MicroRNAs and intellectual disability (ID) in Down syndrome, X-linked ID and Fragile X syndrome

Abstract

Intellectual disability (ID) is one of the many features manifested in various genetic syndromes leading to deficits in cognitive function among affected individuals. ID is a feature affected by polygenes and multiple environmental factors. It leads to a broad spectrum of affected clinical and behavioral characteristics among patients. Until now, the causative mechanism of ID is unknown and the progression of the condition is poorly understood. Advancement in technology and research had identified various genetic abnormalities and defects as the potential cause of ID. However, the link between these abnormalities with ID is remained inconclusive and the roles of many newly discovered genetic components such as non-coding RNAs have not been thoroughly investigated. In this review, we aim to consolidate and assimilate the latest development and findings on a class of small non-coding RNAs known as microRNAs (miRNAs) involvement in ID development and progression with special focus on Down syndrome (DS) and X-linked ID (XLID) [including Fragile X syndrome (FXS)].

Keyword: Down syndrome; Brain development; Cognitive function; Fragile X syndrome; X-linked genetic disease; Non-coding RNA; Neuronal development; Mental retardation