

Syarida H Safii^{1,2}, Geoffrey R Tompkins¹, Helen KP English³, Patrick R Schmidlin⁴, Warwick J Duncan¹



¹ Sir John Walsh Research Institute, School of Dentistry, University of Otago, New Zealand

² Department of Restorative Dentistry, Faculty of Dentistry, University of Malaya, Malaysia

³ Nelson Periodontics, Private Specialist Periodontal Practice, Nelson, New Zealand

⁴ Clinic of Preventive Dentistry, Periodontology and Cariology, Centre of Dental Medicine, University of Zurich, Switzerland

INTRODUCTION

Manuka honey (MH), derived from manuka shrub *Leptospermum scoparium*, native to New Zealand and Australia, contains elevated amounts of antimicrobial methylglyoxal^{1,2}. Topical application of MH is effective in the treatment of burn and surgical wound infections³.

Our aim was to assess the antibacterial effect of MH against oral microorganisms in order to explore its potential use in periodontal treatment.

MATERIALS & METHODS

- ▶ Manuka (Comvita®, New Zealand) and white clover (*Trifolium repens*) honey (Hollands®, New Zealand) were compared for their minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against *Staphylococcus oxford*, *Escherichia coli* and four representative oral bacterial species: *Streptococcus mutans*, *Streptococcus sanguinis*, *Streptococcus gordonii* and *Fusobacterium nucleatum* ATCC: 10953 (a), 25586 (b), 33568 (c) and 44256 (d).
- ▶ Honey was added to either tryptic soy broth or brain heart infusion (two-fold serial dilutions), inoculated with the test microorganisms and incubated at 37°C for 18 hours.
- ▶ MIC was determined by measuring optical density (A_{600}) and MBC by spot-plating samples on appropriate agar and incubating either aerobically (*S. oxford*, *E. coli*) or anaerobically (*S. mutans*, *S. sanguinis*, *S. gordonii* and *F. nucleatum*).

RESULTS

- ▶ Both honeys were bacteriostatic against all microorganisms tested (Figure 1). MH was more effective than clover honey (CH).
- ▶ Both honeys were bactericidal against all microorganisms tested except *S. mutans* (Table 1).
- ▶ Most microorganisms were more sensitive to MH than CH except *S. gordonii* and *F. nucleatum* ATCC 44256.

CONCLUSIONS

- ▶ MH was more effective than clover honey against three of the tested plaque-associated species.
- ▶ Subgingival application of manuka honey as an adjunct to periodontal treatment merits further investigation. However, since *S. mutans* was relatively resistant and pH of honey is below 5.5 this may predispose root surfaces to caries and erosion.

REFERENCES

- Mavric, E.; Wittman, S.; Barth, G.; Henle, T. (2008) Identification and quantification of methylglyoxal as the dominant antibacterial constituent of Manuka (*Leptospermum scoparium*) honeys from New Zealand. *Molecular Nutrition & Food Research* **52**; 483-489
- Adams, C.J.; Boulton, C.H.; Deadman, B.J.; Farr, J.M.; Grainger, M.N.C.; Manley-Harris, M.; Snow, M.J. (2008) Isolation by HPLC and characterization of the bioactive fraction of New Zealand manuka (*Leptospermum scoparium*) honey. *Carbohydrate Research* **343**; 651-659
- Vandamme, L.; Heyneman, A.; Hoeksema, H.; Verbelen, J.; Monstrey, S. (2013) Honey in modern wound care: A systematic review. *Burns* **39**; 1514-1525

Bacterial strains	MBC (% w/v)	
	MH UMF® 20+	Clover honey
<i>S. oxford</i>	12.5	50
<i>E. coli</i>	12.5	25
<i>S. mutans</i>	>50	>50
<i>S. sanguinis</i>	25	50
<i>S. gordonii</i>	25	25
<i>F. nucleatum</i> ^a	25	6.3
<i>F. nucleatum</i> ^b	25	50
<i>F. nucleatum</i> ^c	25	50
<i>F. nucleatum</i> ^d	50	25

Table 1. MBCs of manuka and clover honey against nine bacterial strains after 18 hours of incubation. The highest concentration tested was 50 (% w/v).

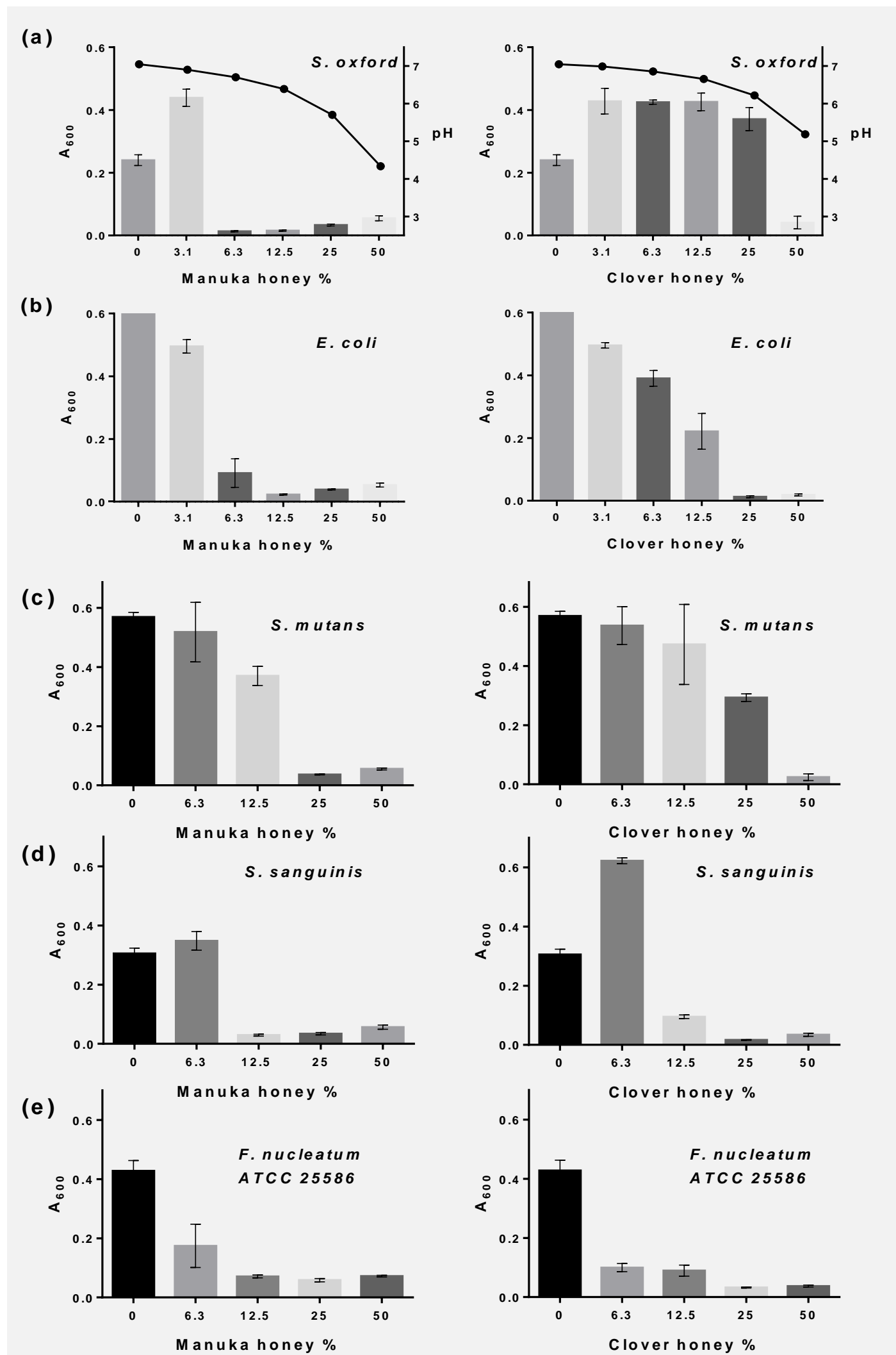


Figure 1. MICs (columns) and pH (•) of manuka and clover honey against (a) *S. oxford*, (b) *E. coli*, (c) *S. mutans* (d) *S. sanguinis* and (e) *F. nucleatum* ATCC 25586 after 18 hours of incubation.

ACKNOWLEDGMENT

This study was funded by New Zealand Dental Research Foundation.
Author contact: safsy736@student.otago.ac.nz