

# Evaluation of the Effect of Different Sugars and Polyols on *Streptococcus mutans* NCTC 10449 Biofilms

Norhaziland Mohamed Zaid<sup>a</sup>, Alexander Szollosi<sup>a</sup>, Claire Martin<sup>b</sup>, Afzal Mohammed<sup>c</sup>, Colin Brown<sup>a</sup>, Aysha Rahman<sup>a</sup>

<sup>a</sup> School of Pharmacy, Faculty of Science and Engineering, University of Wolverhampton, WV11LY

<sup>b</sup> Department of Biological Sciences, University of Worcester, WR2 6AJ

<sup>c</sup> School of Pharmacy, Aston University, Birmingham, B4 7ET

Email: N.MohamedZaid@wlv.ac.uk

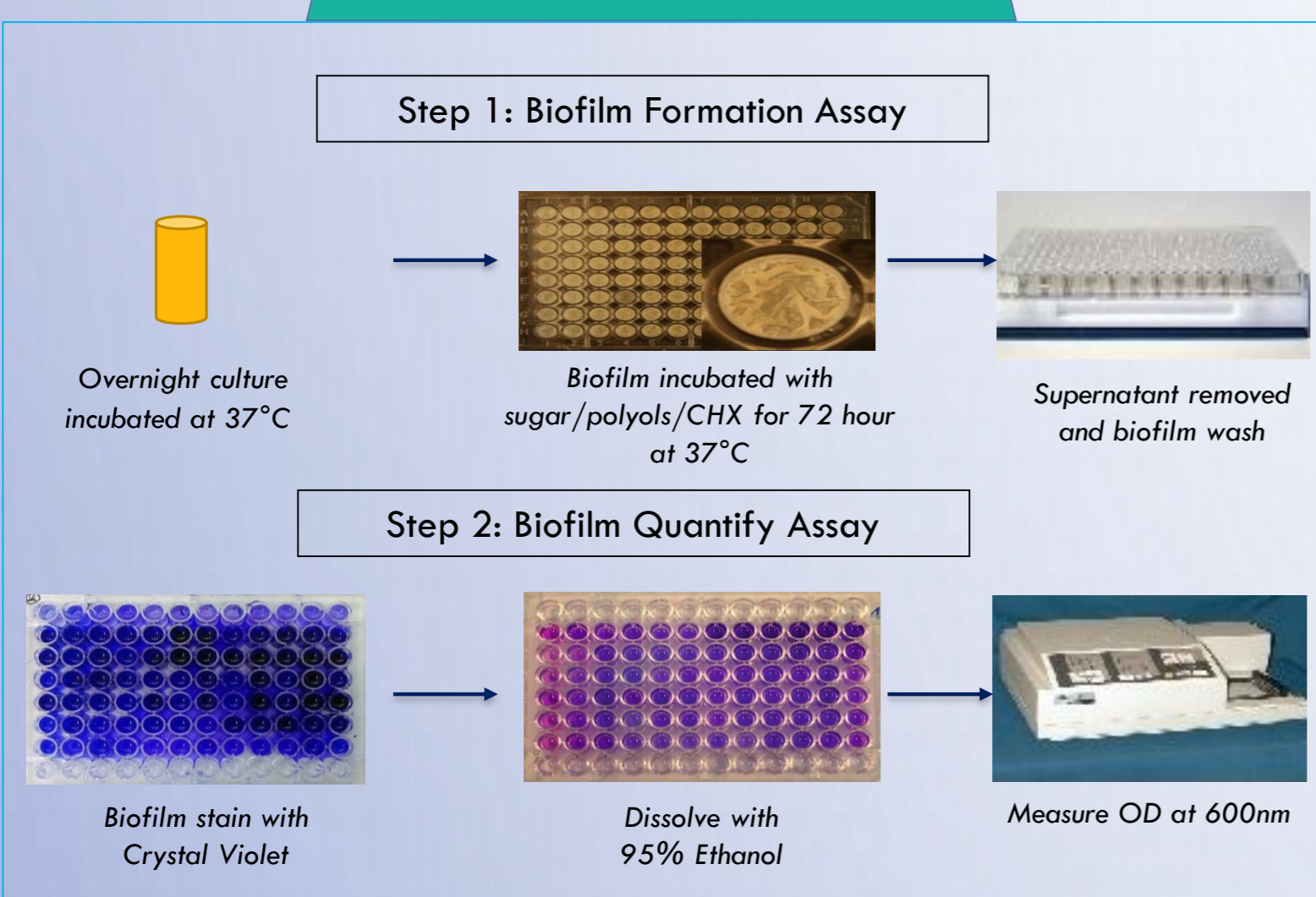
## INTRODUCTION

- Biofilms formed by *Streptococcus mutans* (SM) in the oral cavity are organised compact structures and are a leading cause of dental caries and tooth decay.
- This is due to the accumulation of dietary sugars that upon prolonged exposure to tooth surface, causes gingivitis.
- Gingivitis is mild gum disease which results in inflammation of gums caused due bacterial infection and build up of plaque (sticky film) on the surface of teeth and gums.
- Chlorhexidine (CHX) is an antiseptic used for wound cleansing, prevention of dental plaque and treatment of yeast infections of the mouth.

## OBJECTIVES

- This study aimed to evaluate the effect of sugars and polyols at different concentrations and in combination with the antimicrobial agent chlorhexidine on the formation of biofilms by *Streptococcus mutans*.
- The sugars were included to stimulate the oral environment upon consumption of simple carbohydrates and to study their effect on the formation of dental plaque.

## METHOD



- These biofilms were exposed to sugars such as sucrose, fructose, lactose, maltodextrin and polyols such as xylitol, mannitol, and sorbitol at a concentration range of 2-40% during the formation of biofilm (inhibition assay).
- The sugars were included to stimulate the oral environment upon consumption of simple carbohydrates and to study their effect on the formation of dental plaque.
- The assays were also carried out in combination with chlorhexidine at a concentration range of 0.1 – 4 µg/ml.

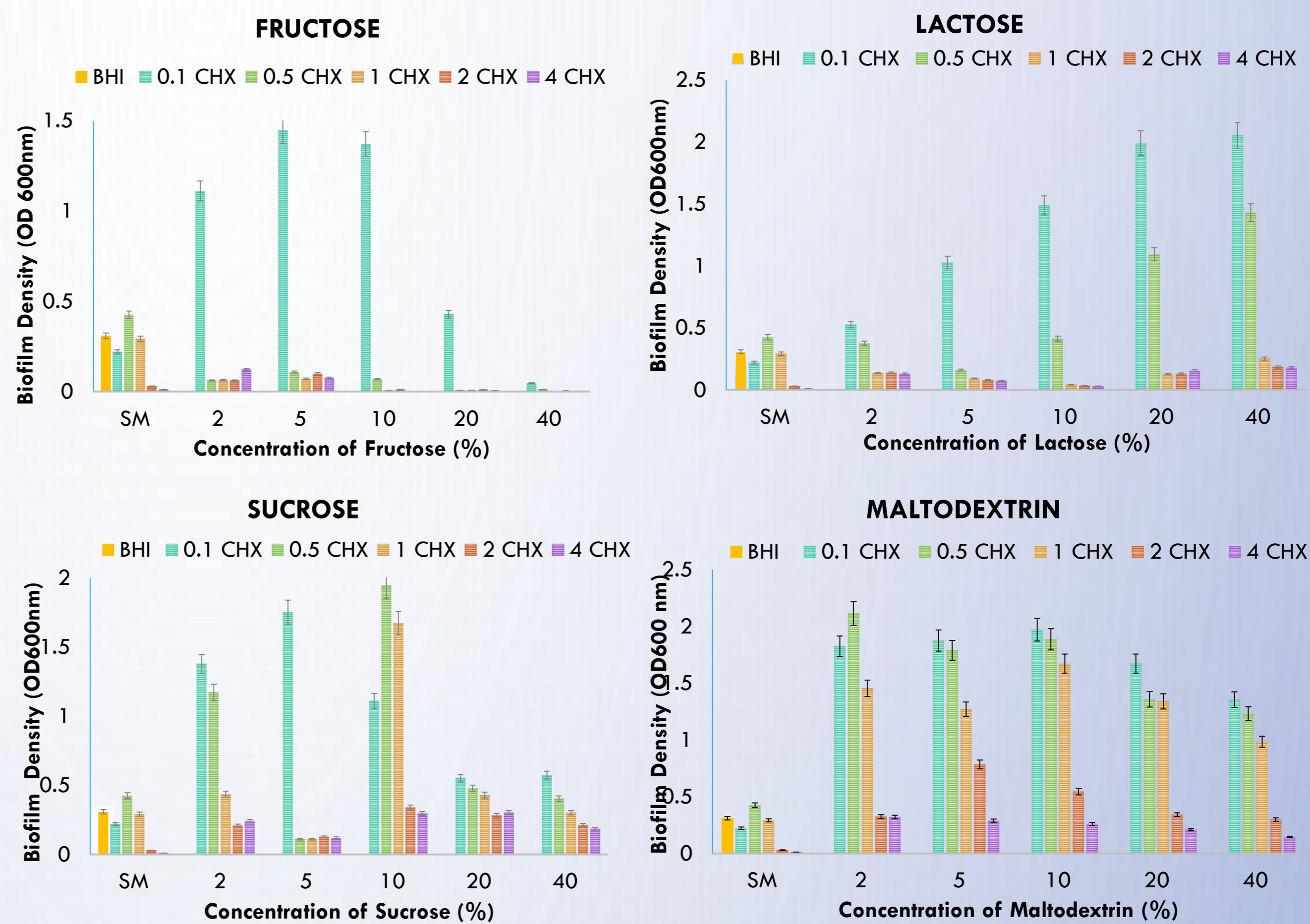
## DISCUSSION

- Polyols supported significantly less biofilm formation when compared to sugars in combination with chlorhexidine.
- Chlorhexidine alone was successful in inhibiting biofilm formation at a concentration of 4 µg/ml.
- According to the results only fructose at 40% concentration in combination with a lower concentration of chlorhexidine (0.1µg/ml) resulted in lower biofilm density when compared to using lower concentrations of the sugar or high concentration of CHX alone.
- Xylitol and sorbitol at 2-40% concentration resulted in significantly less *Streptococcus mutans* biofilm formation when combined with chlorhexidine (0.5µg/ml).
- This biofilms have a variety of attributes that contribute synergistically to the process of antibiotic resistance.
- These attributes include, but are not limited to an exopolysaccharide matrix, pH and nutrients.
- This study indicates that both sorbitol and xylitol have synergistic inhibitory effects with chlorhexidine at low concentrations on biofilm formation by *Streptococcus mutans*.

## RESULTS

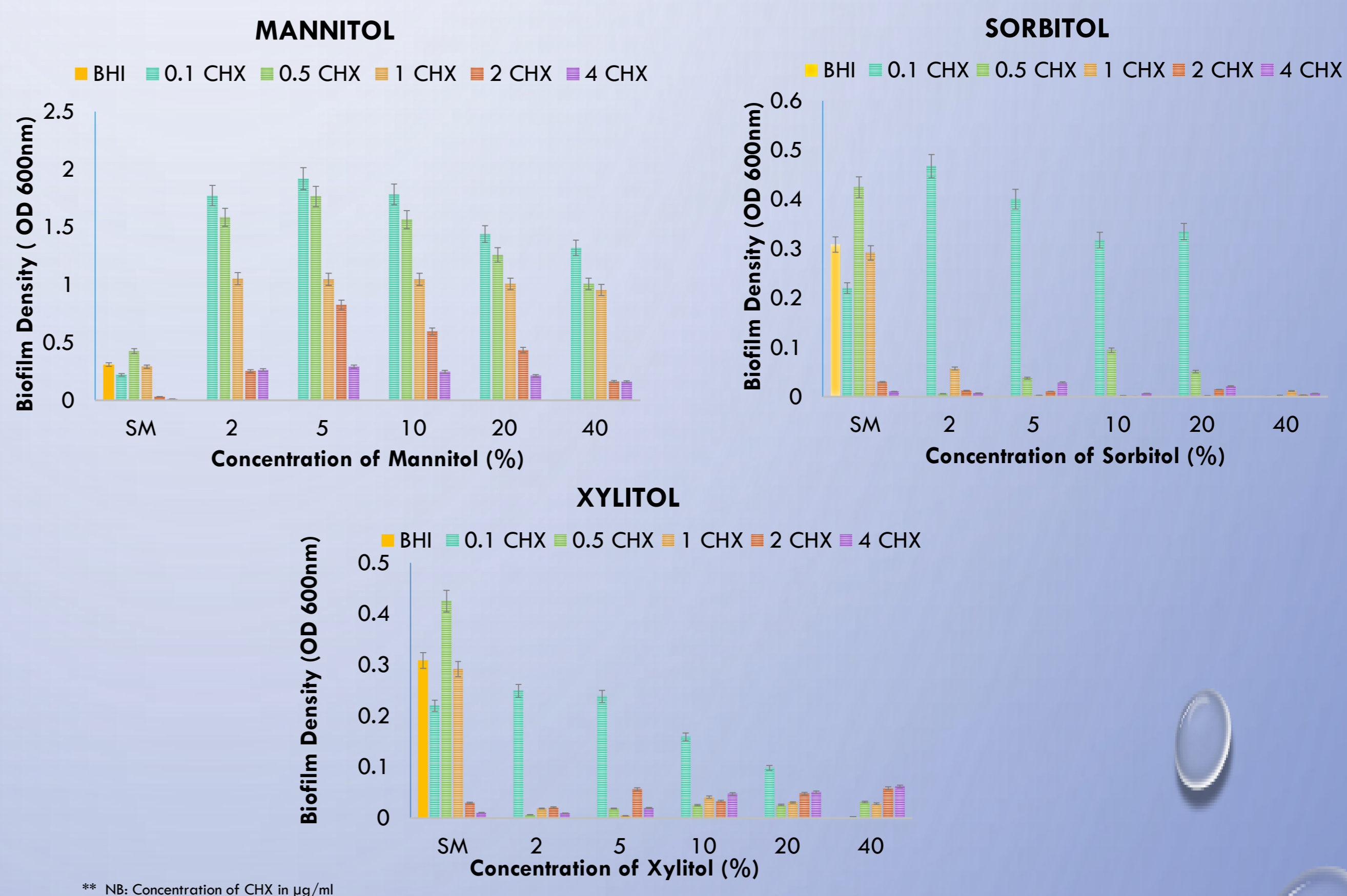
### EFFECT OF SUGARS ON BIOFILM FORMATION

Biofilm Inhibition Assay at different concentrations of sugars with chlorhexidine



### EFFECT OF POLYOLS ON BIOFILM FORMATION

Biofilm Inhibition Assay at different concentration of polyols with chlorhexidine



## CONCLUSION

- Sugars such as fructose at high concentration and polyols such as xylitol and sorbitol not only showed inhibition of biofilm formation but also synergism with chlorhexidine.
- In addition to studying the impact of sugars and polyols on biofilm formation, this study has allowed for the selection of polyols as excipients instead of sugars in the formulation of chlorhexidine lozenges to treat dental plaque.

## REFERENCES

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