Chapter 7

SUMMARY AND CONCLUSIONS

Wound healing is a process, which is fundamentally a connective tissue response. Various physiotherapy modalities are useful in treatment of delayed wound healing. However, UVR has the advantage of producing both bactericidal effect and promoting granulation tissue which will reduce the cost and hospital stay.

In conclusion, we attempted to study the effect of UVR in both in-vitro and in-vivo designs.

I. In-vitro study of effect of UVR:

   Ia. Effect of direct UVR (254nm)

   Effect on gram-positive cocci:

   1. Minimum exposure duration required for 100% bactericidal effect was 5 seconds for *Streptococcus pyogenes*, 10 seconds for *MRSA* and *MSCONS*, 15 seconds for *MSSA* and *Enterococcus species*.

   2. a. Minimum exposure duration and susceptibility pattern: *Streptococcus pyogenes* was completely eradicated by 5 seconds irrespective of their antibiotic susceptibility pattern.

      b. Sensitive strain of *Enterococcus species* required 15 seconds of irradiation compared to the moderate and resistant strain which required only 10 seconds of irradiation.

   Effect on gram-negative bacilli:

   1. Minimum exposure duration required for 100% bactericidal effect was 20 seconds for *Pseudomonas aeruginosa*, 25 seconds for *Klebsiella pneumoniae* and 15 seconds for *Escherichia coli*.

   2. Minimum exposure duration and susceptibility pattern:

      a. Different antibiotic susceptibility patterns of *Pseudomonas aeruginosa* did not have any influence on UVR sensitivity.
b. Pan drug resistant strains of both *Klebsiella pneumoniae* and *Escherichia coli* were UVR (254nm) resistant when compared to *Pseudomonas aeruginosa* which did not exhibit similar phenomenon.

3. *Escherichia coli* were more sensitive to the effects of UVR (254nm) than *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*.

Ib. Effect of direct UVR (400nm):

1. Direct UVR (400nm) did not possess any bactericidal properties on both gram positive cocci and gram negative bacilli.

Ic. Effect of filtered UVR (254nm and 400nm) through plastic sheet:

1. Filtered UVR (254nm and 400nm) through 0.15 mm thick transparent polythene sheet was ineffective in producing any bactericidal effect.

2. Filtered UVR (400nm) did not possess any bactericidal property despite the 49°C of heat production at the level of the plate.

II. **In-vivo experimental study of effect of UVR:**

**Effect of UVR (254nm) on excision wound healing:**

1. In our study we could not infect excision wound with *Enterococcus species*.

2. On 18\textsuperscript{th} day of study, percentage wound contraction in all the experimental animals infected with gram-negative bacilli showed more wound contraction than that of experimental animals infected with the gram-positive cocci.

3. On 18\textsuperscript{th} day of study irradiation, the animals infected with specific organisms were completely replaced by the normal flora.

4. Inflammatory cells were less in the experimental group than the sham control in all groups on 18\textsuperscript{th} day of study (i.e. UVR exposure in the present study exhibited anti-inflammatory effect).

5. Subjectively, bactericidal dose was effective in producing more collagen deposition in all three trials for *MRSA, MSSA, MSCONS, Pseudomonas aeruginosa, Klebsiella pneumoniae, Escherichia coli*. 