

Bonding Performance, Mass Stability, and Mechanical Properties of Self-adhesive Resin Composites and Conventional Dental Composites: A Comparative Laboratory Evaluation

Md Sofiqul Islam¹, Vivek Padmanabhan², Lana Yassin Almaghribi¹, Nansi Fadi Wahbeh¹, Smriti Aryal A C³, Muhammed Mustahsen Rahman⁴

- 1 Department of Operative Dentistry, RAK College of Dental Sciences, RAK Medical and Health Sciences University, P.O Box: 12973, Ras Al-Khaimah, United Arab Emirates
- 2 Department of Pediatric Dentistry, RAK College of Dental Sciences, RAK Medical and Health Sciences University, P.O Box: 12973, Ras Al-Khaimah, United Arab Emirates
- 3 Department of Oral and Craniofacial Health Sciences, College of Dental Medicine, University of Sharjah, P.O Box: 27272 Sharjah, United Arab Emirates
- 4 Department of Periodontology, RAK College of Dental Sciences, RAK Medical and Health Sciences University, Ras Al-Khaimah P.O. Box 12973, United Arab Emirates;

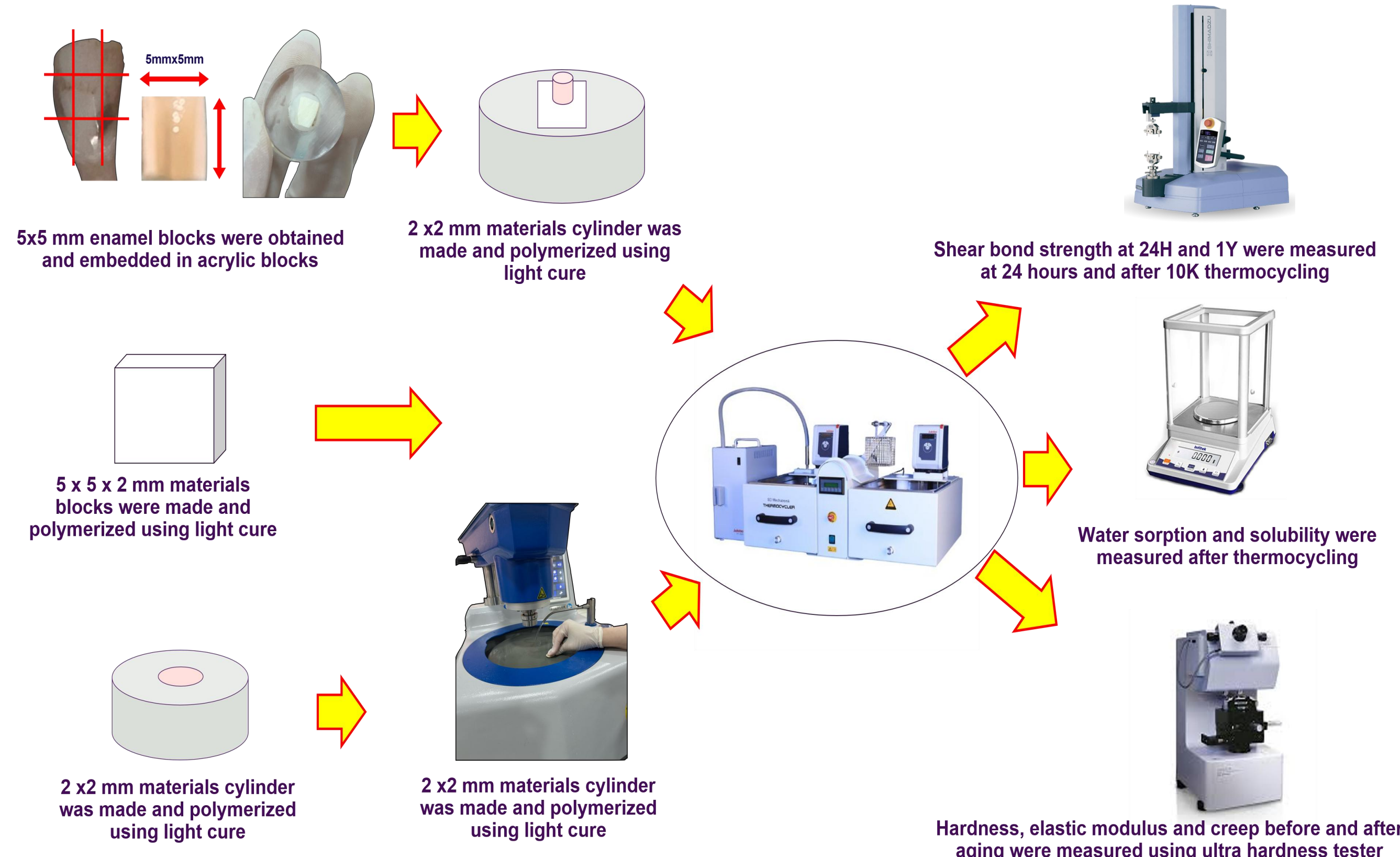
INTRODUCTION & AIM

Self-adhesive resin composites (SARC) have been introduced to simplify the restorative workflow by eliminating separate adhesive steps [1]. Yet simplification in clinical steps often comes at a cost elsewhere, and whether SARC can deliver bonding and mechanical performance comparable to conventional RC used with contemporary universal adhesive system (UAS) remains a matter of debate [2.] Several in vitro investigations have reported that conventional RC used with phosphoric acid etching and modern adhesives consistently achieve high bond strengths to enamel [3]. The SARC, by contrast, tend to produce lower enamel bond strengths though still above thresholds often cited as clinically acceptable [4]. The available scientific evidence reveals that SARC offer procedural simplification but raise the questions regarding their bonding efficacy to enamel and their long-term mechanical stability. There is lack of integrated laboratory evaluations that has been examined both the bonding performance and mechanical properties within the same experimental framework. Moreover, comparisons between multiple commercially available SARC and well-established conventional RC used with a UAS are insufficient.

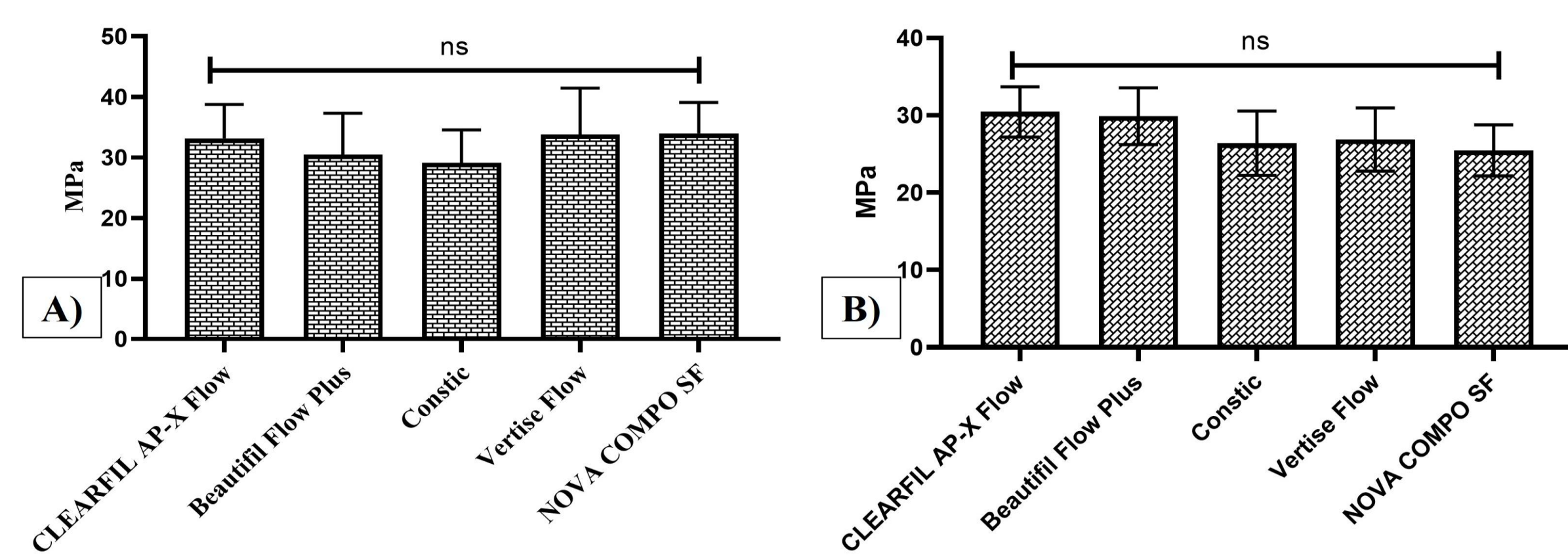
The specific objectives of this laboratory study were:

1. To compare the bonding performance to enamel of selected SARC with that of conventional RC used in conjunction with a UAS by mean of SBS.
2. To evaluate and compare the mass stability of these materials to hydrolytic degradation by mean of WS and SL test.
3. To evaluate and compare the mechanical properties by mean of HV, EM and CR test.

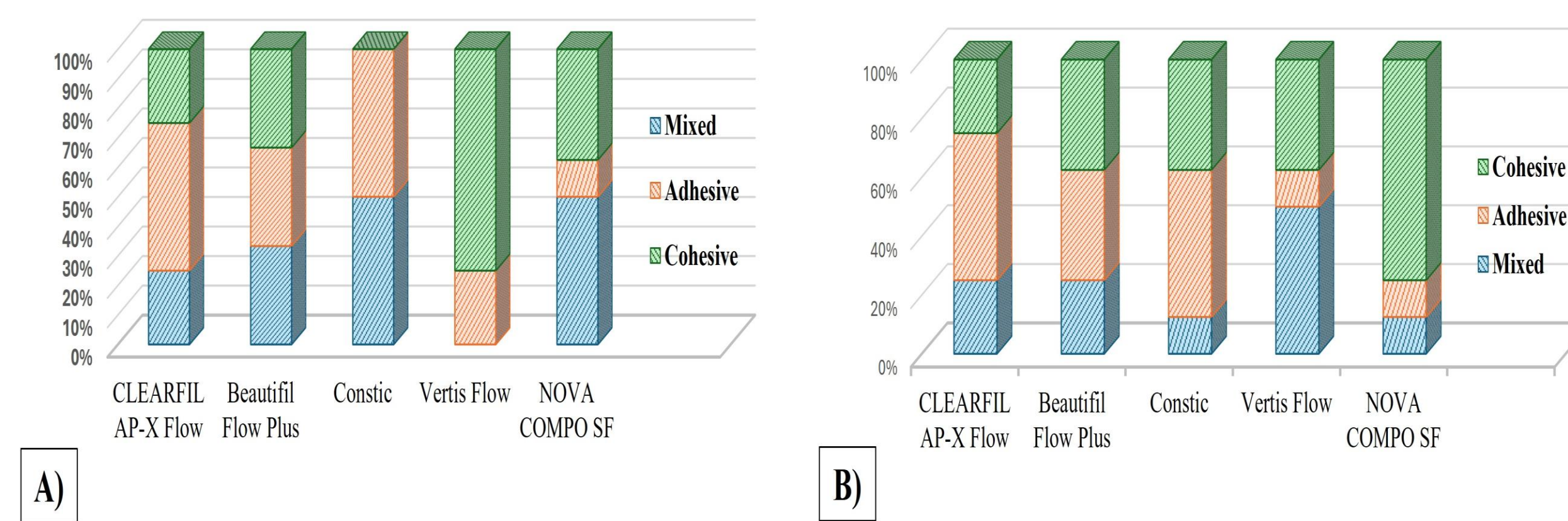
METHOD



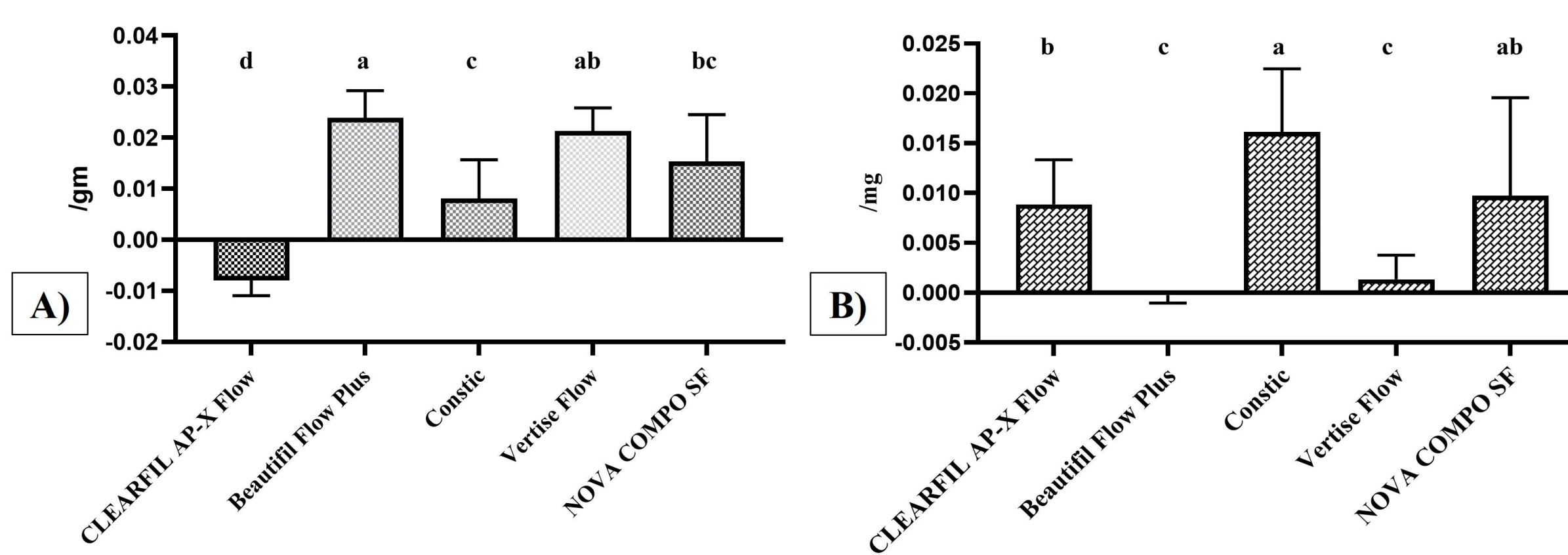
RESULTS & DISCUSSION



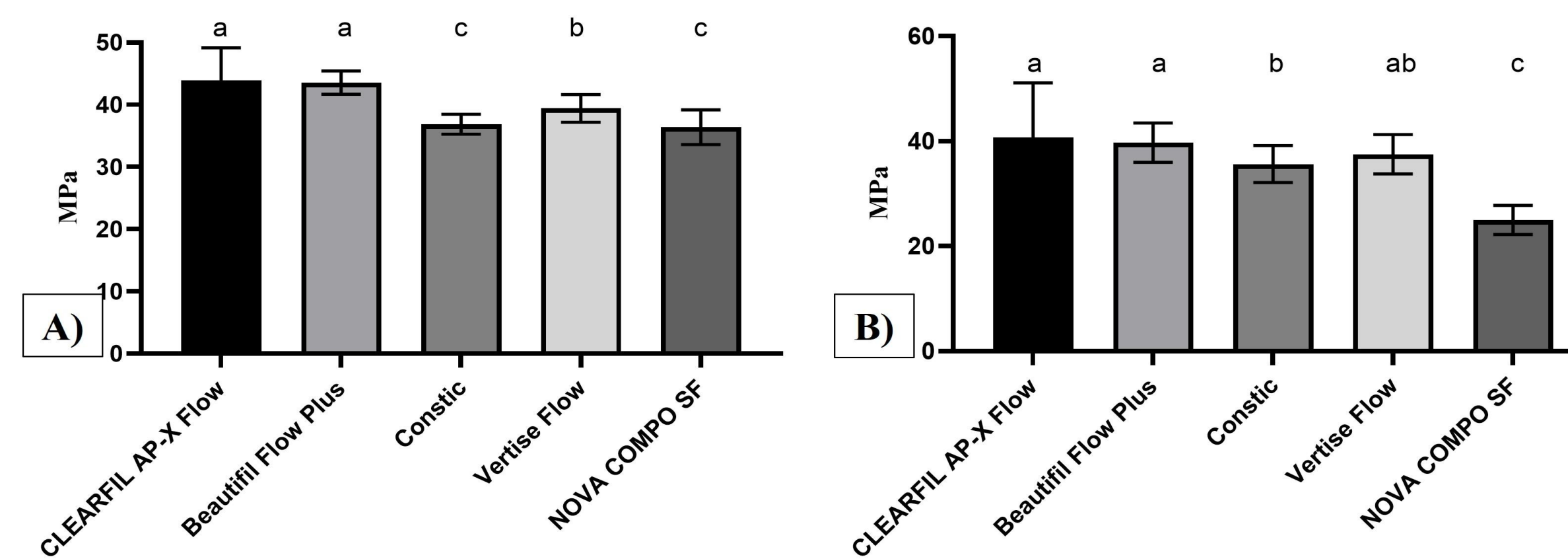
Shear bond strength of the experimented material: A) at 24 hours B) at 1 year
No statistically significant was observed among the tested groups



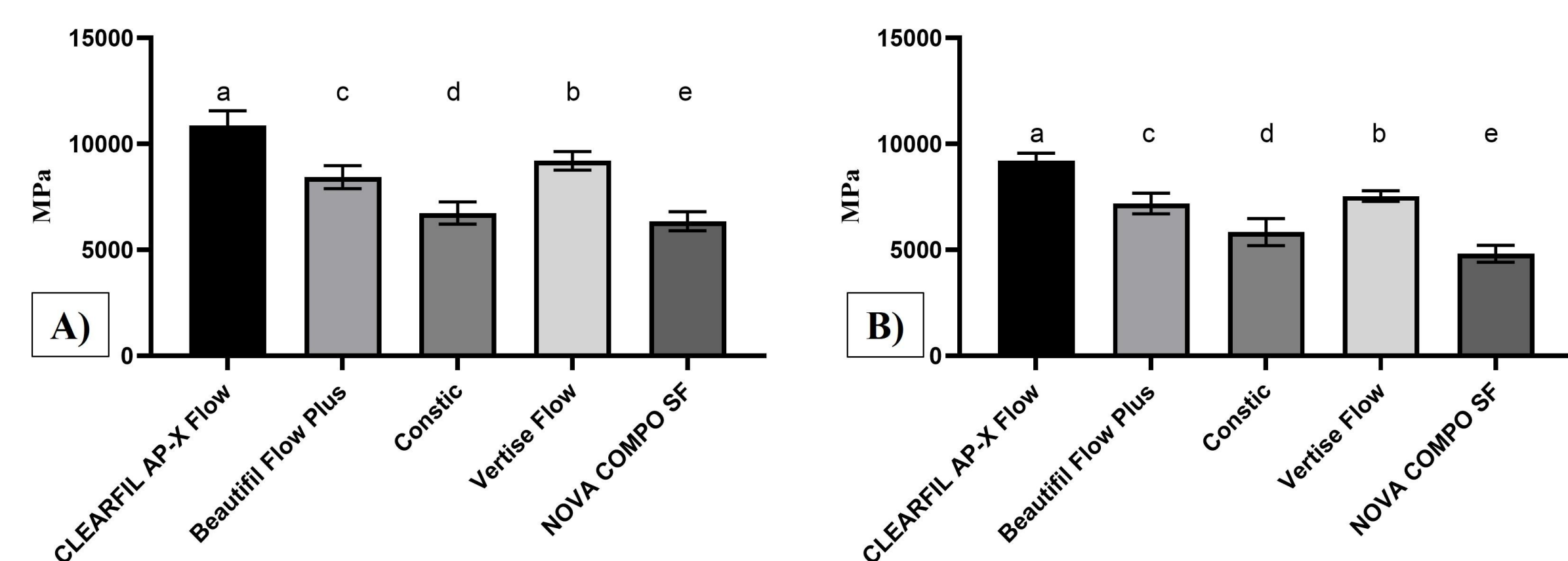
The failure pattern of the de-bonded specimens: A) at 24 hours B) at 1 year
De-bonding of the specimens were classified as Cohesive, Adhesive and Mixed



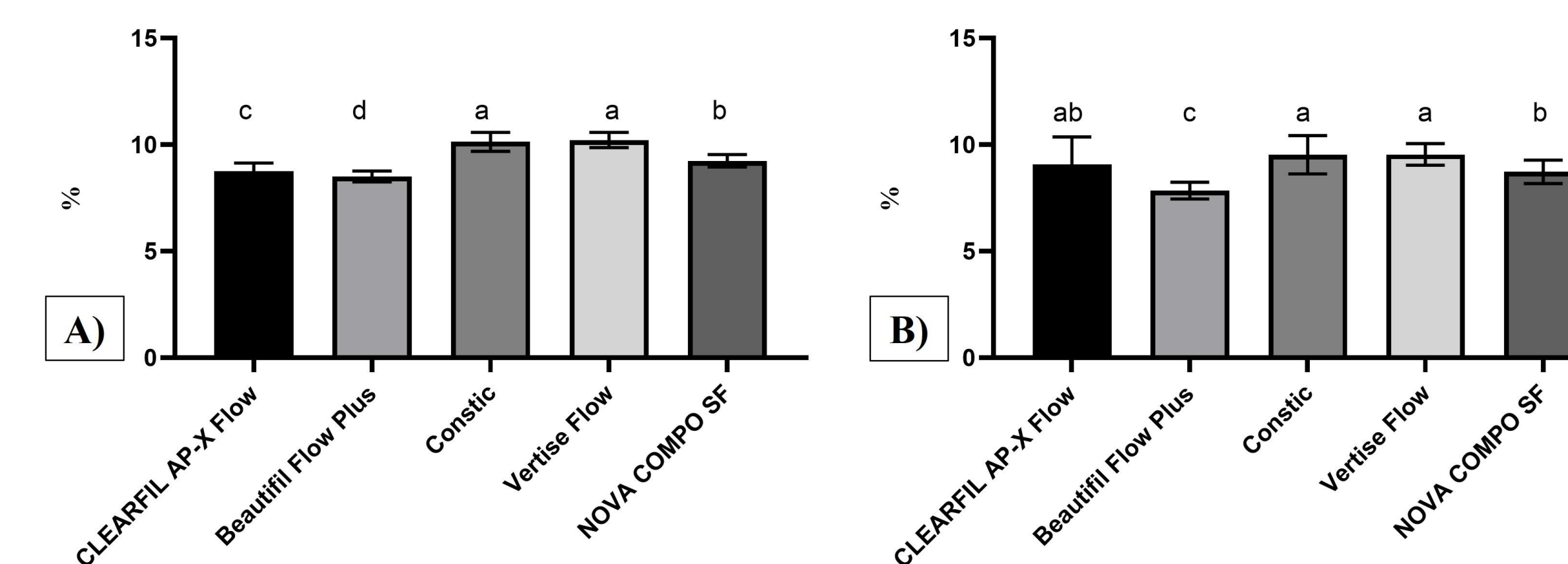
A) Water Sorption of the experimented materials B) Solubility of the experimented materials. Groups identified with the same alphabet are statistically insignificant



Vicker's hardness of the experimented material: A) at 24 hours B) at 1 year
Groups identified with the same alphabet are statistically insignificant



Elastic modulus of the experimented material: A) at 24 hours B) at 1 year
Groups identified with the same alphabet are statistically insignificant



Creep values of the experimented material: A) at 24 hours B) at 1 year
Groups identified with the same alphabet are statistically insignificant

CONCLUSIONS

Within the limitations of this laboratory investigation, it can be concluded that SARC can be used as an alternative of conventional UAS with RC material for certain cases like pediatric dentistry and minimally invasive restorations where procedural simplicity is advantageous. Restoration in high stress bearing areas and restoration where durability is the main objectives, conventional UAS with RC material would be a better choice than SARC.

REFERENCES/ACKNOWLEDGMENT

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