

Quality of Internet Health Information on Thumb Carpometacarpal Joint Arthritis

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ABSTRACT

INTRODUCTION: The Internet has become a heavily used source of health information. No data currently exists on the quality and characteristics of Internet information regarding carpometacarpal (CMC) arthritis.

METHODS: The search terms “cmc arthritis,” “basal joint arthritis,” and “thumb arthritis” were searched using Google and Bing. Search results were evaluated independently by four reviewers. Classification and content specific review was performed utilizing a weighted 100-point information quality scale.

RESULTS: Of the 60 websites reviewed, 27 were unique pages with 6 categorized as academic and 21 as non-academic. Average score on content specific review of academic websites was 56.8 and for non-academic was 42.7 ($p=0.054$). Average Flesch-Kincaid Grade Level for academic websites was 12.4, and for non-academic was 9.9 ($p=0.015$).

CONCLUSION: Internet health information regarding thumb CMC arthritis is primarily non-academic in nature, of generally poor quality, and at a reading level far above the U.S. average reading level of 6th grade. Higher-quality websites with more complete content and appropriate readability are needed.

CLINICAL RELEVANCE: The quality of Internet health information regarding thumb CMC arthritis is suboptimal.

KEYWORDS: basal joint arthritis, CMC arthritis, Internet health information, thumb arthritis

INTRODUCTION

The Internet is a widely used source of information for the general public with over 75% of households accessing the Internet.¹ It is well known that the Internet has become a heavily used source of health information, with reports of 74% of all adults accessing health information online at some time, and 58% to 64% of Internet users searching for health information in the past 12 months.^{2,4} In fact, due to its accessibility and convenience,⁵ nearly half of all patients report going to the Internet first as their primary source for health-specific information.³

In a 2011 telephone survey, 90% of patients who reported searching for health information online believed that the information acquired in this fashion was very reliable.⁴ However, there is little regulation over health information that is posted on the Internet. Prior studies have looked at the quality of Internet health information on orthopaedic problems such as carpal tunnel syndrome,⁶ distal radius fracture,⁷ spinal disorders,^{8,9} and common sports medicine diagnoses.¹⁰ No data currently exists on the quality and characteristics of health information regarding the most common arthritis of the upper extremity requiring surgery, carpometacarpal (CMC) arthritis of the thumb.

This study aims to evaluate current Internet health information on CMC arthritis of the thumb. We hypothesized that the quality and readability of such information would be poor and correlated with website category.

MATERIALS AND METHODS

The terms “cmc arthritis,” “basal joint arthritis,” and “thumb arthritis” were searched on both Google.com and Bing.com. The webpage results were critically analyzed for quality of content, readability, and accountability.¹¹ We conducted a website interface and categorization review, content specific review, and evaluation based on the Health on the Net (HON) Foundation Code for Responsible Websites and objective readability indices.¹² (Table 1)

All outcome measures were independently collected by four investigators. Two of these were senior orthopaedic surgery residents and two were senior medical students. Because it has been shown that users often do not look beyond the first page of search results on a given search engine,¹³ we recorded the first ten webpages that resulted for each search term on each search engine. (Table 2) Webpages that appeared in the first ten results of more than one search were evaluated only once, resulting in 27 unique webpage evaluations. (Figure 1) Separate web addresses that were part of the same website (i.e., part of the same website and connected to one another via a webpage link) were considered to be equivalent and evaluated only once. Webpages that provided only links to secondary webpages, defined as those containing a different homepage URL, were excluded from analysis. Webpages that provided both primary information and links to other webpages were evaluated solely on the primary information that they provided.

Table 1. Website Review Methodology^{11,12}

Author (select one):	
Academic	Affiliated with a university or private educational research institution
Commercial	Marketing of specific healthcare products
News	Use of Internet, newspaper, and television media logos and webpage addresses
Personal	Non-physician websites not representing an institution
Physician	Individual physician practice groups not affiliated with an academic institution, biomedical group, commercial company or news organization
Unidentified	Expired, outdated or otherwise unidentifiable
Contents (select one):	
Conventional Therapy	Standard evaluation and treatment management strategies that are outlined in current textbooks and journals
Unconventional Recommendations	Advocating experimental therapy as the sole mode of treatment and failed to mention any of the more conventional therapeutic options
Misleading Therapeutic Recommendations	Emphasized experimental therapy and did not give equal attention to, or downplayed, more conventional therapeutic methods
Unrelated	Information that does not enhance patient knowledge or understanding of the disease process
Information Source (select one):	
Conventional Reference	Cited literature that could be examined and validated
Anecdotal Reference	Presented by authors who cited their experiences or beliefs regarding diagnosis and treatment
No Referenced Source of Information	Cited data or results but did not state the source of their information
Unable to be referenced	Presented information that is not customarily referenced
Disclosure (circle all that apply):	
Copyright notice	
Disclosure of authorship	
Disclosure of author credentials	
Presence of advertising	
Website contact information	
Images/video present	
Further suggested reading identified	
Presence of HON certification	
Informational Value (Total 100 points):	
Disease Summary (3 points each) Base of thumb pain at rest Weakness Stiffness Pain with activities Adduction/web space contracture Anatomy of CMC joint Pain with CMC grind test Pain at CMC joint on physical exam Diagnosis with x-rays Eaton classification of stage	Operative Management (2 points each) Only after failed nonsurgical management Varies with disease stage and patient factors Partial or complete trapeziectomy Ligament reconstruction or suspension Fusion Implant Arthroscopy with or without interposition Postoperative immobilization Outpatient surgery Postoperative physical therapy
Nonsurgical Treatment Options (5 points each) Splinting Nonsteroidal Anti-Inflammatory Drugs Corticosteroid injection Therapy	Complications (3 points each) Continued pain Incisional scar Weakness/decreased pinch strength Post-operative numbness Wound infection
Results (5 points each) Decreased pain Improved thumb function/pinch strength Increased range of motion	
HON Assessment (Total 16 points):	
Transparency and Honesty (1 point each)	
Name of provider on site	
Physical/electronic address of person or organization responsible for site	
Transparency of purpose and objective of the site	
Target audience clearly defined	
Transparency of all sources of funding for site	
Authority	
Clear statement of sources for all information (0=none; 1=some; 2=all)	
Names and credentials of authors (0=none; 1=some; 2=all)	
Date of publication of source (1 point)	
Privacy and data protection policy and system (1 point)	
Clear and regular updating of the site with dates (1 point)	
Accountability (1 point each)	
User feedback/appropriate oversight responsibility	
Responsible partnering to links provided	
Editorial policy to describe content selection	
Accessibility, general findability, searchability, readability and usability (1 point)	

I. Content Specific Review

Websites were categorized as described by Soot et al., based on authorship, content, source, and disclosures.¹¹ (Table 1) Disclosure of authorship was defined as a webpage and/or website that identified one or more individuals who were responsible for the information provided. Author credentials were determined to be “complete” if they included post-graduate training and/or institutional affiliation, and were evaluated as partial if only the degrees were provided. Information was considered to have references only if it provided the citation of a book, peer-reviewed article, or review article regarding the topic. Reference to other websites or organizations were not considered adequate for citation of the information provided.

II. Readability

To evaluate readability of webpages, each URL was typed into an online readability calculator (http://www.onlineutility.org/english/readability_test_and_improve.jsp).¹⁴ Each website was scored for Flesch-Kincaid Grade Level and Flesch-Kincaid Reading Ease.¹⁵

III. Statistical Analysis

Reliability among observers was evaluated using the intra-class correlation coefficient [ICC(2,1)].¹⁶ Based on established criteria, ICC(2,1) values graded agreement among observers as excellent (0.8 to 1.0), good (0.6 to 0.8), moderate (0.4 to 0.6), or poor (less than 0.4).¹⁵ All outcome variables were reported as the mean ± standard deviation and compared using a Student’s t-test. Statistical significance was set at p<0.05.

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There was no external funding for this study.

RESULTS

Our search resulted in 60 webpages for analysis. Of those, 33 were either repeat webpages or were excluded due to lack of any primary information, leaving 27 unique webpages for analysis. (Figure 1) The ICC(2,1) among the four raters’ scores for all outcome measures ranged between 0.90 and 0.98, which is considered “excellent.”

Physician author classification was the most common (40.7%, n=11) classification of webpage authorship. Commercial and academic authorship were the second and third most common categories, respectively (25.9%, n=7 and 22.2%, n=6). Personal and news-oriented webpage authors were the least frequently encountered (7.4%, n=2 and 3.7%, n=1). Overall, six (22.2%) of the websites were categorized as academic, and 21 (77.8%)

Table 2. Search Results: Unique Top Ten Results for Each Search Term.

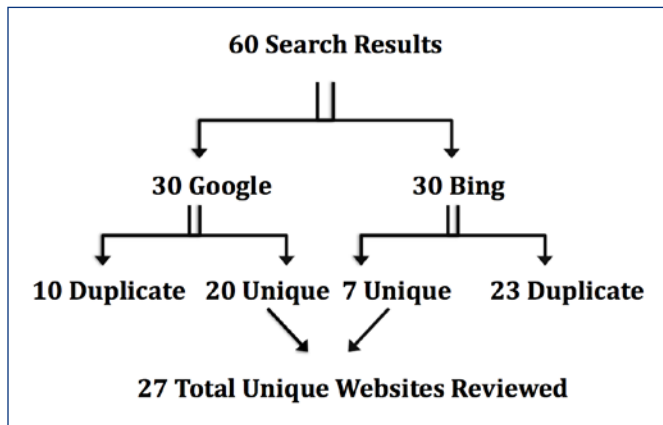
*Indicates information score >75 out of possible 100 points.

Search Engine/ Search Term	Results
GOOGLE	
CMC Arthritis	
1.	www.hsrnj.com/MedicalProblems/ThumbArthritis.asp
2.	www.wheelsonline.com/ortho/cmc_joint_cmc_arthritis
3.	www.coretherapy.com/.../articles_occupational_cmc_arthritis.html
4.	www.eatonhand.com/hw/hw003.htm
5.	https://docs.google.com/viewer?a=v&q=cache:xxTcOoaeP9oJ:www.tcomn.com/images/wmimages/providerforms/thumb%2520carpometacarpal%2520arthritis.pdf+CMC+arthritis&hl=en&gl=us&pid=bl&srcid=ADGEEsju5LG5r6aWIS2MfUPYCZ3ewlhmykbZ6T8Bxhcmx9c-Q5T9rfFIS8uaLFXf0wT55P5Ec6cic3ub0HcQq8GYkRTXiUahtVXMwix-MrInwzAihzFullzHfdkmOir7TL8cz9ILR8HX4l&sig=AHIEtbSCal4dRhb1R-ydalqVUIXm3kkYLA&safe=active&pli=1
6.	www.permanente.net/kaiser/pdf/46743.pdf
7.	www.3pointproducts.com/basal-joint-arthritis-CMC-arthritis/
8.	www.assh.org › ASSH › Information for Public & Patients
9.	www.raleighhand.com/patient.../basilar-thumb-arthritis-cmc-arthritis
10.*	www.mayoclinic.com/health/thumb-arthritis/DS00703
Basal Joint Arthritis	
11.	www.hss.edu/conditions_basal-joint-arthritis-therapy.asp
12.	orthoinfo.aaos.org/topic.cfm?topic=A00210
13.	www.deansmithmd.com/Basal_Joint_Arthritis_Thumb_Arthritis.html
14.	arthritis.about.com/od/basal/
15.	orthopedicspecialistsofseattle.com/education.../basal-joint-arthritis/
16.	www.arthritis-treatment-and-relief.com/basal-joint-arthritis.html
Thumb Arthritis	
17.	www.handsurgery.com/arthritis.html
18.	orthopedics.about.com/od/handwrist/a/thumbarthritis.htm
19.	www.scoi.com/thumba.htm
20.	www.newswise.com/articles/orthopedic-surgeons-see-an-epidemic-of-thumb-arthritis
BING	
CMC Arthritis	
21.	www.kleisertherapy.com/index.php?option=com_content&view=article&id=71
22.*	www.eorthopod.com/content/arthritis-thumb
23.	ezinearticles.com/?CMC-Arthritis---How-I-Restored-Mobility-in-My-Hands&id=5055258
Basal Joint Arthritis	
24.	www.ehow.com/way_5459121_relief-basal-joint-arthritis.html
25.	www.cedarhand.com/basaljoint.html
26.	www.livestrong.com/article/254899-basal-joint-arthritis-causes
Thumb Arthritis	
27.	http://uwmedicine.washington.edu/Patient-Care/Our-Services/Medical-Services/Hand-and-Wrist/Pages/ArticleView.aspx?subId=133

as non-academic (commercial, news-oriented, personal, and physician).

Content classification revealed that nearly all webpages made recommendations for conventional therapy (85.2%,

Figure 1. Top ten results for three search terms on Google and Bing yield 60 results, 33 of which were duplicates and 27 of which were unique.



n=23). Two webpages (7.4%) made misleading recommendations and another two (7.4%) made unrelated recommendations. We identified no (n=0) websites that made unconventional recommendations.

Information sources were predominantly absent, with two-thirds of webpages listing no references (67%, n=18). Five (18.5%) listed conventional references and four (14.8%) listed anecdotal references.

Copyright notice was present in the majority of webpages reviewed, delineating rights to original work in 81.5% (n=22). Webpage contact information was commonly available, with 70.4% (n=19) having details available either on the page reviewed or via a linked webpage within the same site. Authorship disclosure was present on 51.9% (n=14) of webpages, while disclosure of author credentials was present in 44.4% (n=12). Media was present on a number of webpages, including images and/or video in 63.0% (n=17). Advertising was present in 37.0% of webpages (n=10), and 11.1% (n=3) of webpages identified further suggested reading for viewers.

Overall informational value scores averaged 45.9 ± 18.9 points out of a possible 100. Average informational value score for academic websites was 56.8 ± 12.5 and for non-academic was 42.7 ± 19.5 (p=0.054). Mean disease summary score was 14.2 ± 6.5 out of a possible 30 points. Nonsurgical treatment options averaged 14.5 ± 5.2 , while surgical treatment options averaged 9.8 ± 5.8 out of a possible 20 points. Mean complication score was 2.1 ± 3.5 out of a possible 15 points. Mean results score was 5.3 ± 4.8 out of 15 possible points. The two websites with informational value scores above 75 were: www.mayoclinic.com/health/thumb-arthritis/DS00703 and <http://www.eorthopod.com/content/arthritis-thumb>.

A HON certification was present in three webpages (11.1%). HON ratings averaged 4.8 ± 3.1 points out of a possible 16. While three websites (arthritis.about.com, mayoclinic.com, orthopedics.about.com) had HON certification, only mayoclinic.com and wheelessonline.com approached a HON score of 16 upon our review, receiving scores of 15 and 14, respectively.

Average Flesch-Kincaid Grade Level was significantly higher among academic websites when compared to non-academic sites (12.4 ± 3.7 vs 9.9 ± 1.4 , p=0.015). Average Flesch Reading Ease was 34.6 ± 15.2 for academic websites, and 44.9 ± 9.4 for non-academic websites (p=0.050).

DISCUSSION

We found that the majority of Internet health information on CMC arthritis of the thumb is posted by physician authors and is non-academic in nature. While most webpages recommended conventional treatment options and used copyright notice, authorship disclosure and qualification were much less common.

Informational value scores were highly variable across webpages and rarely outlined all possible complications associated with treatment of this common pathology. This may, in part, be due to the predominance of physician authors who, for marketing purposes, may have chosen not to emphasize the possibility of complications on their sites. Academic sites had a higher average content score compared to non-academic sites. However, this difference was not statistically significant (p=0.054), which may be explained by the small number of academic sites in our review. These findings affirm our hypothesis that Internet health information on CMC arthritis is predominantly non-academic and of variable, generally poor quality.

The mean information score in this study was <50 out of a possible 100 points. This finding confirms the inconsistent quality of information found in previous investigations regarding the quality of Internet information on orthopaedic ailments.⁶⁻¹⁰ This study also identified two websites with information scores greater than 75: www.mayoclinic.com/health/thumb-arthritis/DS00703 and <http://www.eorthopod.com/content/arthritis-thumb>. This information may be useful for practitioners who wish to recommend a website to their patients. Caution should be used, however, due to the dynamic nature of the Internet, and websites should be reviewed periodically to ensure high quality and that the site is updated with recent information.

Public health concerns about the potential for inaccurate, misleading and erroneous health information on the Internet date back to its inception.¹⁷ Since that time, numerous studies have shown Internet information to be inconsistent, at best, with regards to reliability.^{6,7,9-11,18,19} One study demonstrated that 70% of reports on quality of Internet information identified a failure to meet individual quality criteria.²⁰ Furthermore, it remains difficult for readers to fairly assess the quality of Internet sites that provide health information.²¹

The Flesch-Kincaid readability index for the webpage studies were consistently far above the sixth grade recommended reading level for patient health information established by the National Institutes of Health.²² The results suggest that the average reader may be unable to appropriately process

information on the Internet regarding CMC arthritis.

Limitations to our study include the inherent subjectivity of any content quality review. We aimed to minimize this limitation by using four reviewers and ensuring inter-rater reliability. Additionally, the search terms utilized in our searches were arbitrarily chosen, leaving open the possibility that we did not account for all of the most commonly viewed webpages on CMC arthritis of the thumb, and the term "carpometacarpal arthritis" was not searched. Finally, our study is limited by the dynamic nature of the Internet itself, as we reviewed only the information available at one moment in time and cannot account for changes to available information over time.

We found that Internet health information on CMC arthritis of the thumb was of variable quality, primarily non-academic in nature, and rarely certified by any overseeing body for quality assurance. It is also consistently above the recommended reading level for use by the general public. Our study is consistent with previous reviews of Internet health information, suggesting that further measures should be taken to evaluate and regulate quality in order to ensure patient access and safety in utilizing this commonly used information source.

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