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Editorial

Early Triggers of a High-fat Diet on Glomerular Integrity

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Early triggers of a high-fat diet on glomerular integrity

It is an universal statement that high-fat consumption can affect health of the human body [1], and body's normal functioning is regulated by a healthy diet and lifestyle. Nowadays, lifestyle is influenced by the overconsumption of a high-fat diet [2]. Such high-fat diet primarily made of a more proportion of saturated fatty acids compared to mono- and polyunsaturated fatty acids. These saturated fats attack the body's positive balance and develop obesity [3]. High fat diet is a harmful factor to develop metabolic disorders like hyperlipidemea, hypertension, diabetes mellitus, insulin disorder and oxidative stress. Gradually it shows lipid Accumulation in various tissues or organs of the body [4,5]. Among all the vital organs, kidney is the prime organ manifesting altered functions because of ectopic accumulation of fat in intracellular compartments [6]. Renal fat deposition makes adverse effect on kidney functions and end up in lipotoxicity in renal tissue [7].

Studies have reported; the impact of a high-fat diet on morphological and functional kidney responses in Wister rats with evidence that consumption of a high-fat diet for subchronic period induces renal lipid accumulation, a decrease in kidney functions and an increase in oxidative stress [6,8].

3 weeks of high-fat diet consumption in experimental rats presented with an increase in body weight and body weight gain percent [4].

High-fat diet intake has induced changes in renal functions as observed by an increase in blood urea and serum creatinine levels. Renal lipid deposition has been associated with altered renal functions and can be a potent marker in renal toxicity [6]. However, fewer is known about the pathological mechanism occurring in the renal tissues mainly compared to the knowledge base about the adverse effects of fats on organs like the heart, liver, and skeletal muscle.

High-fat diet may cause upregulation of fatty acids due to increased levels of triglyceride synthesis and triglyceride transportation which leads to fat accumulation in renal tissue. This may cause an increased level of inflammatory markers like adipokines. It eventually leads to chronic inflammatory changes in glomeruli and proximal tubules of kidneys along with expression of renal function markers [9].

In our same line of research on hyperlipidemic model, we have observed higher levels of lipid peroxidation in renal tissues with a concomitant reduction in GSH (Reduced glutathione) and SOD (Superoxide dismutase) activities. Kidneys are more susceptible to oxidative stress as they encounter easily with lipid Peroxidation by high-fat diet. The formation of reactive oxygen species (ROS) can oxidize biological micro molecules such as lipids causing oxidative destruction, initiating lipid peroxidation in renal tissues, and finally devastating the endogenous antioxidant system [10].

Lipid Peroxidation forms malondialdehyde as an end product. It is considered to be a potential biomarker of oxidative damage. Furthermore, it also initiates a series of cascade chain events in renal tissues leading to renotoxicity [11,12].

It has been also observed that lipotoxicity is associated with an increase in delivered lipid load and energy stress which may further contribute to renal pathogenesis [13]. We evidenced a positive correlation between lipid accumulation and renal focal lesions. The proposed conceptual link may be that higher triglyceride will trigger local inflammatory pathways thereby promoting the production of proinflammatory markers which enter the circulation and lead to systemic low-grade inflammation (LGI). LGI and excess triglycerides may initiate macrophage recruitment in a series of vasculatures including the glomerular microvasculature [14]. Glomeruli developed as a much complex capillary filter through fenestrated endothelial lined by a capillary basement membrane along with epithelial podocytes. At the level of glomerular vasculature, rised lipid levels in the blood may affect the renal perfusion pressure by altering reflex contraction and dilatation of the afferent arteriole respectively. It furthermore develops into the acute capillary lesion and in turn leads to an increase in glomerular capsular area and decrease in Bowman's capsular space [15,16].

Till date, few experimental evidence exists on a causal link between a high-fat diet and renal toxicity mainly on glomerular integrity. In this scenario, a promising research towards crucial role in renal dysfunction and identifying safer line of treatment is the need of hour.

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