Accuracy in the Marginal Adaptation and/or Internal Adaptation of Full-coverage Fixed Prostheses Made with Digital Impressions and Conventional Impressions: A Systematic Review

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SOURCE OF DATA

Table 1. Summary of the overall descriptive characteristics of the included systematic reviews (*n* = 6).

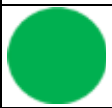
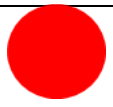
Author (year)	Population	Interventions and comparators	Primary studies	Mention of the following items: 1. PRISMA 2. PROSPERO 3. GRADE 4. Meta-analysis	Reported review limitations
Bandiaky *et al*.(2022) [41]	Fixed - supported prostheses	Intervention: digital scans Control: conventional impressiontechniques	Comparative studies, prospective: 2; randomized controlled clinical studies: 14	1. Yes 2. Yes 3. No 4. Yes	Few studies per parameter and few participants included in each study. Evidence level was low for the studies thatwere otherwise heterogeneous. [41]
Chochlidakis *etal*. (2016) [36]	Fit of fixed dental restorations	Intervention: digital impressiontechniques Control: conventional impressiontechniques	Clinical studies: 2; invitro studies: 9	1. Yes 2. No 3. No 4. Yes	Additional cost of purchasing an intraoral scanner and the learning curvefor adjusting to the new technology [36]
Hasanzade *et al*. (2021) [42]	Fixed prostheses	Intervention: digital scanning and conventional fabrication and digital scanning and fabrication. Control: conventional impression and fabrication and conventional impression and digital fabrication	Clinical trials: 8; invitro studies: 21	1. Yes 2. Yes 3. No 4. Yes	No mention
Hasanzade *et al*. (2019) [43]	Full-coverage restorations	Intervention: digital impression Control: conventional impression	Prospective clinicaltrials: 8; in vitro studies: 26	1. Yes 2. Yes 3. Yes 4. Yes	"Uncontrolled factors may have had a direct influence on marginal and internal adaptation, including scanner type, finish line design, amount of spacer, fabrication technique, measurement of cemented or uncemented restorations, technical error during the laboratory stages, and adjustment of restorations. Subanalysis could not be performed due to the limited number of included studies. Only studies in English were included in the meta-analyses". [43]
Tabesh *et al*.(2021) [44]	Single-unit zirconia crowns	Intervention: digital scans Control: conventional impression	Prospective clinicaltrials: 8; in vitro studies: 11	1. Yes 2. Yes 3. No 4. Yes	"Heterogeneity of the selected studies, including the different methods of tooth preparation, fabrication of restorations, and evaluation of marginal gaps." [44]
Tsirogiannis *etal*. (2016) [45]	Ceramic restoratio ns	Intervention: digital impression Control: conventional impression	In vitro: 8; in vivo: 4	1. No 2. No 3. No 4. Yes	No mention

Table 2. Marginal gap/discrepancy marginal/marginal fit in the general results, graphically represented by colors, where green represents the treatment with the best results, red treatment with the worst results, and yellow that there are no differences between the compared groups.

Systematic review	DI	CI	Reported results	Studies for comparison
Bandiaky *et al*. (2022), France, *Journal of Prosthetic Dentistry* [41]			Marginal fit: MD: -11.1 (C.I. = -32.5, 10.4), P > .05	Comparative studies, prospective (2), and randomized controlled clinical studies (14)
Chochlidakis *et al*. (2016), *Journal of Prosthetic Dentistry* [36]			Marginal discrepancy: MD: 0.24 (-0.32, 0.79), I2= 82.64%, P < .001	Clinical studies (2) and in vitro studies (9)
Hasanzade *et al*. (2021), Iran, *Journal of Prosthetic Dentistry* [42]			Marginal gap: MD: 0.25 (0.09, 0.59), I2 = 66.5%, P = .006	Clinical trials (8) and in vitro studies (21)
Hasanzade *et al*. (2019), Iran, *Journal of Evidence Based Dental Practice* [43]			Marginal gap: MD: -0.59 (C.I. = -0.93, -0.24), I2 = 86%, P < 0.00001	Prospective clinical trials (8) and in vitro studies (26)
Tabesh *et al*. (2021), Iran, *Journal of Prosthetic Dentistry* [44]			Marginal gap: MD: –0.89 (–1.24, –0.54), I2 = 78.2%, P < .001	Prospective clinical trials (8) and in vitro studies (11)
Tsirogiannis *et al*. (2016), Germany, *Journal of Prosthetic Dentistry* [45]			Discrepancy marginal in vivo: adjusted MD: 27.2 (C.I. = -5.3, 59.7), P = .084	4 in vivo studies
			Discrepancy marginal in vitro: adjusted MD: -4.2 (C.I. = -33.0, 24.5), P = .763	8 in vitro studies

DI, digital printing; CI, conventional printing; MD, mean difference; CI, confidence interval.

Table 3. Internal gap/internal adaptation in the general results graphically represented by colors, where green represents the treatment with the best results, red treatment with worse results, and amber indicates that there are no differences between compared groups.

Systematic review	DI	CI	Reported results	Studies for comparison
Bandiaky *et al*. (2022), France, *Journal of Prosthetic Dentistry* [41]			Internal gap: MD: 0.03 (-0.91, 0.96), I2 = 92.22%, P < .0001	Comparative studies, prospective (2) and randomized controlled clinical studies (14)
Hasanzade *et al*. (2021), Iran, *Journal of Prosthetic Dentistry* [42]			Internal adaptation: MD: 0.32 (C.I. = 0.08, 0.56), I2 = 0.0%, P = .457	Clinical trials (8) and in vitro studies (21)
Hasanzade *et al*. (2019), Iran, *Journal of Evidence Based Dental Practice* [43]			Internal gap: MD: -0.17 (C.I. = -0.53, -0.20), I2 = 86%, P < 0.00001	Prospective clinical trials (8) and in vitro studies (26)

DI, digital printing; CI, conventional printing;MD, mean difference; CI, confidence interval.

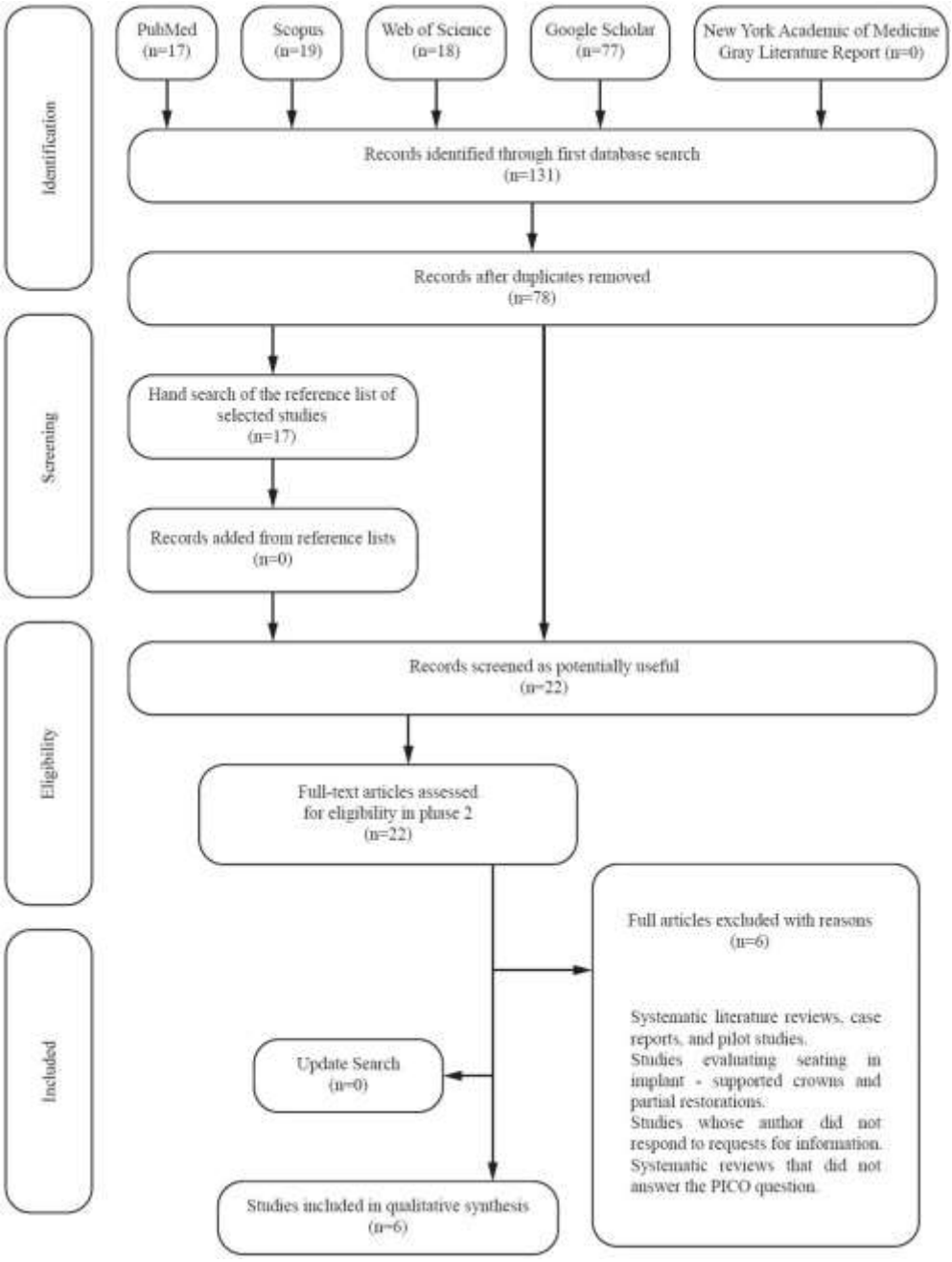


Fig. (1). Flow diagram of the literature search and selection criteria.

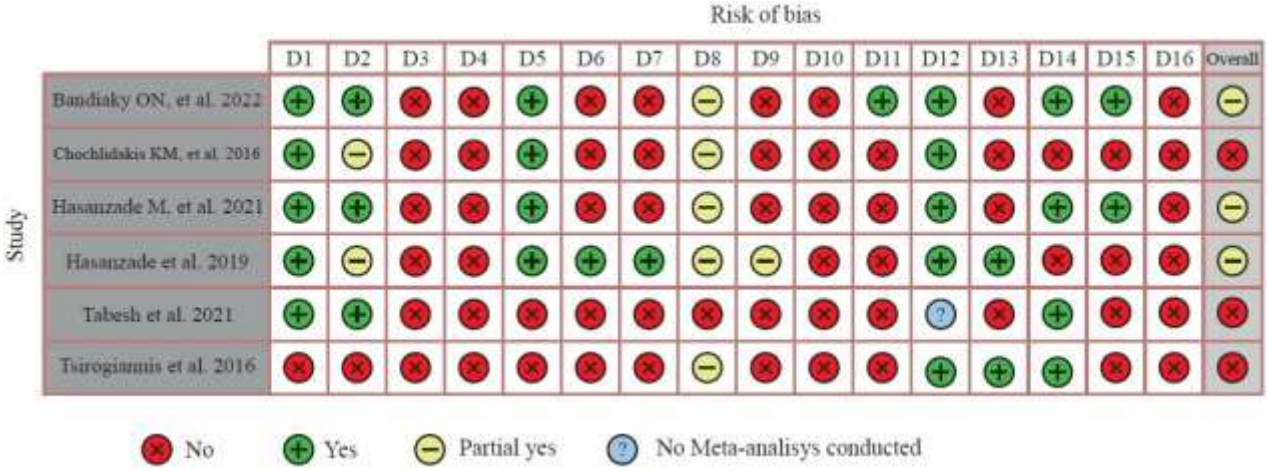


Fig. (2). Summary of the authors' judgments on each included SR, assessed by the critical appraisal tool for systematic reviews AMSTAR 2 and graphically represented as a traffic light plot, generated using robvis (a visualization tool). Green means "yes," yellow "partially yes," and red "no". Blank cells represent the lack of meta-analysis on that question.

D1 Did the research questions and inclusion criteria for the review include the components of PICO?

D2 Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?

D3 Did the review authors explain their selection of the study designs for inclusion in the review?D4 Did the review authors use a comprehensive literature search strategy?

D5 Did the review authors perfom study selection in duplicate?D6 Did the review authors perfom data extraction in duplicate?

D7 Did the review authors provide a list of excluded studies and justify the exclusions?D8 Did the review authors describe the included studies in adequate detail?

D9 Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?D10 Did the review authors report on the sources of funding for the studies included in the review?

D11 If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?

D12 If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?

D13 Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?

D14 Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?

D15 If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?

D16 Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?

APPENDIX

SEARCH STRATEGY		
P		
PUBMED	("posterior fixed" OR "dental porcelain"[Mesh] OR "single-unit" OR "crowns"[Mesh] OR "full-coverage restorations"OR "fixed prosthodontics" OR "fixed dental prostheses")	36.995
WOS	TITLE: (("posterior fixed" OR "dental porcelain"OR "single-unit" OR "crowns"OR "full-coverage restorations"OR "fixedprosthodontics" OR "fixed dental prostheses"))	6.440
SCOPUS	TITLE-ABS-KEY (("posterior fixed" OR "dental porcelain" OR "single-unit" OR "crowns" OR "full-coverage restorations" OR "fixed prosthodontics" OR "fixed dental prostheses"))	164,635
GOOGLE SCHOLAR	("posterior fixed" OR "dental porcelain" OR "single-unit" OR "crowns" OR "full-coverage restorations"OR "fixed prosthodontics" OR "fixed dental prostheses")	939.000
NEW YORK ACADEMIC OF MEDICIN GRAY LITERATURE REPORT.	("posterior fixed" OR "dental porcelain"OR "single-unit" OR "crowns"OR "full-coverage restorations"OR "fixed prosthodontics" OR "fixed dental prostheses")	0
I		
PUBMED	("digital" OR "digital scans" OR "digital impressions")	148
WOS	TITLE: (("digital" OR "digital scans" OR "digital impressions"))	204.377
SCOPUS	TITLE-ABS-KEY (("digital" OR "digital scans" OR "digital impressions"))	1,186,959
GOOGLE SCHOLAR	("digital" OR "digital scans" OR "digital impressions")	7.160.000
C		
PUBMED	("conventional impressions" OR "manual impressions" OR "conventional")	501
WOS	TITLE: (("conventional impressions" OR "manualimpressions" OR "conventional"))	75.259
SCOPUS	TITLE-ABS-KEY (("conventional impressions" OR "manualimpressions" OR "conventional"))	1,706,645
GOOGLE SCHOLAR	("conventional impressions" OR "manual impressions" OR "conventional")	5.790.000
O		
PUBMED	("accuracy" OR "adaptations" OR "dimensional accuracy" OR "marginal fit" OR"internal fit" OR "adjustment")	650.326
WOS	TITLE: (("accuracy" OR "adaptations" OR "dimensional accuracy" OR "marginal fit" OR "internal fit" OR "adjustment"))	158.262

SCOPUS	TITLE-ABS-KEY (("accuracy" OR "adaptations" OR "dimensionalaccuracy" OR "marginal fit" OR "internal fit" OR "adjustment"))	3,108,658
GOOGLE SCHOLAR	("accuracy" OR "adaptations" OR "dimensional accuracy" OR "marginal fit" OR"internal fit" OR "adjustment")	5.970.000

S		
PUBMED	("systematic review and meta-analysis" OR "systematic review" OR "meta-analysis")	306.094
WOS	TITLE: (("systematic review and meta-analysis" OR "systematicreview" OR "meta- analysis"))	232.001
SCOPUS	TITLE-ABS-KEY (("systematic review and meta-analysis" OR "systematicreview" OR "meta-analysis"))	457,226
GOOGLE SCHOLAR	("systematic review and meta-analysis" OR "systematic review" OR "meta-analysis")	17.800
PUBMED	("posterior fixed" OR "dental porcelain"[Mesh] OR "single-unit" OR "crowns"[Mesh] OR "full-coverage restorations"OR "fixed prosthodontics" OR "fixed dental prostheses") AND ("digital" OR "digital scans" OR "digital impressions") AND ("conventional impressions" OR "manual impressions" OR "conventional") AND ("accuracy" OR "adaptations" OR "dimensional accuracy" OR "marginal fit" OR "internal fit" OR "adjustment") AND ("systematic review and meta-analysis" OR "systematic review" OR "meta- analysis")	**17**
WOS	TITLE (("posterior fixed" OR "dental porcelain"OR "single-unit" OR "crowns"OR "full-coverage restorations"OR "fixedprosthodontics" OR "fixed dental prostheses")) *AND* TITLE: (("digital" OR "digital scans" OR "digital impressions")) *AND* TITLE: (("conventional impressions" OR "manual impressions" OR "conventional")) *AND* TITLE: (("accuracy" OR "adaptations" OR "dimensional accuracy" OR "marginal fit" OR "internal fit" OR "adjustment")) *AND* TITLE: (("systematic review and meta-analysis" OR "systematic review" OR "meta- analysis"))	**19**
SCOPUS	(TITLE-ABS-KEY (("posterior fixed" OR "dental porcelain" OR "single-unit"OR "crowns" OR "full-coverage restorations" OR "fixed prosthodontics" OR "fixed dental prostheses")) AND TITLE-ABS-KEY (("digital" OR "digital scans" OR "digital impressions")) AND TITLE-ABS-KEY (("conventional impressions" OR "manual impressions" OR "conventional")) AND TITLE- ABS-KEY (("accuracy" OR "adaptations" OR "dimensional accuracy" OR "marginal fit" OR "internal fit" OR "adjustment")) AND TITLE-ABS-KEY (("systematic review and meta-analysis" OR "systematic review" OR "meta-analysis")))	**18**
GOOGLE SCHOLAR	in title: ("crowns") AND ("digital impressions") AND ("conventional impressions") AND ("accuracy") AND ("systematic review and meta- analysis")	**77**

NEW YORK ACADEMIC OF MEDICINGRAY LITERATUR E REPORT.	("crowns") AND ("digital impressions") AND ("conventional impressions") AND("accuracy") AND ("systematic review and meta- analysis")	0

Appendix B. Articles excluded from the study	
Study	**Reason for exclusion**
[Ahlholm P et al. 2018]	2
[Ahmed WM, et al. 2020]	1
[Al-Haj Husain N, et al. 2020]	2
[Arcuri L, et al. 2019]	3
[Carvalho T, et al. 2018]	1
[Chandran S, et al. 2019]	2
[Cicciù M, et al. 2020]	4
[Gallardo Y, et al. 2018]	4
[Giachetti L, et al. 2020]	2
[Kumar H, et al. 2020]	4
[Kyoung-Rok Kim, et al. 2018]	4
[Mai H, et al. 2020]	4
[Nagarkar S, et al. 2018]	4
[Papadiochou S, et al. 2017]	2
[Pecciarini M, et al. 2019]	2
[Svanborg P, et al. 2020]	2
1	Systematic reviews of the literature, case reports, pilot studies
2	Studies evaluating seating in implant crowns and partial restorations
3	Studies without response from the author to the information query requested
4	Systematic reviews that do not meet the PICO question

Appendix C. AMSTAR 2 assessment criteria and domains																
Study	**Q 1**	**Q 2**	**Q 3**	**Q 4**	**Q 5**	**Q 6**	**Q 7**	**Q 8**	**Q 9**	**Q 10**	**Q 11**	**Q 12**	**Q 13**	**Q 14**	**Q 15**	**Q 16**	**Overall confiance**
Bandiaky ON, et al. 2020	Y	Y	N	N	Y	N	N	PY	N	N	Y	Y	N	Y	Y	N	Low
Chochlidakis KM, et al. 2016	Y	PY	N	N	Y	N	N	PY	N	N	N	Y	N	N	N	N	Critically low
Hasanzade M, et al. 2020	Y	Y	N	N	Y	N	N	PY	N	N	N	Y	N	Y	Y	N	Low
Hasanzade et al. 2019	Y	PY	N	N	Y	Y	Y	PY	PY	N	N	Y	Y	N	N	N	Low
Tabesh et al. 2020	Y	Y	N	N	N	N	N	N	N	N	N	NMA	N	Y	N	N	Critically low
Tsirogiannis et al. 2016	N	N	N	N	N	N	N	PY	N	N	N	Y	Y	Y	N	N	Critically low

Y	YES
N	NO
PY	PARTIAL YES
NMA	NO META- ANALISIS