



GENOTOXIC IMPACT OF CARCINOGENIC AND NATURAL FEED ON LIFECYCLE OF *DROSOPHILA MELANOGASTER* - A QUALITATIVE STUDY

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ABSTRACT - In spite, the known health risks of tobacco smoking, many people including pregnant women continue smoking. The effects of developmental nicotine exposure are known, but the underlying mechanisms are not well understood. *Drosophila melanogaster* is a model organism that can be used for uncovering genetic and molecular mechanisms for drugs of abuse. In the present experimental study, the life cycle of *Drosophila melanogaster* on exposure to Nicotine, Honey, Methanol and a combination of Nicotine and Methanol culture media was observed and analysed. It was inferred that the life cycle of the fly was affected in comparison to the normal life cycle of the *Drosophila*. Nicotine feed affected the developmental time and also decreased the survival rate whereas Methanol feed showed increased longevity and Morphometry. Honey feed increased the growth rate as compared to the normal life cycle of the fly. It is evident from the study that carcinogen, Nicotine affects the life cycle and the development of the fruit fly.

Key words: Carcinogenic feed, CNS, *Drosophila melanogaster*, Genotoxic Impact, Longevity, Life Cycle, Morphometry,

I. INTRODUCTION

Drosophila melanogaster, the common pomace fly, has been used as a model organism in each medical and research for over a century. Work by Thomas Hunt Morgan (1866-1945) and his students at university at the start of the 20th century junction rectifier to nice discoveries like organic phenomenon inheritance which radiation causes mutations in genes. However, the employment of pomace fly wasn't restricted to genetic analysis. Experimentation with this model organism has conjointly junction rectifier to discoveries in neurobiology and Neuro-developmental studies, as well as the premise of time unit rhythms. Its advanced systema nervosum, preserved medicine perform, and human sickness-related loci enable pomace fly to be a perfect model organism for the study of neurodegenerative disease, that it's used these days, aiding analysis into diseases

like Alzheimers and encephalopathy, that have become additional rife in today's aging population.

D. melanogaster is usually employed in analysis as a result of its fast life cycle, comparatively straightforward biology with solely four pairs of chromosomes, and huge variety of offspring per generation. It had been originally associate degree African species, with all non-African lineages having a standard origin. Its geographic vary includes all continents, as well as islands. *D. melanogaster* could be a common tormentor in homes, restaurants, and alternative places wherever food is served. Flies happiness to the family Tephritidae also are referred to as "fruit flies". this will cause confusion, particularly within the Mediterranean, Australia, and South Africa, wherever the Mediterranean pomace fly *Ceratitis capitata* is associate degree economic tormentor [1, 2, 3].

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Wild kind fruit flies are amber, with brick-red eyes and transversal black rings across the abdomen. The brick-red color of the eyes of the wild kind fly are because of 2 pigments, Xanthommatin, that is brown and springs from tryptophane, and drospterins, that ar red and ar derived from nucleoside triphosphate. They exhibit sexual dimorphism; females are concerning a pair of.5 mm (0.10 in) long; males are slightly smaller with darker backs. Males ar simply distinguished from females supported color variations, with a definite black patch at the abdomen, less noticeable in recently emerged flies, and also the sex combs (a row of dark bristles on the skeletal structure of the primary leg). moreover, males have a cluster of high-pitched hairs (claspers) encompassing the reproducing elements wont to attach to the feminine throughout sexual practice. intensive pictures are found at FlyBase [4].

NORMAL LIFECYCLE OF DROSOPHILA

Drosophila melanogaster exhibits complete metamorphism, meaning the lifecycle include an egg, larva, pupa and finally emergence (eclosure) as a flying adult.

Day 0 :- Female lays eggs

Day 1:- Eggs hatch

Day 2:- 1st Instar

Day 3:- 2nd Instar

Day 4:- 3rd Instar

Day 5:- 3rd and final Instar

Day 7:- Larvae begin running

(pupation occurs after 120

hours of egg laying)

Day 11:- Eclosion

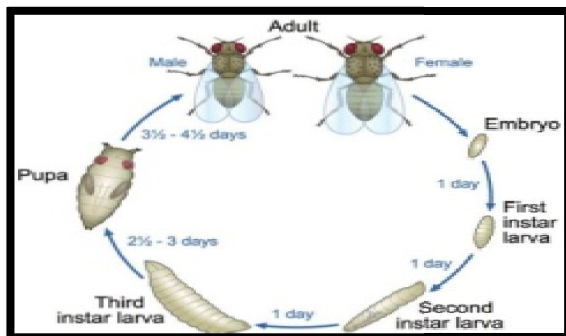


Fig. 1. lifecycle (Source- researchgate.net)

Female becomes sexually mature 8-10 hours after eclosion. Generation time of *Drosophila melanogaster* varies with temperature (optimum temperature-22 * Celsius).

The experimental analysis is done on *Drosophila melanogaster* lifecycle, on exposure to Nicotine, Honey, Methanol and a combination of Methanol and Nicotine. The motive is to do comparative study between *Homo sapiens* and *Drosophila melanogaster* on exposure to the above content.

Nicotine is well known for its health risks where the exposure of Nicotine may increase the developmental time and decrease survival rate and the loss in the weight whereas the exposure to Methanol is suspected to be a developmental toxicity risk. Where Honey makes growth of *Drosophila* little bit faster as compared to the normal lifecycle of *Drosophila* [4].

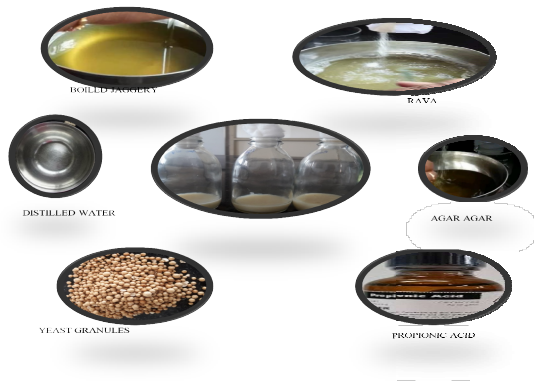
II. OBJECTIVES:-

- To study the carcinogenic effect of nicotine feed on the lifecycle of *Drosophila melanogaster*.
- To study the developmental time and toxicity risk of methanol on lifecycle of *Drosophila melanogaster*.
- To study the growth rate of *Drosophila melanogaster* on exposure to honey feed.
- To estimate the development of fruit fly on exposure to nicotine and methanol feeds.

III. METHODOLOGY:

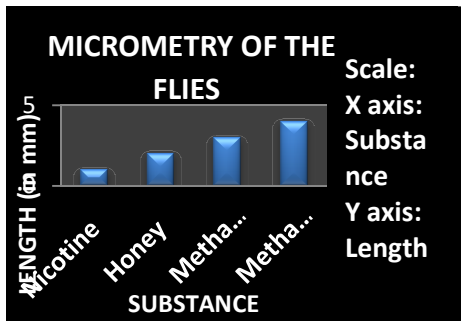
Media was prepared for culturing of *Drosophila melanogaster*. Types of media prepared for drosophila were -Nicotine feed, Honey feed, Methanol feed, Nicotine and methanol feed to understand the lifecycle of the fly.

Flies were transferred in each bottle containing the mentioned media. The comparative study of life cycle of the fly was understood in comparison with normal life cycle of the fly.

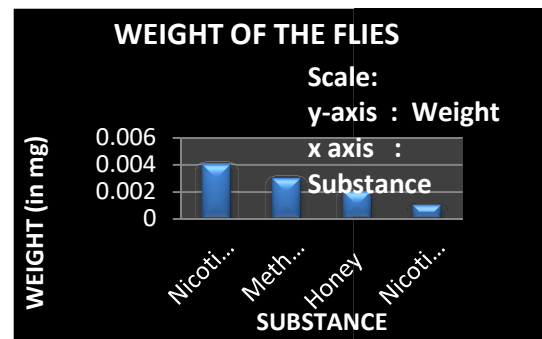


Experimentation results

Certain changes in the life cycle of *Drosophila* were noticed. This was because when the fruit flies were exposed to carcinogenic media, lifespan made a great change where there was a fall in development and survival. Even flies took more time in their development and their longevity was decreased followed by loss in weight of fruit flies. The media containing the carcinogens, impacted the more mortality rate.



Graph 1: Based on the micrometry



Graph 2: Based on the weight

IV. DISCUSSION:

The graph 1 indicates, on exposure to certain carcinogens like methanol there is an increase in length while in nicotine, there is a huge fall in length of the flies. In combination of methanol and nicotine the length is approximately same and in honey there is a slight decrease in weight of the flies. The graph 2 indicates, there is a huge fall in the weight of flies on the exposure of nicotine+methanol where as there is slight change in the weight on exposure to honey considered no harm. There is a quite increase in weight on exposure to methanol whereas there is huge increase in the weight of flies on exposure to nicotine. The above mentioned carcinogen will make the same impact on *Homo sapiens* morphology.

V. CONCLUSION:

On the basis of the experimental analysis it is concluded that these carcinogens are harmful and increases the health risk. The conclusion was made on the comparative study between the lifecycle of fruit-fly cultured in normal media to the lifecycle of fruit fly cultured in carcinogenic media. The carcinogen effects the lifecycle of *Drosophila melanogaster*, also the *Homo sapiens*, as 50% of our genome match with that of fruit-fly. Carcinogen affects the lifecycle of fruit-fly as they make direct attack on CNS by which the growth rate and survival time decreases.

REFERENCES:

1. R Stephenson, N H Metcalfe *Drosophila melanogaster*: a fly through its history and current use PMID: 23516695 DOI: 10.4997/JRCPE.2013.116.



2. R Stephenson, 2 NH Metcalfe) J R Coll Physicians Edinb 2013 *Drosophila melanogaster*: a fly through its history and current use ; 43:70–5 <http://dx.doi.org/10.4997/JRCPE.2013.116> © 2013 Royal College of Physicians of Edinburgh
3. *Drosophila melanogaster* Meigen, 1830.
4. K. Ravi Ram, D. Kar Chowdhuri *Drosophila*: A Model for Biotechnologists. <https://doi.org/10.1016/B978-0-12-416002-6.00001-8>
5. Norma Andrea Velazquez-Ulloa, A drosophila model for developmental nicotine exposure - published 2017 May 12 , doi:10.1371/journal.pone.0177710.
6. Piper MD, Blanc E, Leitão-Gonçalves R, Yang M, He X, Linford NJ, Hoddinott MP, Hopfen C, Soultoukis GA, Niemeyer C, Kerr F, Pletcher SD, Ribeiro C, Partridge L. A holidic medium for *Drosophila melanogaster*. *Nat Methods*. 2014 Jan;11(1):100-5. doi: 10.1038/nmeth.2731. Epub 2013 Nov 17. Erratum in: *Nat Methods*. 2014 Sep;11(9):971. Erratum in: *Nat Methods*. 2015 Nov;12(11):1098.