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C. elegans as model to study of molecular and locomotion effects of caffein and codein drugs

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Abstract

The addictive behavior has become a serious social crisis causing a significant loss to most populations of the earth. Previous research conducted several studies on vertebrates with the aim of identifying the causes of addiction, its effects and ways to prevent it. In this study, the effects of acute and chronic exposure to different concentrations of caffeine and codeine on locomotor activity and gene expression were assessed in *Caenorhabditis elegans* worm. It is known that addictive behavior is accompanied by many neurochemical and molecular changes. Therefore, an important objective of this study is to assess these changes using *C.elegans* (a type of nematode) as a pre- clinical animal model. The method of this study focused on assessing the locomotion of worms by calculating number of parameters such as (distance, speed and mobility rate). Also, assessed the level of gene expression by calculating the quantity of mRNA at each of the UNCoordinated gene (*UNC-63*gene) and the Neuropeptide like protein gene(*NLP-*24gene). These genes are related to locomotor activity and addictive behavior. The results showed that acute exposure to caffeine and codeine had short- term effects limited to activating or inhibiting movement; and the results of gene expression during acute exposure to caffeine and codeine showed different levels of drug response and sensitivity. Moreover, the data of chronic exposure to caffeine and codeine showed more effective responses and changes in locomotor activity compared to acute exposure; which could have an association with the development of different components of addiction such as drug dependence and tolerance. Furthermore, the results of gene expression for caffeine and codeine showed different levels of response to the drug during chronic exposure to the drugs compare with the acute exposure to the drugs. These molecular modifications could help in understanding the mechanism of the developed behaviour, neurochemical changes and neuroadaptation to the chronic effect

of drugs. Therefore, the current study concludes that both neurochemical and molecular alterations could play a significant role in the development of addictive behaviour including drug-seeking behaviour, excessive drug intake; and neuroadaptation. Also, it could be suggested that individual variations could be result from differences in the response and neuroadeptation to drug effects. Furthermore, the finding suggested that *C. elegans* could be used as a pre-clinical animal model instead of using vertebrates to study the mechanism that involved the development of addictive behavior; and linking these results with the neurochemical and molecular changes that are emerge in vertebrates. The data could have therapeutic applications in developing a neuropharmacological and molecular approach for treating addiction and other common diseases in society.