

Evaluation of Genotoxic Effect of Marigold (*Tagetes erecta*) Leaf Extract on Mitotic Chromosome

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ABSTRACT

In this work, mitotic aberrations were examined in order to assess the potential genotoxic effects of 5% Marigold leaf extract. To determine any variations in the occurrence of mitotic chromosomal abnormalities, a control group and a treated group exposed to 5% Marigold leaf extract were compared. A total of 37% mitotic chromosomal abnormalities, including 24% structural abnormalities and 13% disruptive abnormalities, were present in the control group. In contrast, the treated group showed a total of 31.33% mitotic chromosomal abnormalities, of which 15.67% were both mitotic structural and disruptive abnormalities. There was no discernible change in the percentages of mitotic chromosomal anomalies between the control and treatment groups, according to statistical analysis. This implies that 5% Marigold Leaf Extract does not cause a genotoxic reaction, indicating its safety.

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

INTRODUCTION:

The popular garden plant *Tagetes erecta* has medicinal properties and is a common scented annual herb. They produce *Tagetes* oil, a highly aromatic essential oil that is mostly utilized in the creation of premium perfumes. According to [1],[2]. The medicinal plant *Tagetes erecta* has been used in traditional medicine for a million years. Simply put, research into their effects has become increasingly popular in recent years. Due to its bactericidal, nematocidal, fungicidal, and insecticidal effects, members of the *Tagetes* genus are used in many works to describe organic agriculture, particularly in the culture of vegetables. [3],[4],[5],[6],[7].

It is used to treat rheumatic pain, headaches, colds, and respiratory illnesses. [8],[9] due to *Tagetes erecta* essential oil's anti-biotic, anti-microbial, anti-parasitic, anti-septic, and antispasmodic effects [10] and antioxidant piles, kidney, troubles, muscular pain, ulcer and wounds. The pounded leaves are used as an external application to boils and carbuncles. It is reported to have antioxidant, antimycotic, analgesic activity [11],[12]. It also exhibits anti-inflammatory, anti-diabetic, anti-depressant, antibacterial and insecticidal, activity [9], [13].

Tagetes erecta is used as a food color in the African countries because of its richness in carotenoid leutin [14]. Species of the *Tagetes* genus is popular for having medicinal properties, such as analgesic, antispasmodic, immune stimulant, laxative and anti-helminthic [15]. Numerous herbs used in traditional and folk medicine are potentially poisonous, mutagenic, and carcinogenic, according to scientific study.

[16],[17],[18]. Leaf extract of "*Tagetes erecta*" (TE) was regarded as an anticancer potential via in vitro and in vivo tests [19].

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

MATERIALS AND METHODS:

4-to-6-week Albino Swiss mice were divided into two groups: control and treatment. Each group contained eight mice. First group were control, the second group were treated with Marigold leaf extract 5% concentration (M) (Table- 1). After 35 days, animals were sacrificed and slides were prepared. The mitotic chromosome of bone marrow cell were prepared by the Colchicine- hypotonic – aceto-alcohol - flame drying-Giemsa staining technique [20]. The chromosomal abnormalities were screened for the incidence of structural and mitotic disruptive changes in each experimental variant.

Table- 1.

Group	Treatment	Symbol	Dose
1.	Control	C	No treatment of Marigold leaf extract
2.	Marigold leaf extract	M	5%

SLIDE SCREENING:

Approximately 300 cells were screened in a random fashion under light microscope. Two types of aberrations structural and mitosis disruptive were observed at metaphase stage [21]. Structural aberrations include Chromatid Gap, Iso-Chromatid Gap, Chromatid Break, Iso- Chromatid Break, Acentric Chromosome, Ring Chromosome, Minute fragments, Metacentric, Rabbit ear Chromosome and mitotic disruptive chromosomal abnormalities includes Polyploidy, Hypoploidy, Clumping, Stickiness and Pulverisation.

STATISTICAL ANALYSIS:

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

RESULT:

Effect of 5% 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 (5% Marigold leaf extract) the number of total Mitotic chromosome Abnormalities were 31.33% in which mitotic structural abnormalities was 15.67% and mitotic disruptive abnormalities were 15.67%. This percentage of abnormalities was not significantly different than control group (Table- 2, Fig. 1). The different types of structural and mitotic disruptive changes were shown in Table- 3.

The result, thus obtained showed that 5% Marigold leaf extract was not genotoxic.

Table- 2 Effect of Marigold (5% Leaf extract) on mitotic cells.

s	Total No of Cells Scored(N)	Mitotic Structural Abnormalities		Mitotic disruptive Abnormalities		Total Structural Abnormalities	
		No of Abnormalities	% ± S.E.	No of 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
5% Marigold	300	47	15.67±2.10	47	15.67±2.10	94	31.33±2.68

Table-3 No of different types of abnormalities in bone marrow metaphase chromosome of mice treated with Marigold 5% leaf extract.

Exp. Variant.	Screen Cells	Structural Changes									T O T A L	Mitotic disruptive changes					T O T A L
		CG	Iso CG	CB	Iso CB	Acen	RC	Min	Met	RE		Hypo	Clum	Stick	Pul	Hypo	
Cont.	300	6	2	14	10	28	4	7	1	0	72	6	28	3	2	0	39
T.5% M.	300	2	1	13	3	21	2	3	2	0	47	2	25	12	5	3	47

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, RE- Rabbit ear Chromosome and mitotic disruptive chromosomal abnormalities, Pol- Polyploidy, Hypo- Hypoploidy, Clum- Clumping, Stick- Stickiness, Pul- Pulverisation.

Histogram Representation

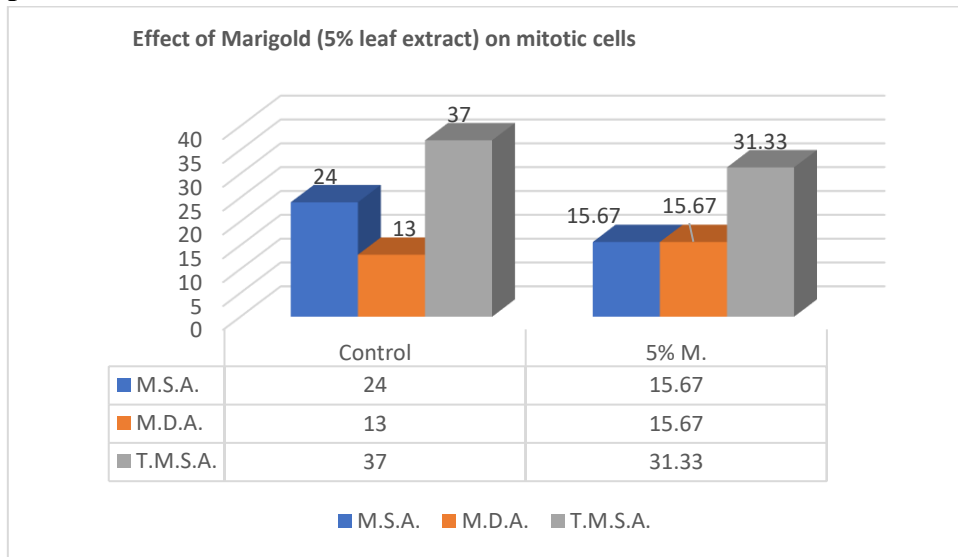


Figure-1: Histogram showing Mitotic cell (5%) Leaf extract Treated group of Marigold.

When considered concentration 5% of Marigold leaf extract (Table- 2) and his Histogram Figure-1.

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