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Research Article

Exploring The Cytoprotective Effect of Phyllanthus Emblica (Amla Leaf)

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ABSTRACT

Phyllanthus emblica (amla) leaf extract's cytoprotective ability is assessed in this work using the in vitro MTT test on L929 fibroblast cell lines. This study examines the lesser-known leaf extract of amla for its capacity to maintain cell viability under cytotoxic stress, despite the fruit's well-established therapeutic qualities. High cell viability was sustained at escalating concentrations (20–100 µg/mL), indicating the extract's strong cytoprotective action. A protective effect against oxidative and toxic insults was demonstrated by the cell viability of 72.30 percent at the highest tested concentration of 100 µg/mL Alkaloids, glycosides, flavonoids, tannins, and saponins—all of which are known to support cytoprotection—were verified by phytochemical analysis. These results point to the possibility for amla leaves to be developed as natural therapeutic agents and support their traditional medicinal use.

INTRODUCTION

When a chemical can shield cells against harmful substances or stressors such oxidative damage, toxins, and inflammation, it is considered to have a cytoprotective activity. Because it is crucial in preventing cell damage, this protective mechanism is of great importance to the development of medications aimed at protecting organs and tissues [1] . The numerous bioactive compounds present in amla (Phyllanthus emblica) leaves, including ascorbic acid, flavonoids, and polyphenols, are well known for their potent cytoprotective properties [2]. Amla leaves' antioxidant activity is crucial for scavenging reactive oxygen species (ROS) and free radicals, which is necessary to preserve cellular integrity. Since chronic inflammation is known to contribute to the genesis of certain diseases, amla leaves' anti-inflammatory properties also aid in reducing it [3]. Amla leaves also increase the activity of natural antioxidant enzymes like catalase and superoxide dismutase,

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which are crucial for avoiding oxidative stress [4]. Recent studies suggest that amla leaves offer protection against toxins, DNA protection, and mitochondrial stability, which may make them useful in medicine [5]. Though intriguing in vitro and in vivo data points to the cytoprotective efficacy of amla leaves in human health applications, additional clinical research is needed to confirm this [6].

2.MATERIALS AND METHODS

2.1 Plant Material and Extraction

Fresh amla leaves were gathered, dried in the shade, and ground into a powder. For six hours, 10 g of the powdered material was extracted using Soxhlet with 250 mL of ethanol. Before being used, the extract was kept at 4°C after being filtered and concentrated by rotary evaporation [7].

2.2 Cytoprotective Assay (MTT Assay)

For twenty-four hours, L929 cells (1×10^4 cells/ml) were incubated in culture media at 37°C with 5% CO_2. Following 96-well plate seeding (100 µl/well), cells were exposed to samples at doses of 20, 40, 60, 80, and 100 µg/ml [8]. 20 µl of MTT reagent (5 mg/ml). At 37°C, plates were incubated for four hours[9]. Under a microscope, formazan crystals produced by living cells were seen [10]. Following the medium's removal, 200 µl of DMSO was added, incubated for ten minutes, and the absorbance at 550 nm was measured [11].

3. RESULTS

The MTT test was used to evaluate the cytoprotective effect on L929 fibroblast cells treated with varying doses of the extract (20–100 µg/mL) [12]. High cell viability in amla leaf extract suggested good cytoprotection and low cytotoxicity [13].Cell vitality at 100µg/mL was 72.30 percent, but cells treated with normal ethanol only displayed 16.85% viability. The extract showed a protective effect against oxidative stress-induced cell death by preserving over 70% cell viability even at higher concentrations.

3.1 Observation Table

Table No.1

SR NO	SAMPLE CODE	Conc. (µg/ml)	OD			Mean	% Of Inhibition	% Of Viability	IC50 (µg/ml)
1	Control		1.534			-	-	-	-
2	Standard	20	1.305	1.304	1.303	1.304	14.88%	85.12%	59.68
	Ethanol	40	0.820	0.824	0.820	0.821	46.40%	53.6%	
		60	0.762	0.760	0.762	0.761	50.32%	49.68%	
		80	0.362	0.360	0.361	0.361	76.43%	23.57%	
		100	0.259	0.258	0.258	0.258	83.15%	16.85%	
3	Amla Leaf	20	1.362	1.365	1.365	1.364	11.08%	88.92%	NE
		40	1.302	1.301	1.303	1.302	15.12%	84.88%	
		60	1.256	1.257	1.254	1.255	18.18%	81.82%	
		80	1.198	1.195	1.196	1.196	22.03%	77.97%	
		100	1.109	1.107	1.111	1.109	27.70%	72.30%	

3.2 Graphical Data

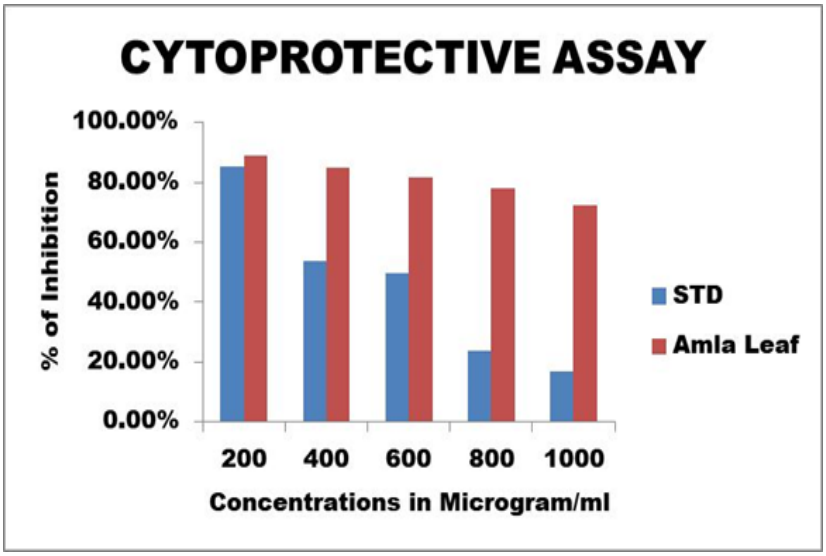

Fig.No.1: Graph

3.3 Images of the Activity

Fig.No.2 Amla Leaf Tif.

Fig No.3Control Tif.

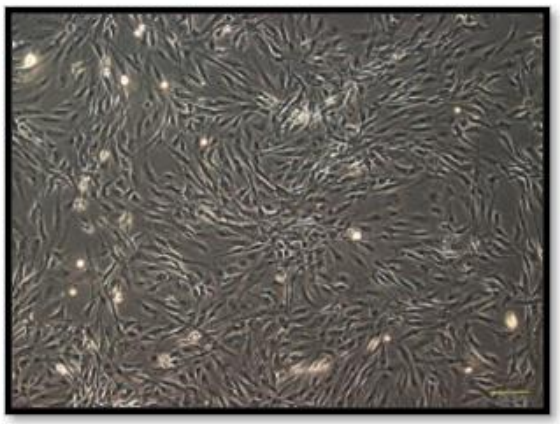

Fig No.4 Standard leaf Tif.

4.DISCUSSION

Using well-established in vitro techniques, the current study sought to assess the cytoprotective potential of Phyllanthus emblica (amla) leaf extract. According to the findings, amla leaves have a potent cytoprotective effect, which validates their historic usage in herbal therapy. Additionally, the MTT assay's evaluation of the cytoprotective action on L929 fibroblast cells produced encouraging findings. At the maximum concentration (100 µg/mL), the extract maintained high cell viability (72.30%), suggesting a protective action against chemical and oxidative stress. The normal ethanol-treated group, on the other hand, only displayed 16.85% viability, indicating that amla extract is not only non-toxic but also promotes cell survival.

5. CONCLUSION

According to the current study, the high concentration of bioactive substances in Phyllanthus emblica (amla) leaf extract, such as polyphenols, flavonoids, tannins, and ascorbic acid, results in notable cytoprotective effects. Comparing samples treated with the amla leaf extract to the standard medication ethanol, the results indicated great cell viability, demonstrating the extract's efficacy in shielding cells from oxidative damage. These results imply that the extract has the capacity to improve cellular integrity and encourage survival under stressful situations. It suggests the cytoprotective characteristics of the sample.

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