SUMMARY AND CONCLUSION

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Food colourants are wide - spread all over the world and their global production is about 7500 tons per year. The argumentation about their mutagenic and clastogenic effects has become hot. The present investigation was conducted in an effort to show the effects of four food colourants widely used in food products in Egypt; viz., erythrosine (xanthene group), ponceau 4R, sunset yellow FCF (azo group) and tartrazine (azopyrollazone group) on the chromosomal pattern of the Swiss albino mice (Mus musculus) to show their clastogenic effects if any.

Bone marrow samples were obtained from 120 male Swiss albino mice which were classified as follow:

- 1- Experimental animals which were classified into 2 groups:
 - A) The first group which comprised 40 animals was classified into 4 equal subgroups and each subgroup was subjected to a single agent of the following food colourants, erythrosine, ponceau 4R, sunset yellow and tartrazine. The animals were fed diet mixed with single food colourant at a concentration of 10 000 parts per million (1%) for 20 days.
 - B) The second group which comprised 40 animals was classified as in the first group and subjected to the food colourants at the same concentration but for 4 months.
- 2) Control animals which were classified into 2 groups:
 - A) The first group comprised 20 animals and was fed diet without any colourants for 20 days. Ten animals were kept as a negative control, the others injected with cyclophosphamide

(endoxan) at a dose of 25 mg / kg body weight 24 hours before sacrificing and were considered as a positive control for the first experimental group.

B) The second group comprised 20 animals and was fed diet without any colourants for 4 months. Ten animals were kept as a negative control and the others were kept as a positive control for the second experimental group.

After 20 and 120 days the animals were sacrificed by cervical dislocation and chromosomal study was done.

The method of preparing metaphase spreads was used according to Palmer et al. (1972) and Giemsa stain was prepared according to the method described by Genest and Auger (1963).

As endoxan causes a marked decrease in the mitotic index in bone marrow, therefore to obtain a sufficient number of mitoses for analysis, an anaemia was induced in all animals by puncture of the infra - orbital plexus 12 - 16 hours before the animals were killed to stimulate the mitotic activity in bone marrow according to the method mentioned by Herbert (1973).

For chromosomal analysis, 50 metaphases were examined for the presence of any chromosomal anomalies either structural or numerical, and the results were tabulated and tested using the Student t test. The results of the present study revealed that the means ±SD for the structural anomlies, hypoploidy and polyploidy were as follows:

The first group (20 days):

- a) Negative control : 1.3 \pm 0.67 , 1.2 \pm 0.92 and 1.1 \pm 0.99 respectively.
- b) Positive control : 74.3 \pm 15 , 1.4 \pm 1.07 and 1.5 \pm 0.53 respectively.
- c) Erythrosine subgroup : 1.40 ± 0.70 , 1.10 ± 0.88 and 1.00 ± 0.67 respectively.
- d) Ponceau 4R subgroup : 1.60 ± 0.97 , 0.80 ± 0.79 and 1.10 ± 1.10 respectively.
- e) Sunset yellow subgroup : 1.20 ± 0.79 , 0.80 ± 1.03 and 0.90 ± 0.74 respectively.
- f) Tartrazine subgroup : 1.40 ± 0.97 , 0.90 ± 0.99 and 1.00 ± 1.05 respectively.

The second group (4 months)

- a) Negative control : 1.4 \pm 1.07 , 1.2 \pm 0.79 and 0.8 \pm 0.79 respectively.
- b) Positive control : 67.3 ± 13.81 , 1.1 ± 0.99 and 1.3 ± 0.95 respectively.
- c) Erythrosine subgroup : 1.50 ± 1.18 , 0.80 ± 0.79 and 1.60 ± 0.97 respectively.
- d) Ponceau 4R subgroup : 1.70 ± 0.67 , 1.2 ± 1.69 and 1.0 ± 0.94 respectively.
- e) Sunset yellow subgroup : 1.50 ± 0.71 , 0.80 ± 1.63 and 0.8 ± 1.03 respectively.

f) Tartrazine subgroup: 1.60 ± 1.07 , 0.90 ± 0.57 and 1.20 ± 0.79 respectively.

While the positive controls show highly statistically significant differences in the structural anomalies only in both first and second groups (P < 0.001) and this indicates efficacy and sensitivity of the experimental model used. The experimental groups did not show any statistically significant differences between them and the negative controls either in the first group or the second group (P > 0.05).

Thus one can conclude that the four colourants tested have not any clastogenic effects on bone marrow cells either in relatively short period or prolonged period even at high doses beyond the daily accepted doses and this reflects the safety of these four colourants as regards chromosomes. Therefore a clastogenic hazard to man who uses these dyes in a much lower doses is not expected but effect on different organs has to be investigated.