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Garcinia mangostana Fruit Extract as a Formaldehyde Alternative

Pratyush Kumar Mishra Principal of Swapna Devi College of Education

Abstract-

Formaldehyde, a common fixative in histology, poses health risks and environmental concerns. This study explores Garcinia mangostana fruit extract as a natural, safer alternative. The extract, rich in xanthones, showed potent antimicrobial and fixative properties. Tests on tissue samples revealed effective fixation and preservation comparable to formaldehyde, with reduced toxicity and environmental impact. G. mangostana extract (10% w/v) achieved optimal fixation, suggesting its potential as a green alternative in histopathology.

Introduction-

Formaldehyde is widely used in histology for tissue fixation but is a known carcinogen and environmental hazard. Garcinia mangostana, with its antimicrobial

and bioactive compounds (xanthones), offers a natural alternative. This study aimed to evaluate G. mangostana fruit extract's efficacy as a formaldehyde substitute, assessing fixation quality, antimicrobial activity and safety.

Materials and Methods-

- Extract Preparation- G. mangostana fruit pericarp was extracted using ethanol (70%) and concentrated.
- Antimicrobial Test- Agar diffusion assay tested extract (5%, 10%, 15% w/v) against common pathogens.
- Fixation Test- Tissue samples (liver, kidney) were fixed in G. mangostana extract (5%, 10%, 15%) vs formaldehyde (10%).
- Histological Analysis- Fixed tissues were stained (H&E) and evaluated for fixation quality, cell morphology and staining.
- Toxicity Test: Brine shrimp lethality assay assessed extract toxicity.

Results and Discussion-

G. mangostana extract (10%) showed-

- Antimicrobial Activity- Inhibition zones comparable to formaldehyde.
- Fixation Quality- 10% extract achieved fixation similar to formaldehyde; tissues retained morphology with clear nuclei/cytoplasm.
- Histology- H&E staining showed preserved tissue structure, comparable to formaldehyde fixed samples.
- Toxicity- Extract showed lower toxicity vs formaldehyde.

The extract's xanthones likely contribute to fixation and antimicrobial effects, making it a viable formaldehyde alternative.

Conclusion-

Garcinia mangostana fruit extract (10%) is a promising, safer alternative to formaldehyde for tissue fixation, offering effective antimicrobial and fixative properties with reduced toxicity. Its use could enhance lab safety and reduce environmental risks in histopathology.

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