

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

There is increasing prevalence of infections caused by pathogenic *Candida* species among patients in hospitals. Beside to that several *Candida* spp. have become resistance to many antifungal drugs resulting in increased morbidity and mortality caused by this pathogen; consequently it is necessary to prevent infections with this pathogen. This study was designed to determine if selected lactic acid bacteria isolated from different sources of honey samples were able to inhibit the five strains of pathogenic *Candida* spp. namely, *C. albicans* ATCC1405, *C. glabrata* ATCC2001, *C. tropicalis* ATCC750, *C. parapsilosis* ATCC22019 and *C. krusei* ATCC6258. Lactic acid bacteria HH, HS, HC and HM were identified using API 50CHL and 16S rDNA as *L. curvatus* HH isolated from Al-Hanon honey, *L. plantarum* HS isolated from Al-Sedar honey, *Pediococcus acidilactici* HC isolated from Tualang honey, *Pediococcus pentosaceus* HM isolated from Al-Maray honey. All the isolates inhibited the growth of pathogenic *Candida* spp. as evaluated by dual overly method. The supernatant produced by these isolates inhibited the growth of *Candida* spp. as evaluated by well diffusion method and microtiter plate assay. The antifungal activity of these isolates was reduced by heating the cell free supernatant at 90 and 121°C compared to the control. However, the heated CFS of *L. curvatus* HH completely inhibited the growth of *C. glabrata* and *P. pentosaceus* HM completely inhibited *C. glabrata*. The supernatants of these isolates were active at pH 3-5, but the activity of supernatants were decreased at pH 6, while supernatants of *L. plantarum* HS and *P. pentosaceus* HM lost their antifungal activity especially, against *C. krusei* and *C. parapsilosis* at pH 7.

The antifungal activity of supernatant *L. plantarum* HS was decreased when tested with proteinase K indicating that supernatant contained protein-like antifungal compounds while, the antifungal activity of HC, HH and HM was not destroyed when treated with proteinase K. Treating supernatant with RNase destroyed the antifungal activity of HC and HH against all *Candida* spp. The treated supernatant also inhibited the adhesion of five *Candida* spp. biofilm in pre-coating and co-incubation experiments, especially CFS of *L. curvatus* HH. Strains of LAB cells or their supernatants could be used to inhibit growth of the *Candida* spp. infections, and decreased the biofilm formation. The mechanisms of anti-adhesion activity of *Candida* species by LAB are competition for the adhesion sites by the substances present in the CFS of LAB.

6.2 RECOMMENDATIONS

The results of this study showed that LAB isolated from honey produced some compounds which had antimicrobial and anti-adhesion activities against pathogenic *Candida* species that often cause many human infection. These compounds were not determined. However, future studies are needed as listed below:

- To characterize and identify the responsible compounds for the antimicrobial and anti-adhesion activities of these LAB.
- To study the effectiveness of these compounds on other human pathogenic microorganisms.
- To identify bioactive compounds in honey that may contribute to the anti-adhesion activity against *Candida* spp. and other pathogens.