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Research Article

In Vitro Assessment of Cytoprotective Activity of Buchanania Lanzan (Chironji Seeds)

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ABSTRACT

Ayurvedic and Unani systems have long utilized Buchanania lanzan, often known as chironji, as a medicinal herb because of its therapeutic qualities. Using an in vitro MTT test, this study assesses the cytoprotective efficacy of ethanolic extracts of chironji seeds on oxidatively stressed L929 fibroblast cells. While co-treatment with the seed extract sustained cell viability in a dose-dependent way, hydrogen peroxide-treated cells displayed decreased viability. Viability was high at 84.88% at 100 µg/mL, whereas it was 99.09% at 20 µg/mL. These findings show that B. lanzan extract can reduce oxidative stress-induced cellular damage, indicating that it may be used in formulations to treat conditions linked to oxidative stress. Using the MTT test, cytoprotective efficacy was evaluated in L929 fibroblast cells exposed to oxidative stress. Protective actions against cellular stress were demonstrated by the extract's enhancement of cell viability and mitigation of oxidative damage. These components are known to play a role in the cytoprotective mechanisms that the study found. They may help fight diseases linked to oxidative stress if they are added to nutraceuticals or medicinal formulations. This study not only supports conventional wisdom but also offers empirical evidence for the therapeutic benefits of chironji seeds in contemporary medical settings.

INTRODUCTION

Buchanania lanzan Spreng, commonly known as chironji and a member of the Anacardiaceae family, is a tree predominantly found in the arid and semi-arid regions of India. In traditional medical systems such as Ayurveda and Unani, it is highly valued, and different sections of the plant are used for its medicinal qualities[1]. The seeds are stimulants and utilized in calming formulations, while the leaves have been shown to have antidiabetic, antihyperlipidemic, and antioxidant properties[2]. The leaves have yielded bioactive flavonoids, including Myricetin 3'-rhamnoside-3-galactoside, as a result of phytochemical studies. The pharmacological properties of the bark, fruits,

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rhizomes, and seed oil include antihypertensive, anticancer, analgesic, and skin-protective properties[3]. With its advantageous fatty acid esters, such as oleic, linoleic, and stearic acids, the seeds are especially rich in edible oil. Because they contain a lot of polyphenols, flavonoids, tannins, and saponins, chironji seeds have strong antioxidant properties that help neutralize reactive oxygen species and lessen oxidative stress[4]. This antioxidant potential has cytoprotective effects, improving cell viability, stabilizing membranes, protecting DNA, and reducing inflammation in addition to supporting cellular health. These characteristics show how chironji seeds can be used to create therapeutic agents and nutraceuticals that target illnesses linked to oxidative stress[5].

MATERIAL AND METHOD

2.1 Plant Preparation and Extract Preparation

The chironji seeds were cleaned, dried in the shade, and then milled into a powder. Using ethanol, about 30 g of powdered seeds were extracted over 6–8 hours in a Soxhlet system[6]. The crude extract, which was kept at 4°C until it was needed, was obtained by filtering and condensing the extract using a rotary evaporator[7].

1.2 Cell Line and Culture Conditions

L929 mouse fibroblast cells were cultured in DMEM supplemented with 10% FBS and 1% antibiotic solution in a humidified CO_2 incubator at 37°C with 5% CO_2[8].

1.3 Cytoprotective Assay Using MTT

After being cultivated at a density of 1×10^4 cells/ml, L929 cells were incubated for 24 hours at 37°C with 5% CO_2. In triplicate, cells were seeded into 96-well plates and exposed to test substances at different doses (20–100 µg/ml)[9] The initial wells were supplemented with 0.2% DMSO in PBS. 20 µl of MTT reagent (5 mg/ml) was added after the mixture had been incubated for 24 hours, and it was then incubated for 4 hours[10]. 200 µl of DMSO was used to dissolve the formazan crystals produced by live cells, and they were then incubated at 37°C for 10 minutes. To evaluate cell viability, absorbance was measured at 550 nm using a microplate reader[11].

2. RESULT

Chironji seed extract's cytoprotective properties were evaluated using the MTT test on oxidatively stressed L929 fibroblast cells. After treating the cells for 24 hours with different concentrations of the extract (20, 40, 60, 80, and 100 µg/ml), the vitality of the cells was assessed[12]. According to the findings, the chironji seed extract considerably increased cell viability in a way that was dependent on concentration. Cell viability was 99.09% at 20 µg/ml and progressively dropped to 84.88% at 100 µg/ml, however significant cytoprotection was still maintained in comparison to stressed control cells[13]. Cells treated with ethanol, a common cytotoxic agent, on the other hand, showed a significant decrease in viability, reaching 16.85% at 100 µg/ml[14]. This proved that chironji seed extract offered protection against oxidative stress-induced cellular damage[15].

3.1 Observation Table

Table No. 1

Sr No	Sample Code	Co Nc. (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%**	

	Ethanol	**40**	0.820	0.824	0.820	**0.821**	**46.40%**	**53.6%**	**59.68**
		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	Chironji Seeds	**20**	1.520	1.521	1.520	**1.520**	**0.91%**	**99.09%**	**NE**
		40	1.495	1.496	1.496	**1.495**	**2.54%**	**97.46%**	
		60	1.462	1.463	1.464	**1.463**	**4.62%**	**95.38%**	
		80	1.362	1.365	1.365	**1.364**	**11.08%**	**88.92%**	
		100	1.302	1.301	1.303	**1.302**	**15.12%**	**84.88%**	

3.2Graphical Data

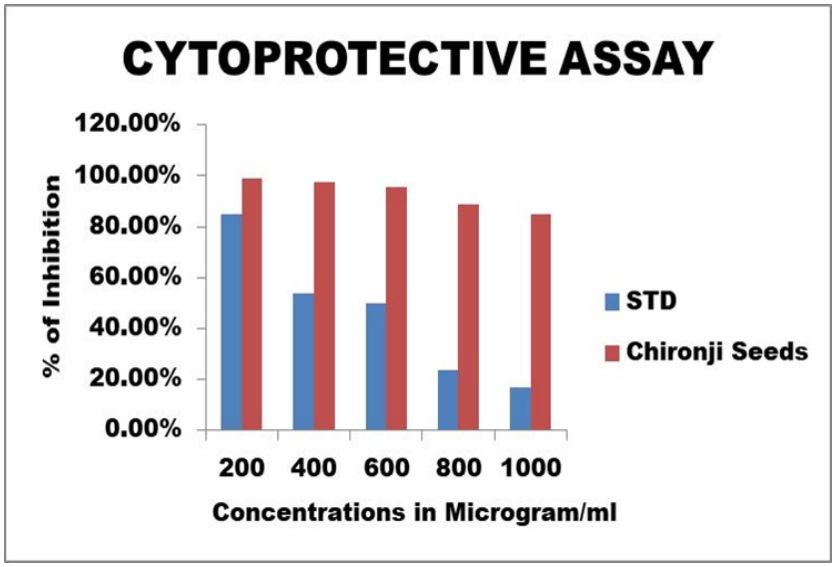

Fig No. 1 Graph

3.3 Images of the Activity

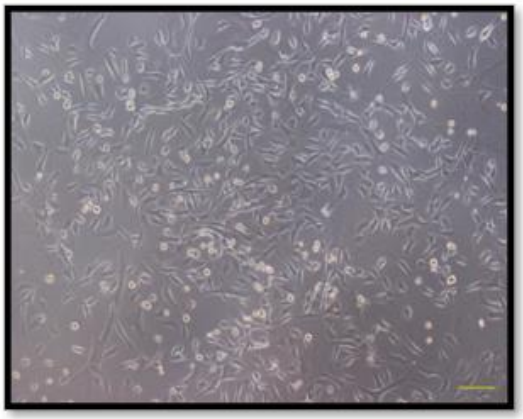

Fig No. 2 SEEDS. If

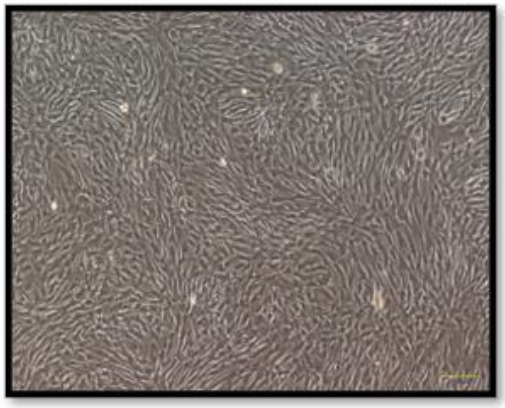

Fig No. 3 CONTROL.tif

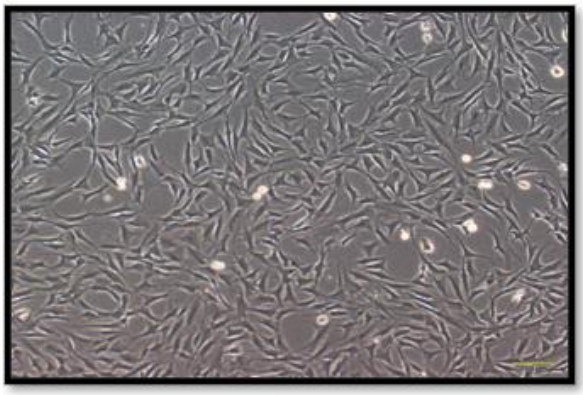

Fig No. 4 STANDARD.tif

DISCUSSION

In vitro tests were used in this work to evaluate the cytoprotective ability of Buchanania lanzan (chironji) seed extract. Traditional medical systems like Ayurveda and Unani have long recognized the medicinal benefits of chironji seeds, especially in the treatment of inflammatory, digestive, and skin ailments. Their cytoprotective effects in particular have not received much scientific support, despite their historic significance. This study helps close that gap by using standardized laboratory procedures to verify the chironji seeds' potential for therapeutic use.

The MTT assay was used to evaluate the cytoprotective activity of the chironji seed extract on L929 fibroblast cell lines, and the results were encouraging. Cells treated with the seed extract after being exposed to hydrogen peroxide-induced oxidative stress showed a dose-dependent increase in cell viability. The extract had substantial protective effects against oxidative damage, preserving 84.88% of cell viability at a dosage of 100 µg/ml. By scavenging reactive oxygen species (ROS), stabilizing cellular membranes, and maybe increasing endogenous antioxidant enzyme activity, the extract most likely demonstrated its protective effects.

CONCLUSION

This study was conducted to assess the cytoprotective properties of Buchanania lanzan (also called chironji) seed extract, which has long been used for medicinal purposes in Ayurvedic

and Unani medicine. The research findings provide important new information on the possible medical benefits of chironji seeds, especially in preventing cellular damage caused by oxidative stress and enhancing well-being. The seed sample exhibits a high percentage of viability against the L929 cell line at varying concentrations when compared to the standard medication, ethanol. It suggests the cytoprotective characteristics of the sample. Additionally, the results of the study support conventional wisdom regarding the medicinal uses of chironji seeds, particularly their potential to treat a range of illnesses associated with inflammation and oxidative stress. The study concludes by highlighting the potential of Buchanania Lanzan seeds as a naturally occurring source of cytoprotective compounds. These discoveries offer up new study directions to investigate the potential benefits of chironji seeds in the creation of herbal medications, nutritional supplements, and functional foods, as well as provide important scientific evidence in favor of their traditional therapeutic usage.

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REFERENCES

1. Warrier PK, Nambiar VPK, Ramankutty C. Indian Medicinal Plants: A Compendium of 500 Species. Vol. 1. Chennai: Orient Longman; 1993.
2. Suryawanshi AS, Malpathak N. Pharmacognostic and phytochemical investigation of Buchanania lanzan Spreng. Indian J Nat Prod Resour. 2011;2(3):362–7.
3. Bhatia H, Sharma YP, Manhas RK, Kumar K. Ethnomedicinal plants used by the villagers of district Udhampur, J&K, India. J Ethnopharmacol. 2014;151(2):1005–18.
4. Choubey S, Varma A, Kumar V, Bisen PS. Nutritional and phytochemical profiling of Buchanania lanzan Spreng seeds: a potential source of functional food. Food Sci Hum Wellness. 2014;3(3-4):162–8.
5. Meena AK, Rao MM, Kumari S, Panda P, Preeti K, Patra A. Evaluation of antioxidant and cytoprotective activity of Buchanania lanzan Spreng seeds. Asian Pac J Trop Biomed. 2012;2(1):S169–S175.
6. Sakat SS, Juvekar AR, Gambhire MN. In-vitro antioxidant and anti-inflammatory activity of methanol extract of Buchanania lanzan Spreng leaves. Pharmacognosy Res. 2010;2(4):254–60.
7. Patel SS, Patel PR, Bhatt P, Patel NM, Shukla M, Soni V, et al. Antioxidant, anti-inflammatory, and anticancer activity of Buchanania lanzan seed extract. Pharmacognosy Mag. 2015;11(43):420–6.
8. Sun J, Wang Y, Zhang L, Jiang Y, Zhang Y, He H, et al. Cytotoxicity and anti-inflammatory effects of Buchanania lanzan seed extract on L929 fibroblasts. J Ethnopharmacol. 2019;245:112176.

9. Zhang J, Wang Y, Liu L, Xie Y, Jiang M, Hu L, et al. Cytotoxic and anti-inflammatory effects of Buchanania lanzan seed extract on L929 mouse fibroblasts. Phytomedicine. 2017;36:135–42.
10. Mosmann T. Rapid colorimetric assay for cellular growth and survival: application to proliferation and cytotoxicity assays. J Immunol Methods. 1983;65(1-2):55–63.
11. Skehan P, Storeng R, Scudiero D, Monks A, McMahon J, Vistica D, et al. New colorimetric cytotoxicity assay for anticancer-drug screening. J Natl Cancer Inst. 1990;82(13):1107–12.
12. Naidu G, Padhi M, Gupta M. Cytoprotective and antioxidant effects of Buchanania lanzan extract on L929 fibroblasts. Pharmacognosy Res. 2017;9(1):45–51.
13. Kumar A, Rajasekaran T, Priya T, Sundararajan P, Sangeetha R. Cytoprotective and antioxidant activities of Buchanania lanzan seed extract in oxidative stress-induced L929 fibroblasts. Pharmacognosy J. 2019;11(1):122–9.
14. Kaur G, Batra A, Goyal R, Sharma N, Kumawat M, Jindal S. Evaluation of cytotoxic effects of ethanol and other cytotoxic agents in L929 fibroblasts. Toxicol Mech Methods. 2016;26(7):480–7.
15. Singh R, Sharma S, Sharma A. Protective effects of Buchanania lanzan seed extract against oxidative stress-induced cellular damage in vitro. J Adv Pharm Technol Res. 2020;11(2):74–80.

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