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RESEARCH ARTICLE

MUTAGENICITY ASSESSMENT OF SUNSET YELLOW ON CHROMOSOMAL ABERRATIONS AND WHOLE GENOME DNA STRAND BREAKS IN *ALLIUM CEPA*

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SUMMARY Food additives are substances intentionally added to modify the visual appearance, taste, texture, flavour, processing or storage life of food. Some artificial food additives have mutagenic properties and hence have been discontinued from the market. Sunset yellow (SY) is a common food colouring agent, currently used in India and some other countries. Previous reports do indicate that SY is mutagenic. We have assessed the influence of three different concentrations [1000, 2000 and 3000 parts per millions (ppm)] of SY and four different time intervals (4, 8, 12 and 24 h) of treatment, in inducing chromosomal aberrations in *Allium cepa* L. which is routinely used as a model system to study chromosomal aberrations in higher eukaryotes. SY lead to a decrease in mitotic index and increase chromosomal aberrations, in a dose- and time-dependent manner. Clastogenic, nonclastogenic (structural) and aneugenic aberrations were observed due to SY treatment. We checked if very high concentrations of SY (2000, 5000 and 10000 ppm) could induce whole genome DNA strand breaks, if treated for short time interval (24 h). Using comet assay, we compared the SY-treated nuclei with that of malathion-treated ones as positive control. While the former treatment did not induce any DNA strand breaks, 14.71% of the latter-treated nuclei exhibited DNA strand breaks. Thus, unlike chromosomal aberrations, whole genome strand breaks did not occur when the treatment period was as short as 24 h, irrespective of the higher concentration.

Keywords: Food additives, cytotoxicity, sunset yellow, comet assay, chromosomes, aberrations, mutations, DNA strand breaks.

INTRODUCTION

Food additives are the substances added to various food products for flavouring, colouring, nutrient enrichment, texture enhancement, shelf-life extension, as well as the promotion of food safety. More than 2500 such chemicals are available in global market (Carocho et al. 2014). It is estimated that, the use of food additives started from 5000 B.C., at the time of Egyptian civilization, and usage of food dyes started from 1500 B.C. (Chequer et al. 2012, Meggos 1995). After the industrial revolution, in order to cope up with the need of food products at industrial level, various food additives were developed over the years (Jen & Chen 2017). The risks and adverse effect of food additives have been under high grade inspection for a number of years. A number of food additives were banned after confirming their carcinogenic, hepatotoxic, cardiotoxic and neurotoxic effects on body (Rangan & Barceloux