SUMMARY

During present study, experiments were carried out to assay for potential mutagenicity, reproductive toxicity and abnormal morphological changes by Bis-acrylamide, Acrylamide and Acetamide causing toxic effect for the first time in *Drosophila melanogaster* as a model system.

The experimental results obviously revealed that different concentrations of Bis-acrylamide, Acrylamide and Acetamide when feed to larvae and adults of *Drosophila melanogaster* have shown remarkable changes specially with higher dose.

In case of Bis-acrylamide, the observations on developmental pattern demonstrated adverse effect on hatchability of egg, emergence of adult flies and survivorship of adult flies with increasing concentration. The reproductive toxicity which has not been reported earlier for Bis-acrylamide was observed during present investigations.

The reproductive toxicity was observed in term of total fecundity, mean daily egg production/female, egg hatchability, fertility percentage & reproductive performance.
A sharp decline was observed in all the above observations for reproductive toxicity when both male & female flies were exposed with different doses of 10ppm concentration of Bis-acrylamide compared to control condition.

Many pupae were observed to die before eclosion even when imaginal disc had developed.

Treatment with low concentration for 24h. did not produce any drastic morphological change but when exposed from 48h. to 72h., some changes in abdomen shape, pigmentation, shortening of foreleg, abnormal outgrowth in ventral side in proboscis and thoracic region were observed.

The morphological changes were more pronounced when flies emerged after treatment of larvae for 24h. with 50ppm concentration. Besides this, changes in morphology were also observed for higher duration with 2.5ppm concentration, which are abnormal outgrowth in proboscis region, curling of foreleg, wing size & shape and loss in number of sternopleural bristles in both sexes and mesopleural bristles in male.
Three small paracentric inversions appeared in 3L&3R chromosome, a puff induced in 2R and an asynaptic segment was observed in 2R besides some very minute deletions when larvae were treated with 2.5ppm concentration. The treatment with higher concentration resulted in sluggish and sticky chromosomes and two inversions were recorded in 2R &3L chromosomes while two large Balbiani puff were observed in 3L and 2R chromosome.

In case of Acrylamide, the observations on developemental pattern demonstrated adverse effect on hatchability of egg, emergence of adult flies and survivorship of adult flies with increasing concentration.

The reproductive toxicity which has not been reported earlier was observed during present investigations. The reproductive toxicity was observed in term of total fecundity, mean daily egg production/female, egg hatchability, fertility percentage & reproductive performance.

A sharp decline was observed in all the above observations for reproductive toxicity when both male & female flies were exposed with different doses of 2.5ppm concentration of Acrylamide compared to control condition.
Many pupae were observed to die before eclosion even when imaginal disc had developed.

Morphological changes were also observed when treated larvae emerged as adult flies with lower (2.5ppm) & higher (50ppm) concentration of Acrylamide. Though treatment with lower concentration, for 24h. did not produce any drastic change but when exposed for 48h. to 72h., the adult flies were observed to show remarkable changes like shrinking of abdomen, abnormal pigmentation pattern (loss in pigmentation), shortening of forelegs, slight change in wing curvature and abnormal outgrowths in proboscis and ventral side of thoracic regions.

The morphological changes were more pronounced when flies emerged after treatment with 50ppm. Such adult flies showed remarkable morphological changes in wing shape (distorted curvature) and size (shrinkage), loss of abdominal pigmentation, protrusion of proboscis and thorax on ventral side, shortening of abdomen and curling of foreleg, the loss in number of sternopleural bristles from 9-13 to 6or 7 in almost all flies observed. A few male were found without mesopleural bristles which normally are present in single number in control condition.
In most of the 3rd Instar larvae, pupation did not occur and in few case where pupae were found alive, pupae could not eclosed into adult male/female flies as imaginal disk failed to differentiate into adult organs.

In polytene chromosome preparation, both physiological and clastogenic changes were observed. The changes were more pronounced with higher concentration of Acrylamide. Inversions appeared in 2L, & 3L arms, a puff was induced in 3L (63th segment and in 67th segment) besides some very minute deletions. The treatment with higher concentration resulted in sluggish and sticky chromosomes.

In case of Acetamide, the observations on developmental pattern demonstrated adverse effect on hatchability of egg, emergence of adult flies and survivorship of adult flies with increasing concentration.

A sharp decline was observed in all the above observations for reproductive toxicity when both male & female flies were exposed with different doses of 50ppm concentration of Acetamide compared to control condition. Many pupae were observed to die before eclosion even when imaginal disc had developed.
Further, morphological changes were also observed when treated larvae emerged as adult flies with lower (2.5ppm) & higher (50ppm) concentration of Acetamide. Though treatment with lower concentration for 24h. did not produce any drastic change.

The morphological changes were more pronounced when flies emerged after treatment of larvae for 24h. with 50ppm concentration. Besides, changes in morphology were observed for higher duration with 2.5ppm concentration as abnormal outgrowth in proboscis region, curling of foreleg, wing size & shape. Loss in number of sternopleural bristles in both sexes of very few flies and mesopleural bristles in few male were also observed.

The changes were more pronounced in polytene chromosomes with higher concentration of Acetamide. Small paracentric inversions appeared in 2R, 3L, & 3R chromosome, a puff was induced in 3L (79th segment) and in 3R (95th segment) besides some very minute deletions. The treatment with higher concentration resulted in sluggish and sticky chromosomes.

From the results observed during present study, it is observed that among three amide group of test chemicals selected for our experiments,
a decreasing pattern for their toxic potential was observed as Bis-acrylamide > Acrylamide > Acetamide.

The fruit fly, *Drosophila melanogaster* has every potential to use as living biological model for quick assaying the toxicological effect of chemicals of natural hazards and the methodology proposed seems to be sensitive and economically viable for studying the effect of toxic test chemicals.