

METHODOLOGICAL QUALITY OF THERAPY RESEARCH PUBLISHED IN ISI DENTAL JOURNALS: PRELIMINARY RESULTS

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Abstract

The aim was to determine the methodological quality (MQ) of therapy research articles published in four representative ISI dental journals. MQ was measured using the MINCIR scale and level of evidence (LoE) using the Oxford Center for Evidence Based Medicine ranking. MINCIR general score was 12.84±6.08, the difference between journals scores was statistical significant (p=0,0001). The LoE were: 4 for 59.6%, 3b for 3.0%, 2b for 21.2%, and 1b for 16.2% of articles, being this difference statistical significant (p=0,003). MQ and LoE for dental therapy research is low. Higher impact factor journals not necessarily publish the higher quality research.

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Introduction

In the last years has been increased the attention paid to quality of biomedical research, especially due to the implementation of evidence-based paradigm¹, and despite the poor concordance between clinical practice and the published evidence² the importance to produce and to use the "good research" is undeniable to improve the clinical practice and health policy development³.

But to determine the quality of research is not an easy task and many systems and concepts has been developed to measure it, including: level of evidence (LoE) rankings as Sacket, Oxford Center for Evidence-Based Medicine (OCEBM) and others⁴; checklists to write/read specific study designs as CONSORT for clinical trials or STROBE for observational studies⁵; and the methodological quality (MQ)

scales as Jadad and PEDro⁶.

With the exception of LoE rankings, all these systems has the limitation to assess the quality on a specific study design⁶; in the other hand, the LoE rankings allow the grading of the evidence just in four to five levels⁴. MINCIR (Research Methodology in Surgery, *Metodología de la Investigación en Cirugía*) scale⁷ has been developed to measure MQ in the surgical field to correct this limitation allowing the MQ assessment of the entire scenario of clinical therapy, the most important for healthcare practitioners, including observational and experimental studies.

Research quality evaluations in Dentistry are scarce and most of them has been focused on specific specialties^{8,9} or journals¹⁰, but mainly centered on specific high LoE study designs like systematic reviews^{8,10} and clinical trials⁹. The main problem with this approach is that most of published research is not high LoE studies¹¹. Therefore a great proportion of dental research is not considered and this situation contributes to the lack of knowledge about research quality in Dentistry.

The aim of this study is to determine the MQ of therapy research articles published in four representative ISI journals in 2012.

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Material and Methods

The research design was a bibliometric study on methodological quality for articles of dental therapy in humans, indexed in the category "Dentistry, Oral Surgery and Medicine" of the Web of Science (Thomson-Reuters, formerly ISI) for year 2012.

Considering this is the first study that evaluates MQ in dental therapy research, sample size was calculated based on previously reported data for Surgery journals⁷ using the MINCIR scale (11.6 (4.9) points), and considering a 95% confidence level and one point accuracy. The required size is 94, but was rounded up to 100 items.

Due to preliminar nature of this report a stratified sampling was performed to get a representative sample of the dental therapy research published in ISI journals, including four journals listed in the Journal Citation Report 2012. One journal per quartile (Q1 to Q4) was selected because the reported correlation between MQ and impact factor^{7,12}.

In order to get the highest representativeness, only general or multi-specialty journals was considered for the selection, excluding one-specialty journals like those only focused on implants, surgery, periodontology, etc. The proportion of articles per journal to be evaluated was defined according to the proportion of articles published in all the journals of the respective quartile for 2012. If a journal has more therapy articles than needed, a random sampling was used.

The articles within the four previously selected journals were selected according to the following criteria: articles of dental therapy in humans, without restriction of gender or age, and published in 2012. The following type of articles were excluded: reviews, in vitro research, letter to the editor, and bibliometric studies.

The MQ was measured using the MINCIR Scale⁷, that consider three key aspects of clinical therapy studies: study design, population (amount and justification of sample size), and methodology (objective, design, selection criteria, and sample size calculation), as showed in Table 1.

Item	Points
Multicenter randomized clinical trial (double blind)	12
Randomized clinical trial (double blind)*	9
Clinical trial (simple blind or nonblinded, nonrandomized)†	6
Concurrent cohort studies	4
Case-control studies and historic cohort studies	3
Cross-sectional studies	3
Case series	1
Sample size	
201	6 or 12
151-200	5 or 10
101-150	4 or 8
61-100	3 or 6
31-60	2 or 4
30	1 or 2
Objective	
Precise and definite objectives are presented	3
Imprecise objectives are presented	2
No objectives are presented	1
Design	
Design used is mentioned and justified	3
Design used is only mentioned	2
Design used is neither mentioned nor justified	1
Methodology	
Selection criteria	
Inclusion and exclusion criteria are described	3
Inclusion or exclusion criteria are described	2
No selection criteria are described	1
Sample size	
Justified sample size	3
Nonjustified sample size	1

*Includes clinical trials with restricted randomization and quasi-experimental studies.

† Includes experimental studies (pre-post).

Table 1. Items of MINCIR scale⁷

The scale has a score range from 6 to 36 points, the bottom score is assigned to poor reported low LoE studies (deficient case reports) and the top score is assigned to well reported high LoE studies (excellence large multicenter clinical trials). The MINCIR scale was recently validated for Dentistry field, showing excellent psychometric properties¹³.

The application of the MINCIR scale was standardized between two dentists evaluators (RC-V and PA) with prior experience using the scale, they applied it independently following its Use Instructions¹⁴. Each scale's item (Table 1) was critically evaluated and scored for each article, then the total score was obtained. A third experienced evaluator (JM) made the consensus for those articles where there were differences between the two initials evaluations.

The LoE for each article was determined according to OCEBM ranking⁴, that consider: 1 for good quality clinical trials (1b) and systematic reviews of them, 2 for good quality cohort studies (2b) and systematic reviews of them, 3 assigned for quality case-control studies (3b) and systematic reviews of them, and 4 for case reports or low quality cohort/case-control studies. Level 5 was not considered in this research.

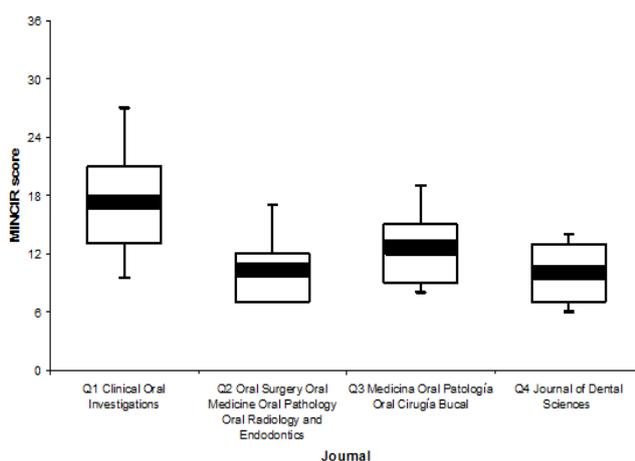
Data were tabulated on an MS Excel 2003 (Microsoft Corporation, Redmond, USA) spreadsheet, and analyzed on STATA 10/SE (STATA Corporation, Texas, USA). Descriptive statistics were calculated for MQ and LoE in each journal and the general sample including: average and standard deviation, and percentile distribution. Differences between the journal scores and LoE was determined by Kruskal-Wallis and chi-square tests.

For ethical considerations, the identity of researchers/institutions affiliated with each article were protected.

Results

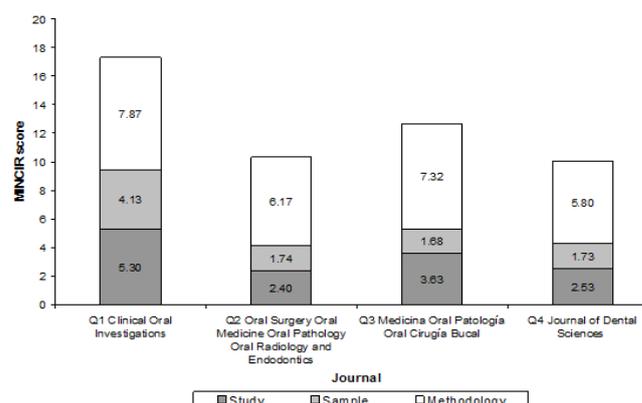
From the four journals (one per quartile) one-hundred articles were selected: *Clinical Oral Investigations* (Q1=30), *Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics* (Q2=35), *Medicina Oral Patología Oral Cirugía Bucal* (Q3=19), and *Journal of Dental Sciences* (Q4=15). The final sample was 99 articles because an uncorrect selection of one article that can not be replaced because there is no other therapy article in the journal.

The MINCIR score for the general sample was 12.84 (6.08), the score for each journal is shown in Graph 1, the difference between journals was statistical significant (p=0,0001).



Graph 1. Methodological quality (MINCIR score) by quartile/journal

The scores for 3 item of MINCIR scale were: 3.54 (2.95) for Design, 2.45 (2.52) for Sample size, and 6.85 (1.72) for Methodology. The item scores for each journal is shown in Graph 2.



Graph 2. Score for 3 items of MINCIR scale by quartile-journal

The LoE were: 4 for 59.6%, 3b for 3.0%, 2b for 21.2%, and 1b for 16.2% of articles. The LoE for each journal is shown in Table 2, the difference between journals was statistical significant (p=0,003).

Quartile/Journal	Level of Evidence OCEBM*			
	1b	2b	3b	4
Q1 Clinical Oral Investigations	30%	40%	3%	27%
Q2 Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics	11%	6%	3%	80%
Q3 Medicina Oral Patología Oral Cirugía Bucal	11%	26%	5%	58%
Q4 Journal of Dental Sciences	7%	13%	0%	80%
Total	16%	21%	3%	60%

*Oxford Center for Evidence Based Medicine.

Table 2. Level of evidence by quartile-journal

Discussion

The evidence-based dentistry paradigm, as any evidence-based practice, require the best-quality possible research to support the clinical and health policy decisions, but the level and quality of the most part of research published in Dentistry is not adequate for this purpose. The good news is that over the last years there is an increasing concern about this topic in the dental field.^{8-11,15-18}

The results of this study shows that just one sixth of the research corresponds to high LoE studies, and almost two thirds are only descriptive or anecdotal research as case reports or case series. These results are very similar for those recently reported for two oral and maxillofacial journals¹¹ and the Iranian dental

research¹⁵, where the great proportion of the published research is low quality.

The results are consistent with some specific therapy research in Dentistry, e.g.: all evidence for the pre-implant surgery of the atrophic jaw has a LoE of 4¹⁶, the correlation between dental and orthopedics findings in orthodontics¹⁷, and the efficacy of antibiotic prophylaxis in dental procedures for patients with some systemic diseases¹⁸ are based on low quality research.

But LoE has only five levels and four grade of recommendations, besides it is almost exclusively based on study design. To complement the assessment of research quality in biomedical sciences other systems as checklists and MQ scales were designed. The MINCIR scale has the advantage to measure the entire scenario of clinical therapy, including observational and experimental studies, from case reports to clinical trials.

The results of this study shows that MQ for dental therapy research are little better than those reported previously for surgery journals⁷, but with a higher standard deviation, probably due to a smaller sample. Some correlation between MQ and impact factor (journal quartile) was determined, similar to surgery journals' case⁷.

The Q1 journal has the biggest MQ score, but the other 3 journals has an erratic correlation. The Q3 journal has a bigger score than Q2 journal, what is reinforced but a lesser proportion of low LoE studies in Q3 journal when is compared to Q2 and Q4 journals. This fact support the hypothesis that highly cited papers or articles published in highly cited journals are not necessarily high quality research contributing to evidence-based practice.

A closer analysis for the 3 items of the scale shows another interesting facts about the research quality over the journals (quartiles): the first one is that Q1 journals is superior in the 3 items, but mostly in the study design and the population (sample size and its justification); the second one is that Q2 and Q4 journal has very similar scores for each item and the total score, besides the LoE distribution are almost the same for these journals; the third one is that Q3 journal gets a better score (over Q2 and Q4 journals) on study design and methodology. An explanation for this phenomena exceeds the aim of this study, but one hypothesis is that editorial lines of Q1

journal and partially of Q3 journal are strongly focused on high LoE studies, where the Q2 and Q4 journals are covering all LoE studies, but mostly case reports and other observational studies.

It is important to consider the aim of this study and some limitations: this study was designed and executed in order to get a first (preliminary) quantification of the MQ for dental therapy studies that support further and extensive assessments of the research quality published in ISI dental journals. About the limitations, it must be considered that the stratified sampling of one journal per quartile were chosen because the previous correlation reported for MQ and impact factor⁷, but that correlation was erratic in this case, further research is necessary to confirm this fact; another probable limitation is the overrepresentation of pathological and surgical studies, that could be explained because other dental specialties perform a great proportion of in vitro or non-clinical research.

Conclusions

The MQ for dental therapy research is similar to previously reported in the surgical field, mainly low. As previously described in some dental specialties and topics, the LoE of dental therapy research is low. Higher impact factor journals not necessarily publish higher quality research.

Declaration of Interest

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References

1. Smith R, Rennie D. Evidence-based medicine--an oral history. *J Am Med Assoc.* 2014; 311: 365-7.
2. Norton WE, Funkhouser E, Makhija SK, Gordan VV, Bader JD, Rindal DB, et al. Concordance between clinical practice and published evidence: Findings from The National Dental Practice-Based Research Network. *J Am Dent Assoc.* 2014; 145: 22-31.
3. Pitts N, Amaechi B, Niederman R, Acevedo AM, Vianna R, Ganss C, et al. Global oral health inequalities: dental caries task group--research agenda. *Adv Dent Res.* 2011; 23: 211-20.
4. Graham AJ, Gelfand G, McFadden SD, Grondin SC. Levels of evidence and grades of recommendations in general thoracic surgery. *Can J Surg.* 2004; 47: 461-5.

5. Cobo E, Cortés J, Ribera JM, Cardellach F, Selva-O'Callaghan A, Kostov B, et al. Effect of using reporting guidelines during peer review on quality of final manuscripts submitted to a biomedical journal: masked randomised trial. *Br Med J*. 2011; 343: d6783.
6. Bhogal SK, Teasell RW, Foley NC, Speechley MR. The PEDro scale provides a more comprehensive measure of methodological quality than the Jadad scale in stroke rehabilitation literature. *J Clin Epidemiol*. 2005; 58: 668-73.
7. Manterola C, Pineda V, Vial M, Losada H. What is the methodologic quality of human therapy studies in ISI surgical publications? *Ann Surg*. 2006; 244: 827-32.
8. Aziz T, Compton S, Nassar U, Matthews D, Ansari K, Flores-Mir C. Methodological quality and descriptive characteristics of prosthodontic-related systematic reviews. *J Oral Rehabil*. 2013; 40: 263-78.
9. Tu Y-K, Maddic R, Kellett M, Clerehugh V, Gilthorpe MS. Evaluating the quality of active-control trials in periodontal research. *J Clin Periodontol*. 2006; 33: 151-6.
10. Sequeira-Byron P, Fedorowicz Z, Jagannath V, Sharif M. An AMSTAR assessment of the methodological interventions published in the *Journal of Applied Oral Science (JAOS)*. *J Appl Oral Sci*. 2011; 19: 440-7.
11. Sandhu A. The evidence base for oral and maxillofacial surgery: 10-year analysis of two journals. *Br J Oral Maxillofac Surg*. 2012; 50: 45-8.
12. Manterola C, Pineda V, Vial M, Losada H. Is impact factor an appropriate index to determine the level of evidence of studies on therapeutic procedures in surgery journals? *Cir Esp*. 2005; 78: 96-9.
13. Cartes-Velásquez R, Manterola C, Aravena P, Moraga J. Reliability and validity of MINCIR scale for methodological quality in dental therapy research. *Braz Oral Res*. 2014; 28: 1-5.
14. Moraga J, Manterola C, Cartes-Velásquez R, Burgos M, Aravena P, Urrutia S. Instructions for the Use of MINCIR Scale to Assess Methodological Quality in Therapy Studies. *Int J Morphol*. 2014; 32: 294-8
15. Sadeghi M, Shahravan A, Haghdoost AA, Asgary S, Rad M. Trend in dental research output in Iran over a period of 20 years (1990-2009). *Int Dent J*. 2012; 62: 84-9.
16. Blackburn TK, Cawood JI, Stoeltinga PJ, Lowe D. What is the quality of the evidence base for pre-implant surgery of the atrophic jaw? *Int J Oral Maxillofac Surg*. 2008; 37: 1073-9.
17. Hanke BA, Motschall E, Türp JC. Association between orthopedic and dental findings: what level of evidence is available? *J Orofac Orthop*. 2007; 68: 91-107.
18. Lockhart PB, Loven B, Brennan MT, Fox PC. The evidence base for the efficacy of antibiotic prophylaxis in dental practice. *J Am Dent Assoc*. 2007; 138: 458-74.