CHAPTER 5

General Discussion and Conclusion

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5.1 Motivation of this study

Foodborne bacterial illnesses are still a major health concern in both the developing and developed countries (Alzoreky & Nakahara, 2003). *Listeria monocytogenes* has been implicated as the culprit to most deaths caused by food related illnesses (White *et al.,* 2002). Plants have been used in folk medicine against symptoms caused by listeriosis. Furthermore, this organism has been found to be resistant to several single antibiotics (Nichterlein *et al*., 1998; White *et al*., 2002) and results in the need for multidrug therapy (Cone *et al*., 2003). The use of multidrug treatment however results in side effects (Gleckman and Borrego, 1997) and this has led to the use of medicinal plants as an alternative treatment for listeriosios.

Various medicinal plants have been used in daily life to treat diseases all over the world (Ates and Erdogrul, 2003). It is through the development of traditional medicine that the therapeutic effect of drugs has been revealed (Hikino, 1991). The use of medicinal plants by South Africans in treating symptoms associated with listerioisis such as, diarrhoea, headaches, fever, inflammation, prevention of abortion etc has been documented (Van Wyk *et a*l. 1997). The problem of multidrug resistance has necessitated the need to explore the potential of South African medicinal plants for antilisterial activity. Finding the most effective novel drugs from plants against *L. monocytogenes* could reduce the risk of multidrug resistant species and reduce the treatment costs. Scientific basis for the use of such plants in South African traditional medicine was required and therefore, against this background the antilisterial activity of 13

local medicinal plants were investigated. The plant extracts were screened for activity against *Listeria monocytogenes.*

5.2 Discussion and conclusion

Most of the studies of antimicrobial activity of plants against *L. monocytogenes* have focused on the planktonic cells. In the present study both planktonic cells and biofilm with regard to the bioactivity of plants against *L. monocytogenes* were investigated. The results obtained from the present study showed the potential of crude plants extracts of *A. karroo* and *P. ecklonii* together with their isolated pure compounds in combating listeriosis. Quave *et al*. (2008) have reported that biofilms are associated with severe infections. Listerial biofilms fall in this category of pathogens.

From the 13 plants that were screened for antililsterial activity, two plants *A. karroo* and *P. ecklonii* showed more activity as compared to the other eleven plants. This necessitated further investigation of the two plants. As stated in Chapter 2 the two plants have not been previously tested against *L. monocytogenes.*

From the three known compounds isolated from *A. karroo*, epicatechin (**1**) did not exhibit activity against *L. monocytogenes*. β-sitosterol (compound **2**) and epigallocatechin (**3**) showed activity against the pathogen. Although epicatechin (**1**) did not show activity against *L. monocytogenes*, in the previous study it has been reported to have anti-inflammatory activity. In literature it has been reported that components of Chinese green tea extract such as epicatechin, epigallocatechin gallate, epicatechin gallate and caffeine when acting together were able to show activity against *L. monocytogenes* and other major food-borne pathogens, however when they were tested on its own, not in combination they did not show activity against the *L. monocytogenes* (Si *et al*. 2006). In the present study epigallocatechin (**3**) which is similar to

the previous mentioned compounds not only showed activity against the planktonic cells of *L. monocyo*genes but also against the listerial biofilm. Bacterial biofilm in particular listerial biofilm are more resistant to action of antimicrobial agents (García-Almendárez *et al*., 2007), however in this study the β-sitosterol (**2**) also showed good activity against *L. monocytogenes* biofilm. β-sitosterol (**2**) has been reported in literature to have antibacterial activity against Gram positive bacteria such as *S. aureus* and *B. subtilis* (Sanches *et al*., 2005). *L. monocytogenes* is a Gram positive bacteria like the other two previous mentioned organisms. Besides showing the lowest value, β-sitosterol (**2**) also exhibited moderate (IC_{50}) value as compared to the control drug during cytotoxicty test.

P. ecklonii and its two isolated compounds showed activity against *L. monocytogenes*. Parviflon D (compound P**1**) and parvifloron F (compound P**2**) not only showed activity against *L. monocytogenes* but also against a variety of organisms such as *Mycobacterium tuberculosis, M. smegmatis, S. aureus, Pseudomonas aeruginosa, E. coli* and *Enterococcus faecalis.* This is the first report on the bioactivity of the two compounds against *L. monocytogenes* (Nyila *et al*., 2009). The activity of *P. ecklonii crude* in the tyrosinase assay and also its antibacterial activity against *S. aureus* in the present study clearly demonstrate as to why the plant is used for skin related ailments (Lukhoba *et al*., 2006). The results of the present study illustrate that the two active compounds isolated from *A. karroo* and the two from *P. ecklonii* could play role as disinfectant agents and preliminary tests should be carried out to check out their potential for removing listerial biofilm on contaminated surfaces.

5.7 References

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CHAPTER 6

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