Evaluation of the Therapeutic Effects of Food Medicine Homology in treating NAFLD

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Background

Non-Alcoholic Fatty Liver Disease (NAFLD) is a growing health concern characterized by excess fat accumulation in the liver. It can progress to severe conditions like cirrhosis and liver cancer. Current treatments primarily focus on lifestyle changes and medications, which often lack effectiveness. Worldwide, 47 in every 1000 people are affected.

This research evaluates the effectiveness of using medicine food homology, particularly focusing on Indian Ayurveda herbs such as Indian gooseberry and Neem Leaves.

Indian Gooseberry

Properties: ***Rich in vitamin C and antioxidants***

Properties*: Anti-inflammatory, Antioxidant, and Hepatoprotective effects.*

Neem Leaves

Resesrch Objective

1. **To highlight the relationship between food and medicine**
2. **To evaluate the effectiveness of using food-based traditional practices to treat chronic diseases.**
3. **To identify how food components with medicinal properties can help to treat non-alcoholic fatty liver disease.**
4. **To evaluate and differentiate the toxicity of clinical drugs and herbal treatments**

Methodology

Experimental Study Design

1. Boil Herbs in water

Parameters for boiling: time, temperature, volume (10 mL water per 1g of herbs)

2. Freeze drying

(i) Freeze dry in the machine for 2 days
(ii) Collect Powder and refrigerate

3. Cell culture model

AML12 cells with NAFLD are purchased from ATCC

4. Stock Solution

DI Water is mixed with freeze dry powder

5. Adding Drug Treatment

Serial dilutions of stock solutions and drug treatment in various concentrations

6. MTT Assay

Measure the metabolic activity of living things and the toxicity of drugs on cells

7. Fat Absorption Evaluation

Observe cells under microscope and compare lipid absorption control and experiment groups

Findings

Efficiency of extraction = weight of extracted powder(freeze- dried)/weight of raw material (fresh herbs)

	Gooseberry Fruit			Neem Leaves		
	Trial 1	Trial 2	Trial 3	Trial 1	Trial 2	Trial 3
Wt. raw material (herbs)	10g	20g	20.93g	9.08g	15.1g	20.3g
Wt. freeze-dry powder obtained	0.37g	1.30g	1.18g	0.61g	0.26g	0.85g
Efficiency of extraction	0.037	0.065	0.056	0.07	0.017	0.042

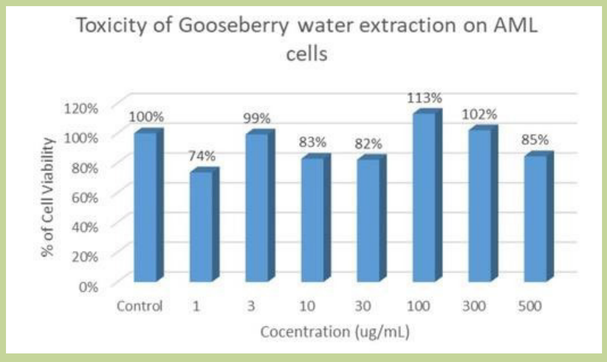

Fig.1 **The Graph representing the survival rates of cells after adding gooseberry**

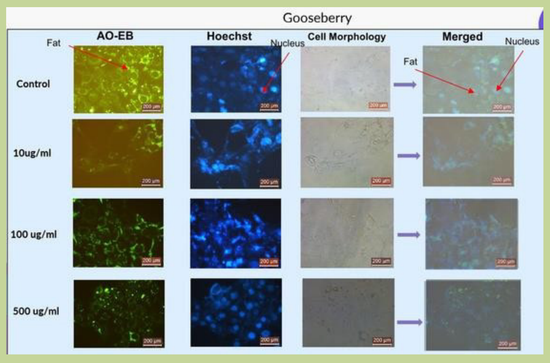

Fig.2 **The images show the cells under a forscenic microscope after the application of gooseberry water extraction**

The graph shows cell survival rates treated with gooseberry water extraction, showing its effectiveness and safety. Cell viability remained 100% in the control group, with optimal cell health at 100 µg/mL. Cell health was influenced by stress responses and nutrition availability.

The forensic microscopic images shows the cells using different lights.The green light shows the fat signals (adipocytes) in the liver cells. The blue staining marks the dense nuclues of the cells. In the control group, the fat signals are highly visible, which means that the fat absorption of cells are high. The blue lights shows the presence of dense nuclues. At 10µg/mL, the green fat signals were less visible, with a clearly seen blue-stained nucleus. At 100µg/mL,the green signals was fainter, but the blue-stained nucleus was still easy to see. At 500µg/mL,weak green fat signals, similar to the 100µg/mL, but the nucleus was stained a dark blue.

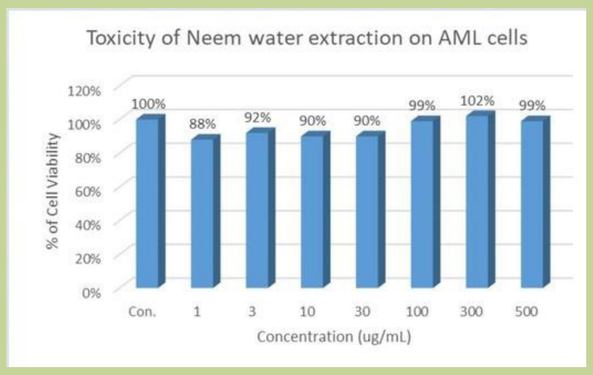

Fig.3 **The Graph representing the survival rates of cells after adding neem leaves**

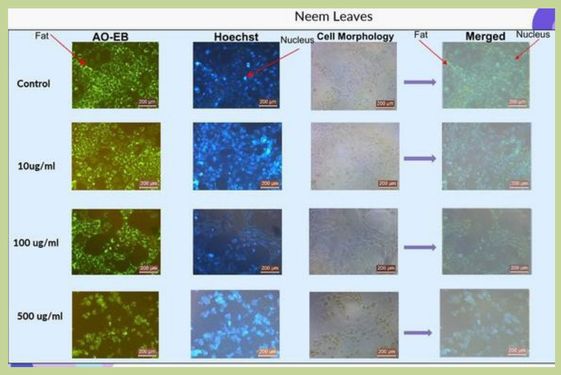

Fig.4 **The images show the cells under a forscenic microscope after the application of Neem leaves water extraction**

The graph shows cell survival rates treated with neem leaves water extraction, demonstrating its effectiveness and safety. Cell viability remained 100% in the control group, with optimal cell health at 100 µg/mL. Even at high concentration, the neem water extraction shows no toxicity. Cell health was influenced by stress responses and nutrition availability.

Forensic microscopic images showed cells using different lights, with green light revealing fat signals in liver cells and blue staining marking dense nuclues. Green fat signals were less visible at 10µg/mL, 100µg/mL fainter, and 500µg/mL weak green fat signals, with the nucleus stained dark blue.

Conclusion

In conclusion, Indian Ayurvedic practices have proven effective in treating chronic diseases such as Non-Alcoholic Fatty Liver Disease (NAFLD). Both water extracts of Indian gooseberry and neem leaves possess hepatoprotective properties and are commonly used to address liver-related issues. A key aspect of managing NAFLD is preventing fat absorption in cells, which can be effectively supported through the consumption of these Ayurvedic herbs. Additionally, the low toxicity levels associated with these herbs are beneficial for overall health. Experimental results further confirm that these extracts have no toxic effects on cells, reinforcing their safety and efficacy in treatment.