

# Determining the Antibacterial Activities Using Different Types of Honey on Selected Bacterial Strains

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## Background

- The antibacterial activity of honey is attributed largely to osmolarity, pH, hydrogen peroxide production & presence of other phytochemical components like methylglyoxal (MGO)(1).
- Manuka honey (MH) is collected from the *Leptospermum scoparium*, which is indigenous to New Zealand. This specific honey has been found to exhibit additional antibacterial properties that are attributed to the presence of methylglyoxal (MGO) (2,3).
- A recent study showed that Manuka honey +20, +16 & +10 have strong antibacterial activities against both sensitive and resistant *P. aeruginosa* strains in addition to *P. aeruginosa* ATCC 27853 (4).
- A previous study showed that MH of lower UMF grade demonstrated equal to significantly increased antibacterial activity compared to higher UMF grade honey for all tested organisms (5).
- This study aimed to evaluate the antibacterial potential of different types of honey including Talha honey (*Acacia origena*), Zahoor honey (Mixed flower), MH (*L. scoparium*) with different Unique Manuka Factor (UMF) including +20, +16, +5 & Black Forest honey against selected bacterial strains.

## Methods

- This study was an experimental design using different types of honey, being Talha honey (*Acacia origena*), Zahoor honey (Mixed flower) and MH (*L. scoparium*) with different UMF including +20, +16 and +5 and Black Forest honey. These types were obtained from different global regions.
- All honey types were tested against selected gram-negative strains including *E. coli* ATCC 25922, *K. pneumonia* ATCC 700603 and *P. aeruginosa* ATCC 27853. Moreover, *S. aureus* ATCC 29213, methicillin-resistant *S. aureus* (MRSA) ATCC 43300 and *E. faecalis* ATCC 29212 were also evaluated as gram-positive strains.
- Data was determined using agar well diffusion method on Muller-Hinton agar supplemented with horse blood.

## Results

- The data revealed that TH, ZH and MH with all its UMFs indicated significant antibacterial potentialities against bacterial strains. Black forest honey had no significant effects against all strains (Table 1).

Table 1. ZOI for all tested strain. The values were found to be statistically significant ( $p < 0.05$ ).

Strains	Honey Types					
	MH 20+	MH 16+	MH 5+	TH	ZH	BF
<b>G+ Bacteria</b>	<b>Zone of inhibition in mm (ZOI mm)</b>					
MRSA	23	21	22	20.6	15.6	10
<i>S. aureus</i>	24.6	21.6	20.6	20.3	15	12.3
<i>E. faecalis</i> (B)	25	19.3	15	19	15.6	10
<i>E. faecalis</i> (A)	18.6	17.6	13	15.3	11.6	10
<b>G- Bacteria</b>						
<i>P. aeruginosa</i>	14	12	13.6	15.6	14.3	10
<i>K. pneumonia</i>	19.6	20.3	16.3	14.3	12.6	12.3
<i>E. coli</i>	22.3	21	17.6	15.6	13.6	12

- MA 20+ was found to be the most effective type of MH. It was effective against most tested strain such as MRSA, *S. aureus* and *E. faecalis* showing 25 mm ZOI, whereas the least ZOI was *P. aeruginosa* showing 14 mm ZOI (Fig. 1). On the other hand, MA +16 showed smaller ZOI, being MRSA as 21 mm, *S. aureus* showing 21.6 mm and *E. faecalis* showed 19.3 mm ZOI. *P. aeruginosa* had only 12 mm ZOI (Fig. 2).

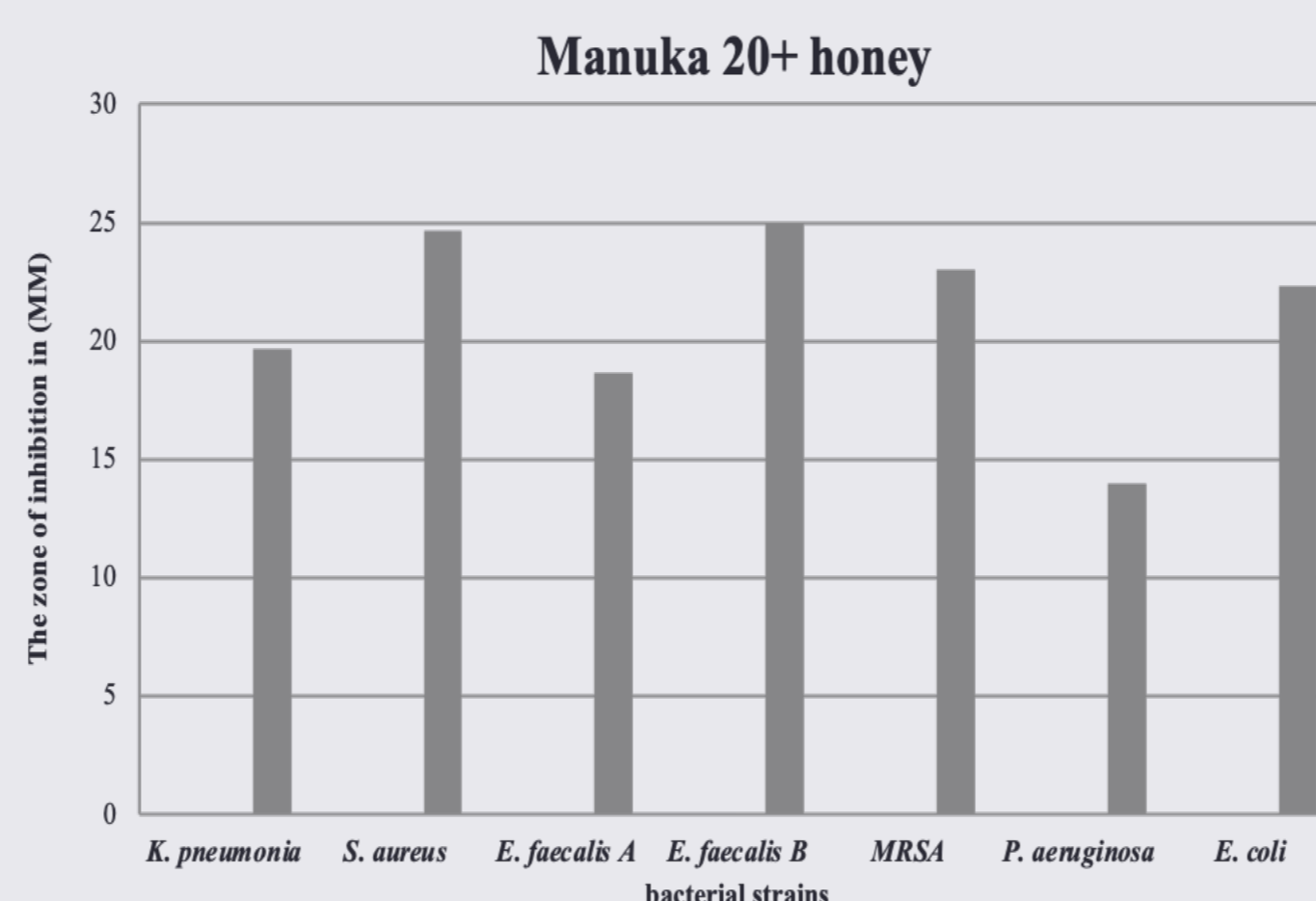


Fig1. Antibacterial activities of MH 20+ against tested bacterial strains. The largest three ZOI were *E. faecalis* (B), *S. aureus* and MRSA.

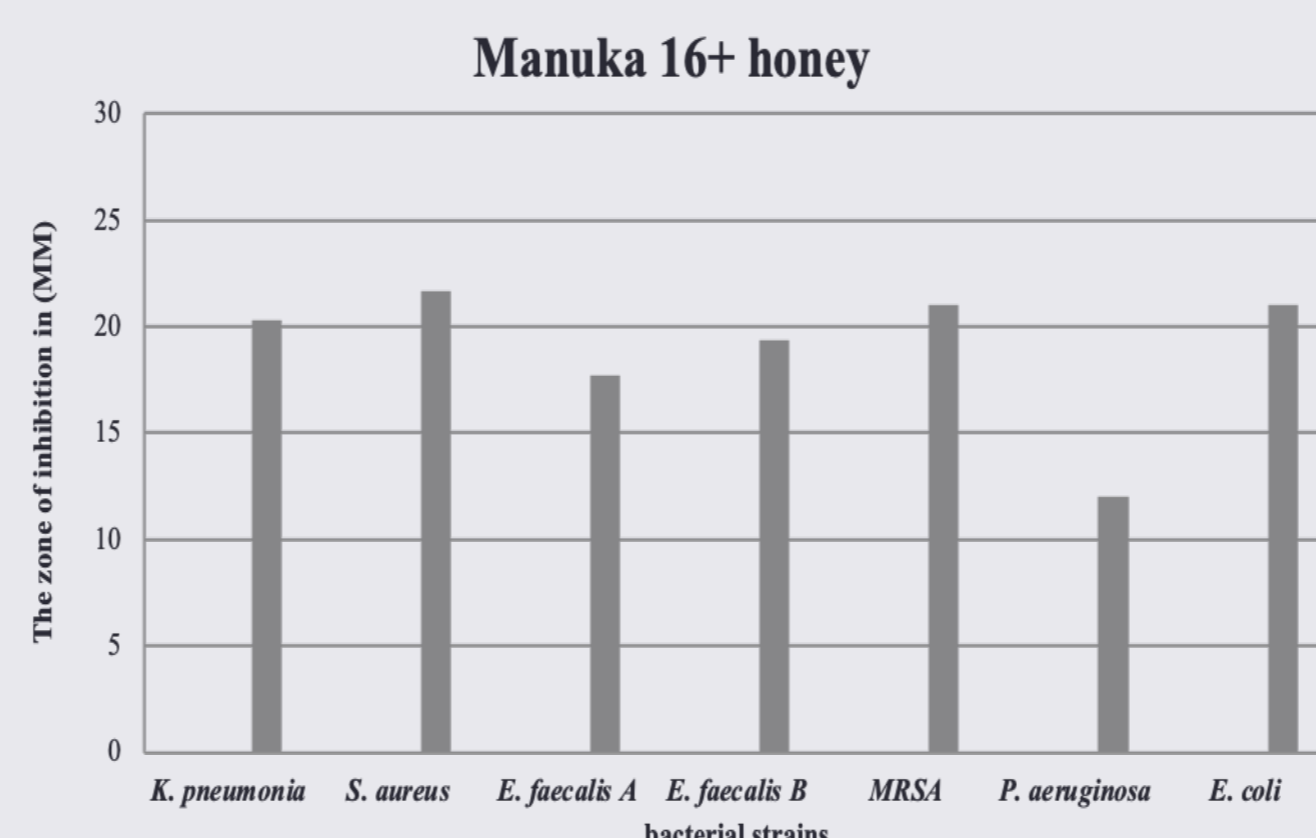


Fig 2. Antibacterial activities of MH 16+ honey against tested bacterial strains. The largest four ZOI were *S. aureus*, *E. faecalis* (B), MRSA and *E. coli*.

## Results

- The inhibition zones due to TH were found to be similar to MH results compared to other honey types. MRSA was the most affected bacteria showing 20.6 mm ZOI followed by *S. aureus* showing 20.3 mm ZOI. TH was also found to be the most effective honey type on *P. aeruginosa* (15.6 mm ZOI). The least ZOI was found in *K. pneumonia*, being only 14.3 mm (Fig. 3).

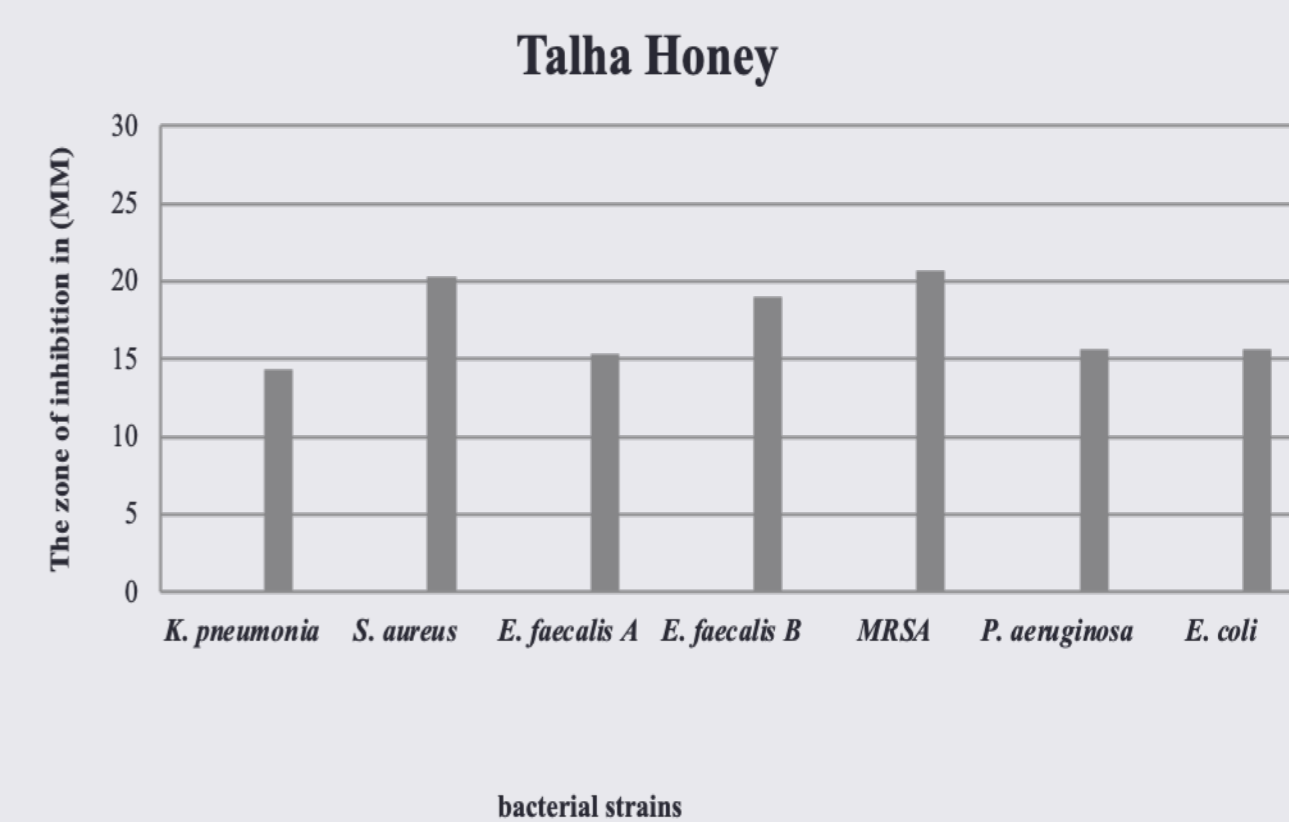


Fig.3 Antibacterial activities of TH against tested bacterial strains. The largest ZOI were *S. aureus*, *E. faecalis* (B), MRSA & *P. aeruginosa*.

## Conclusion

- All tested honey types except black forest, have exhibited antibacterial activities against all tested bacteria, especially *S. aureus* and MRSA.
- MH UMF +20 and +16 were found to be more effective against all tested strain than other types probably due to the concentration of MGO. While Black forest honey has no significant effects against all tested strains.
- Further studies are required to evaluate different types of honey on different bacterial strains in order to determine the exact composition of tested honey.

## References

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