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Abstract

Short-term sleep loss is known to cause temporary difficulties in cognition, behaviour and health but the effects of persistent sleep deprivation on brain development have received little or no attention. Yet, severe sleep disorders that last for years are common in children especially when they have neurodevelopmental disabilities. There is increasing evidence that chronic sleep loss can lead to neuronal and cognitive loss in children although this is generally unrecognized by the medical profession and the public. Without the restorative functions of sleep due to total sleep deprivation, death is inevitable within a few weeks. Chronic sleep disturbances at any age deprive children of healthy environmental exposure which is a prerequisite for cognitive growth more so during critical developmental periods. Sleep loss adversely affects pineal melatonin production which causes disturbance of circadian physiology of cells, organs, neurochemicals, neuroprotective and other metabolic functions. Through various mechanisms sleep loss causes widespread deterioration of neuronal functions, memory and learning, gene expression, neurogenesis and numerous other changes which cause decline in cognition, behaviour and health. When these changes are long-standing, excessive cellular stress develops which may result in widespread neuronal loss. In this review, for the first time, recent research advances obtained from various fields of sleep medicine are integrated in order to show that untreated chronic sleep disorders may lead to impaired brain development, neuronal damage and permanent loss of developmental potentials. Further research is urgently needed because these findings have major implications for the treatment of sleep disorders.

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