CHAPTER 1
B. LITERATURE SURVEY
LITERATURE SURVEY

1. Girish Kumar & Amit Shaivrayan (2015) evaluated and compared differences in compressive strength, diametral tensile strength and flexural strength of two composite materials (Z-100 Restorative and Dyract), Resin Modified GIC (Vitremer), silver cermet (Hi-Dense XP) and silver amalgam (Shofu). Visible light cured composite (Z-100) was found having the highest strength among the tested materials. Amalgam showed the highest value for elastic modulus and silver cermet showed less value for all the properties except for elastic modulus.

2. Lalit Kumar et al (2015) assessed the fracture resistance of three composite resin core build-up materials on three prefabricated non metallic posts, cemented in extracted endodontically treated maxillary central incisors. Luxacore showed the highest fracture resistance among the three core build up materials with all three post systems. Ti-core had intermediate values of fracture resistance and Lumiglass had the least values of fracture resistance.

3. Anatara Agarwal & Kundbala Mala (2014) evaluated and compared individual compressive, tensile, and flexural strength of fiber re-inforced dual cure resin core build up material (Para Post ParaCore), silorane based composite resin (Filtek TM P90), and dual curing composite for core build up (Luxa Core Dual) with silver amalgam as control. Both dual cure composite materials with nanofillers were found superior to amalgam core. The silorane based material showed the highest flexural strength, but other mechanical properties were inferior to dual core composite materials with nanofillers.

4. Kiran KV et al (2014) evaluated and compared the compressive strength of microhybrid and nanocomposites. Materials tested in this study were Filtek Z250 XT, CharmFill plus, Tetric Ceram and Esthet X. Statistical Analysis showed that the compressive strength of nanocomposites is higher than microhybrids. Also, it was observed that Charm Fill Plus showed the highest compressive strength and Tetric Ceram showed the least compressive strength among the tested materials.

5. Sheila P Passos et al (2013) compared the mechanical properties of five materials (Rock Core, Cosme Core, Para Core, Multi Core Flow and Filtek Supreme Plus); concluded that Cosme Core had the highest KHN values and was expected to present a higher degree of
conversion during its dual core process (light and chemical cure) when compared to the dual cure materials while Rock Core had the lowest young’s values. Based on these results and taking into consideration the convenience of the use of automix systems and dual cure properties, the authors suggested Cosme Core and Multi Core Flow as core build up materials of choice.

6. B. Petronijević et al (2012) [33] examined the fracture resistance of restored maxillary premolars with composite resin, dental amalgam and glass ionomer cement (GIC) using compressive strength test. Also, they analysed the influence of bond strength of restorative materials on intact and carious dentin. The fracture force corresponding to the teeth restored with GIC were significantly lower compared to the control group and the group with composite resin and amalgam. Satisfactory mechanical properties of restored premolars were obtained using composite resin and dental amalgam as a core build-up material. The carious-affected dentin led to lower bond strength of restored teeth.

7. Umesh V Hambire (2012) [34] analyzed various dental composite materials and effect of variation of different physical properties of composite and gave full description of basics of composite with classification. A detailed comparison of fracture pattern of four composite materials namely Solidex, Artglass, Belle Glass and Targis was made by testing compressive and flexural strength. Belle Glass and Targis had higher flexural strength and modulus of elasticity than artglass and solidex, but lower compressive strength.

8. D Markovic et al (2011) [20] examined the ultimate strength of restored Maxillary Incisors with composite resin, dental Amalgam and Glass Ionomer Cement as a traditional restoration and concluded that the caries affected dentin led to lower bond strength of restored teeth and composite resin had the best bond and tensional strength ratio.

9. Chetana S Makade (2011) [35] compared the fracture resistance and mode of failure of 40 endodontically treated maxillary incisors restored with different post core systems such as cast post-core, stainless steel post with composite core and glass fibre post with composite core using adhesive resin cement. Control group consisted of samples with intact coronal structure. The endodontically treated teeth without post core system showed least fracture resistance demonstrating the need to reinforce the tooth. The teeth restored with stainless steel post/composite core demonstrated the highest fracture resistance compared to other systems. All
teeth restored with glass fiber posts had restorable fractures making them amenable to retreatment.

10. **Mithra N Hegde et al (2010)** [36] assessed and compared compressive strength of newer nanocomposites (Filtek Z350, Ceram X Mono, Ceram X Duo) and monohybrid (Tetric Ceram) and concluded that nanocomposites had better compressive strength than microhybrid composite. Filtek Z 350 showed the highest compressive strength and Tetric Ceram showed the least compressive strength among the tested materials. Among the nanocomposites, Ceram X Duo had the least compressive strength as compared to Ceram X Mono and Filtek Z 350.

11. **Carlos A Munoz – Viveros (2009)** [37] evaluated the compressive strength, fracture toughness, and flexural strength of four different core materials – Build It FR core material, Luxacore Z core material, Core Paste Syringeable core material and Clearfil Photo Core core material and concluded that Build it FR core material exceeds all physical properties for comparable core- Build up materials.

12. **Bonilla ED (2009)** [38] tested five core build up materials: (1) glass ionomer, (2) resin-modified glass ionomer, (3) titanium-reinforced composite, (4) composite resin with fluoride, and (5) amalgam and compared their fracture toughness. They concluded that titanium-reinforced composite resin, the composite resin with fluoride, and amalgam materials showed fracture toughness most likely to withstand the stresses generated during mastication.

13. **Constantin Varlan (2009)** [4] presented a survey of the current knowledge about the clinical approach of restoring endodontically treated teeth by reviewing available literature and concluded that the unrestored endodontically treated tooth is susceptible to fracture, which could lead to loss of the tooth. On analyzing the reasons for extraction of endodontically treated teeth, the most common reason found (44%) was a restorative consideration.

14. **Sepideh Banava & Saman Salchyar (2008)** [39] evaluated the compressive strength of five composite resins after 1 hour, 24 hours, 7 days and 1 month. Materials studied were Nulite –F, Z250, P60, Biscore & Tetric ceram HB. P 60 and Z250 had the highest and Nulite –F and Tetric Ceram HB had the lowest compressive strength at all times. The study also concluded that compressive strength increased with time.
15. Clarisse C.H et al (2006) [40] investigated the fracture resistance of restored endodontically treated teeth when residual axial tooth structure was limited to one half the circumference of the crown preparation using maxillary anterior teeth with quartz fiber posts, composite resin cores and metal crowns and concluded that for restored endodontically treated teeth that do not have a complete circumferential tooth structure between the core and preparation finish line, the location of the remaining coronal tooth structure may affect the fracture resistance.

16. William Cheung (2005) [41] conducted a review of the principles for the use of post and core and the newer materials such as ceramic and fiber reinforced posts. He discussed the principles of core build up, as well as options for the final restorations to help clinicians make a clinical decision based on sound evidence.

17. Fernandes A.S & Dessai G.S (2001) [1] obtained articles cited in MEDLINE search and reviewed them with respect to factors affecting fracture resistance of post-core reconstructed teeth. They concluded that literature indicates that (1) preservation of tooth structure is a must; (2) posts should not be used with the intention of reinforcing the tooth; (3) review of functional and parafunctional forces must be undertaken before restoring the tooth, as these will influence the prognosis; and (4) controlled prospective clinical studies evaluating each factor should be undertaken.

18. Braem MJ (1995) [42] conducted a study to investigate the fatigue behavior of several dental restoratives, including composites, glass ionomers and a resin-reinforced glass ionomer. As a general trend, all products showed a decrease in Young's modulus following water sorption. For all products except the resin-reinforced glass ionomer, the same trend was seen in the restrained fracture strength. This was, however, no longer valid for the flexural fatigue limit: the trend is steady-state for the glass ionomers, status quo for the resin-reinforced glass ionomer, and all composites tested show a decrease.
SUMMARY OF REVIEW OF LITERATURE

With the existing literature it can be concluded that most of the materials which have been studied were not specifically developed for the purpose of core build up, but as a consequence of their properties, have found application in core build-up procedures. More recent formulations have incorporated different combinations of materials; therefore flow composite core build-up materials have been introduced. These are specifically developed to be used as core build up materials. Although many studies compared fracture loads of simulated cores in various geometric configurations often on extracted teeth, the strength of these core materials has rarely been compared separately. Shear failures are unlikely to occur in the oral cavity, hence shear strength of the material holds less significance while choosing the strongest material.
LACK OF LITERATURE

There is lack of literature on classification of core build up materials in general and classification of core build up materials according to strength specifically.
HYPOTHESIS

The null hypothesis tested will be that

1) there will be no differences among the compressive strength, tensile strength and flexural strength of the four core build up materials being studied.

2) there will be no differences in the fracture resistance of endodontically treated maxillary incisors restored with fibre posts and the core build up materials being studied.