Rationale

A combination of both high calorie diet coupled with chronodisruption ideally represents the present lifestyle shifts. Diverse studies on clock gene knockout model for chronodisruption and *ob/ob* or *db/db* models for NAFLD/NASH had revealed to cause hepatic and neuro-behavioural perturbations. On the other hand, the alterations in gut microflora, diurnal/nocturnal leading to changes in behaviour, altered liver-gut-brain axis and BDNF-TrkB pathway has been reported in scientific literature. The scientific leads available till date suggest that, mechanistic clarity on a combination of high fat diet and chronodisruption impacting neuro-behaviour, gut microbiota and liver function is lacking. The shift workers and transcontinental travellers form the high risk group for developing lifestyle disorders. Hence, photoperiodic manipulation induced chronodisruption and/or high fat-high fructose diet model was used herein, to mimic the altered sleep/wake and feeding/fasting cycle. These experimental models are appropriate for investigation of subtle physiological perturbations that furthers into systemic stress, altered gut microbiota, fatty manifestations in liver and behavioural shifts. Melatonin, a neurohormone, has been implicated in making corrective changes not only in clock gene oscillations but also in physiological functions of the body. Hence, later part of the study deals with exogenous melatonin administration and assessment of its efficacy in modulating neuro-behavioral perturbations, altered gut-microflora and the hippocampal BDNF-TrkB pathway in the said experimental model of lifestyle disorder. This study is the first to investigate and report on the neuro-behavioral perturbations and role of exogenous melatonin in making possible corrective changes.