Tiago M Barbosa[1,4], Eurico Pinto[1], Ana M Cruz[1,4], Daniel A Marinho[2,4], António J Silva[3,4],Victor M Reis[3,4], Mário J Costa[1,4,], Telma M Queirós[1]

[1] Polytechnic Institute of Bragança, Bragança, Portugal
[2] University of Beira Interior, Covilhã, Portugal
[3] University of Trás-os-Montes and Alto Douro, Vila Real, Portugal
[4] Research Centre in Sports, Health and Human Development, Vila Real, Portugal

Evolution on Swimming Science Research: Content analysis of the "Biomechanics and Medicine in Swimming" Proceeding Books from 1971 to 2006

INTRODUCTION

Swimming seems to be one of the sports more studied .

More than one decade ago, Clarys (1996) made an content analysis of the research about swimming. However, in these last 13 years several developments happened in the aquatic activities. In the past swimming research was dedicated almost exclusively to competitive swimming. Nowadays there are several other aquatic activities being practiced in swimming centers, such as, Aquatic exercises, Aquatic Rehabilitation, Infant swimming, etc. Swimming research is also dedicated to analyze and understand all these aquatic activities. So, we hypothesized that data reported by Clarys (1996) may be out of date.

"Symposium of Biomechanics and Medicine in Swimming" (BMS) is a scientific meeting of aquatic activities researchers. The event happens every 4 years since 1971 and gathers all main research groups dedicated to these sports. So, BMS can be considered as representative of the work done by the main research groups in a given moment.

The aim of this study was to analyze the evolution of the swimming "science" research in the last decades based in the BMS proceeding books.

METHODS

The content of all the 622 papers published in the Proceedings books of the Symposiums of Biomechanics and Medicine in Swimming from 1971 to 2006 were analyzed.

The main category "aquatic activity" included the following sub-categories: (i) Competitive swimming; (ii) Water Polo; (iii) Synchronized Swimming; (iv) Diving; (v) Hydrotherapy; (vi) Infant Swim; (vii) Head-out Aquatic Exercises; (viii) Fins Swimming and; (ix) others.

The main "scientific area" applied in the study of aquatic activities, in all manuscripts, was considered as being the category to analyze. The following sub-categories were defined (adapted from Clarys, 1996): (i) Biomechanics; (ii) Psychology; (iii) Sociology; (iv) Pedagogy/Teaching; (v) Biochemistry; (vi) Physiology; (vii) Thermoregulation; (viii) Hydrodynamics ; (ix) Electromyography; (x) Anthropometry; (xi) Equipments/ Methodologies; (xii) Clinical Medicine/Traumatology and; (xiii) Interdisciplinary assessment.

RESULTS AND DISCUSSION

There was an increasing number of papers published within the period of time analyzed (ranging from 23 papers in 1971 to 145 manuscripts in 2006). "Biomechanics" was the sub-category of assessment most often (ranging from 27.3% in 1988 to 60% in 1979) and with 37.7% of the papers The following sub-category was "Physiology" with 17.20%. Since 2003 it is verified an increasing number of "interdisciplinary assessment" manuscripts (e.g., 9.7% in 2003 and 21.4% in 2006, shifting from the third to second sub-category). It represents 8.52% of overall papers within the period of time analyzed. For the "aquatic activity" category, "Competitive swimming" was always on the top. However, starting in 1999 there was an increasing interest about "Head-out aquatic exercises" and "Fins swimming".

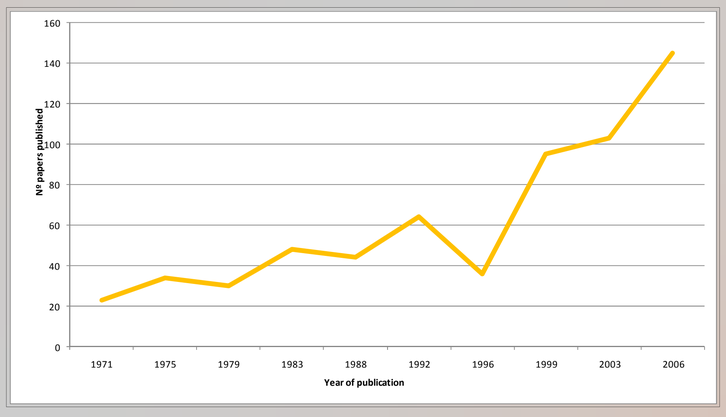
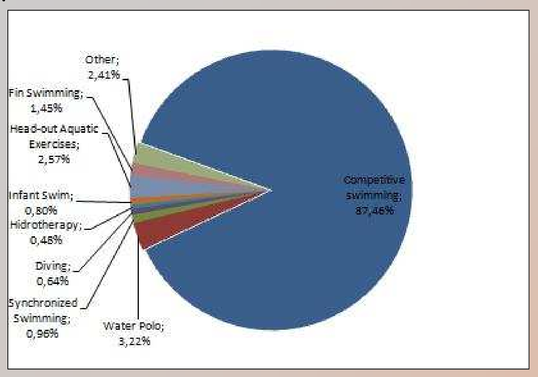


Figure 1. Evolution in the absolute frequency of papers for pooled data.



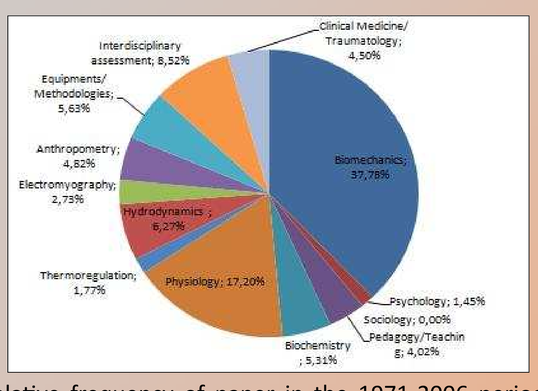


Figure 2. Relative frequency of paper in the 1971-2006 period according to the sub-category analyzed.

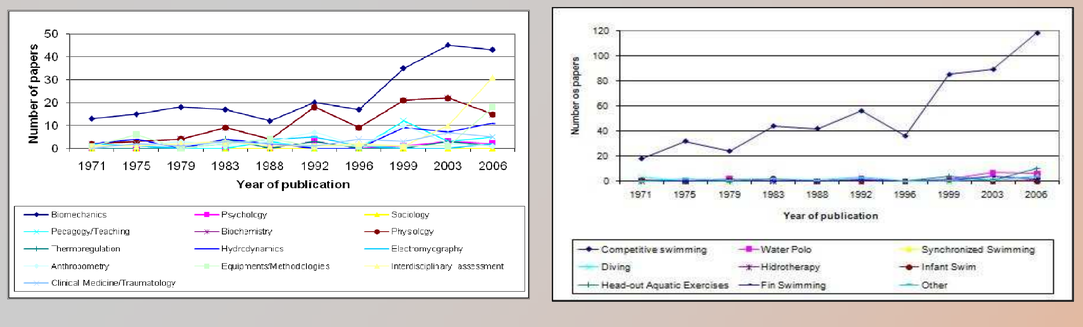


Figure 3. Variation in the absolute frequency of papers.

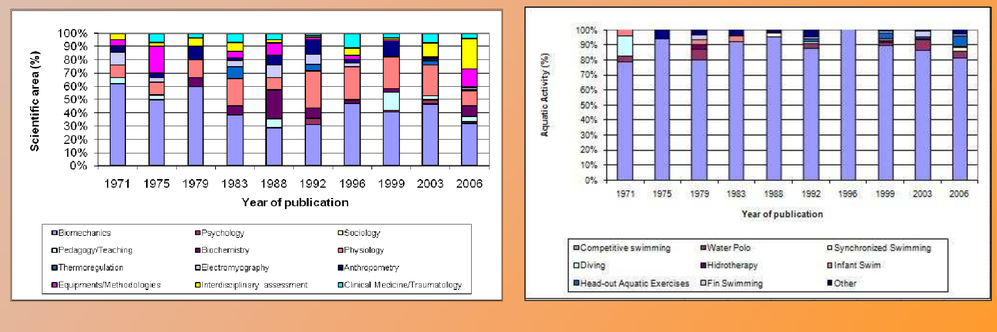


Figure 4. Variation in the relative frequency of papers.

CONCLUSION

As a conclusion, there is a significant increase in the swimming science throughout the 1971-2006 period of time. Main interest is related to "Biomechanics" and "Physiology" topics. "Competitive swimming" is the main aquatic activities studied. Even so, at least on the last proceeding books it was verified the tendency for a higher interest in "Head-out aquatic activities".

REFERENCES

Clarys JP (1996). The historical perspective of swimming science. In: Troup JP, Hollander AP, Strasse D, Trappe SW, Cappaert JM, Trappe TA (eds). Biomechanics and Medicine in Swimming VII, pp. xi-xxxiv. E & FN Spon, London.

ACKNOWLEDGE

From the Ana M Cruz to the Science and Techology Foundation (Bolsa de Integração na Investigação BII - CIDESD/UTAD).