

CHAPTER VI

CONCLUSION

In this investigation, the Ormco[®] Grey Power Chain Generation II, were tested. Three-loop and four-loop closed, open and wide space elastomeric chains were tension testing by Instron[®] universal testing machine. The force-displacement curves of each group were established, and then the generated force, displacement and percent elongation at elastic limit were obtained. Furthermore, three groups of elastomeric chains, four-loop closed space, three-loop open and wide space, were initially stretched at 22.5 millimeters with the initial force range 300-400 grams. The force measurements were repeated over six-week period with simulated tooth movement, 0.5 millimeters per week. The conclusions of this investigation were as follows:

1. The patterns of force-displacement curves of three-loop and four-loop closed, open and wide space of elastomeric chains were similar to the typical tension curve pattern of the polymeric materials.

2. At elastic limit, in the same number of loops the generated forces of closed and open forms were greater than wide form. The displacement in wide form was the greatest, but open form had the greatest percent elongation. In the same form, three-loop groups had greater generated forces and percent elongations, and less displacements than four-loop groups.

3. There was statistically significant difference of the generated force at elastic limit among three-loop and four-loop groups of three forms of elastomeric chains only by form, but the percent elongation was significantly different by both form and number of loops.

4. The percent remaining forces after six weeks with simulated tooth movement of closed, open and wide forms were 41.27%, 27.51% and 29.62% respectively.

5. All three forms of elastomeric chains showed significant differences of the percent remaining force in all eight periods ($p < 0.01$).

6. The force degradations of three forms, four-loop closed space, three-loop open and wide space, were rapidly decreased on the first day (30-40 % per day) and then gradual reduction rates of force loss (0.5-1 % per day) were seen throughout the six-week period.

7. All three forms of elastomeric chains showed significant differences of the percent force decay rate only between the first day to the other time intervals ($p < 0.01$).

8. The force decay patterns of all three forms of elastomeric chains were relatively similar. The greatest force declination occurred only on the first day, then it was gradually decreased and maintained almost the same in the other time intervals.

Based on the results of this investigation, the following recommendation could be made as follows:

1. The factors that effected on the remaining force and the force degradation were amount of initial force, elastic relaxation, reduction of chain extension and also the geometric configurations of elastomeric chains.

2. Among three forms of elastomeric chains, the closed space form seemed to be the most suitable for tooth movement because they had the greatest generated force at elastic limit with the least force decay rate and established the effective tooth movement force for a longer time period. Furthermore, their geometric configuration could be easily adjusted by number of loops for varying extensions.