ORIGINAL ARTICLE

Alterations of Hepcidin and Interleukin in Diabetics

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ABSTRACT

Aim: This study was done to determine the levels of hepcidin and interleukin-6 (IL-6) in diabetics. **Materials and Methods:** The study involved 100 diabetics and 100 apparently normal subjects of the same age group 40–70. The levels of hepcidin and IL-6 were measured with an enzyme-linked immunosorbent assay method. **Results:** The level of hepcidin and IL-6 significantly increased in the diabetics when compared to the controls ($P < 0.05$). **Conclusion:** This study probably indicated a significant increase in serum IL-6 and hepcidin levels in patients with diabetics.

Key words: Diabetics, interleukin-6, hepcidin

INTRODUCTION

Diabetes poses a serious health risk among elderly individuals.[1] It is a disease that is associated with a deficiency of insulin or its impairment. It is a known fact that the pancreas releases insulin to aid the body store and use sugar and fat from the food. Diabetes can result when insulin is reduced or lacking or when the body does not respond actively to insulin.[2]

Some studies identified an essential regulatory agent called hepcidin, which acts as a major regulator of systemic iron metabolism.[3] It is a small peptide with antimicrobial properties which affects systemic iron availability. It is mainly generated by liver sinusoidal endothelial cells in response to iron-load. The hepcidin molecule participates in parts in innate immunity and iron metabolism and can be isolated from individual blood and urine;[4] actually, reversible diabetes conditions consist of prediabetes and gestational diabetes. Prediabetes results when the blood glucose levels are increased than normal but not too high to be classified as diabetes. Prediabetes is mainly the precursor of diabetes unless appropriate measures are taken to prevent progression. Gestational diabetes results during pregnancy but may resolve after the baby is delivered.[5]

The extrahepatic generation of hepcidin occurs gradually and rarely at these sites it acts as an antimicrobial peptide. In the kidney, hepcidin modulates the defense barriers against urinary tract infections.[6]

Some researchers determined the important role of interleukins (ILs) play in the human system. IL is a group of cytokines with complex immunomodulatory functions consisting of cell proliferation, maturation, migration, and adhesion, which contributes in immune cell differentiation and activation.[7]

This type of cytokine called IL-6 is an endogenous chemical which is sensitive in inflammation and in B cell maturation. Apart from being an immune protein, it is equally a pyrogen, which contributes to fever in autoimmune, infectious, or non-infectious disease. It is produced in the body, wherever there is inflammation, either acute or chronic. This includes situations such as trauma, burns, cancers, and infection. It

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interacts with IL-6 receptor alpha to induce transcription of inflammatory gene products.[8]

IL-6 is implicated in a host of chronic disease conditions linked with inflammation. IL-6 tends to lead higher susceptibility to diabetes mellitus, as well as the systemic form of juvenile rheumatoid arthritis.[9]

Hence, IL-6 participates in the short-term defense against infection or damage. It equally warns the immune system against the origin of inflammation. The disorder of this regulation of molecule leads to disease.[10]

IL-6 insufficiency has a great response on immune activation and IgA antibodies. Besides, IL-6 overexpression has clear, effective responses. It regulates cell growth and differentiation of various tissues.[11]

In this study, assessment of the hepcidin and IL-6 in diabetic patients to provide further information for better management

MATERIALS AND METHODS

Subjects

This study included 100 confirmed diabetics. Age of the participants ranged from 40 to 70 years. There were 50 males and 50 females. One hundred apparently healthy subjects matched with the age and the sex matched were chosen as controls.

This study was conducted in accordance with the guidelines approved by the Ethics Committee of the hospital. Informed consent was also obtained from all the study participants.

Specimen collection and evaluation

Five milliliters of blood sample were collected by standard venipuncture method from each participant and were dispensed into the dry bottle. This was centrifuged to get the serum for the analysis of the hepcidin and IL-6. Informed consent of the participants was obtained.

Biochemical assay

The serum hepcidin and IL-6 were determined by the enzyme link immunosorbent method.[12]

Statistical analysis

Student's *t*-test for independent samples was used to compare different study groups. All data were designated in terms of mean ± standard deviation (SD). A value <0.05 was considered to be statistically significant for this study. All the statistical calculations were done using the computer program Statistical Package for the Social Science (SPSS); SPSS Inc., Chicago, IL, USA).

Table 1: Mean value of hepcidin and interleukin-6 in diabetics and non-diabetics

Biochemical parameters	Diabetics	Non-diabetics
Hepcidin (ng/ml)	6.50±1.99*	1.34±0.92
IL-6 (ng/ml)	163±3.95*	28.00±12.11

*Significantly decreased when compared with non-diabetics at P<0.05

RESULTS

The results from Table 1 showed that the levels of hepcidin and interleukin-6 were significantly increased in diabetes when compared with the non-diabetes at $P < 0.05$.

DISCUSSION

In the present study, the serum hepcidin was observed to have significant increases in diabetics' patients than healthy controls. This is in line with other studies.[13] This increase in hepcidin among diabetic patients can be linked to oxidative stress.[14]

Furthermore, a high statistically significant difference has been observed in the level of IL-6 in diabetics when compared with the controls. This was in line with the earlier studies in which immunological cells such as macrophages and T-lymphocytes release more pro-inflammatory cytokines, particularly IL-6, which later lead to the generation of hepcidin.[15] This induction of hepcidin expression results in hypoferremia, which accompanied inflammatory. Elevated hepcidin generation stimulated by IL-6 enhances iron retention in reticuloendothelial cells. Hence, weakening iron release subsequently represses intestinal iron absorption.[16,17]

CONCLUSION

This study probably has shown the necessity of determining the levels of hepcidin and IL-6 in diabetes, which tend to maintain overall iron homeostasis in the body. This may lead to a better outcome in the management of diabetics.

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