ASPROSIN IN METABOLIC SYNDROME

Abstract

Metabolic Syndrome (MetS) is a group of clinical features that include insulin resistance, obesity, impaired fasting glucose and elevated blood pressure. Asprosin is an adipokine having 140 amino acid C-terminal profibrillin (encoded by FBN1) which was discovered recently. It is mainly synthesised and released by white adipose tissue during fasting state. Regulation of both glucose and lipid metabolism, and insulin resistance is associated with asprosin. It is considered to play a complex role in metabolic diseases. In recent studies, it is found that serum asprosin levels are increased in T2DM, obesity and polycystic ovary syndrome, which are associated with elevated fasting glucose and triglyceride. As MetS is strongly associated with lipid homeostasis, glucose and insulin resistance, serum asprosin levels are found to be altered in MetS.

Keywords: Asprosin, metabolic syndrome, obesity, PCOS.

Authors

Florida Ashem
Post Graduate Trainee,
Department of Biochemistry
Regional Institute of Medical Sciences
Manipur University
Manipur, India.

Davina Hijam
Associate Professor,
Department of Biochemistry
Regional Institute of Medical Sciences
Manipur University
Manipur, India.

I. INTRODUCTION

Metabolic Syndrome (MetS) is a group of risk factors that include insulin resistance, obesity, impaired fasting glucose, increased triglycerides, decreased high density lipoprotein and increased blood pressure. It has become one of the major public health challenges worldwide. In India, prevalence of MetS among adults is about 20% to 25%. Asprosin is a novel adipokine which is encoded by two exons (exons 65 and exons 66) of the fibrillin 1 (FBN1). It plays a crucial and complex role in metabolism and metabolic diseases.

1. **Asprosin in Obesity:** Asprosin plays an important role in obesity. In the hypothalamus, asprosin escalates the activity of Agouti related peptide neurons by a G protein cAMP-Protein Kinase A axis which in turn increases the food intake. It also inhibits the activity of pro-opiomelanocortin neurons stimulating the food intake. In some studies, it is found that serum levels of asprosin are elevated in adults with obesity. However, data among children is conflicting as in some studies asprosin levels are decreased in obese children in the age group 6 to 14 years.

2. **Asprosin in Diabetes:** Type 2 Diabetes Mellitus is characterised by insulin resistance, elevated fasting and post prandial blood glucose levels and β cell dysfunction. In the skeletal muscles, asprosin impedes the insulin sensitivity by activating PKCδ/SERCA 2 mediated ER stress/inflammatory pathway leading to insulin resistance. In the liver, asprosin stimulates G protein cAMP-PKA axis by acting via the (OLFR73) G protein coupled receptor and thus increases the glucose levels. In the β cells of pancreas, asprosin leads to decrease in insulin secretion. This is due the action of asprosin in the β cells, where it binds to toll like receptor 4 through TLR4/JNK- mediated pathway to increase the level of reactive oxygen species production and pro-inflammatory cytokines promoting inflammation and apoptosis of β cells. Because of these numerous actions of asprosin, its level increases in T2DM. Recent studies are now more focused on the relationship between concentration of asprosin and insulin resistance.

3. **Asprosin in Polycystic ovarian disorder (PCOS):** PCOS is a heterogenous disorder of endocrine and metabolism. It is the most common endocrine disorder of women of reproductive age group. Central obesity plays a crucial role in PCOS. It is a combination of signs and symptoms which comprise of androgen excess, ovarian dysfunction and metabolic dysfunction. In some studies, it was found that asprosin levels were elevated in women with PCOS as compared to the control groups. But effects of asprosin in the aetiology of PCOS is still controversial as in some studies the relationship between circulating asprosin levels and PCOS is non-significant.

II. CONCLUSION

Asprosin is a recently discovered novel adipokine that is mainly associated with metabolic syndrome. Its levels are significantly elevated in T2DM, insulin resistance, PCOS and obesity patients. Therefore, reducing the level of asprosin may aid in the treatment of metabolic diseases or may be protective. It might also serve as a diagnostic and therapeutic target in MetS. As knowledge of asprosin is limited and conflicting results were found, so further more studies are required as many aspects of its physiological and pathophysiological activity needs to be discovered.

REFERENCES

[1] Yuan M, Li W, Zhu Y, Yu B, Wu J. Asprosin: A Novel Player in Metabolic Diseases. Front Endocrinol (Lausanne). 2020 Feb 19;11:64.
[2] Hong T, Li JY, Wang YD, Qi XY, Liao ZZ, Bhadel P, Ran L, Yang J, Yan B, Liu JH, Xiao XH. High Serum Asprosin Levels Are Associated with Presence of Metabolic Syndrome. Int J Endocrinol. 2021 Mar 2;2021:6622129.
[3] Zhang L, Chen C, Zhou N, Fu Y, Cheng X. Circulating asprosin concentrations are increased in type 2 diabetes mellitus and independently associated with fasting glucose and triglyceride. Clin Chim Acta 2017; 489:183-88
[4] Farrag M, Ait Eldjoudi D, González-Rodríguez M, Cordero-Barreal A, Ruiz-Fernández C, Capuozzo M, González-Gay MA, Mera A, Lago F, Soffar A, Essawy A, Pino J, Farrag Y, Gualillo O. Asprosin in health and disease, a new glucose sensor with central and peripheral metabolic effects. Front Endocrinol (Lausanne). 2023 Jan 5;13:1101091.
[5] Ovali MA, Bozgeyik I. Asprosin, a C-Terminal Cleavage Product of Fibrillin 1 Encoded by the *FBN1* Gene, in Health and Disease. Mol Syndromol. 2022 May;13(3):175-183.
[6] Keses MG, Ünüsan N. Asprosin and Effects on Glucose Metabolism. Turk J Diab Obes. 2021;1:89-95.

