

# Evaluation of Genotoxic Effect of Marigold (Tagetes Erecta) Leaf Extract in Mice on Mitotic Chromosome

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## ABSTRACT

In this study, 10% Marigold leaf extract was tested for possible genotoxicity by looking at mitotic aberrations. In order to ascertain any differences in the incidence of mitotic chromosomal aberrations, a comparison was made between a control group and a group that received treatment with 10% Marigold leaf extract. The control group had a total of 37% mitotic chromosomal abnormalities, which included 24% structural abnormalities and 13% disruptive abnormalities. Conversely, On the other hand, the treatment group (who received a 10% Marigold leaf extract) exhibited a total of 53.00% mitotic aberrations, of which 25.00% were structural and 28.00% were disruptive. Compared to the control group, this percentage of anomalies was substantially ( $P < 0.01$ ) higher. 10% of marigold leaf extract may be genotoxic.

**Keywords:** Bone Marrow, Mitotic disruptive Abnormalities, Mitotic Structural Abnormalities, Tagetes erecta.

## INTRODUCTION

*Tagetes erecta*, a popular garden plant, is a common aromatic annual herb with medicinal potential. They generate Tagetes oil, an extremely aromatic essential oil that is mostly used in high-end perfumery according to [1],[2]. For a million years, traditional medicine has made use of *T. erecta*, a medicinal herb. In other words, interest in studying their effects has grown within the past few years. Members of the Tagetes genus, particularly in the growing of vegetables, are utilized in many publications describing organic agriculture because of their bactericidal, nematocidal, fungicidal, and insecticidal properties [3],[4],[5],[6],[7].

It is used to treat colds, respiratory ailments, headaches, and rheumatoid arthritis. [8],[9]. The antibacterial, antimicrobial, antiparasitic, antiseptic, and antispasmodic properties of *T. erecta* essential oil [10] wounds, kidney problems, muscular aches, ulcers, and antioxidant piles. Boils and carbuncles are treated externally with the pulverized leaves. It is said to possess analgesic, antimycotic, and antioxidant properties [11],[12]. It also exhibits anti-inflammatory, anti-diabetic, anti-depressant, antibacterial and insecticidal, activity [9], [13].

*T. erecta* is used as a food colour in the African countries because of its richness in carotenoid leutin [14]. The Tagetes genus of plants is well-known for its analgesic, antispasmodic, immune-stimulating, laxative, and anti-helminthic qualities [15]. A scientific study has found that many of the herbs used in traditional

and folk medicine have the potential to be toxic, mutagenic, and carcinogenic [16],[17],[18]. Through both in vitro and in vivo testing, "*T. erecta*" leaf extract was thought to have anticancer potential [19].

Therefore, present study aims to evaluate the genotoxic effect of high dose leaf extract of *Tagetes erecta* on mitotic chromosome in mice.

**MATERIALS AND METHODS:**

Four to six weeks two groups of albino Swiss mice were created: treatment and control. There were eight mice in each group. Table-1, shows that the first group was treated as the control and the second group received 10% concentration (M) of marigold leaf extract.

Slides were made and animals slaughtered after 35 days. Bone marrow cells' mitotic chromosomes were generated using the Colchicine-hypotonic-aceto-alcohol-flame-drying-Giemsa staining method [20]. All experimental variant's chromosomal aberrations were examined for the presence of structural and mitotic disruptive alterations.

Table- 1.

Group	Treatment	Symbol	Dose
1.	Control	C	No treatment of Marigold leaf extract
2.	Marigold leaf extract	M	Treated with 10% Marigold leaf extract

**SLIDE SCREENING:**

Three hundred or more cells were randomly checked under a light microscope. At the metaphase stage, two different kinds of aberrations were seen: structural and mitotic disrupting [21]. In Mitotic Structural Abnormalities: Chromatid Gap, Iso- Chromatid Gap, Chromatid Break, Iso- Chromatid Break, Acentric Chromosome, Ring Chromosome, Minute fragments, Metacentric Chromosome. Mitotic disruptive Abnormalities: Polyploidy, Hypoploidy, Clumping, Stickiness and Pulverisation.

**STATISTICAL ANALYSIS:**

The data are expressed as Mean ± SE and statistical analysis was performed by using t-test.

**RESULT:**

**Effect of 10% Marigold leaf extract (M):**

The number of total Mitotic chromosome Abnormalities were 37% in which 24% mitotic structural abnormalities and 13% were mitotic disruptive abnormalities in control group. Whereas, in treated group (10% Marigold leaf extract) the number of total Mitotic chromosome Abnormalities were 53.00% in which mitotic structural abnormalities was 25.0% and mitotic disruptive abnormalities were 28.0%. This percentage of abnormalities was significantly (P<0.01) higher than control group (Table- 2, Fig. 1). The different types of structural and mitotic disruptive changes were shown in Table- 3 and 4.

**Table- 2 Effect of Marigold (10% Leaf extract) on mitotic cells.**

Exp. Variant.	Total No of Cells Score d (N)	Mitotic Structural Abnormalities		Mitotic disruptive Abnormalities		Total Structural Abnormalities	
		No of Abnormalities	% ± S.E.	No.Abnormalities	% ± S.E.	Total No of Abnormalities	% ± S.E.
Cont.	300	72	24.00±2.47	39	13.00±1.94	111	37.00±2.79
10% Marigold	300	75	25.0±2.50	38	28.0±2.59*	113	53.0±2.88*

\*- Indicate significant (P<0.01) difference with control.

**Table-3. No of different types of Structural Changes abnormalities in bone marrow metaphase chromosome of mice treated with Marigold 10% leaf extract.**

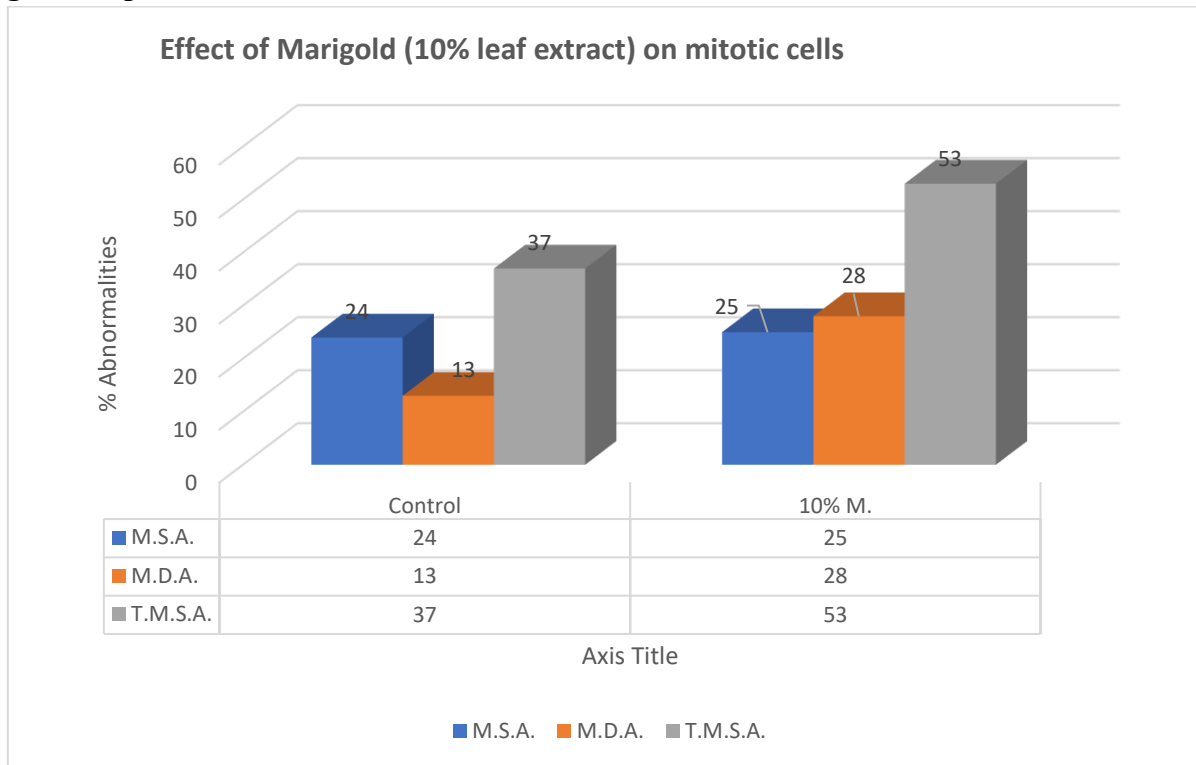
Exp. Variant.	Screen Cells	Structural Changes								Total Structural Changes
		CG	Iso CG	CB	Iso CB	Acen	RC	Min	Met	
Cont.	300	6	2	14	10	28	4	7	1	72
T. 10% M.	300	4	5	13	10	33	6	2	2	75

**Table-4. No of different types of Mitotic disruptive Changes abnormalities in bone marrow metaphase chromosome of mice treated with Marigold 10% leaf extract.**

Exp. Variant.	Screen Cells	Mitotic disruptive changes					Total Mitotic disruptive changes
		Poly	Hypo	Clump	Stick	Pulev	
Cont.	300	6	28	3	2	0	39
T.10% M.	300	2	20	12	2	2	38

*Keyword:* T.- Treated, Cont.- Control, M- Marigold, CG-Chromatid Gap, Iso CG- Iso-Chromatid Gap, CB- Chromatid Break, Iso CB- Iso- Chromatid Break, Acen-Acentric Chromosome, RC- Ring Chromosome, Min- Minute fragments, Met- Metacentric, Poly- Polyploidy, Hypo- Hypoploidy, Clump- Clumping, Stick- Stickiness, Pulev- Pulverisation.

### Histogram Representation



**Figure-1: Histogram showing Mitotic cell (10%) Leaf extract Treated group of Marigold.**

M.S.A.-Mitotic Structural Abnormalities, M.D.A.- Mitotic disruptive Abnormalities, T.M.S.A.- Total Mitotic Structural Abnormalities

When considered concentration 10% of Marigold leaf extract (Table- 2) and his Histogram Figure-1.

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