SPECIAL ARTICLE

Orthodontic literature: An overview of the last 2 decades

Anestis Mavropoulos, DDS,[a] and Stavros Kiliaridis, DDS, Odont Dr/PhD[b]
Geneva, Switzerland

The aim of this study was to explore the orthodontic literature in the most important orthodontic and other dental and medical journals from 1981 to 2000. The most commonly used medical bibliographic database, MEDLINE, was used. In addition, some journals were hand searched to estimate the error of the method. Despite some indexing inconsistencies, MEDLINE was found to be a powerful and relatively accurate tool for use in bibliometric studies. About 16,000 articles with orthodontic interest were published during this period. The number of orthodontic articles written in English rose during this period, but almost half of them (45%) were published in nonorthodontic journals. Articles in the orthodontic journals are focusing more and more on diagnosis and treatment evaluation as the need for high-quality evidence becomes obvious, while other topics, such as new techniques and new materials, are losing ground. Many high-quality studies with orthodontic interest are published in nonorthodontic journals with a high Impact Factor, remaining more or less out of reach for most orthodontists. (Am J Orthod Dentofacial Orthop 2003;124:30-40)

Any real step forward in orthodontics does not necessarily have to do with new appliances or techniques advertized on glossy paper. Over the past few decades, the orthodontic specialty has experienced a dramatic evolution. It would not be exaggerating to suggest that clinical orthodontics has already achieved a high maturity level. Various diagnostic procedures, effective treatment modalities, more realistic views on the stability of treatment results, and the systematic investigation of side effects during orthodontic treatment are some fields that have been largely developed during this period. This does not mean that further progress is unneeded or unwanted. Basic research, for example, will always help to explore in depth the biologic background underlying our specialty.

All this progress has been made possible not just by transferring clinical experience from the older to the younger generation; a systematic approach to clinical questions and the scientific examination of various hypotheses has led to these results. With evidence-based clinical decision-making gaining increasing momentum, access to all this knowledge is essential. The wide use of computer-based information systems and online access to most of the published orthodontic evidence could, at least theoretically, enhance clinical orthodontics even further.[1] However, evidence-based clinical decisions inevitably rely on the availability of high-quality evidence, which can only be the outcome of sound research.

Undoubtedly, the main sources of information concerning orthodontics are the articles published in periodic journals, in which one can search for answers to many interesting questions. How has research in orthodontics evolved during the past few decades? Is there any change in the quantity or the quality of orthodontic articles, and in which direction? Do we really have the correct tools to find the evidence we need?

In this bibliometric study, we sought to explore the orthodontic literature in the most important orthodontic journals and other dental and medical journals. We defined *orthodontic literature* as any scientific article with a content related to orthodontic practice or the scientific basis that underlies orthodontics, or produced by an orthodontic department of a university. We considered the number of articles in various dental and medical journals to present a general overview of the current published work dealing with orthodontics or coming from orthodontic departments.

More specifically, the aims of this study were to (1) estimate the number of orthodontic articles published during the decades 1981-1990 and 1991-2000, distinguishing between those published in orthodontic journals and in other dental and medical journals; (2) present the main subjects of research interest in orthodontics during representative years and compare them

From the Department of Orthodontics, School of Dentistry, University of Geneva, Geneva, Switzerland.
[a]Research associate.
[b]Professor and chairman.
Reprint requests to: Dr Stavros Kiliaridis, 19, Rue Barthélemy-Menn, 1205 Genève, Switzerland; e-mail, stavros.kiliaridis@medecine.unige.ch.
Submitted and accepted, January 2003.

0889-5406/2003/$30.00 + 0
doi:10.1016/S0889-5406(03)00199-9

in orthodontic and other journals; and (3) learn how useful and accurate MEDLINE is when used to retrieve articles with orthodontic interest.

MATERIAL AND METHODS

Because our aim was to investigate all published orthodontic research between 1981 and 2000, we had some practical considerations; it was impossible to hand search for all articles in orthodontic and other dental and medical journals during these 20 years. We used the most common medical bibliographic database, MEDLINE, as provided online by PubMed on the Internet at http://www.ncbi.nlm.nih.gov/PubMed. PubMed, available via the National Center for Biotechnology Information's "Entrez" retrieval system, was developed by the National Center for Biotechnology Information at the National Library of Medicine. "Entrez" is the text-based search and retrieval system used at the National Center for Biotechnology Information for all major databases including PubMed. PubMed was designed to provide access to citations from biomedical literature, including MEDLINE.

MEDLINE is the National Library of Medicine's premier bibliographic database for medicine, nursing, dentistry, veterinary medicine, the health care system, and the preclinical sciences. It contains bibliographic citations and author abstracts from more than 4600 biomedical journals published in the United States and 70 other countries. Coverage is worldwide, but most records are from English-language sources or have English abstracts. Although other medical databases and retrieval systems are also available, MEDLINE is generally considered the best source of evidence for health care, because of its depth, range, and continuous maintenance by the National Library of Medicine.[2]

A simple search strategy was adopted, taking advantage of a useful MEDLINE operation called *truncation* that can be used for word searches in text. A truncated term ("wild card") is the first part of a word followed by an asterisk.[2] This feature allows all terms beginning with that part of the word to be searched. In this study, *orthodont** was used to include all articles containing words starting with *orthodont* in any field in MEDLINE. From *publication types*, we excluded editorials, letters to the editor, comments, interviews, biographies, and historical articles so that we retrieved only original articles, case reports, and reviews with orthodontic content or from orthodontic departments. The language limit feature was also used to search for articles written in English.

To estimate the error of our method, we narrowed our search to the year 2000 and to journals having more articles with orthodontic content published in this year (Table I). We first performed a search using MEDLINE and then a hand search to investigate the possible sources of error inherent in our procedure. The database collected most articles relevant to orthodontics, but it inevitably retrieved some that did not correspond to the criteria (lack of precision or specificity) or failed to identify some that were really relevant (lack of recall or sensitivity).[3]

Table I. Journals selected to estimate method error and classify research topics (MEDLINE abbreviations)

Orthodontic journals	*Other journals*
Am J Orthod Dentofacial Orthop/Am J Orthod	Cleft Palate Craniofac J
Angle Orthod	J Oral Rehabil
Eur J Orthod	J Clin Pediatr Dent
Aust Orthod J	Arch Oral Biol
J Clin Orthod	Br J Oral Maxillofac Surg
J Orthod/Br J Orthod	J Dent Res
Int J Adult Orthod Orthognath Surg	Acta Odontol Scand
	Br Dent J
	J Craniofac Genet Dev Biol
	J Craniofac Surg
	J Oral Maxillofac Surg

The number of articles published during 2000 in the 7 orthodontic journals chosen was 548 when we used MEDLINE with no search term or limit. The manual search of all issues of the same journals for 2000 showed that the real number of original articles, case reports, and reviews was actually 420. When we applied our search protocol, we retrieved 408 articles, a rather high sensitivity of 0.97. Those 408 articles were hand searched and reduced to 370, after excluding those that did not meet the criteria; thus, our method was associated with a specificity of 0.91 for the orthodontic journals.

On the other hand, the number of orthodontic studies published in 2000 in the 11 nonorthodontic journals chosen was 107 when we used *orthodont** in MEDLINE, although the number rose to 153 after manually searching all issues of those journals. From those 107 articles retrieved through MEDLINE, our hand search showed that only 95 were really relevant to orthodontics. This is a specificity of 0.89 and a sensitivity of 0.70.

RESULTS

As a first step, we estimated the total number of orthodontic articles indexed in MEDLINE from 1981 to 1990 and 1991 to 2000, and, among them, those written in English. Notably, the total number of articles did not increase much (from 7648 to 9099), although those

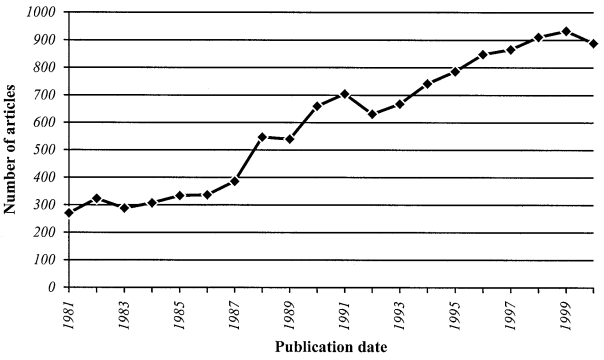

Fig 1. Articles with orthodontic content in English published during 1981-2000.

written in English doubled during the decade of 1991 to 2000 (from 3992 to 7955).

For a more objective view of the number of original articles, case reports, and reviews published between 1981 and 2000, we limited our search to those written in or also in English (Fig 1). The number steadily rose from 1981 through 2000.

It was interesting to retrieve all orthodontic journals that have been cited in MEDLINE. We used the same term (*orthodont**) in the *journal browser* section. A total of 30 orthodontic journals have been cited in the database (Table II). When we narrowed the search to 4 representative years (1985, 1990, 1995, and 2000), the number of journals was significantly reduced to 14 (Table III).

Among the orthodontic studies written in English, we tried to differentiate between those in orthodontic journals and those in other dental and medical journals (Fig 2). The total number of nonorthodontic journals having at least 1 article with orthodontic content was 81 in 1990 and 111 in 2000. Those with the most orthodontic articles published in 1990 and 2000 are shown in Table IV.

In the decade of 1991 to 2000, twice as many orthodontic articles can be retrieved compared with the decade of 1981 to 1990. The ratio between orthodontic and other journals remained almost unchanged during our 4 representative years (Fig 3).

For the same 4 years, we investigated the distribution of orthodontic articles in orthodontic journals with or without an Impact Factor (IF) (Fig 4). A journal's IF represents the number of times it is cited in other journals divided by the number of articles it published during a 2-year period; numbers below a certain threshold are not reported, so those journals do not have an IF. The ratio of articles in journals with an IF to those in journals without an IF rose from about 1:1 in 1985 to 3:2 in 2000. The ratio for nonorthodontic journals was even higher (almost 2:1) for 2000, in favor of the journals with IF (Fig 5).

To classify the articles in relation to their topic of interest, we further narrowed our search to the 7 orthodontic journals with a constant presence over the time period under study and the 11 nonorthodontic journals having the most articles with orthodontic content. These journals are listed in Table I.

In the orthodontic journals, we investigated 4 representative years (1985, 1990, 1995, and 2000), defining each article's main topic after carefully reading the abstract (Fig 6). In 2000, 27% of the articles in English were about evaluation of treatment, but in 1985 the main subject of interest was the introduction of new methods (28%). The number of studies about new methods has decreased significantly during the past 20 years, although they still amount to about 10% of the total. During this time, there seems to have been a trend for more studies about diagnosis (18% of total publications in 2000). Studies concerning the evaluation of new materials or bonding modalities constituted about 9% of the total in 2000, but they had reached 17% in 1995.

We followed the same procedure for orthodontic articles written in English in other dental and medical journals in 2000 (Fig 7). The main problem in interpreting these results was that, in contrast to the orthodontic journals, the orthodontic articles in other journals are not a homogenous sample. However, some basic conclusions can be drawn to compare them with the orthodontic journals. Subjects such as socioeconomic aspects, materials and bonding, new diagnostic and treatment methods, and professional aspects are 3 to 10 times more frequent in the orthodontic journals. In other fields (animal research, biology and genetics, diagnostic procedures, and even reviews and case reports), most of the articles are in nonorthodontic journals. Studies dealing with biology or genetics, for example, constitute the 7.9% of the total in nonorthodontic journals and only 0.5% in orthodontic journals, but, for animal research studies, the respective numbers are 8.6% and 3.8%.

DISCUSSION

Bibliometrics is not a new discipline, and it would probably be wrong to understand it simply as a means of scientific control. It has many creative possibilities and can help in mapping the intellectual growth of a discipline and paving the way to a more sophisticated approach to evidence-based medicine. Many efforts, using various methods, have already been made to evaluate the availability of medical literature in several

Table II. Orthodontic journals in MEDLINE

MEDLINE abbreviation	*Full name*
Am J Orthod Dentofacial Orthop*	American Journal of Orthodontics and Dentofacial Orthopedics
Am J Orthod*	American Journal of Orthodontics
Angle Orthod	Angle Orthodontist
Aust Orthod J	Australian Orthodontic Journal
Begg J Orthod Theory Treat	Begg Journal of Orthodontic Theory and Treatment
Bilt Udruz Ortodonata Jugosl	Bulletin of Orthodontic Society of Yugoslavia
Br J Orthod**	British Journal of Orthodontics
Bull Pac Coast Soc Orthod	Bulletin - Pacific Coast Society of Orthodontics
Clin Orthod Res	Clinical Orthodontics and Research
Eur J Orthod	European Journal of Orthodontics
Funct Orthod	The Functional Orthodontist
Inf Orthod Kieferorthop	Information about Orthodontics and Jaw Orthopedics
Int J Orthod	International Journal of Orthodontics
J Pract Orthod	Journal of Practical Orthodontics
J Clin Orthod	Journal of Clinical Orthodontics
J Gen Orthod	Journal of the General Orthodontist
J Orthod**	Journal of Orthodontics
J Am Soc Study Orthod	Journal of the American Society for the Study of Orthodontics
Orthod Fr	French Orthodontics
Nippon Kyosei Shika Gakkai Zasshi	Journal of the Japan Orthodontic Society
Orthod Rev	Orthodontic Review
Orthod Epitheorese	Journal of the Greek Orthodontic Society
Proc Found Orthod Res	Proceeding of the Foundation for Orthodontic Research
Rep Congr Eur Orthod Soc	Report of the Congress. European Orthodontic Society
Semin Orthod	Seminars in Orthodontics
Int J Adult Orthod Orthognath Surg	International Journal of Adult Orthodontics and Orthognathic Surgery
J Indian Orthod Soc	Journal of the Indian Orthodontic Society
Orthodontist	The Orthodontist
Trans Br Soc Study Orthod	Transactions. British Society for the Study of Orthodontics
Trans Eur Orthod Soc	Transactions. European Orthodontic Society
Turk Ortodonti Derg	Turkish Journal of Orthodontics
J Orofac Orthop	Journal of Orofacial Orthopedics

**Am J Orthod* was former name of *Am J Orthod Dentofacial Orthop.*
***Br J Orthod* was former name of *J Orthod.*

medical disciplines.[1,4-8] The *medical subject heading* (MeSH) terms can be an efficient tool to retrieve subject-limited articles from MEDLINE, but they have not yet been thoroughly developed for orthodontics. The main issue with articles published in nonorthodontic journals is the failure to identify all that are really relevant (lack of sensitivity). Our simple search strategy decreased the specificity but increased the sensitivity of the article retrieval, which we considered more important.

The total number of orthodontic articles indexed in MEDLINE between 1981 and 1990 and 1991 and 2000 did not increase much (from 7648 to 9099). However, if we consider only articles written in English, there are twice as many during the decade of 1991 to 2000 (increasing from 3992 to 7955). The most plausible reason is that MEDLINE stopped citing many journals in languages other than English during this period.

The number of original articles, case reports, and reviews in English follows an ascending curve from 1981 to 2000. From 270 in 1981, the number climbed to 705 in 1991 and 889 in 2000. Certain years (1983, 1992, 2000) appear to be an exception to this trend, but this has more to do with inconsistencies in the number of journals cited in MEDLINE.

The total number of orthodontic journals cited in MEDLINE is 30. However, only 9 were indexed for 1985. This number is 12 in 1990, 10 in 1995, and 11 in 2000. Not all journals are cited consistently. The journal of the Greek Orthodontic Society (*Orthod Epitheorese*), for example, was indexed only for a short time (November 1988 to December 1990), but *Seminars in Orthodontics* was cited from its first issue (March 1995), only to be interrupted after the September 1999 issue, although it is still being published. We do not know MEDLINE's inclusion or exclusion criteria.

On the other hand, the number of nonorthodontic

Table III. Orthodontic journals in MEDLINE database for 4 representative years (MEDLINE abbreviations)

1985	*1990*	*1995*	*2000*
Am J Orthod*	Am J Orthod Dentofacial Orthop	Am J Orthod Dentofacial Orthop	Am J Orthod Dentofacial Orthop
Angle Orthod	Angle Orthod	Angle Orthod	Angle Orthod
Aust Orthod J	Aust Orthod J	Aust Orthod J	Aust Orthod J
Br J Orthod**	Br J Orthod**	Br J Orthod**	J Orthod
Eur J Orthod	Eur J Orthod	Eur J Orthod	Eur J Orthod
Funct Orthod	Funct Orthod	Funct Orthod	Funct Orthod
J Clin Orthod	J Clin Orthod	J Clin Orthod	J Clin Orthod
Int J Orthod	J Gen Orthod	J Gen Orthod	J Gen Orthod
Nippon Kyosei Shi-ka Gakkai Zasshi	Int J Adult Orthod Orthognath Surg	Int J Adult Orthod Orthognath Surg	Int J Adult Orthod Orthognath Surg
	Int J Orthod	Sem Orthod	J Orofac Orthop
	Nippon Kyosei Shika Gakkai Zasshi		Clin Orthod Res
	Orthod Rev		

**Am J Orthod* was former name of *Am J Orthod Dentofacial Orthop.*
***Br J Orthod* was former name of *J Orthod.*

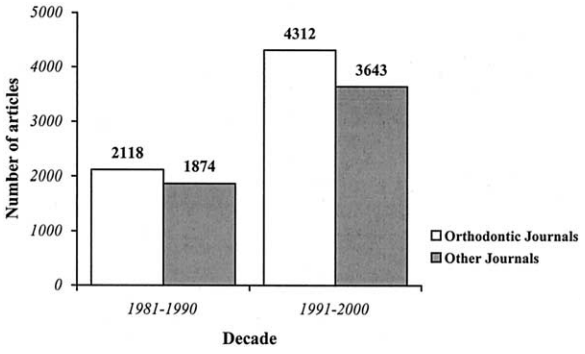

Fig 2. Articles with orthodontic content written in English and published in last 2 decades in orthodontic and other dental and medical journals (search term *orthodont** with MEDLINE).

Table IV. Nonorthodontic journals with greatest number of orthodontic articles for 1990 and 2000 (MEDLINE abbreviations), with number of articles in parentheses

1990	*2000*
Br Dent J (18)	Cleft Palate Craniofac J (18)
J Dent Res (11)	J Oral Rehabil (12)
ASDC J Dent Child (8)	J Clin Pediatr (11)
J Craniomaxillofac Surg (8)	Arch Oral Biol (8)
Gen Dent (7)	Br J Oral Maxillofac Surg (7)
J Oral Maxillofac Surg (7)	J Dent Res (7)
Dent Clin North Am (6)	Acta Odontol Scand (6)
Arch Oral Biol (5)	Br Dent J (6)
Cleft Palate J (5)	Pediatr Dent (6)
Dent Update (5)	J Craniofac Genet Dev Biol (5)

journals that had at least 1 article with orthodontic interest (and was cited in MEDLINE) rose from 81 in 1990 to 111 in 2000. The journals with the most orthodontic articles are those dealing, as expected, directly or indirectly with dentistry and craniofacial surgery.

The ratio between the articles published in orthodontic and other dental and medical journals remained almost unchanged during the last 2 decades. Some orthodontic journals increased the number of issues per year, others became bilingual (and thus met the English language criterion), new journals came into existence, and a few stopped publishing recently (*International Journal of Adult Orthodontics and Orthognathic Surgery*).

The journal IF is based on information obtained from citation indexes. The most commonly used index is the Science Citation Index, introduced by the Institute for Scientific Information and published since 1963. All original articles, technical notes, and reviews (but not letters, editorials, and comments) published in a set of core journals are scanned, and all articles cited as references are recorded. It is assumed that a measure of an article's importance is reflected by the number of times it is quoted in a given time period.[9] The journal IF represents, for a given year, the ratio between the number of citations divided by the number of articles published by a journal, during a 2-year period of reference. It is a retrospective index of a journal's short-term impact.

We also investigated the distribution of studies in orthodontic journals with or without an IF. Only 3 orthodontic journals (the same since 1985) have an IF that is considered significant enough to be estimated each year by the Institute for Scientific Information

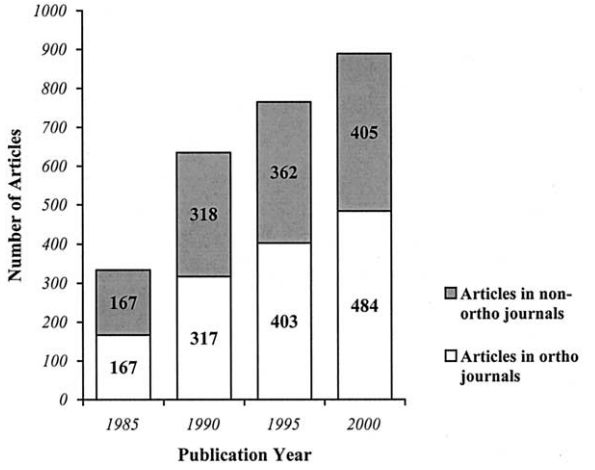

Fig 3. Orthodontic articles (written in English) published in orthodontic and other journals in 4 representative years (search term *orthodont** with MEDLINE).

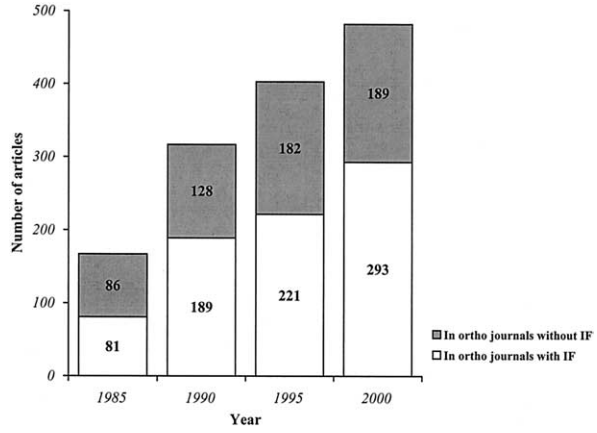

Fig 4. Articles with orthodontic content written in English and published in orthodontic journals with or without IF during 4 representative years.

(*American Journal of Orthodontics and Dentofacial Orthopedics, European Journal of Orthodontics, and Angle Orthodontist*). The number of articles published each year in these journals has been constantly rising—81 in 1985, 189 in 1990, 221 in 1995, and 293 in 2000. This explains why the ratio of the articles in orthodontic journals with an IF (the same 3 journals) to those without an IF rose from about 1:1 to 3:2 from 1985 to 2000. For nonorthodontic journals, the ratio was even higher (almost 2:1) for 2000, in favor of the journals with an IF. The IF of the orthodontic journals for 2001 ranged from 0.591 (*European Journal of Orthodontics*) to 0.600 (*American Journal of Orthodontics and Dentofacial Orthopedics*). As a comparison, the IF range of the 50 dental journals included in the 2001 Institute for Scientific Information list is 0.198 (*Journal of Dentistry for Children*) to 3.350 (*Journal of Dental Research*). Interestingly, 4 major periodontal journals have an IF of more than 1.5, occupying some of the list's higher ranks. Although the immediate comparison of IF scores is not entirely appropriate between scientific disciplines,[10] it is a measure of scientific value. Because 38 articles with orthodontic interest were published in 2000 in nonorthodontic journals with an IF higher than 2, and 14 had an IF higher than 4, this raises the question of whether some orthodontists actually prefer publishing their high-quality work in nonorthodontic journals associated with higher IFs, and whether these articles are more or less out of reach for orthodontists who are not in academics.

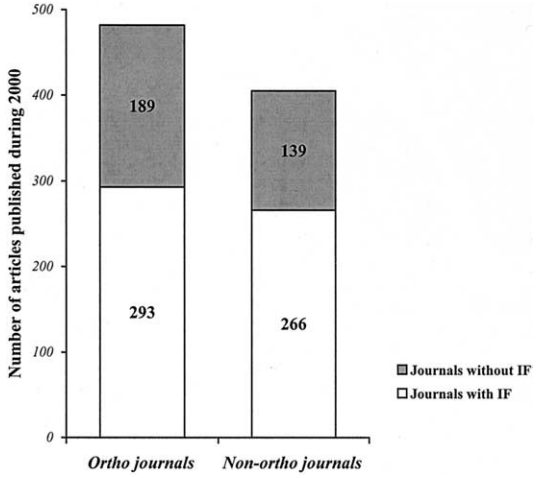

Fig 5. Articles with orthodontic content written in English and published in orthodontic and nonorthodontic journals with or without IF during 2000.

It has been found that faulty indexing and inherent software limitations compromise the search validity with MEDLINE.[11,12] An obvious example is that the articles' abstracts are not consistently included in the database. Our specificities of the search strategy were 0.91 and 0.89 for the orthodontic and the nonorthodontic journals, respectively. This means that the use of *orthodont** in MEDLINE retrieved about 10% more articles than it should have with our criteria. For the orthodontic journals, this could be because it is impossible to retrieve only original articles, case reports, and reviews with MEDLINE. Some articles are not classified as letters, comments, editorials, biographies, or interviews, making it impossible to exclude them with MEDLINE. For the nonorthodontic journals, the lack of specificity is related more to *orthodontic* or *orthodontics* in articles without real orthodontic content (eg,

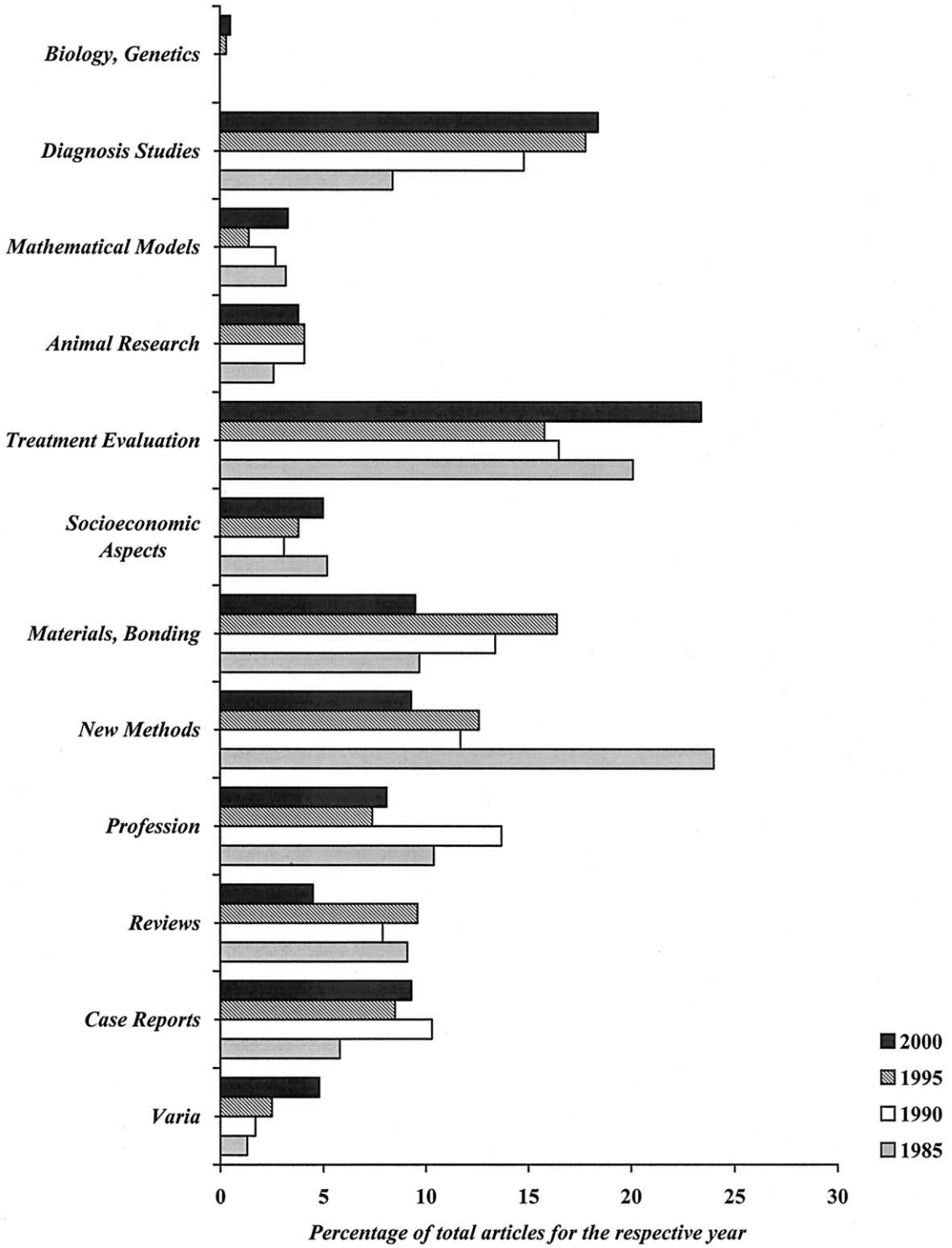

Fig 6. Percentage of articles written in English and published in orthodontic journals during 4 representative years by topic.

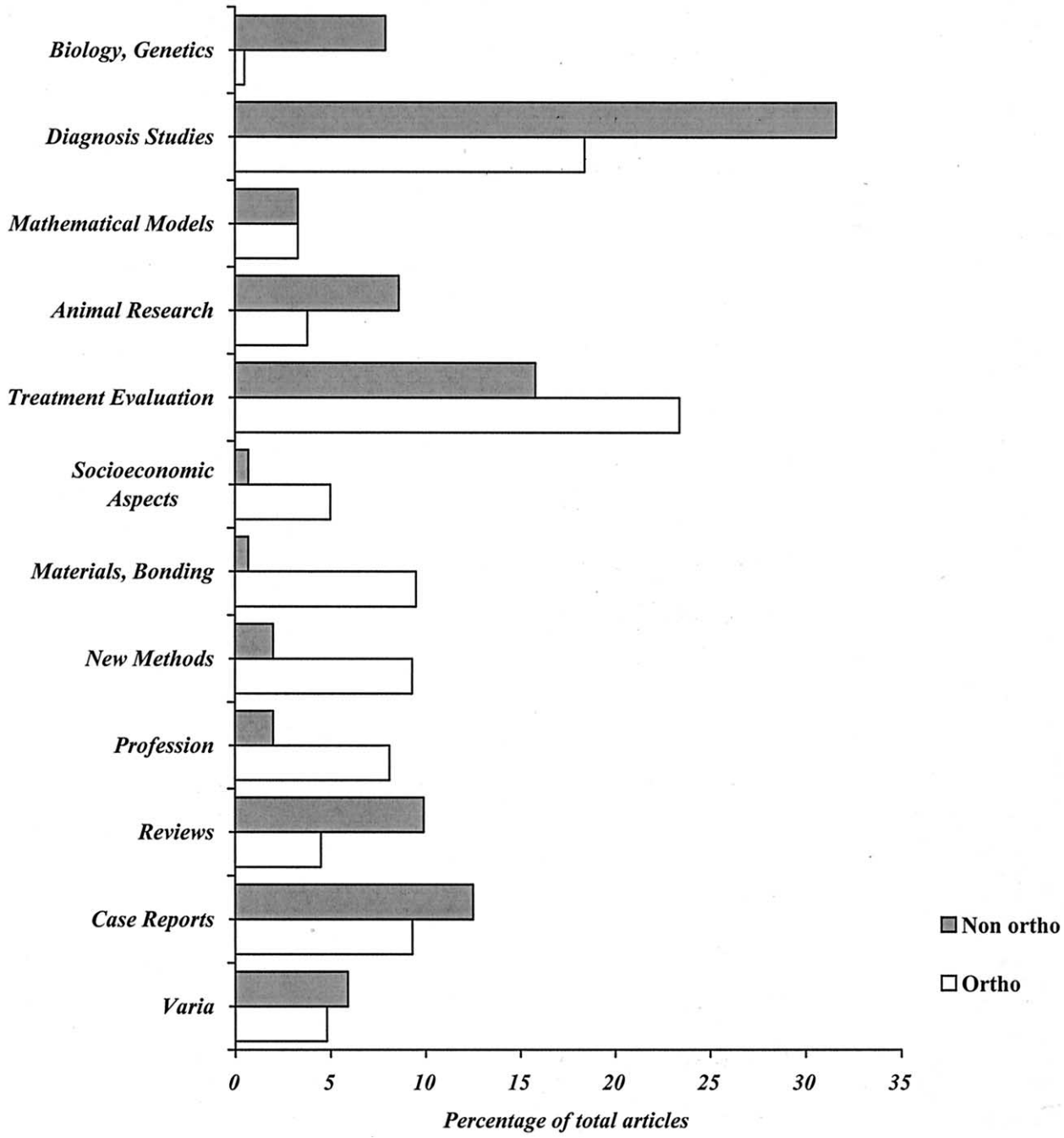

Fig 7. Percentage of orthodontic articles written in English and published in orthodontic and other dental and medical journals during 2000 by topic.

studies of premolars extracted for orthodontic reasons). In addition, some orthodontists participate in high-quality studies on broader medical and dental topics, without direct or indirect orthodontic content.

The sensitivity of our method was 0.97 for the orthodontic journals but only 0.70 for the nonorthodontic journals. This means that, although most orthodontic articles were found in orthodontic journals with *orthodont**, 30% remained undetected in the nonorthodontic journals under investigation. This could be because original articles dealing with more basic research might not contain the word *orthodontics*, at least not in their

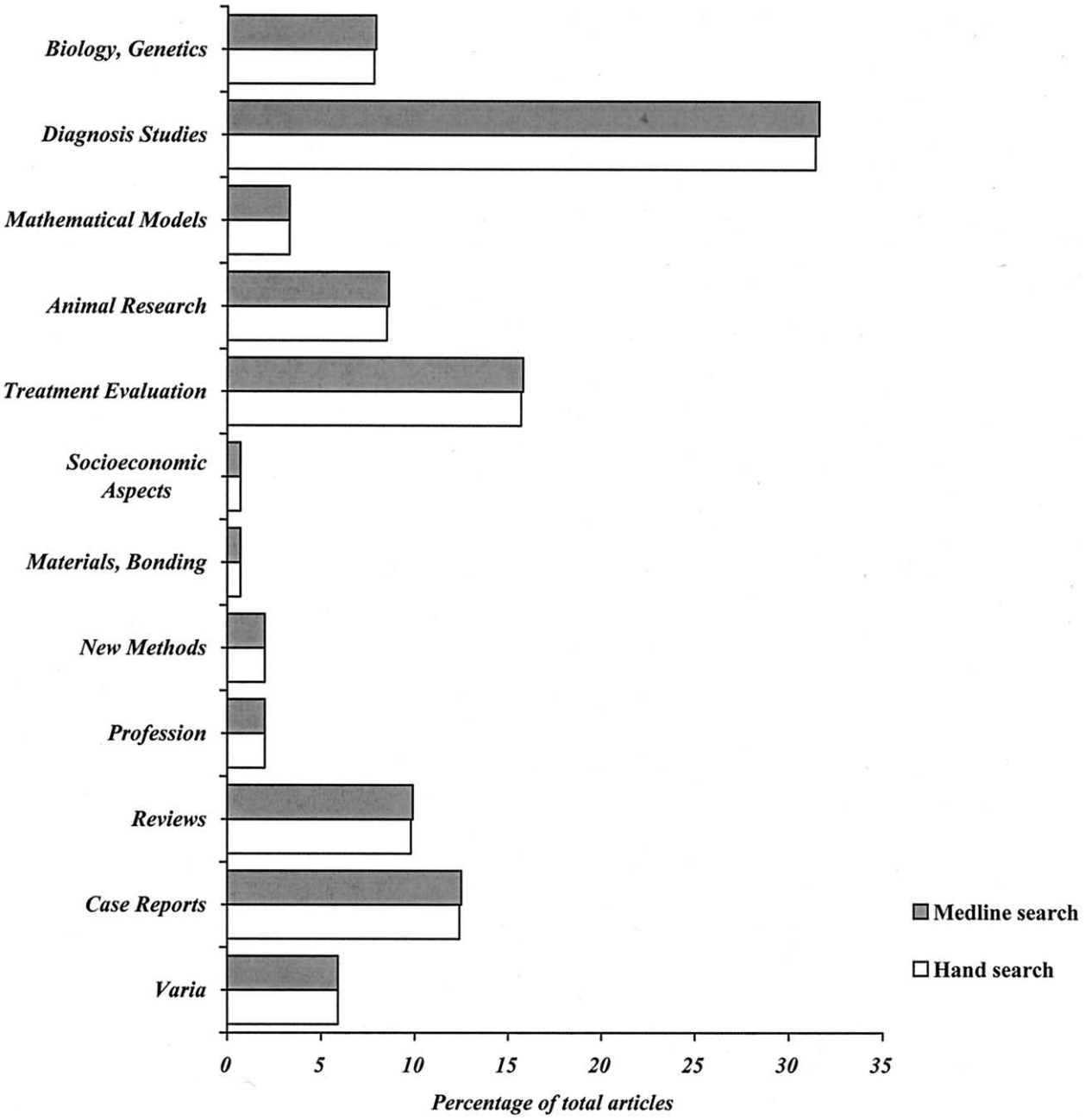

Fig 8. Percentage of articles by research topic for 2000 in selected nonorthodontic journals (search either with MEDLINE or by hand).

titles or abstracts, even though they are of great interest to orthodontists.

In a further effort to investigate the qualitative evolution of published orthodontic research, the articles were classified according to their topics of interest. Classifying research articles is not always straightforward. Special effort was made to apply consistent, although inevitably subjective, criteria, to systematically sort the articles into groups by main subject. In the orthodontic journals, there have been some noticeable changes. Treatment evaluation has always been a main subject of orthodontic interest, and even more so in the last few years, because of the increasing emphasis on evidence-based clinical decisions. This explains also the steadily growing interest in diagnosis studies during the last decades. Because clinical orthodontics has

achieved a high degree of evolution, the need for high-quality evidence on treatment evaluation and diagnosis has become more important in orthodontic research. It is interesting to see that the percentage (not necessarily the absolute number) of studies dealing with new treatment methods has dropped from about 24% in 1985 to 12.6% in 1995 and 9.3% in 2000. Although biology and genetics are only a small part of the orthodontic literature, their increasing importance is evident. It is also apparent that more articles do not fall into any of the main categories, as the orthodontic specialty embraces new ways of multidisciplinary thinking.

Because of the comparative lack of sensitivity concerning the nonorthodontic journals, we tried to assess the error in the subject classification of the articles retrieved using MEDLINE. The articles found by hand searching were also classified into the same subject categories, and the differences were only minimal (Fig 8). In a comparison between orthodontic studies in orthodontic and nonorthodontic journals in 2000, we found interesting differences. Subjects such as biology, genetics, and animal research are clearly overrepresented in nonorthodontic journals. There are, for example, 15 times more articles dealing with biology and genetics published in nonorthodontic journals; these could have been of interest to an orthodontist. Obviously, it is harder for these journals to reach the orthodontic audience; this could be a problem.

Studies like this can be no more than an approximation of reality. First, we used only MEDLINE and based our assumptions mostly on studies in English. If we had included other databases or articles in other languages, the outcome would have been different. On the other hand, this would probably have led to lower levels of specificity and sensitivity, because indexing non-English language journals is even more problematic.[8] Even so, some orthodontic articles might have been omitted (eg, some articles published in *Cleft Palate Journal* for 1990 were not included in our study), and some irrelevant studies might have been included. Especially for the nonorthodontic journals, a certain underestimation of the number of orthodontic articles is probable, given the relatively low method sensitivity observed (0.70). However, despite these shortcomings, a recent study concluded that even if MEDLINE contains some errors, it is generally accurate and extremely efficient as a subject-oriented retrieval tool.[13]

CONCLUSIONS

Approximately 16,000 articles with orthodontic interest were published from 1981 to 2000, and the number of articles published each year in English has almost constantly risen during these 2 decades (from about 300 in 1981 to about 900 in 2000). It is apparently a huge flow of information whose value is not always substantiated. Almost half (45%) of these were published in nonorthodontic journals, some of which are associated with high IFs. Most high-quality studies with orthodontic interest were not published in the purely orthodontic journals.

The articles published in the orthodontic journals focus more and more on treatment evaluation and diagnosis as the need for high-quality evidence becomes increasingly obvious. Other topics, such as new techniques and materials, are losing ground. Subjects such as biology and genetics are gaining momentum in the nonorthodontic journals, where they already constitute a significant portion of the total number of articles with orthodontic content, along with studies related to diagnosis.

Not all articles with orthodontic content contain *orthodont* or its derivatives in their titles, abstracts, or affiliations, but, on the other hand, not all articles that contain this term are really of orthodontic interest. Even so and despite some other inconsistencies, MEDLINE is a powerful and relatively accurate tool in retrieving orthodontic literature and using in bibliometric studies.

REFERENCES

1. Sun RL, Conway S, Zawaideh S, Niederman DR. Benchmarking the clinical orthodontic evidence on Medline. Angle Orthod 2000;70:464-70.
2. Sutherland SE. Evidence-based dentistry: Part II. Searching for answers to clinical questions: how to use MEDLINE. J Can Dent Assoc 2001;67:277-80.
3. Lewison G, Grant J, Jansen P. International gastroenterology research: subject areas, impact, and funding. Gut 2001;49:295-302.
4. Yang S, Needleman H, Niederman R. A bibliometric analysis of the pediatric dental literature in MEDLINE. Pediatr Dent 2001; 23:415-8.
5. Glazier R, Fry J, Badley E. Arthritis and rheumatism are neglected health priorities: a bibliometric study. J Rheumatol 2001;28:706-11.
6. Garcia-Rio F, Serrano S, Dorgham A, Alvarez-Sala R, Ruiz Peña A, Pino JM, et al. A bibliometric evaluation of European Union research of the respiratory system from 1987 to 1998. Eur Respir J 2001;17:1175-80.
7. Stevens SR. Mapping the literature of cytotechnology. Bull Med Libr Assoc 2000;88:172-7.
8. Kim MY, Lin J, White R, Niederman R. Benchmarking the endodontic literature on MEDLINE. J Endod 2001;27:470-3.
9. Neuberger J, Counsell C. Impact factors: uses and abuses. Eur J Gastroenterol Hepatol 2002;14:209-11.
10. Eliades T, Athanasiou AE. Impact factor. A review with specific relevance to orthodontic journals. J Orofac Orthop 2000;62:74-83.

11. Sjogren P, Halling A. Medline search validity for randomised controlled trials in different areas of dental research. Br Dent J 2002;192:97-9.
12. Hopewell S, Clarke M, Lusher A, Lefebvre C, Westby M. A comparison of handsearching versus MEDLINE searching to identify reports of randomized controlled trials. Stat Med 2002; 21:1625-34.
13. De S, Jones T, Brazier H, Jones AS, Fenton JE. The accuracy of MEDLINE and journal contents pages for papers published in *Clinical Otolaryngology*. Clin Otolaryngol 2001;26:39-42.