatotropic RNA virus that causes progressive liver damage, which might result in liver cirrhosis and hepatocellular carcinoma. Globally, between 64 and 103 million people are chronically infected. Major risk factors for this blood-borne virus infection are unsafe injection drug use and unsterile medical procedures (iatrogenic infections) in countries with high HCV prevalence (Manns, et al., 2017; Medhat and Aljanabay, 2022). Interleukin-7 (IL-7), a product of stromal cells, provides critical signals to lymphoid cells at early

stages in their development. Two types of cellular responses to IL-7 have been identified in lymphoid progenitors: (1) a trophic effect and (2) an effect supporting V(D)J recombination (Jin,*etal.*,2013). The IL-7 receptor is comprised of two chains, IL-7R*a* and γc. Following receptor crosslinking, rapid activation of several classes of kinases occurs, including members of the Janus and Src families and PI3-kinase (Grigorian, *et al.*, 2012; Hadi and Aljanaby, 2022).

The trophic response to IL-7 involves protecting lymphoid progenitors from a death process that resembles apoptosis. This protection is partly mediated by IL-7 induction of Bcl-2, however other IL-7-induced events are probably also involved in the trophic response (Walsh, 2012; Alhasnawi and Aljanaby, 2022). Unlike other gc cytokines, IL-7 is not produced by T cells themselves but by non-immune stromal cells, fibroblastic reticular cells, keratinocytes as well as certain DCs and macrophages. The bone-marrow and thymus are premier sites of IL-7 production and the cytokine plays a critical role in T (and B) cell development. IL-7- and IL-7Ra-deficient mice show a dramatic reduction in cellularity of the thymus (Kim, *et al.*, 2011; Aljanabay et al., 2022). On immature thymocytes, IL-7Ra is initially expressed on $CD4^{-}CD8^{-}$ double negative (DN) cells at the DN2 and DN3 stages. IL-7 provides survival and proliferation signals at these stages and genetic deletion of IL-7/IL7Ra results in a developmental block at DN3. At DN4, IL-7Ra expression is downregulated and becomes completely extinguished at the double positive (DP) stage when ab TCRs are being expressed and their engagement regulates life/death decisions for maturing thymocytes. DP cells receiving an appropriate TCR signal resulting in expression of the anti-apoptotic protein Bcl-2 will survive, while absence of a matching TCR ligand will result in death (Zarogoulidis, *et al.*, 2014).

Results and Discussion

The current study includes 100 samples, which were separated into groups for further analysis in the AL-Sader hospital in Al-Najaf City, Iraq, HCV patients = 60 (60%), and healthy control 40 (40%). According to the results of the study, the male patients was 35(58 %) and female 25(42 %) infected with HCV. For control samples male constitute 24 (60%) samples while female 16 (40%) sample .This study showed age group ranging (20 years-70 years) comprises 40 female and 50 male .

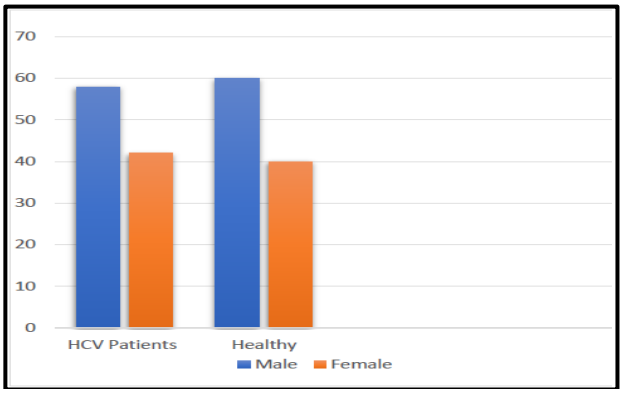

Figure 1. Distribution of patients with and without HCV according to sex

Increased incidence of HCV in male deal with the results of (Puga, et al., 2017) they mentioned that (15.4%) were female and 2,848 (84.6%) were male infected with HCV. Sex disparity in incidence is notable in almost all countries, with rates among males being 2- to 3-fold higher than rates among females (Ozakyol, 2017). Incidence HCV among male repeat testers exceeded that of female repeat testers across all years, although the gap narrowed over time. From 2000 to 2011, there were approximately 15% more female than male repeat testers each year (Kuo, *et al.*, 2015). The prevalence of males HCV infection significantly higher than that of females in 2011 (male 56.62 % vs female 43.38 %,) and 2012 year (male 53.29 % vs female 46.71 %,), respectively (Niu, *et al.*, 2016). Patients were placed into three groups based on their age ranges, with each group being separated into two groups. According to figure (2) the distribution of HCV according to age groups that present 40-50 had the highest affected group, followed by those aged 50-60, 30-40, 60-70, and those aged 20-30, was the less affected age group.

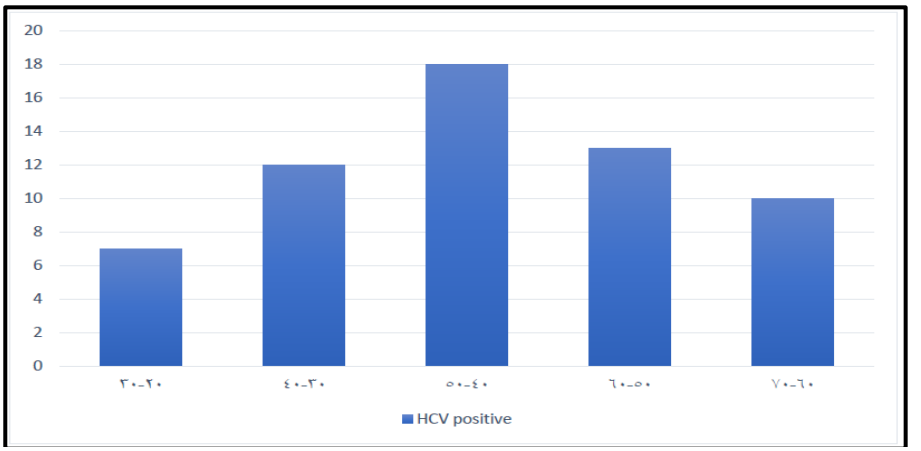

Figure 2. Distribution of the HCV patients according to the age group

The prevalence of HCV infection showed different variations with age, as the highest incidence was shown for the age group 50–59 (25.85 %) and the lowest prevalence was 0–9 (0.93 %) (Niu, *et al.*, 2016). Among both males and females, a bimodal age distribution was observed with infections highest among persons aged 20–39 years (peak: 29 years) and a second apex around 55–70 years (peak: 59 years) (CDC, 2019). Sixty positive samples for HCV were measured by ELISA according to the methods that is explained in previous chapter. The result were obtained by ELISA reader device by measuring optical density for the examined samples. The result were separated for both control group and patients group and then the result were converted from O.D to concentration. The sixty positive samples for HCV were measured by this method according to the methods that is explained in previous chapter. The result were obtained by ELISA reader device by measuring optical density for the examined samples. The results were separated for both control group and patients group and then the result were converted from O.D to concentration.

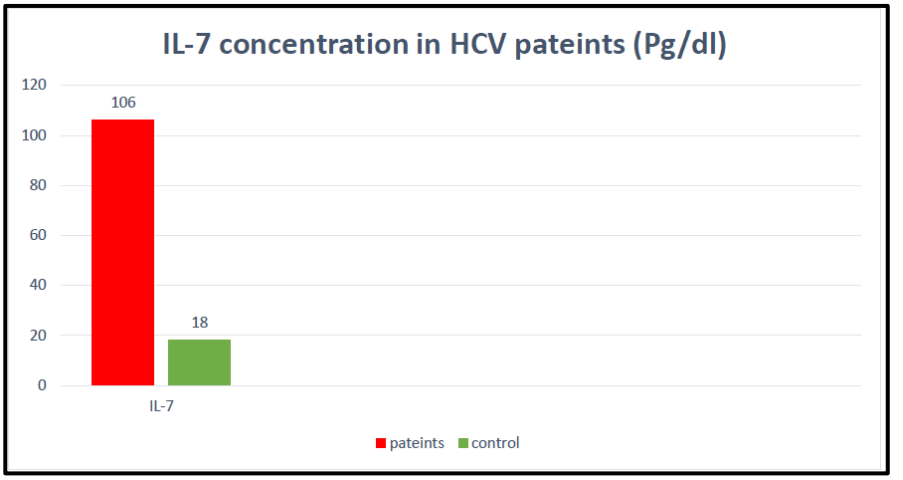

Figure 3. Concentration of IL-23 in serum of HCV patients, and control group.

Plasma IL-7 levels were significantly higher in the HIV+ women compared to the uninfected RNA+ women compared to HIV negative women (Kerzerho, *et al.*, 2016). Level of IL-7 levels of control, untreated and treated group were 44.63±22.11, 35.11±14.68 and 37.87±17.66 respectively (Jadoon, *et al.*, 2022).

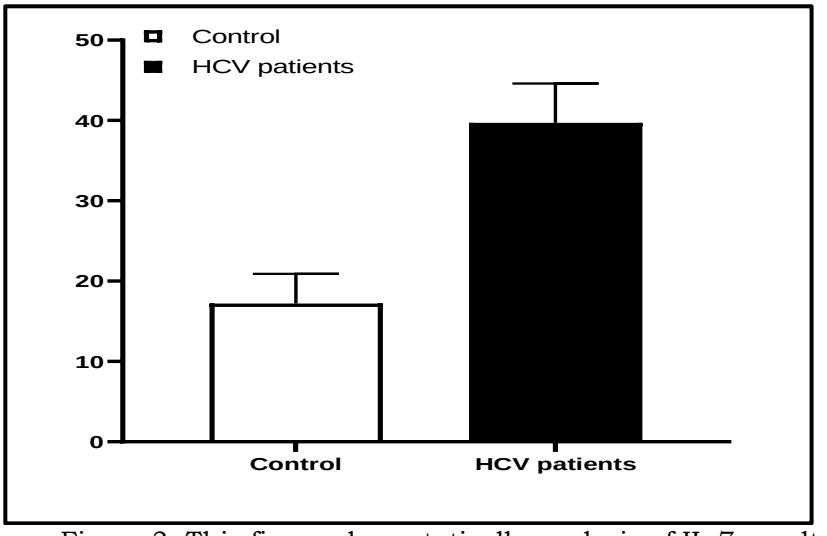

Figure 3. This figure show statically analysis of IL-7 result

Results Compared with the healthy control group,the chronic hepatitis C group had significantly higher levels of interleukin-7 (IL-7),interferon-inducible protein 10 in HCV patients (ZhiJun, et al., 2019). IL-7, which overcomes inhibitory mechanisms to promote homeostatic immune cell expansion, might also have the ability to overcome the inhibitory networks that develop during chronic viral infection. These findings indicate that IL-7 promotes antiviral immunity by suppressing T cell expression of inhibitory molecules, such as SOCS3. The efficacy of therapeutic IL-7 in this study is particularly exciting, as it suggests

that IL-7 therapy could be used for managing HIV or HCV infections in humans. (Bordon, 2011).

References

Alhasnawi HMR, Aljanaby AAJ. The immunological role of CD4 and CD8 in patients infected with Helicobacter pylori and stomach cancer. Gene Reports 26 (2022) 101500. https://doi.org/10.1016/j.genrep.2022.101500

Aljanaby, A.A.J., Al-Faham, Q.M.H., Aljanaby, I.A.J. and Hasan, T.H., 2022. Immunological role of cluster of differentiation 56 and cluster of differentiation 19 in patients infected with mycobacterium tuberculosis in Iraq. Gene Reports, p.101514. doi.org/10.1016/j.genrep.2022.101514

Bordon, Y. (2011). IL-7 goes antiviral. Nature Reviews Immunology, 11(3), 159-159.

CDC (centre of disease control) 2019

Grigorian, A., Mkhikian, H., & Demetriou, M. (2012). Interleukin-2, Interleukin-7, T cell-mediated autoimmunity, and N-glycosylation. Annals of the New York Academy of Sciences, 1253(1), 49-57.

Hadi, H. I. & Aljanaby, A. A. J. (2022). Helicobacter Pylori-oncogenic protein cytotoxin-associated gene A and assessment of CD14 and CD163 in duodenal ulcer and gastric cancer patients. International Journal of Health Sciences, 6(S2), 839–851. https://doi.org/10.53730/ijhs.v6nS2.5134

Jadoon, A., bin Saad, A., Khan, M. B., Zahid, M., Kayani, J. A., & Ahmed, N. (2022). Levels of interleukin-7 in interferon treated and untreated patients of hepatitis-c: a cross-sectional study. Pakistan Journal of Physiology, 18(1), 26-28.

Jin, J. O., Kawai, T., Cha, S., & Yu, Q. (2013). Interleukin-7 Enhances the Th1 Response to Promote the Development of Sjögren's Syndrome–like Autoimmune Exocrinopathy in Mice. Arthritis & Rheumatism, 65(8), 2132-2142.

Kerzerho, J., McIlvaine, E. J., Anthony, P., Mack, W. J., Wang, C. H., Frederick, T., ... & Kovacs, A. (2016). Impact of hepatitis c virus on the circulating levels of il-7 in hiv-1 co-infected women. Journal of acquired immune deficiency syndromes (1999), 71(2), 172.

Kim, C. W., & Chang, K. M. (2013). Hepatitis C virus: virology and life cycle. Clinical and molecular hepatology, 19(1), 17.

Kuo, M., Janjua, N. Z., Burchell, A. N., Buxton, J. A., Krajden, M., & Gilbert, M. (2015). Decreasing Hepatitis C incidence among a population with repeated tests: British Columbia, Canada, 1993–2011. American journal of public health, 105(8), 1604-1610.

Mahardika, I. M. R., Suyasa, I. G. P. D., Kamaryati, N. P., & Wulandari, S. K. (2021). Health literacy is strongest determinant on self-monitoring blood glucose (SMBG) type 2 DM patients during COVID-19 pandemic at public health centre in Tabanan Regency. *International Journal of Health & Medical Sciences*, *4*(3), 288-297. https://doi.org/10.31295/ijhms.v4n3.1752

Manns, M. P., Buti, M., Gane, E. D., Pawlotsky, J. M., Razavi, H., Terrault, N., & Younossi, Z. (2017). Hepatitis C virus infection. Nature reviews Disease primers, 3(1), 1-19.

Medhat, A. R., & Aljanabay, A. A. J. (2022). Epidemiology of typhoid fever in Balad City, Iraq. International Journal of Health Sciences, 6(S1), 1049-1063. https://doi.org/10.53730/ijhs.v6nS1.4834

Niu, Z., Zhang, P., & Tong, Y. (2016). Age and gender distribution of Hepatitis C virus prevalence and genotypes of individuals of physical examination in WuHan, Central China. Springerplus, 5(1), 1-9.

Ozakyol, A. (2017). Global epidemiology of hepatocellular carcinoma (HCC epidemiology). Journal of gastrointestinal cancer, 48(3), 238-240.

Puga, M. A. M., Bandeira, L. M., Pompilio, M. A., Croda, J., Rezende, G. R. D., Dorisbor, L. F. P., ... & Motta-Castro, A. R. C. (2017). Prevalence and incidence of HCV infection among prisoners in Central Brazil. PloS one, 12(1), e0169195.

Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). Health and treatment of diabetes mellitus. *International Journal of Health Sciences*, *5*(1), i-v. https://doi.org/10.53730/ijhs.v5n1.2864

Thrift, A. P., El-Serag, H. B., & Kanwal, F. (2017). Global epidemiology and burden of HCV infection and HCV-related disease. Nature reviews Gastroenterology & hepatology, 14(2), 122-132.

Walsh, S. T. (2012). Structural insights into the common γ-chain family of cytokines and receptors from the interleukin-7 pathway. Immunological reviews, 250(1), 303-316.

Zarogoulidis, P., Lampaki, S., Yarmus, L., Kioumis, I., Pitsiou, G., Katsikogiannis, N., ... & Zarogoulidis, K. (2014). Interleukin-7 and interleukin-15 for cancer. Journal of Cancer, 5(9), 765.

ZhiJun, L., & Jian, F. (2019). Influence of sofosbuvir-based antiviral therapy on the expression profile of cytokines and chemokines in patients with chronic hepatitis C. , 35(10), 2200-2204.