

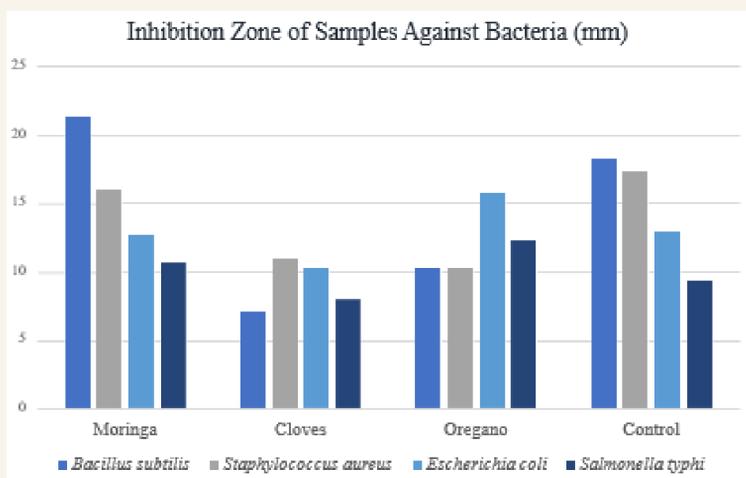
## INTRODUCTION

- The interest in functional food has increased gradually due to the varying advantages derived from incorporated traditional plants and are widely introduced into the current market.
- Moringa oleifera*, *Syzygium aromaticum* and *Plectranthus amboinicus* are incorporated in a widely consumed sugary product with rubbery texture, chewable gummies (Lemos et al., 2021).
- The high presence of sugar and additives in chewable gummies are concerning, which is not less than harming individuals especially children who are more captivated to the food product, hence, an effort of substituting the ingredients in chewable gummies is to form a nutritious kind of food product.
- Moringa oleifera*, *Syzygium aromaticum* and *Plectranthus amboinicus* are ayurvedic herbs that own numerous benefits that have been found to be effective on human health.

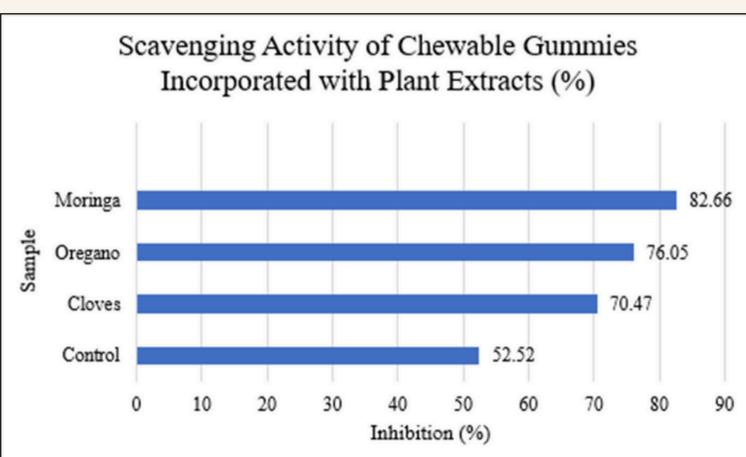
The three incorporated herbs are believed to possess antimicrobial and antioxidant activity, which is evaluated in this study, to verify their potential of inhibiting Gram-positive and Gram-negative bacteria; *Bacillus subtilis*, *Staphylococcus aureus*, *Salmonella Typhi* and *Escherichia coli* as well as their effects on the growth of *Lactobacillus* spp., along with the antioxidant activity and total phenolic content of the incorporated chewable gummies.

## RESULTS & DISCUSSION

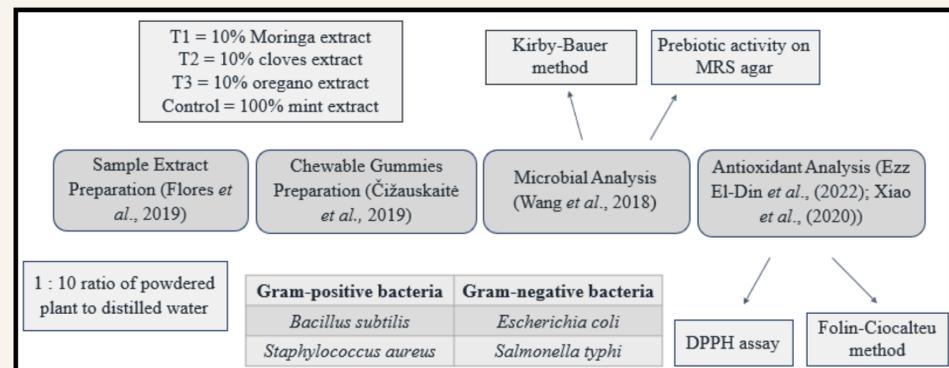
### a) Kirby-Bauer method



### c) DPPH assay



## METHODOLOGY



### b) Prebiotic activity on MRS agar

Sample	Microbial Count (log CFU/mL)
Moringa	TNTC
Oregano	TNTC
Cloves	3.37 ± 1.32
Control	TNTC

Values represent means ± SD of a triplicate sample (n=3); TNTC = Too Numerous to Count

- For Kirby-Bauer method, chewable gummies with Moringa yields the highest result against Gram-positive bacteria, *Bacillus subtilis* at  $21.3 \pm 1.5$  mm, which is the highest value among the three herbs utilized, which may due to the absence of outer membrane compared to Gram-negative bacteria.
- Chewable gummies incorporated with cloves has a result of  $3.37 \pm 1.32$  log CFU/ml when tested on MRS agar to detect the growth of *Lactobacillus* spp., when the other three treatments demonstrated "too many to count" (TNTC).

### d) Folin-Ciocalteu method

Sample	Total Phenolic Content (mg GAE/g)
Moringa	59.64 ± 0.0060
Oregano	53.53 ± 0.0017
Cloves	45.38 ± 0.0400
Control	38.42 ± 0.0863

Values represent means ± SD of a triplicate sample (n=3)

- The highest radical scavenging effect is shown by chewable gummies with Moringa extract, which is also significantly lower ( $p < 0.05$ ) compared to other treatments with a value of  $82.66$  %, which explains a higher antioxidant value than other treatments due to the existence of phenols, flavonoids and other that results in a synergistic mechanism.
- For total phenolic content assay, chewable gummies with Moringa extract demonstrates the highest value, with a reading of  $59.64 \pm 0.0060$  mg GAE/g and is significantly lower compared to others

## CONCLUSION

- Moringa extract seems to yield the best results when incorporated in chewable gummies, according to the findings of this study, as it demonstrates a better antimicrobial activity against Gram-positive and Gram-negative bacteria; *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Salmonella Typhi*, propose prebiotic activity as it allows the growth of *Lactobacillus* spp. and possess a higher antioxidant value along with total phenolic content.
- Further research is required on the aspects of final product formulation to comply with the sensory acceptability, toxicity and allowed dosage of the food product.

## REFERENCES

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