



What is the current research in orthodontics and where can we read about it?

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The advancements in orthodontics concern more than what somebody may observe in the advertisements of new orthodontic products. The different diagnostic procedures, the effective treatment modalities offered nowadays in orthodontics, the realistic view on the stability of the orthodontic results, as well as the side effects that may appear during orthodontic treatment are few of the fields in orthodontics that have been largely developed in the recent decades.

All this progress in the field has not been achieved just by adding the clinical experience transferred from the older to the younger generation. The systematic approach of clinical questions and the test of the hypotheses made in different fields in Orthodontics gave fruitful results. This knowledge has been constituted in a number of articles published in different journals. Access to this information is essential both during the specialization period of the orthodontists as well as during their active professional life, giving answers to problems raised often in the clinic, and being part of their continuous education. Therefore it is reasonable to ask questions about how many publications are dealing with orthodontic subjects and where can we reach this information. There is a certain number of orthodontic journals which cover a big part of the research in orthodontics. However, it is not clear what do they represent in relation to the whole number of the articles published yearly and dealing with orthodontics. Another question deals with the different fields in Orthodontics where the efforts of the new generation of researchers are devoted to. Do these fields gather the same intensity of research interest during the recent twenty years or different tendencies appear in the literature? With all these questions as background, the aim of this paper is to give a general overview of the current research in orthodontics as related to the number of the articles published, an orientation on the journals publishing research that is closely related to orthodontics, as well as a description of the different fields of research formed in orthodontics.

MATERIALS AND METHODS

The material consisted of the published articles related to orthodontics as they appear in the Medline during the period 1981 to 2000, excluding the editorials, letters to the editor and comments. The Medline search engine was based on the term "orthodont*" as it may have been used either in the title, the abstract and/or in the affiliation of the authors of the article in question.

A classification of these articles has been attempted based on different research fields. An effort was made to compare the findings of the last two decades, the decade of the '80s (publications from 1981 to 1990) with those from the decade of the '90s (publications from 1991 to 2000).

Another attempt was to estimate the number of published articles with orthodontic interest in journals possessing impact factor or not.

Finally, the number of articles related to orthodontics published in non-orthodontic journals were searched and compared to those published in purely orthodontic journals.

RESULTS AND COMMENTS

During the 1980's, 7,648 articles were published on a subject related to orthodontics, 52% of them being in English. Ten years later, 9094 articles were cited in the Medline, 88% being in English. This large percentage difference in the English written articles between the two decades reflects the fact that a lot of non-English language journals were excluded from the Medline in the recent decade. If this were not the case, the difference between the two decades should have been much bigger. Nevertheless, a clear increase in the number of the published articles could be found.

As it could be expected in both decades, the majority of the "orthodontic" articles written in English were published in orthodontic journals. However, 37% of



the articles in the 1980's and 42% in the 1990's have been published in non-orthodontic journals. In order to get a closer look in these findings, a detailed search was performed to define exactly the non-orthodontic journals in 2 specific years: in 1990 and in the year 2000. In 1990, 570 articles in English have been found to be related to orthodontics, 35% of them were published in 81 different non-orthodontic journals. In 2000, 801 similar articles have been found, 33% of them been published in 111 various non-orthodontic journals. It is worth to mention that ten of these non-orthodontic journals have published more than the one third of those "orthodontic" articles.

The evaluation of the journals based on the impact factor may yield only three orthodontic journals: a) *American Journal of Orthodontics and Dentofacial Orthopaedics*, b) *European Journal of Orthodontics*, c) *The Angle Orthodontist*. In the year 2000 59% of the "orthodontic" articles were published in journals with impact factor: 37% in the above mentioned orthodontic journals, and 22% in various non-orthodontic journals. This possibly reflects the exerted demand of the educational and research institutes to publish in journals with impact factor.

No big differences were found between the distribution of the different orthodontic topics published in the literature between the years 1990 and 2000. However, it is worth mentioning that there was a difference in the presence of different topics between the orthodontic and the non-orthodontic journals. In the orthodontic journals, we found more of the articles about the evaluation of treatment outcome and relapse (14.5%), orthodontic materials and bonding techniques (9%) and different treatment modalities (12%), in contrast to the non-orthodontic journals which contained less than 4% for the evaluation of treatment outcome and relapse, 4% on orthodontic materials and bonding techniques while less than 1% on orthodontic treatment modalities.

Nevertheless, the non-orthodontic journals included more articles about diagnosis, facial morphology, genetics and prognosis in orthodontics (18%) in contrast to 12% in orthodontic journals and they contained more articles about tissue reaction and treatment side effects (16.5%) in contrast to 6.5% found in orthodontic journals. Besides, the number of the review articles published in the non-orthodontic journals seems to be higher (19%) than those published in the orthodontic journals (7.4%).

In closing, it should be mentioned that there were certain problems comparing the two different decades, the 1980's and the 1990's, since not all journals cited during the one decade continued to be cited in the next decade, due to interruption of the

publication of certain journals, or the launching of other journals in more recent years.

The method that we have used in the search engine contains certain inconsistencies, e.g. there are articles in orthodontic journals, as it was found manually, where it was not possible to identify them using the term "orthodont*" in the title, in the abstract, or in the affiliation. Thus, beside those that we could identify manually that they did not exist in the list proposed by Medline for the years 1990 and the year 2000, others must have not been identified by the search engine in the other years. On the other hand, we should realize the term "orthodont*" might appear in publications irrelevant to the interest of orthodontics as, e.g. in case where extracted teeth for orthodontic reasons have been used in caries research or in other fields that have no direct orthodontic interest.

Another weak point of the method used is that we can not identify research done by orthodontists working on relative fields where the term "orthodont*" is not encountered. It is characteristic that the publication of Vastardis in 1996 in the "Nature Genetics", a journal with very high impact factor (30.9) was not identified in the search engine of Medline using the term "orthodont*" neither the most of the articles of Thesleff could be identified using the same term, although a big portion of this research has been performed by researchers with orthodontic background.

When presenting the orthodontic research it should be stressed that there are classified reports on the industrial level, which contributed to the development of novel materials and techniques. These in their turn have contributed in the advancement of clinical applications in orthodontics, but the results of the industrial research most often are not available to the public.

To summarize the evidence presented in this paper, more than 12,000 articles written in English have been published in the recent 20 years in different journals. The flow of information is huge and it is difficult to answer if all these articles worth publication. Almost 1/3 of them have been published in one of the three main journals of orthodontics with impact factor, while the other 2/3 should be searched either in one of the other orthodontic journals without impact factor (about half of them) or in non-orthodontic journals (the other half). The number of articles with orthodontic interest published in non-orthodontic journals with impact factor is steadily increasing. The risk of finding in the future high quality "orthodontic" articles published primarily in non-orthodontic journals with higher impact factor than this the three main orthodontic journals have, is real.