



An Experimental Pilot Study to Evaluate the Effect of Herbal Solution as an Alternative for Tissue (Body Muscles) Preservation in Comparison to Formalin

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ABSTRACT

Different formulas were explained and utilised in ancient Indian culture for the body preservation, and later, new methods utilising formalin-based embalming solutions were devised. It is well known that formalin is used in the fixing process. Since its creation, formalin has demonstrated a wide range of poisonous and irritating effects in addition to being bad for the environment. Recent epidemiologic studies on embalmers and other industrial employees who are exposed to formalin may show an elevated risk of cancer in these groups. In light of all these potentially dangerous issues, the current study will attempt to create a potential herbal remedy that can replace formalin. The aim of the study is to develop a safe herbal preservative solution for human tissue. The constituents are Citric Acid, Ethyl and Methyl Alcohol, Neemand Karanja, produced using the maceration technique. The samples of muscle parts in each glass jar were examined every 10 days for the course of the study's two-month duration to determine their consistency, colour, odour of the solution, and structural integrity. Based on analytical parameters it was concluded that the solution might have preservative properties. The limitations of this study are addressed by the findings of this study, which aid in future research on the preservation of organs and bodies for extended periods.

Keywords- Preservation, formalin, corrosive, extract, properties.

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INTRODUCTION

The first year of any medical profession's academic programme begins with a study of human body structures, which is done at the level of the medical discipline known as anatomy. The only effective method to learn about the architecture of the human body is dissection, or cadaveric anatomy. In his or her first year of medical school, a medical student who has never entered the institute's cadaver lab is not capable of becoming a competent doctor or surgeon [1]. Science's field of human anatomy can primarily be studied through cadaveric dissections [2]. When it came to embalming solutions, for maintain the cadaver as long as possible such as formalin, additional ways were created decades after the ancient Indian civilization employed various formulas for body preservation. It is commonly known that formalin is used in the fixing process [3]. Since its discovery, formalin has played a significant role in preserving biological tissues. Since its creation, formalin has caused a wide range of poisonous and irritating consequences in addition to being bad for the environment [4]. Recent epidemiological studies on embalmers and other industrial employees who are exposed to formalin may show an elevated risk of cancer in these groups [5]. Coughing, wheezing, and other respiratory issues may be brought on by it, and it may also have irritated and corrosive effects on the eyes, nose, throat, and skin. In addition to these techniques, cadavers have also been preserved using substances like glutaraldehyde, phenol, ethanol, sodium chloride, etc. Despite these alternatives, none of them have been routinely used to embalm human cadavers in place of formalin for a variety of reasons. Like formalin, glutaraldehyde and phenol are poisonous and irritating. Both ethanol and sodium chloride can dehydrate and shrink tissue, making them ineffective for long-term preservation. Therefore, it is critical to investigate the use of herbal preservatives as a secure and efficient substitute for conventional embalming techniques [6]. By

combining *Neem*, *Karanja*, and citric acid with an alcohol (methanol & ethanol) extract formulation, this study will attempt to provide a feasible herbal treatment that can replace formalin in light of all these dangerous issues. *Neem*, [7] and *Karanja* [8] are plants with high phenolic content that have *krimighna* (antimicrobial, antifungal, and antibacterial) qualities, as noted in the Samhita. These natural Ayurvedic components are safer and less expensive than formalin. A natural preservative solution might be produced according to this experiment's hypothesis. Ayurveda's brilliance lies in its assessment of theories regarding the preservation of health and the origins of disease [9]. This study is being prepared in light of it. A grasp of herbs for preservation will be provided through this research.

MATERIAL AND METHODS

Plant material (collection of raw drugs)

Neem and *Karanja* leaves were collected in December 2021 in the Parul University botanical park in Waghodia, Gujarat. The leaves were then cleaned with sterile water, dried in the shade, and ground into powder using a mechanical grinder. The raw medicine will be examined for its effectiveness by the *DravyaGuna* Department of Parul University in Waghodia, Gujarat. Identification and verification in accordance with the guidelines outlined in the API (Ayurvedic Pharmacopoeia of India).

Preparation of neem leaf and stick ethanol extract [10] –

The dried *neem* leaves and stick (1 part) powder were put in the conical flask, and 10 parts ethanol is used for the extraction process by maceration method. The extraction continued until a transparent solvent can be seen in the sample and after that add 2% citric acid in the extract.

Preparation of Karanja leaf methanol extract [11] –

The conical flask filled with the powdered dried *Karanja* leaf (1 part), and 10 parts methanol is used for the extraction process by maceration method. The extract won't be collected unless a transparent solvent can be seen in the sample during the extraction process and after that add 2% citric acid in the extract.

Preparation of sample-

Samples-

- A. 10% alcoholic herbal extract is mixed with 90% distilled water to create a sample.
- B. 20% alcoholic herbal extract solution and 80% distilled water are combined to create a sample.
- C. 25% of an alcoholic herbal extract solution and 75% of distilled water are combined to create a sample.
- D. 50% alcoholic herbal extract solution and 50% distilled water are combined to create a sample.
- E. A sample is created by mixing 25% distilled water and 75% alcohol-based herbal extract solution.
- F. Only a 100 percent trial extract solution is used to create a sample.

Analytical parameters of solution

The physico-chemical and organoleptic characteristics of the solution are studied analytically. Additionally, the pH of the sample was assessed on the days of preparation and spoiling. The references found in the CCRAS procedure were used to analyse the ensuing parameters.

1. Organoleptic characteristics' morphological evaluation (appearance, colour, odor, and touch)
2. Physicochemical variables, including pH, specific gravity, viscosity, total suspended particles, refractive index.

Three repeats of the aforementioned analytical parameters were run, and the average reading or value was then calculated.

RESULT AND DISCUSSION

The physico-chemical and organoleptic characteristics of the solution are studied analytically and results given below:

Morphological Evaluations-

1. Appearance - clear
2. Colour - transparent green
3. Odor - no specific odor
4. Touch - cold

Physiochemical Variables-

5. pH - 5.8
6. Specific gravity - 0.96
7. Viscosity - nil
8. Refractive index - 1.16
9. Density - 0.9
10. TSS (Total Suspended Solids) mg/l - nil, Alcohol – 28%

Tests for-

1. Alkaloids - positive
2. Glycosides - positive
3. Phenols - positive

We can see from this data analysis that the strength and freshness of the muscle parts are significantly influenced by the concentration of the distilled fluid. Lesser concentrations (10%, 20%, and 25%) led to waste during the first fifteen days with foul smell but not found any maggots and insects, but higher concentrations (75%) allowed for a preservation period of about twenty days, it's also found the same finding like no maggots and insects. Yet, it was discovered that the 100% solution's concentration was still effective after two months.

As in many studies it has been already mentioned that the shelf life of a tissue is less than 3 hours after that the tissue undergo decomposition and foul smell can be felt in the atmosphere, but in this case the tissue was preserved more than 2 months that is a sign that the study can be further proceeded with various safety measures and testing [7-11].

CONCLUSION

After keeping a muscle piece in the prepared herbal solution for two months. it was observed that the tissue was in good condition and preserved well. Hence, based on analytical parameters it was concluded that the solution might have preservative properties. This study expands the possibility for several research projects to follow the same course.

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REFERENCES

1. Patil, Abhijit (2015), Human Body preservation: Expanding life after death. Aayushi International Interdisciplinary Research Journal (AIIRJ). Vol - II Issue -XII DECEMBER, Monthly ISSN 2349-638X
2. K.Vijayakumar, Raju Bokan, Vaishaly Bharambe, Mandar Ambike, VK Arun Prasad (2020), "Preparation of Wet Specimens in Anatomy Museum: A Practical Approach to Overcome Difficulties", *ijmsir* January, Vol - 5, Issue -1, P. No. 179 - 188.
3. Brenner E (2014). Human body preservation: old and new techniques' *Anat*;224:316-44.
4. Ragan DI, Boreiko CJ (1981). Initiation of C3H/10T1/2 cell transformation by formaldehyde. *Cancer Lett*;13:325-31.
5. Dharamveer Choudary, Ved Prakash (2017), "Ancient ayurvedic and modern, method of preservation of dead body:" *wjpmr*,3(8)55-57.
6. Geetanjali, Ajitkumar S. Wahane2, Dr. Arushi Sharma3 (2023), Developing an Herbal Preservative for Cadavers in Ayurvedic Anatomy-A Pilot Study, *Journal of Survey in Fisheries Sciences*, 10(1) 2459-2465.
7. Sandeep Shewale, Virendra K Rathod (2018), Extraction of total phenolic content from *Azadirachta indica* or (Neem) leaves: Kinetics study, *Preparative Biochemistry and Biotechnology*, vol.48, No. 4, 312-320.
8. Sasmita Panigrahi, Sujata Mahapatra (2016), Evaluation of Antibacterial Activity of *Pongamia pinnata* L., *Curcuma longa* L. and *Mentha arvensis* L. Against *Staphylococcus aureus*, *International Journal of ChemTech Research*, IJCRGG, ISSN: 0974-4290 Vol.9, No.02 pp 205-212.
9. Singh, Kishan & Kumar, Krishna & Patil, Abhijit. (2020). Role Of Purishdhara Kala In Malavstambha -A Review. Volume IX, Issue VI, June/2020. 5077-5087.
10. Widowati Siswomihardjo, Masahiro Nishimura (2007), The difference of the antibacterial effect of neem leaves and stick extracts, *Int Chin J Dent*; 7: 27-29.
11. Vivek K. Bajpai, Atiqur Rahman, Savita Shukla, Archana Mehta, Shruti Shukla, S. M. Yassir Arafat, M. Mizanur Rahman, and Zennat Ferdousi (2009), Antibacterial activity of leaf extracts of *Pongamia pinnata* from India, *Pharmaceutical Biology*; 47(12): 1162-1167

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