CHAPTER 6

SUMMARY AND CONCLUSION
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6.1. Evaluation of biocompatibility:

Silorane based composites are the emerging materials gaining popularity owing to the low polymerization shrinkage exhibited by them. These composites may enhance the clinical integrity and reduce marginal leakage leading to improved restoration longevity. The present material used for silorane based composite is Filtek P90 and the following results may thus be generalized for silorane based composites to be developed in future also. The present study mainly confines to the evaluation of the biocompatible properties of the chemical compound present in the composites. Hence it gives an implication to all the further research on the silorane based compounds.

Following conclusions can be drawn from the present investigations:

1. The SBC and MBC restorative materials do not cause cytotoxicity in human gingival fibroblasts and are regarded safe when tested in vitro. The SBC showed comparable cytotoxic characteristics to clinically successful MBC suggesting the non-toxic nature in the oral environment and hence contributing to clinical success of these restorative materials.

2. The SBC and MBC restorative materials were not cytotoxic and are regarded safe when tested for the dental pulp cells in an in vitro study. DPCs are more susceptible to the cytotoxic effect of the composites. Compared to MBC, the cytotoxic effect of SBC decreases as the time passes on. This difference should be considered, particularly in deep cavities, in order to preserve the regenerative capacity of the pulp.
The present study adds new information to our knowledge about the cytotoxicity of dental composite resin restorations based on different chemistries.

3. The antimicrobial activity of SBC was significantly higher in both *C. albicans* and *S. mutans* when compared to MBC whereas it was resistance against *L. acidophilus* with no zone of inhibition.

4. Among the microorganism, irrespective of the materials, surface adherence and penetration of *C. albicans* was seen more, comparative to *S. mutans* and *L. acidophilus*. The SBC revealed a significantly lower susceptibility to adhere all the three microrganisms tested (*S. mutans, L. acidophilus, C albicans*) when compared to conventional MBC.

6.2. Evaluation of biomechanics:

5. Results suggest that fluoride-containing dental materials had long term sustained fluoride releasing capacity. The choice of a material for use in the caries-prone patient should be based on the release data to the individual material rather than assumed from the general class of material. For caries risk patients GICs are more effective in preventing further demineralization than composite resin. Also composite needs more intermittent and more frequent application of fluoride for effective release. The use of a higher temperature during topical fluoride applications may increase the fluoride recharging and re-release ability of restorative materials, and a low oral environment temperature should be avoided during topical fluoride application. As the fluoride release change in each material and as most of the population use a fluoridated dentifrice at least once a day, the potential of a material
for recharge would seem to be an effective method of self-administered secondary caries prevention.

6. Color stability is of great importance to patients and clinicians when working in the esthetic zone. Patients should be aware of their dietary habits if their restorations needs to be worn for long period and therefore, may be advised to avoid or minimize consumption of these beverages during the service of the composites. The dentist should select and use materials with good color stability, for the excellent serviceability of these restorations.

7. Among all the polishing system for SBC, Diamond bur- Astropol and Astrobursh combinations to be used. Whereas in MBC, Tungsten carbide bur - Soflex disc used showed good surface finish. SBC showed least Ra values with lower surface hardness than MBC. Delayed finishing/ polishing of materials is better than immediate polishing in both the tested materials. Clinical significance of surface roughness and hardness is related to: i. Aesthetic appearance of restoration (discoloration and wear) ii. Biological consequences regarding periodontal health (gingivitis) iii. Development of secondary caries due to increased plaque accumulation. This study would be helpful to make some considerations about clinical indication and longevity of restorative materials studied.

8. The SBC showed lower WS and SO results than obtained with MBC. The storage in artificial saliva increased the WS and SO when compared to distilled water. The study suggest that SBC composites exhibit better hydrolytic stability even after a month of water immersion compared to conventional MBC, encouraging the clinical use of the SBC composite material.
9. The results of the study provide valuable information about the difference in thermal stability of the two composites. The results clearly indicate that as the temperature increases the rate of decomposition of the restorative material also increases. The change of color was the most common characteristic for each range of temperature, and this was directly related with the level of carbonization and incineration of teeth. The resistance of restoration to variable temperature is unique in itself.

6.3. Suggestions for further study (with Limitations of the study)

1. In the present study the screening period for the cytotoxicity was 24-48 hours, further the effects of cytotoxicity on ageing beyond 72 hours could be assessed.

2. Further research in analyzing the effect of cytotoxicity on residual monomers on apoptosis, oxidative stress, delay in cellular and molecular mechanism, could be elucidated since the residual monomer and leachable components of SBC and MBC could produce cytotoxicity.

3. To investigate the fluoride releasing and recharging ability, color stability, surface roughness, surface hardness and the performance of composites in a clinical setting and evaluate the effect of interaction of composites, the present study can be further carried forward as planned in vivo studies.