"Multidisciplinary Approach towards Indian Knowledge System"

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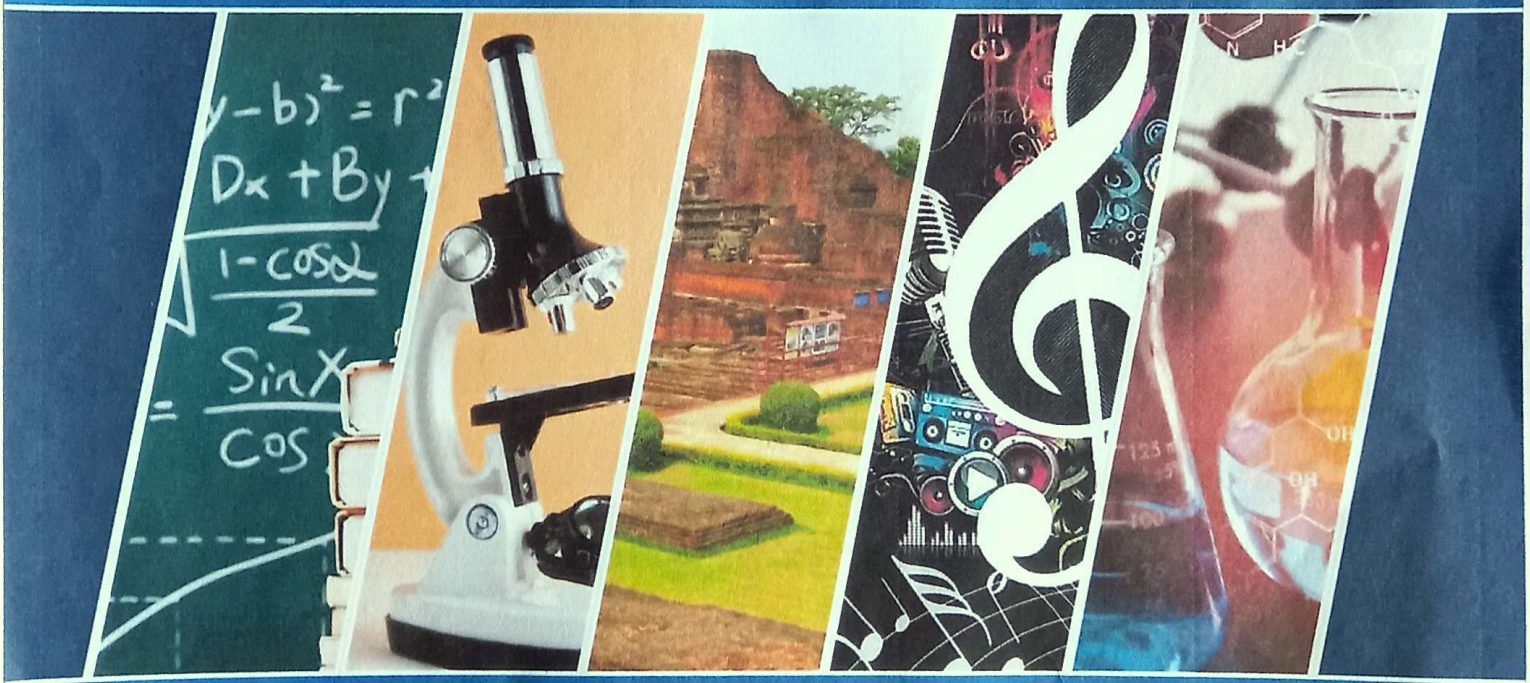

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Antigenotoxic Potential of Mucilage Extracted from Medicinal Plants

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Abstract:

Due to the compounds' affinity for mammalian systems, the *Allium cepa* assay is frequently employed to assess the antigenotoxicity of the substances. Mucilage was extracted from the leaves of *Aegle marmelos* and the fruits of *Bridelia scandens* for this investigation. The antigenotoxic potential of the mucilage at various concentrations was evaluated in comparison to pure water as a negative control and mercuric chloride as a positive control. The *Allium cepa* root tips were treated with mercuric chloride and mucilage aqueous extracts pre-, post-, and simultaneously. Compared to mercuric chloride, it was found that pre-, post-, and simultaneous treatments of the mucilage aqueous extract stimulated the mitotic index. As a result, the mucilage extracts from the fruits of *Bridelia scandens* and the leaves of *Aegle marmelos* have the potential to be antigenotoxic against the chromosomal aberrations in *Allium cepa* caused by mercuric chloride. These extracts can also be safely used as a coating for different kinds of pharmaceutical tablets and as a tool to counteract the genotoxic effects of various hazardous chemicals and environmental pollutants.

Keywords: Fruits of *Bridelia scandens*, Leaves of *Aegle marmelos*, Chromosomal aberration, Mitotic index.

Introduction:

The term "genotoxicity" describes a substance's capacity to harm live cells' DNA, or genetic material. The DNA may undergo structural changes, chromosomal abnormalities, or mutations as a result of this damage. Chemicals, radiation, and some biological agents are examples of genotoxic agents. [1]. In survival scenarios, the impact on *Allium* chromosomal irregularity (CA) could serve as a useful test for the universal detection of genotoxin.[4,5] due to the greater connection of the *Allium cepa* test or experiment with mammalian systems. [4]. Additionally, mixed role oxidases like hepatocytes from mammals are present in the root cells of *A. cepa*, and they can drive promutagens to mutagens. [6). Herbal remedies have been made from medicinal plants for ages, and these plants have been beneficial in treating and preventing various forms of human inflammation.[2]. In addition to their use in herbal medicine, medicinal plants are a rich source of biologically active compounds, some of which are utilized to make stock modish stimulants [3]. Flavonoids and organosulfur compounds, which are abundant in mucilaginous plants, may be able to counteract or lessen the harmful effects of genotoxic chemicals.

Material and Method:

The leaves of *Aegle marmelos* and the fruits of *Bridelia scandens* were gathered from several areas within the Kolhapur District. The procedure of [7] was followed to extract the mucilage content, and the amount of mucilage recovered was noted. The anti-genotoxic potential of a mucilaginous plant extract was assessed in four distinct trials conducted in identical settings. 30ml of distilled water was used to soak three grams of oven-dried mucilage powder from *Bridelia scandens* fruits and *Aegle marmelos* leaves for a whole day at room temperature (27–30°C). After being filtered via Whatman filter paper, the extract was used as a stock and refrigerated for storage. Onion (*Allium cepa*) bulbs of uniform size were purchased from the nearby market. Nine identically sized commercial bulbs (3–4 g) were utilized for each treatment. Antigenotoxicity of mucilaginous plant extract samples was carried out by using method of [8].

Sr. No	Concentration	Continue extract	I	II	III

The mitotic index (MI) was determined by using formula,

Mitotic index (MI) = Number of cells in mitosis X 100

Total number of cells analysed

Different chromosomal aberrations were characterized and percent chromosomal appearing frequency with and without extract in cells were calculated.

Result and discussion

In comparison to the positive control, the mitotic index increased before, after, and concurrently with mercuric chloride and mucilage extract treatment (Table No. 1). The effects of 0.5 and 1% mucilage extracts reduced the clastogenic and physiological abnormalities.(Table 2.). *Aegle marmelos* extract lowers physiological and clastogenic aberration in simultaneously treated roots, although pretreatment of *Bridelia scandens* mucilage resulted in a more significant percent suppression of chromosomal aberrations (Table No-3). A growing number of people are looking for and using universal plant items to counteract genotoxic or carcinogenic effects. Usually employed, the antigenotoxic assay can demonstrate the protective effect against reagent and additional material exchanges in the form of hereditary material. [9].

Antigenotoxicity activity

Table No 1. Effect of Pre, Post and Simultaneous treatments of Mercuric chloride and aqueous extracts of fruits of *Bridelia scandens*, Leaves of *Aegle marmelos*on Mitotic index in *Allium cepa.*

1	Negative control			68.18	
2	Posiive control			55.25	
		Brideliascandens(fruits)			
1	0.50%	75.93	56.84	83.86	80.41
2	1%	70.44	69.07	81.41	81.52
		Aegle marmelos(leaves)			
1	0.50%	83.19	86.49	92.49	86.32
2	1%	89.93	63.39	85.46	81.03

I-Pre, II-Post and III- Simultaneous treatments.

NC- Negative control (Distilled water)

PC- Positive control (0.75 ppm Mercuric chloride)

Table 2. Effect of Pre, Post and Simultaneous treatments of Mercuric chloride on extracts of fruits of *Bridelia scandens*, Leaves of *Aegle marmelos*on physiological and clastogenic aberrations in root tip cells of *Allium cepa*

	NC	PC	0.5% Treatment				1% Treatment			
			Contine extract	I	II	III	Contine extract	I	II	III
Physiological aberrations (PA)			*Bridelia scandens*							
C-Mito	2	6	4	9	4	3	4	2	4	2
Delayed anaphase	3	3	2	5	-	2	1	4	2	1
Laggards	3	5	3	7	3	2	3	1	3	5
Stickiness	-	5	5	1	13	9	7	5	5	2
Vagrants	-	6	4	-	-	2	2	3	-	1
Total PA	8	25	18	22	20	18	17	15	14	11
Clastogenic aberrations (CA)										
Bridges	2	5	3	3	5	2	4	2	4	2
Rings	1	3	1	2	-	1	1	3	3	1
Breaks	2	9	4	5	3	3	3	4	2	3
Total CA	5	17	8	10	8	6	8	9	9	6
Total abberations	13	42	27	25	19	22	25	22	25	14
Physiological aberrations (PA)			*Aegle marmelos*							

C-Mito	1	4	2	3	5	2	4	1	7	2
Delayed anaphase	2	2	2	2	-	1	1	-	5	3
Laggards	2	3	-	5	4	1	3	4	2	6
Stickiness	-	4	8	4	3	4	-	6	6	4
Vagrants	-	3	1	1	4	1	5	2	5	-
Total PA	5	16	13	15	16	9	13	13	25	15
Clastogenic aberrations (CA)										
Bridges	2	5	3	1	5	2	2	5	4	5
Rings	1	3	1	-	-	-	1	2	2	-
Breaks	2	9	2	6	1	4	2	5	5	1
Total CA	4	17	6	7	6	6	5	12	11	6
Total abberations	13	42	20	25	19	18	21	27	25	33

I-Pre, II-Post and III- Simultaneous treatments.

NC- Negative control (Distilled water)

PC- Positive control (0.75 ppm Mercuric chloride)

Table No-3 Effect of Pre, Post and Simultaneous treatments of ethanolic extracts of fruits of *Bridelia scandens*, Leaves of *Aegle marmelos* on percent inhibition of genotoxicity induced by Mercuric chloride in root tip cells of *Allium cepa*.

Sr No	Types of Abberent cells	NC	PC	0.5%				1%			
Bridelia scandens											
				Continue extract	I	II	III	Continue extract	I	II	III
1	No of cells with (PA)	8	25	18	21	19	17	16	14	13	10
2	PI of PA			41.17	17.64	29.41	41.17	47.05	58.82	64.70	82.35
3	No of cells with (CA)	5	17	9	12	14	18	10	11	7	8
4	PI of CA			66.66	41.66	25	-	58.33	50	83.33	75
5	(PA± CA)	13	42	27	34	34	36	37	26	21	19
6	PI of (PA± CA)			50.62	25.48	24.48	21.68	15.24	52.13	71.31	78.21
Aegle marmelos											
1	No of cells with (PA)	8	25	17	19	18	9	13	13	27	15
2	PI of PA			47.05	35.29	41.17	94.11	70.58	70.58	-	58.82
3	No of cells with (CA)	5	17	12	9	5	8	5	6	13	0

4	PI of CA			41.66	66.66	100	75	100	91.66	33.33	-
5	(PA± CA)	13	42	29	28	23	17	18	19	40	15
6	PI of (PA± CA)			42.82	46.27	60.41	31.27	81.60	80.21	6.89	90.10

I-Pre, II-Post and III- Simultaneous treatments, PI- Percent inhibition, PA-Physiological aberrations, CA- Clastogenic aberrations, PI=a-b/a-c x 100. Where a - number of aberrant cells induced by Positive control, b– number of aberrant cells induced by mucilaginous plant extract and c – number of aberrant cells induced by negative control.

Conclusion

The results of this investigation showed that mucilage pre-, post-, and simultaneous treatments with aqueous extracts increased the mitotic index and decreased clastogenic and physiological abnormalities. This suggests that the mucilage of *Bridelia scandens* fruits and *Aegle marmelos* leaves exhibited antigenotoxic capability against *Allium cepa* mercuric chloride-induced aberration. This may be the result of chromosomal aberration correction. Consequently, mucilage, as a polymer, can be effectively utilized to coat pharmaceutical tablets, ideally for the treatment of cancer. Additionally, this mucilage might be employed as a tool to lessen the genotoxic effects of different dangerous substances and environmental contaminants.

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