TO STUDY PROTECTIVE EFFECTS OF BIOFLAVONOIDS ON RETINAL NEUROVASCULAR DEGENERATION IN DIABETIC RATS

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Abstract
In the present dissertation, we studied the protective effects of bioflavanoids (hesperetin and quercetin) on diabetes induced retinal neurovascular degeneration in type-1 diabetic rats. In the first part, the role of bioflavanoids in the prevention of retinal vasculopathy has been evaluated in type-1 diabetic rats. Various parameters have been evaluated like effect on basement membrane (BM) thickness, dilatation of retinal vessels, vascular leakage and angiogenic factors (VEGF and PKC-α). Further, the results clearly showed that bioflavanoids could be a potential candidate for the prevention of retinal microvascular degeneration and vascular leakage.

In the later study, we studied the effects of bioflavanoids on retinal neuroinflammation, oxidative stress and apoptosis in type-1 diabetic rats. We found that bioflavanoids acts as good anti-inflammatory agent (via inhibition of TNF-α and IL-1β), anti-oxidant (as it positively modulated retinal levels of GSH and anti-oxidant enzymes; SOD and CAT) and anti-apoptotic agent via inhibition of caspase-3 activity. Apart from this, bioflavanoids prevented formation of edema in muller cell endfeet in diabetic rats. We also found significant protective effects of bioflavanoids on diabetes induced photoreceptor degeneration.

Further, we studied effects of bioflavanoids (Quercetin-25 mg/kg BW and Hesperetin – 100 mg/kg BW) on gene expression of tight junction proteins (Ocludin, Claudin-5 and ZO-1) and protein expression of extracellular matrix (Collagen-IV and Fibronectin) in diabetic rat retina. We found that bioflavanoids prevented inhibition of gene expression of tight junction proteins and inhibited increased expression of collagen-IV and fibronectin in diabetic retinas as evident from real time-PCR, western blot and immunofluorescence studies.
Bioflavanoids (Hesperetin and Quercetin) have shown potential antioxidant, antiinflammatory, antiapoptotic and neuroprotective effects in diabetic rat retina. Therefore, based on the results it can be concluded that bioflavanoids (Hesperetin and Quercetin) may be prescribed as supplements in the prescribed dosage for the prevention of retinal neurovascular damage in diabetic patients.

Apart from this, we also tried to evaluate effects of herbal drugs (Moringa oleifera, Fenugreek and Triphala) on prevention of diabetic retinopathy in streptozotocin-induced type-1 diabetic rats. The results from the present study showed that test herbal drugs (Moringa oleifera, Fenugreek and Triphala) possess hypoglycemic, anti-oxidant, anti-inflammatory and anti-angiogenic properties. Therefore, based on the encouraging results of the individual drugs, a polyherbal combination (Moringa oleifera @ 100 mg/kg BW, Fenugreek @ 100 mg/kg BW and Triphala @ 175 mg/kg BW) was evaluated for its efficacy against diabetic retinopathy in rats. The novel polyherbal combination has shown overall better efficacy for diabetic retinopathy as compared to individual test herbal drugs in diabetic rats. Therefore, we came to the conclusion that the present novel polyherbal combination acts by synergistic mechanism and can be used as therapeutic intervention in diabetic patients.