



MECHANICAL PROPERTIES OF CAD/CAM FELDSPATHIC CERAMICS: LITERATURE REVIEW OF *IN VITRO* STUDIES

INTRODUCTION: Contemporary ceramic materials allow a biomimetic replacement of dental tissues.¹ On the account of the existence of several commercial feldspathic ceramics, together with a research priority focused on adhesion and aesthetics, a necessity arises in complementing these studies with information regarding mechanical properties.²

OBJECTIVES:

1. To review and report in vitro studies which tested the flexural strength and fracture toughness of feldspathic ceramics
2. To identify gaps in the scientific evidence regarding this topic

METHODS: A systematic search was conducted in the **PubMed/Medline and Scopus** databases, with controlled search terms such as: “feldspathic ceramic/porcelain”, “CAD/CAM”, “flexural strength”, “fracture toughness”, “three point bending”, “four point bending”, “strength”. Studies featuring samples of CAD/CAM feldspathic ceramics in comparison with other CAD/CAM ceramics, published after 2010 were included. The retrieval and selection process followed the **PRISMA statement flowchart** and was conducted by two reviewers, working independently.

RESULTS:

STUDY	SAMPLE	METHOD	RESULTS
San & Us (2018)	30 samples	Flexural strength	Lava Ultimate - 243 (27) MPa Vita Enamic - 174 (13) MPa Vitablocs Mark II - 97 (8) MPa Vita Suprinity - 510 (43) MPa IPS E.max CAD - 415 (26) MPa
Sonmez et al. (2018)	22 samples	Fracture toughness and Flexural strength	Lava Ultimate - 191(3) MPa / 1.29 MPa Vita Enamic - 152 (3) MPa / 1.23 MPa Vitablocs Mark II - 112 (3) MPa / 2.34 MPa IPS E.max CAD - 359 (4) MPa / 1.67 MPa IPS Empress CAD - 135 (3) MPa / 1.23 MPa
Blackburn, Rask & Awada (2017)	45 samples	Flexural strength	Lava Ultimate - 175 MPa Vita Enamic - 149 MPa Vitablocs Mark II - 133 MPa Paradigm MZ100 - 154 MPa
Ramos et al. (2016)	60 samples	Fracture toughness	Vita Enamic - 0.86 (0.26) MPa Vitablocs Mark II - 0.84 (0.06) MPa Vita Suprinity - 1.25 (0.79) MPa IPS E.max CAD - 1.23 (0.26) MPa
Argyrou, Thompson, Cho & Berzins (2016)	22 samples	Flexural strength	Lava Ultimate - 170 (13) MPa Vita Enamic - 124 (8) MPa Vitablocs Triluxe Forte - 120 (6) MPa IPS Empress CAD - 159 (18) MPa
Badawy, El-Mowafy & Tam (2016)	10 samples	Fracture toughness	Lava Ultimate - 0.85 (0.21) MPa Vita Enamic - 1.02 (0.19) MPa Vitablocs Mark II - 0.73 (0.13) MPa IPS E.max CAD - 1.88 (0.62) MPa Celtra Duo - 2.65 (0.32) MPa
Albero, Pascual, Camps & Grau-Benitez (2015)	30 samples	Flexural strength	Lava Ultimate - 164 (33) MPa Vita Enamic - 181 (42) MPa Vitablocs Mark II - 138 (21) MPa IPS E.max CAD - 272 (65) MPa Empress CAD - 147 (20) MPa
Vichi et al. (2013)	15 samples	Flexural strength	IPS Empress CAD - 125 (13) MPa Cerec Blocs - 112 (8) MPa Vitablocs Mark II - 103 (4) MPa Paradigm C - 109 (10) MPa Sirona Cerec Blocs CP - 105 (5) MPa Vita Triluxe Forte - 105 (5) MPa Vita Triluxe - 102 (7) MPa

CONCLUSION: Contemporary feldspathic ceramics for CAD/CAM systems are outperformed by the rest of the CAD/CAM ceramic options in terms of mechanical properties. Feldspathic ceramics by Vita Zehnfabrik hold a monopoly in relation to studies assessing flexural strength and fracture toughness. Only one of the reported studies assessed different brands of feldspathic ceramics.

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