

## BIBLIOMETRICS

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## Kickboxing scientific production indexed on PubMed: productivity, topics and citations

Submission: 13.07.2022; acceptance: 10.10.2022

**Key words:** combat sports, sport sciences, health sciences, martial arts, bibliometrics

### Abstract

Background. Kickboxing is a combat sport created in the 70s and is nowadays on the rise, being one of the best-known and practiced in the world.

Problem and aim. Our objective is to carry out a bibliometric analysis of the most published topics, most cited articles, most productive journals, and authors within kickboxing scientific production indexed on PubMed database.

Material and methods. We searched PubMed for the keyword “kickboxing” on 01/26/2022 and found 107 studies and after applying the exclusion criteria, 103 remained. To collect the citations for each article, they were consulted on Google Scholar.

Results. The most published and cited studies are related to injuries, followed by studies with physiological analyses. The most productive newspapers with the modality were “The Journal of Strength & Conditioning Research” (n = 7), followed by the “International Journal of Environmental Research and Public Health” (n = 4). Among the most productive authors in the first place was the Brazilian researcher Emerson Franchini (n = 11), followed by the Tunisian Ibrahim Ouergui (n = 9). In this ranking, a tie in the frequency of appearance was observed between Polish and other Tunisian researchers (both with 4 researchers).

Conclusions. Many studies need to be undertaken to advance the science of kickboxing. We speculate that with recognition by the International Olympic Committee, studies into kickboxing will consequently increase.

### Introduction

Kickboxing is a worldwide known and widely practiced combat sport [Da Silva Duarte *et al.* 2021], it is esti-

mated that there are more than 4,000,000 practitioners in more than 40,000 gyms worldwide [WAKO 2022]. Its recognition is such that in 2018 the International Olympic Committee recognized it [Dugonjic *et al.* 2019],

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### For citation – in IPA style:

da Silva Duarte J.D.R., Salinas J.A.R., Souza R.F. (2024), *Kickboxing scientific production indexed on PubMed: productivity, topics and citations*, “Ido Movement for Culture Journal of Martial Arts Anthropology”, vol. 24, no. 3, pp. 23–31; doi: 10.14589/ido.24.3.3.

In other standard – e.g.:

da Silva Duarte, J.D.R., Salinas, J.A.R., Souza, R.F. Kickboxing scientific production indexed on PubMed: productivity, topics and citations, *Ido Mov Cult J Martial Arts Anthropol*, 2024, 24 (3): 23–31 DOI: 10.14589/ido.24.3.3

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becoming an Olympic Sport in 2021 [Da Silva Duarte *et al.* 2021a]. This sport can be practiced for both health and competitive purposes [Da Silva Duarte *et al.* 2021a].

Kickboxers can participate in competitive events at both amateur and professional levels [Ambrozy *et al.* 2020]. An amateur competition has 3 rounds lasting 2 minutes with a 1-minute break between each round [Salci 2015]. The professional has 3 rounds of 3 minutes with a 1-minute break between each round, in case of a title and/or belt dispute, up to 5 rounds can happen. From a historical point of view, the modality emerged with karatekas who were dissatisfied with the limiting rules of their sport, in which it was only allowed to strike without force (for the purpose of scoring) and in a cadenced way [Ritschel 2008]. It was then that in 1974 the first karate full contact championship (the initial name given to the modality) took place, with the first champions Bill Wallace, Joe Lewis, Jeff Smith, and Usuena Duenas [Ritschel 2008].

Kickboxing contains seven modalities separated by ring and mat [Da Silva Duarte *et al.* 2021a]. The mats are: musical forms, point fight kick light and light contact; and ringside: full contact, low kicks and K1 [Da Silva Duarte *et al.* 2021a]. Basically, the mat modalities are punches without force with the objective of scoring, whereas the ring ones are punches with force that can knock out [Ouergui *et al.* 2019]. However, the musical forms are not combat, being just an individual performance with music, which can be with or without the use of implements (nunchaku, stick, sword, among others). The origins and emergence of these different modalities are still unclear in the literature.

For the best development of any sport in terms of performance and health, serious scientific studies are necessary. In this sense, sports science is a broad scientific field that includes several disciplines such as motor learning, physiology, nutrition, psychology, biomechanics, performance analysis, among others [Halperin *et al.* 2017]. This specialty of science serves to inform practitioners and coaches what possible decision-making should be taken, and it is up to researchers to carry out useful and relevant research, however, methodological errors and biased studies can negatively impact athletes and coaches [Halperin *et al.* 2017]. Health sciences can also be linked to the regular practice of sports due to their health benefits.

Bibliometric review methods employ a quantitative approach that seeks to survey, map and evaluate published scientific studies on a given topic [Zupic, Cater 2015]. In the field of martial arts and combat sports, there are bibliometric studies with *tai chi chuan* [Yang *et al.* 2015], *taekwondo* [Perez-Gutierrez *et al.* 2015], *judo* [Peset *et al.* 2013; Reis *et al.* 2022], *jujutsu* [Perez-Gutierrez *et al.* 2021], *kickboxing* [Podrigalo *et al.* 2022] and Olympic combat sports at the time (fencing, boxing, *judo*, *taekwondo*, and wrestling) [Franchini *et al.*

2018]. Regarding the studies that analyzed the most cited research in the sports context, there are few, as this analysis is recent, having only with sports medicine [Khatra *et al.* 2021], sports economics [Santos, Garcia 2011], sports biomechanics [Knudson 2022], disability sport [Khoo *et al.* 2018] and the most cited journals in sports management [Shilbury 2011]. Specifically, only one sport exists with soccer [Brito *et al.* 2018], collegiate athletics [Jenkins *et al.* 2022] and *judo* [Reis *et al.* 2022]. The study by Millet *et al.* [2021] ranked the most cited studies with each Olympic modality, which includes Olympic combat sports. This type of analysis serves as a simple tool to assess the quality of research carried out on a given topic [Brito *et al.* 2018].

Bibliometric methods can help researchers understand which works are the most influential and which mind gaps need to be filled [Zupic, Cater 2015]. There is only one bibliometric study with kickboxing in the Web of Science database [Podrigalo *et al.* 2022]. In this sense, there are no bibliometric studies conducted with the kickboxing modality in different databases such as PubMed. Thus, the present study aims to perform a bibliometric analysis of research with kickboxing in the PubMed database from the years 1986 to 2022. Taking into account, our research will focus on the following criteria: (a) which are the most discussed themes; (b) the most producing journals; (c) which articles are the most referenced; and (d) the most producing researchers in the modality.

## Material and methods

Data were obtained by PubMed using the keyword "kickboxing" [Perez-Gutierrez *et al.* 2011] on 01/26/2022 (without a pre-established time to start the search), and 107 studies were found. Afterwards, titles and abstracts were read. Original studies that have kickboxing practitioners in the sample universe and those of review with kickboxing (cited in the title or in the abstract) were included. After applying the inclusion criteria, 4 studies were excluded, 3 for not having kickboxing and 1 for not being a scientific article, leaving 103 studies analyzed.

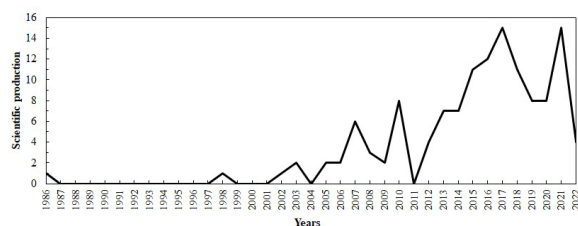
To collect the citations of the articles, Google Scholar was consulted (study by study), and the number of citations was noted and counted. The data were consulted on 01/28/2022. To count the most productive journals and researchers in the modality, we referenced the studies included in a document in Microsoft Office Word 2006 (authors, title, journal, volume, and year) and counted the most cited authors and journals. This analysis was carried out by 2 authors, the first author performed the initial accounting, and the second author checked the counts.

The articles were selected for the different areas through the variables analyzed (physiology, nutrition,

and injuries). To this end, the titles and abstracts were read (in case of doubt, the entire article: introduction, methodology, results, discussion, and conclusion) and then categorized into their main themes. Although most studies use the Web of Science for bibliometric analyses [Perez-Gutierrez *et al.* 2015; Perez-Gutierrez *et al.* 2021; Franchini *et al.* 2018], PubMed is focused on biomedical literature [Alryalat *et al.* 2019] and can also be used for this analysis [Song *et al.* 2014; Bissar-Tadmouri *et al.* 2009]. However, as PubMed does not present a citation quantification system, we opted for the use of Google Scholar which is an interesting database to do this type of survey [Martin-Martin *et al.* 2018].

## Results

103 articles were selected with a total number of 3,231 citations. The most productive years were 2021 and 2017, both with 15 articles. The first study found was in 1986 using the nomenclature karate full contact. Figure 1 shows the years and their respective productions. An increase in production is observable from the year 2012 onwards. Additionally, the year 2022 has only 4 articles, as these data were collected at the beginning of the same year.



**Figure 1.** Scientific production of kickboxing in different years

Among the various areas that encompass the sport sciences, in the case of kickboxing, the prevalence of studies with analysis of injuries ( $n = 39$ ) (their characteristics during training and competitions and their treatments) was found, followed by physiological analysis ( $n = 18$ ) (blood collection, heart rate, salivary cortisol), sports training and performance ( $n = 13$ ) (technical and tactical analysis and training methods), health and quality of life ( $n = 9$ ) (improvement in physical capabilities), psychology ( $n = 7$ ) (psychological characteristics of athletes), biomechanics ( $n = 6$ ) (kinematic analysis of kickboxing techniques), nutrition ( $n = 4$ ) (weight loss aspects for competitions), technical and tactical aspects ( $n = 3$ ) (most used techniques and effort-pause ratio), anatomy ( $n = 3$ ) (wingspan) and doping ( $n = 1$ ) (illegal substances to increase performance). Table 1 shows the areas found and the number of articles respectively.

The journals that most published articles on kickboxing were “The Journal of Strength & Conditioning Research” ( $n = 7$ ) and the “International Journal of Environmental Research and Public Health” ( $n = 4$ )

respectively (Table 2). “The Journal of Strength & Conditioning Research” is a renowned journal that aims to publish original articles, reviews, and recommendations for procedures to improve the process of hypertrophy, strength, and physical conditioning. “The International Journal of Environmental Research and Public Health” is an interdisciplinary journal of environmental health sciences and public health.

**Table 1.** Most represented topics within kickboxing scientific production.

Areas	Amount	Percentage
Injuries	39	40,17%
Physiology	18	18,54%
Sports training and performance	13	13,39%
Health and quality of life	9	9,27%
Psychology	7	7,21%
Biomechanics	6	6,18%
Nutrition	4	4%
Technical and tactical aspects	3	3,09%
Anatomy	3	3,09%
Doping	1	1,03%
<b>Total</b>	<b>103</b>	<b>100,00%</b>

**Table 2.** The most productive scientific journals in kickboxing

Journal	The amount
The Journal of Strength & Conditioning Research	7
International Journal of Environmental Research and Public Health	4
Journal of Sports Sciences	2
Injury Epidemiology	2
BMC Psychiatry	2
Clinical Endocrinology	2
Asian Journal of Sports Medicine	2
Military Medicine	2

Table 3 presents the 10 most cited articles with the kickboxing modality. Articles on injuries are the ones with the highest number of citations [Tanriverdi *et al.* 2015; Tanriverdi *et al.* 2007; Zazryn *et al.* 2003]. Followed by the physiological aspects [Ghanbari-Niaki *et al.* 2010; James *et al.* 2016].

Table 4 shows the most productive researchers in the kickboxing modality. Firstly, the Brazilian researcher Emerson Franchini from the University of Sao Paulo, followed by the Tunisian researcher Ibrahim Ouergui from University of Jendouba. However, the universities of Tunisia and Poland have productive researchers with the modality, both with four ranked and Brazil with two researchers (Table 4).

## Discussion

As far as we know, this is the first study to do a bibliometric analysis of kickboxing in the PubMed indexing database. Our main findings were that studies related to

**Table 3.** Top – 10 of the most cited articles

Title	Author	Year	n° of citations
Pituitary dysfunction after traumatic brain injury: a clinical and pathophysiological approach.	Fatih Tanriverdi; Harald Jorn Schneider; Gianluca Aimaretti; Brent E. Masei; Felipe F. Casanueva; Fahrettin Kelestimur.	2015	134
Kickboxing sport as a new cause of traumatic brain injury-mediated hypopituitarism.	Fatih Tanriverdi; Kursad Unluhizarci; Bekir Coksevim; Ahmed Selcuklu; Felipe F. Casanueva; Fahrettin Kelestimur.	2007	133
Towards a determination of the physiological characteristics distinguishing successful mixed martial arts athletes: a systematic review of combat sport literature.	Lachlan P. James; G. Gregory Haff; Vincent G. Kelly; Emma M. Beckman.	2016	131
A 16-year study of injuries to professional kickboxers in the state of Victoria, Australia.	T. R. Zazryn; C. F. Finch; P. McCrory.	2003	114
Prevalence and patterns of combat sport related maxillofacial injuries.	Gholamreza Shirani; Mohammad Hosein Kalantar Motamedi; Alireza Ashuri; Pooyan Sadr Eshkevari.	2010	98
Perceptions of the contribution of psychology to success in elite kickboxing	Tracey J. Devonport.	2006	97
Biomechanical study of full-contact karate contrasted with boxing.	M. L. Schwartz; A. R. Hudson; G. R. Fernie; K. Hayashi; A. A. Coleclough.	1986	84
Weight loss strategies in combat sports and concerning habits in mixed martial arts	Oliver R. Barley; Dale W. Chapman; Chris R. Abbiss.	2018	74
Apolipoprotein E3/E3 genotype decreases the risk of pituitary dysfunction after traumatic brain injury due to various causes: preliminary data.	Fatih Tanriverdi; Serpil Taheri; Halil Ulutabanca; Ahmet Okay Caglayan; Yusuf Ozkul; Munis Dunder; Ahmet Selcuklu; Kursad Unluhizarci; Felipe F. Casanueva; Fahrettin Kelestimur.	2008	70
Plasma nesfatin-1 and glucoregulatory hormone responses to two different anaerobic exercise sessions.	Abbas Ghanbari-Niaki; Robert R. Kraemer; Raheleh Soltani.	2010	69

injuries during competitions and training are the most produced and cited within this modality. The fact that PubMed is an indexing base focused on life sciences and biomedical sciences [Alryalat *et al.* 2019], may be the reason why studies on injuries are predominant. In the study by Perez-Gutierrez *et al.* [2017] with taekwondo, injuries are among the most published with the modality, similar to our results. In this context, kickboxing is characterized as a strike (traumatic blows such as punches,

kicks, and knees), resulting in rates of imminent injuries, with professional athletes at greater risk of injury compared to amateurs [Lystad 2015]. This difference is probably due to the use of helmets and shin guards in amateur sports [Lystad 2015]. During competitions, the most common injuries are lacerations in the head region, fractures in different parts of the body, dental and jaw injuries, dislocations, among others [Chatrchaiwiwatana *et al.* 2016; Lystad 2015]. As far as brain injuries are concerned, repetitive concussions can develop chronic traumatic encephalopathy (a neurodegenerative disease) [Stormezand *et al.* 2022], a possible strategy to avoid neurological problems is non-blunting blows to the head region during periodization.

**Table 4.** The most productive researchers in kickboxing

Researcher	Filiation	Country	n° of articles
Emerson Franchini	University of Sao Paulo	Brazil	11
Ibrahim Ouergui	University of Jendouba	Tunisia	9
Fatih Tanriverdi	Erciyes University Medical School	Turkey	7
Ezzedine Bouhleb	University of Sousse	Tunisia	7
Lukasz Rydzik	University of Physical Education in Krakow	Poland	5
Tadeusz Ambrozy	University of Rzeszow	Poland	5
Nabil Gmada	University of Jendouba	Tunisia	5
Foued Cheour	High Institute of Applied Biology of Medenine	Tunisia	3
Reidar P. Lystad	Central Queensl and University	Australia	3
Zbigniew Obminski	Institute of Sport-National Research Institute	Poland	3
Helmi Chaabene	National Center of Medicine and Science in Sports	Tunisia	3
Wojciech J. Cynarski	University of Rzeszow	Poland	3
Bianca Miarka	Federal University of Pelotas	Brazil	3
Karim Chamari	Athlete Health and Performance Research Centre	Qatar	3

In the context of training, it is reported that for instructors the most recurrent injuries are in the back, followed by the knee, hip, and shoulder [Romaine *et al.* 2003]. For the participants/students, it was back, knee and ankle, with strains, sprains and tendinitis being the most common [Romaine *et al.* 2003]. In this sense, knowing the risks of injuries in sport represents an essential basis for developing prevention strategies [Pococco *et al.* 2013] and even the use and creation of protective equipment. In this regard, harmful training is not interesting for kickboxers. These facts could explain the common interest of several researchers in this subject.

The physiological analysis of the modality serves as valuable information for strength and conditioning professionals to design specific training programs [Franchini

2020]. Studies have analyzed physiological markers in combat simulations [Ouergui *et al.* 2016] and in official competitions [Rydzik *et al.* 2021]. Physiological markers were similar in both studies, being 178 to 189 heart beats per minute and 11 to 14 millimole lactate [Ouergui *et al.* 2016; Rydzik *et al.* 2021]. These data show that combat simulations seem to be a good stimulus from a physiological point of view for competition and a good indication for modalities that still do not have studies in real competition situations.

Another study analyzed the physiological markers (heart rate and lactate) in different kickboxing modalities (full contact, light contact, and point fighting) with no difference in heart rate between the modalities (160 to 171 bpm), however the full contact requested more glycolytic pathway ( $15.2 \pm 5.3$  mmol/L) compared to point fighting ( $13.2 \pm 2.6$  mmol/L) ( $p < 0.05$ ) [Ouergui *et al.* 2019]. From the hormonal and metabolic point of view, the simulated combat in the full contact modality was found to increase in all variables ( $p < 0.001$ ), being them GH before ( $0.3 \pm 0.3$   $\mu$ g/mL) and after ( $11.8 \pm 4.4$   $\mu$ g/mL), testosterone before ( $3.1 \pm 1.0$   $\mu$ g/mL) and after ( $4.1 \pm 1.4$   $\mu$ g/mL), cortisol before ( $90.0 \pm 31.8$   $\mu$ g/mL) and after ( $134.0 \pm 36.1$   $\mu$ g/mL), glucose before ( $5.1 \pm 0.4$  mmol/L) and ( $8.3 \pm 1.1$  mmol/L) and lactate before ( $2.2 \pm 0.5$  mmol/L) and after ( $14.4 \pm 1.7$  mmol/L) [Ouergui *et al.* 2016]. In view of the various competitive events (amateurs and professionals) in different modalities, this may be the reason for the interest of these researchers, aiming at a better training prescription.

The areas of sports training, performance and technical and tactical aspects are directly related. In the first round of the World Kickboxing Championship, higher values of high-intensity activities and a 1:1 pause effort ratio (10 seconds of effort for 10 seconds of pause during fights) were observed [Ouergui *et al.* 2014]. These data are relevant, because kickboxing is a high-intensity intermittent sport and structuring training based on the effort-pause relationship of real combat can be a way of conditioning the athlete in a specific way for combat [Ouergui *et al.* 2014]. Another study in the same championship found that winning athletes threw greater amounts of punches, punch combinations, foot defenses and clinch than losers [Ouergui *et al.* 2013]. Despite this result, technical efficiency is something important, in the study by Rydzik [2022] it was observed that the higher the athlete's level, the greater his technical effectiveness. In this context, a high level of physical fitness is essential for optimal development of techniques during competitions [Rydzik, Ambrozy 2021]. In a targeted manner, Ouergui *et al.* [2015] developed a functional training protocol (The Specific Kickboxing Circuit) based on kickboxing techniques (jab, cross, and roundhouse kick) on the heavy bag, seeking to approximate physiological markers (heart rate, lactate, GH, cortisol, glucose, and testosterone) from the competition. According to

the same authors, this protocol simulates physiological markers in a cheap way (for more details we recommend reading the Development of a Noncontact Kickboxing Circuit Training Protocol That Simulates Elite Male Kickboxing Competition). This different research seeks to bring kinetically tested information to strength and conditioning professionals.

The most studied themes connected with kickboxing were injuries, physiology, sport training and performance (72.1% of the total articles), definitely corroborating the relevance of the competitive or sport approach of kickboxing in scientific research. Thus, future studies should check other databases to discuss the current results, since they may offer a more comprehensive view of the interests and concerns of scholars on kickboxing.

From a bibliometric point of view, a recent study ranked the top 5 most cited studies within Olympic modalities [Millet *et al.* 2021], in the present discussion we will focus only on combat sports. Among the ranking studies, no modality had a predominance of injuries, being boxing: development of punching strength; judo: physiology; taekwondo: physiology, and wrestling: nutrition (weight loss) [Millet *et al.* 2021]. In our study, the total number of articles found in PubMed was 103 losing to judo ( $n = 262$ ), boxing ( $n = 225$ ), taekwondo ( $n = 159$ ) and wrestling ( $n = 405$ ) [Millet *et al.* 2021]. Karate is the closest modality ( $n = 114$ ) [Millet *et al.* 2021]. The inclusion of these sports in the Olympic games is probably one of the possible causes for having more published articles than sports like kickboxing that are not yet in this competition.

The Brazilian researcher Emerson Franchini was recognized as the most productive author in another sport as in judo [Peset *et al.* 2013; Reis *et al.* 2022]. Moreover, in another recent bibliometric study of kickboxing in the Web of Science, he ranked first [Podrigalo *et al.* 2022]. This is similar to our results with the PubMed indexing database. The high production of researcher Emerson Franchini may explain why the University of Sao Paulo published the most articles on Olympic combat sports [Franchini *et al.* 2018]. In a recent study still with kickboxing Ibrahim Ouergui ranked second among the most productive researchers [Podrigalo *et al.* 2022], also agreeing with our results. Already a bibliometric study with Polish researchers in the jujutsu modality the most productive researcher was Wojciech J. Cynarski ( $n = 27$ ) and in second place the researcher Tadeusz Ambrozy ( $n = 10$ ) [Perez-Gutierrez *et al.* 2021]. In our turn, Wojciech J. Cynarski ranked fifth ( $n = 3$ ) tying with other researchers (Foued Cheour, Reidar P. Lystad, Zbigniew Obmiński, Helmi Chaabene, Bianca Miarka and Karim Chamari) and Tadeusz Ambrozy ( $n = 5$ ) ranked third tying with two researchers (Lukasz Rydzik and Nabil Gmada). However, with taekwondo the researcher Willy Pieter was the most productive in the Web of Science [Perez-Gutierrez *et al.* 2017; Perez-Gutierrez *et al.* 2015].

In our study the researcher Fatih Tanriverdi is third (tied with Ezzedine Bouhlel, both with 7 articles) (Table 4) and among the most cited articles Fatih Tanriverdi has 3 [Tanriverdi *et al.* 2015; Tanriverdi *et al.* 2008; Tanriverdi *et al.* 2007] (Table 3). His high production rate added to possible self-citations may have influenced his appearance in these two tables. In our turn, this is the first study to survey the most productive authors, the most published areas, the most cited research, and the journals with the highest number of published studies on kickboxing in the PubMed indexing base. In a bibliometric study with taekwondo, the most productive journal was Archives of Budo and the second was "The Journal of Strength & Conditioning Research" [Perez-Gutierrez *et al.* 2015]. Unfortunately, journals specializing in martial arts and combat sports are not indexed in PubMed ("Ido Movement for Culture Journal of Martial Arts Anthropology", "Archives of Budo", and "Revista de Artes Marciales Asiaticas"), which opens the possibility for future studies. However, in the bibliometric study on kickboxing with the indexing base of Web of Science, the most productive journal was "The Journal of Strength & Conditioning Research" [Podrigalo *et al.* 2022], which concurs with the PubMed database described in our results.

In the list of the most productive authors, we can observe that Polish and Tunisian researchers are the most cited. The appearance of Polish researchers among the most productive in kickboxing can be explained by the fact that Poland contains a quality journal specializing in martial arts and combat sports [Cynarski, Reguli 2014], indicating that the country has considerable attention to research in these sports. The African country Tunisia, holds a partnership with Ibrahim Ouergui, Ezzedine Bouhlel, Nabil Gmada and Foued Cheour that is considerably productive with kickboxing [Ouergui *et al.* 2019; Ouergui *et al.* 2016; Ouergui *et al.* 2015; Ouergui *et al.* 2014; Ouergui *et al.* 2014a; Ouergui *et al.* 2013]. A possible explanation for this could be that one or more of these researchers has some kind of connection with the sport (former athlete, teacher and/or referee).

Although there is a very strong positive correlation ( $r = 0.84$ ) between the most productive countries from a scientific point of view with the medal tables in the Olympic Games between the modalities [Moreira, Franchini 2017], we recommend future studies that analyze the correlation among the most productive countries and the medal table in the Kickboxing World Championship. Another important aspect is that the countries that produce the most articles in the world are the USA, United Kingdom, Germany, Japan, China, France, Italy, and Canada [Gazni, Sugimoto, Didegah 2012]. In Perez-Gutierrez *et al.* [2015] study with taekwondo it was found that South Korea was the country that published the most, while in another more comprehensive study about Olympic combat sports, the USA was the most produc-

tive [Franchini *et al.* 2018]. However, in our study, other countries had the most productive researchers on kickboxing (Tunisia, Poland, Brazil, Qatar, Australia, and Turkey), indicating the researchers from the countries that pay more attention to the modality.

As a limitation, we recognize that the analysis performed in this study has the chance of human error, however, it was checked by a second author to reduce the chance of bias. Another important aspect is that because it was consulted only in the PubMed indexing base and in English, some articles may have been left out of the ranking. On the other hand, PubMed is a portal that indexes relevant and quality articles [Morshed, Hayden 2020] and the most relevant studies are published in English.

## Conclusions

Kickboxing is a modality on the rise and has many studies to be developed, we estimate that with the recognition of the International Olympic Committee, the increase in scientific productions with the modality will increase. Regarding the studies carried out on kickboxing, injuries are the most published and cited, followed by physiology studies. Among the most productive researchers, we have a tie in the number of researchers from Poland and Tunisia in the ranking (both with three researchers), while the most productive researcher is Brazilian.

## Acknowledgement

We would like to thank Prof. Dr. Mario Eugenio Tchamo for his comments.

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## Publikacje naukowe dotyczące kickboxingu indeksowane w PubMed: produktywność, tematy i cytowania

**Słowa kluczowe:** sporty walki, nauki o sporcie, nauki o zdrowiu, sztuki walki, bibliometria

### Streszczenie.

Tło. Kickboxing jest sportem walki powstałym w latach 70. XX wieku, a obecnie zyskuje na popularności, będąc jednym z najbardziej znanych i praktykowanych na świecie.

Problem i cel. Celem autorów było przeprowadzenie analizy bibliometrycznej najczęściej publikowanych tematów, najczęściej cytowanych artykułów, najbardziej produktywnych czasopism i autorów w ramach publikacji naukowych dotyczących kickboxingu indeksowanych w bazie danych PubMed.

Materiał i metody. Autorzy przeszukali PubMed pod kątem słowa kluczowego "kickboxing" w dniu 26.01.2022 r. i znaleźli 107 badań, z czego a po zastosowaniu kryteriów wykluczenia pozostały 103. Aby zebrać cytowania każdego artykułu, sprawdzono je w Google Scholar.

Wyniki. Najczęściej publikowane i cytowane badania dotyczą urazów, a następnie badań z analizami fizjologicznymi. Najbardziej produktywnymi gazetami z modalnością były *The Journal of Strength & Conditioning Research* (n = 7), a następnie *International Journal of Environmental Research and Public Health* (n = 4). Wśród najbardziej produktywnych autorów na pierwszym miejscu znalazł się brazylijski badacz Emerson Franchini (n = 11), a następnie Tunezyjczyk Ibrahim Ouergui (n = 9). W tym rankingu zaobserwowano remis w częstotliwości pojawiania się między polskimi i tunezyjskimi badaczami (obaj z 4 badaczami).

Wnioski. Należy przeprowadzić wiele badań, aby rozwinąć naukę o kickboxingu. Autorzy przewidują, że wraz z uznaniem Międzynarodowego Komitetu Olimpijskiego, badania nad kickboxingiem będą konsekwentnie wzrastać.