CHAPTER 7

SUMMARY AND CONCLUSION

7.1 SUMMARY

This chapter attempts to summarize and integrate the effectiveness of physiotherapy interventions in treating DOMS, and to understand their influence on biochemical markers and on clinical changes, that contribute much to muscle soreness. This research has important implications, not only for recreational athletes and even for elite athletes, that exercise intervention will be the immediate remedy to reduce the acute symptoms of muscle soreness and can facilitate the recovery faster and prepare them for early participation in sports.

7.2 RESEARCH RATIONALE

The objective of this research was to investigate the effect of three physiotherapy interventions on biochemical parameters (CK and LDH), MIVC and pain as compared to control group of delayed onset of muscle soreness in recreational athletes.

7.3 MAJOR FINDINGS

The major finding of this study is that the exercise intervention (group 3) was found to be effective in limiting the biochemical markers CK & LDH elevation by 72 hours when compared to other three groups. Both phonophoresis (group 2) & exercise intervention (group 3) was found to be effective in reducing the pain and for the recovery of muscle strength (MIVC) by 72 hours when compared to cryotherapy intervention (group 1) and as well as with control group.
7.4 RATIONALE FOR THE STUDY

All individuals perform movements on a daily basis that require strong eccentric muscle actions. A wide range of the population experiences the negative effects of Delayed Onset Muscle Soreness. Increasing numbers are participating in athletic activities and taking a more active approach in achieving health and wellness. This increase in activity exposes them to DOMS and the associated negative effects.

There is a large variation among subjects in response to exercise that leads to DOMS, Some subjects show large biochemical or functional changes. As DOMS has been shown to alter biomechanics of movement and predispose participants to injury, it is important to determine an effective treatment intervention that will reduce the negative impacts of DOMS. Some commonly used methods of treating DOMS by clinical practitioners were NSAIDs and ice application which had no impact in reducing the symptoms of muscle soreness. Therefore the specific exercise intervention used in the present research will have scope for DOMS experienced by athletes.

7.5 FINDINGS BASED ON PHASE I STUDY

It was found that 80% of 1 RM was enough to induce DOMS experimentally when compared to 70% and 90% of 1 RM. Thus the pilot report concludes the effectiveness of the standardization of the procedure to induce DOMS by eccentric loading protocol.

7.6 FINDINGS BASED ON PHASE II STUDY

In order to test the hypothesis that there is no significant differences among physiotherapy intervention in limiting the enzymatic activity of biochemical markers (
CK & LDH), and reducing the symptoms of muscle soreness (MIVC & VAS), One way ANOVA was done. The null hypothesis is rejected and the effectiveness of physiotherapy intervention is established.

In conclusion, the results produced from this study, showed that, the eccentric protocol causes more muscle soreness and rise in the plasma CK and LDH activity. Subjective enzymatic values remained elevated for at least 4 days after exercise induced muscle damage in group1 (cryotherapy), group 2 (phonophoresis ) and in group 4 (control), but in group3 (exercises), the values remained elevated for 2 days only, than the values reached near to the baseline in day 4. Thus exercise intervention was successful in significantly limiting the elevation of biochemical markers CK and LDH, while cryotherapy and phonophoresis demonstrated no significant effect in altering the biochemical enzymatic activity. The peak of muscle soreness and strength loss occurred one day after eccentric exercise and remained till 48 hours in all the groups. Participants in the exercise group and phonophoresis group experienced slightly less soreness sensation and recovery in strength loss on day three after eccentric exercise than the cryotherapy group and control group.

7.7 CLINICAL IMPLICATIONS

Most of the individuals and athletes experience muscle soreness after unaccustomed exercises due to lack of training.

From this study it can be known that exercise intervention will be the immediate remedy to reduce the acute symptoms of muscle soreness and can facilitate the recovery faster and prepare the athletes for early participation in sports.
### 7.8 RECOMMENDATIONS

It is recommended that future research studies observing the effects of eccentric exercise on CK, LDH, and DOMS should be measured from the time the eccentric exercise is performed until recovery and various protocols of exercises can be compared to show better improvements in recovery for muscle strength and from pain relief.

From a clinical perspective physical signs of DOMS such as muscle swelling and muscle tenderness should also be evaluated.