



## Research Article

# The Efficiency of Corn Solution as a Cytological Fixative in Buccal Smear

Jalal Eldein Mahmoud Nour Wara<sup>1</sup>, Mohammed Abdulelah Abuzeid Abdulrahem<sup>1</sup>, Tasabeeh Mustafa Alzain Salem<sup>1</sup>, Waad Akram Albager Mohammed<sup>1</sup>, Walaa Tamim Eldar Khalaf Allah Abuzeid<sup>1</sup>, Maha Hamid Omer Bushara<sup>1</sup>, Amna Mohammed Hassan<sup>1</sup>, Alkhair Abd Almahmoud Idris<sup>2\*</sup>

<sup>1</sup> Department of histopathology and cytology, Faculty of Medical Laboratory Sciences, Elrazi University of Khartoum, Sudan

<sup>2</sup> Department of Human biology and histology, Ahfad University for Women, Sudan

\*Corresponding author: [alkhair20@hotmail.com](mailto:alkhair20@hotmail.com)

## ABSTRACT

### Article history:

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**Keywords:** Corn syrup, cytological fixative, maltose, oligosaccharide.



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**Background:** Corn Syrup is food syrup higher of carbohydrate, depending on grade. The study aimed to assess efficiency of Corn syrup as cytological fixative.

**Subjects and methods:** This was laboratory based study, it has been conducted at Elrazi University included apparently 30 healthy students have been involved in this study.

**Results:** Out of 30 smears fixed with 95% alcohol, 76.7% (n=23) shows excellent nuclear stain, 23.3% (n= 7) shows good nuclear stain. 70% (n=21) show excellent cytoplasmic stain, 26.7% (n=8) shows good cytoplasmic stain, 3.3% (n=1) shows poor cytoplasmic stain.

Out of 30 smears fixed with corn solution, 60% (n=18) shows excellent nuclear stain, 40% (n=12) good nuclear stain, 3.3 % (n=1) shows excellent cytoplasmic stain, 83.3% (n=25) shows good cytoplasmic stain, 13.3% (n=4) shows bad cytoplasmic stain.

**Conclusion:** Study concluded that Corn syrup can be used as cytological fixative alternatively to 95% ethyl alcohol.

## Introduction

Corn Syrup is primary ingredient in most brands of commercial “pancake syrup” as a less expensive substitute for maple syrup (1; 2; 3).

Corn syrup is used in baked goods and other many food products, and dark corn syrup is also used (4).

Study has shown that sugar preserve cell morphology and causes no difficulties in routine processing and staining. These substances are harmless, eco-friendly, well suited for laboratory processing and staining.

Exfoliative cytology is the microscopic study of cells shed or obtained from body especially for diagnostic purposes (as in determining the presence or absence of cancerous condition) (5).

Corn syrup can also be used as a good cytological fixative alternatively to common 95% ethanol alcohol.

Fixation is an important step in cytological diagnosis and the basis or foundation of cytological technique. Ethanol is traditionally a popular and widely used fixative for cytological diagnosis. Commercially ethanol is expensive and not freely available in some institution, flammable, beside its toxicity, it has a

pungent, irritating odor. Corn syrup is less costly, harmless, eco-friendly, well suited for laboratory processing and staining (5). The study aimed to assess efficiency of Corn syrup as cytological fixative.

## Subjects and Methods

This was laboratory-based study, it has been conducted at Elrazi University included apparently 30 healthy students have been involved in this study.

### Ethical approval and consent to participate

Ethical approval was obtained from Ministry of Health Ethical Research Committee in accordance with the Declaration of Helsinki Principles, and the agreement was taken from all hospital administration before sample and data collection. The patient's information were highly secured and not used for other purposes than scientific inquiry.

Each participant was asked to sign a written ethical consent form during the interview, before the specimen was taken.

**Ethical clearance code number:** MH-RES/8-021-09

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### Statistical analysis:

Data was analyzed using statistical package for social science software version (20) SPSSV20 (IBM Corp, Armonk, NY, USA).

### Method of specimen collection:

A commercially available tongue depressor was used for the collection of the samples. The scraps were smeared onto the center of the glass slides and spread over a large area, preventing the clumping of cells. The smears were immediately fixed with 95% alcohol (control) and corn syrup (test) (6).

### Corn syrup preparation:

30 g of corn were boiled with 300 ml of water and then filtered to remove any excess deposits. Then we added 45 g of sugar and 3.5 ml of lemon juice to the filtered syrup and boiled it again till it gains its viscosity. The syrup has diluted first before fixation, 1:2 with DW (5).

### Staining technique:

The smear were fixed by corn syrup for 15-30 min, then it was treated with 70% alcohol 2 min, rinse in Distilled water 3 min, stain with Harris's for 3 min, wash by water, differentiated by 1% acid alcohol for seconds, rinse in water then dehydrate in 70% alcohol for 2 min, stain with Orange G6 for 2min, then rinse in 95% alcohol (2) for 2 min, then 95% alcohol (1) 2 min, stain Eosin Azure for 3min, rinse in 95% alcohol (2) 2 min, then 95% alcohol (1) for 2 min, mount cover slip with DPX (Distyrene, plasticizer and xylene), to be examined by light microscopically (6).

### Staining assessment:

- Nuclei appear blue/black.
- Cytoplasm blue/green.
- Keratinizing cell pink-orange

### Assessment of cytological smears for staining quality

The smears were assessed and evaluated by an experienced cytopathologist. For comparative analysis of both techniques, parameters such as thickness, cellular distribution were evaluated, adopting criteria reported elsewhere (7; 8). Also, given that a good staining method must show the shapes and sizes of the cell, provide crisp delineation of nuclear chromatin, and demonstrate the cytoplasm, each slide was evaluated as follows: (i) excellent; (ii) good; (iii) poor. All parameters were compared to standard parameters illustrated elsewhere, (9) and the degrees were given (10).

## Results

From each case involved in this study two samples have been collected, one sample was fixed with 95% ethanol alcohol as control, while the other was fixed with corn syrup as test.

Out of 30 smears fixed with 95% alcohol, 76.7% (n=23) shows excellent nuclear stain, 23.3% (n=7) shows good nuclear stain. 70% (n=21) show excellent cytoplasmic stain, 26.7% (n=8) shows good cytoplasmic stain, 3.3% (n=1) shows poor cytoplasmic stain.

Out of 30 smears fixed with corn solution, 60% (n=18) shows excellent nuclear stain, 40% (n=12) good nuclear stain, 3.3% (n=1) shows excellent cytoplasmic stain, 83.3% (n=25) shows good cytoplasmic stain, 13.3% (n=4) shows poor cytoplasmic stain.

Out of 30 smears fixed with 95% alcohol, 76.7% (n=23) shows excellent nuclear stain, 23.3% (n=7) shows good nuclear stain, Out of 30 smears fixed with corn solution, 60% (n=18) shows excellent nuclear stain, 40% (n=12) good nuclear stain. This result shows no significant variation between corn solution and 95% ethanol alcohol in nuclear stain (P value=0.165), as showing in table (1).

**Table 1:** Effects of fixative in the quality of nuclear stain

Type of agents	Quality of nuclear stain		Total
	Good	Excellent	
Corn solution	12(40.0%)	18(60.0%)	30(100.0%)
95% ethyl alcohol	7(23.3%)	23(76.7%)	30(100.0%)

P value=0.165

Out of 30 smears fixed with 95% alcohol 70% (n=21) show excellent cytoplasmic stain, 26.7% (n=8) shows good cytoplasmic stain, 3.3% (n=1) shows poor cytoplasmic stain, Out of 30 smears fixed with corn solution 3.3% (n=1) shows excellent cytoplasmic stain, 83.3% (n=25) shows good cytoplasmic stain, 13.3% (n=4) shows poor cytoplasmic stain. This result shows highly significant variation between corn solution and 95% ethyl alcohol in cytoplasmic stain (P value=0.000), as showing in table (2).

**Table 2:** Effects of fixative in the quality of cytoplasmic stain

Type of agents	Quality of cytoplasmic stain			Total
	Poor	Good	Excellent	
Corn solution	4(13.3%)	25(83.3%)	1(3.3%)	30(100.0%)
95% ethyl alcohol	1(3.3%)	8(26.7%)	21(70.0%)	30(100.0%)

P value= 0.000

## Discussion

In this study we compare between 95% ethanol alcohol and corn syrup as cytological fixative, the procedure of fixation with corn syrup is inexpensive.

From each case involved in this study two samples have been collected, one sample was fixed with 95% ethanol as control, while the other was fixed with corn syrup as test.

Out of 30 smears fixed with 95% alcohol, 76.7% (n=23) shows excellent nuclear stain, 23.3% (n=7) shows good nuclear stain. 70% (n=21) show excellent cytoplasmic stain, 26.7% (n=8) shows good cytoplasmic stain, 3.3% (n=1) shows poor cytoplasmic stain.

Out of 30 smears fixed with corn solution, 60% (n=18) shows excellent nuclear stain, 40% (n=12) good nuclear stain, 3.3% (n=1) shows excellent cytoplasmic stain, 83.3% (n=25) shows good cytoplasmic stain, 13.3% (n=4) shows poor cytoplasmic stain.

All the smears in both group was satisfactory. It shows good fixation and also good staining intensity of oral squamous cells and background which agreed with previous study (5; 11; 12).

## Conclusion

Study concluded that Corn syrup can be used as cytological fixative alternatively to 95% ethyl alcohol.

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This research did not receive any specific fund.

## Conflict of Interest

No conflict of interest

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