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The digital dilemma of Haglund deformity: assessing online information's reliability and readability-a cross-sectional study

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ABSTRACT

Aims: This study aimed to evaluate the quality, reliability, and readability of online information on Haglund deformity.

Methods: The three most popular browsers were selected, and two reviewers categorized the websites by type. The quality of each site was assessed based on its adherence to the HONcode and evaluated using scoring instruments like the DISCERN, JAMA benchmark, and GQS. The Flesch-Kincaid grade level (FKGL) score was utilized to evaluate the readability of the websites.

Results: Academic webpages exhibited markedly superior ratings in DISCERN, JAMA, GQS, and HCS compared to other subcategories ($p<0.05$). Websites with a HON code also demonstrated higher scores across most metrics, except for FKGL and FKRS. However, readability scores indicated that much of the content was above the recommended comprehension level for the general public. A strong positive correlation was observed between DISCERN and JAMA scores ($r=0.935$; $p<0.05$), while a negative correlation was noted between FKRS and HCS scores ($r=-0.723$; $p<0.05$).

Conclusion: The study highlights significant variability in the quality and accessibility of online information on Haglund deformity. While academic sources offer higher-quality information, their complexity may limit public understanding. These findings emphasize the need for accessible, high-quality online resources to enhance patient education and support informed decision-making.

Keywords: Haglund, internet, online information, search engine

INTRODUCTION

The internet serves as a prominent source of medical information.[1] The rising prevalence of self-educated individuals is establishing a novel dynamic for physicians, as patients are now more informed about their conditions than ever before. Self-educated patients may enhance patient management by improving their ability to critically evaluate treatment options and fostering realistic expectations regarding treatment outcomes.[2,3] However, the quality of data available on the Internet remains inconsistent and lacks regulation. The absence of regulation for search engines may result in websites via commercial or financial biases misleading patients.[4,5]

Haglund's deformity refers to an unusual bony enlargement located at the posterosuperior part of the calcaneus, first identified by Patrick Haglund in 1927.[6] Recurrent irritation of the retrocalcaneal bursa among the tendon of the Achilles and the calcaneal prominence may contribute to retrocalcaneal bursitis, a notable contributor to posterior heel pain.[7,8] Patients with this condition commonly report pain localised to the retrocalcaneal area.[9]

In addition to providing reliable information, websites should be easy to read for their intendedusers. The National Institutes of Health (NIH) recommends that patient education content be composed at a reading level of seventh grade or lower.[10] Previous studies have shown that a considerable percentage of health-related websites exceed the recommended readability level,suggesting that an important percentage of the patient population may struggle to understand the information presented on these sites.[11,12] The current study aimed to examine the reliability,readability, and accuracy of the data accessible on the Internet regarding Haglund's deformity. As far as we are aware, no research has been published that

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assesses the performance of internet-based resources for Haglund's deformity. This study sought to address the research gapby assessing the content, quality, and readability of online information regarding Haglund's deformity.

METHODS

As this article does not contain any studies with human participants or animals by any of the authors, no ethics committee report is required. The three most popular search engines, Google, Yahoo!, and Bing, were employed when browsing the Internet using the term 'Haglund's deformity.' Google is the leading search engine worldwide, followed by Bing and Yahoo![13] The scans were conducted on November 1, 2024, after deleting all cookies associated with the search engines before the scanning. After removing any websites that were either duplicates or had paywalls, a final count of 60 websites remained. Assigning the kinds of scanned websites was the initial step in the examination. Wesorted the websites into four categories: academic, medical, commercial, and professional physician.

Each website underwent a thorough evaluation using a comprehensive set of assessment tools designed to measure quality, readability, and credibility. The tools applied included the DISCERN instrument for evaluating reliability, the Flesch-Kincaid grade level (FKGL) to assess readability and comprehension level, and the global quality score (GQS) for overall content quality. Additionally, the JAMA benchmark was used to gauge adherence to established health information standards, and the Haglund-specific content (HSC) score provided a specialized measure tailored to Haglund-related content (Table 1). The evaluation also included verification of health on the net (HON) certification to confirm compliance withethical standards in health information dissemination.

The DISCERN tool is widely acknowledged as an effective and reliable method for assessingthe quality and trustworthiness of health information found online, helping users identify credible sources. This assessment framework comprises 16 distinct questions, each contributing one point to the final score. Websites can therefore earn up to a maximum score of 80, providing a clear measure of the quality and credibility of health content offered to the public.[14]

The JAMA benchmark criteria evaluate websites based on four primary factors: authorship, attribution, disclosure, and currency.[15] Each factor is scored with one point, for a total possiblescore of four points in this assessment. Additionally, each website's quality is rated using the GQS on a 5-point scale, which assesses the informational value and potential benefits providedto the patient.[16]

To evaluate the readability of each website, two widely recognized tools were employed: the FKGL, which estimates the educational grade level required to understand the text, and the Flesch reading ease score (FKRS), which provides a readability rating based on sentence structure and word complexity. The FKRS evaluates the understandability of a subject, with scores from 0 to 100. The FKRS score runs from 0 to 100,with a lower number signifying a more challenging reading passage. The text from each page was extracted without accompanying figures or table legends and input into an open-access readability calculator.[17,18]

Table 1. Haglund content score (HCS)

Haglund content score	Score
Retrocalcaneal bursitis	1
Achilles tendon	1
Calcaneal prominence	1
Heel pain	1
Physical therapy	1
Surgical treatment	1
Orthotic devices	1
Radiography	1
MRI	1
NSAIDs	1
Stretching exercises	1
Footwear modification	1
Ultrasound	1
Corticosteroid injection	1
Heel padding	1
Pain management	1
Bone spur removal	1
Endoscopic surgery	1
Haglund syndrome	1
Calcaneal osteotomy	1
Foot mechanics	1
Posterior heel pain	1
Inflammation	1
Conservative treatment	1
Shock wave therapy	1
Calcaneal spur	1
Custom orthotics	1
Cold therapy	1
Topical analgesics	1
Tendon repair surgery	1

We evaluated each website for adherence with the health on the net code (HON code), a benchmark created by the HON foundation to uphold the quality and integrity of online health information. Recognized as a leading standard, the HON code is instrumental in verifying thatdigital health resources meet essential criteria for credibility, transparency, and ethical presentation.[19]

In addition, we have created our own grading system that takes into account the accuracy of the material offered by the websites (Table 1). In the HCS scoring, 30 phrases or themes received one point if they were included on the webpage. The HCS evaluation was performed by the two authors of this study. Websites with varying rankings were reassessed until an agreement was achieved.

Statistical Analysis

The statistical analysis of the study was carried out using IBM SPSS Statistics 22 software (SPSS IBM, Turkey). The normality of variable distributions was checked through the Kolmogorov-Smirnov and Shapiro-Wilk tests. Descriptive statistics, including mean, standard deviation, median, and frequency, were utilized. The Kruskal-Wallis test was applied

to compare different categories, and Dunn's test identified the group causing significant differences. The Mann-Whitney U test evaluated scores based on HON specifications while correlations between scores were analyzed with Spearman's rho. The intraclass correlation coefficient (ICC) provided lower and upper bounds to assess interobserver agreement, with a significance level set at p<0.05.

RESULTS

The 60 websites were categorized according to the type of resources they offered. The distribution was as follows: 15 academic websites (25%), 12 physician websites (20%), 25 medical websites (41%), and 8 commercial websites (14%) (Figure 1). Table 2 presents the overall scores across all assessment tools, while Table 3 details each website's results for DISCERN, JAMA, GQS, FKGL, FKRS, and HCS.

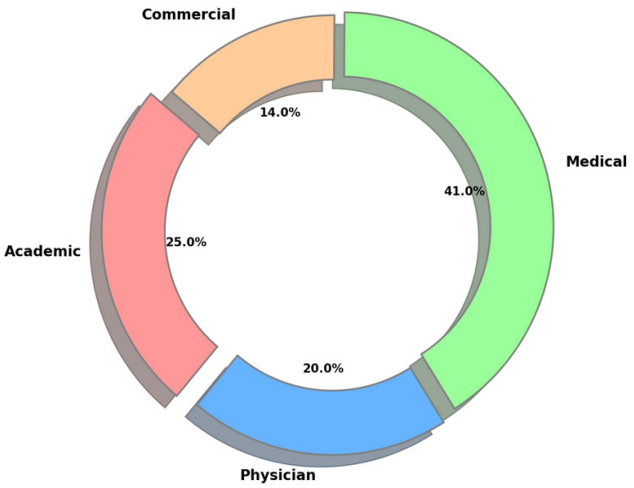

Figure 1. Website distribution based on sources

Table 2. Range, mean, and standard deviation values of the assessment tools

Tool	Range	Mean±SD
DISCERN reviewer A	18.2-63	35.15 ± 11.95
DISCERN reviewer B	18.2-63	37.05±13.05
DISCERN score	19- 63.5	36.10±12.75
JAMA reviewer A	1 - 4.5	2.05±1.01
JAMA reviewer B	1-4.5	2.30±1.12
JAMA score	1-4.5	2.15±1.07
GQS reviewer A	1-4.5	2.22±1.12
GQS reviewer B	1-5	2.40±1.20
GQS score	1-4.6	2.30±1.15
FKGL	4.0-12.5	9.35±2.15
FKRS	7.2-81.0	47.10±19.25
HCS	6-30	20.15±8.05

SD: Standart deviation, GQS: Global quality score, FKGL: Flesch-Kincaid grade level, FKRS: Flesch reading ease score, HCS: Haglund content score

The study's results revealed that academic websites achieved higher average scores across various assessment criteria compared to physician, medical, and commercial sites. Detailed analysis demonstrated that, within the academic category, scores on metrics such as DISCERN, JAMA, GQS, FKGL, and HCS were notably higher than those in physician, medical, and commercial categories (p<0.05). Conversely, academic websites had a significantly lower FKRS score compared to the other groups (p<0.05) (Table 3).

The scores on DISCERN and JAMA were found to have a noteworthy positive correlation of 0.939, which reflects the strong association that exists between the two metrics (p<0.05). There was a statistically significant positive correlation of 0.621 between DISCERN and FKGL scores and an even larger connection of 0.928 between DISCERN and HCS scores (Figure 2). Both of these correlations were statistically significant (p<0.05). However, the FKRS and HCS scoreswere found to have a statistically significant negative correlation of 0.752 (p=0.000; p<0.05) (Figure 3). The histogram (Figure 4) illustrates the variation in readability levels, with FKGL scores clustering around a mean of approximately 9, indicating a readability level above the recommended sixth-grade standard. The FKRS scores show a broader range, with values spread widely, highlighting the significant variation in content complexity across websites. This variation suggests that many sites may not be accessible for readers with lower health literacy, potentially impacting patient understanding and engagement.

Only 26.8% of the websites displayed a HON code. Notably, websites bearing the HON code had significantly different assessment scores in DISCERN, JAMA, GQS, and HCS compared to those without the code, with these differences being statistically significant (p<0.05). Nonetheless, Table 4 shows that neither group's FKGL nor FKRS scores changed significantly (p>0.05).

DISCUSSION

A quick, effective, and mostly unrecognised way to obtain medical information is the internet. Nevertheless, accessing in-depth information can be difficult. Patients frequently rely on commercial websites for guidance, often judging a site's reliability more on its visual design than on the credibility of its information source.[18]

This study's findings, derived from established assessment tools, indicate that websites commonly available to those researching Haglund deformity typically exhibit a low quality of information. The findings align with prior orthopaedic research regarding information quality.[20,21] Individuals seeking information on Haglund deformity can access a variety of sources, including online journals, anecdotal personal accounts, and commercial websites.

In the current study, the academic group outperformed the other groups on DISCERN, JAMA, GQS, FKGL, and HCS. Our results align with previous research, showing that information from academic sources was the most relevant and of the highest quality. The websites in this study yielded an average DISCERN score of 36.10±12.75, reinforcing these findings. These findings corroborate those of previous studies that showed the low quality of data accessible online.[24,25] On the contrary, some studies found no correlation between groups and quality ratings.[17] These findings show that academic research and other online materials may vary in quality and substance.

Table 3. Evaluation of scores by category and correlation analysis

Category	DISCERN score (Mean±SD)	JAMA Score (Mean±SD)	GQS Score (Mean±SD)	FKGL (Mean±SD)	FKRS (Mean±SD)	HCS (Mean±SD)
Academic	52.25±6.65	3.54±0.48	3.64±0.52	11.34±0.44	22.84±7.34	27.01±2.02
Physician	37.29±9.48	2.63±0.45	2.63±0.90	9.22±1.97	47.66±17.79	20.45±4.78
Medical	30.67±8.56	1.59±0.58	1.79±0.87	8.36±1.85	53.57±13.54	16.95±6.59
Commercial	21.76±7.43	1.09±0.26	1.35±0.35	6.45±1.04	60.70±12.47	10.56±4.82
p1	**0.000***	**0.000***	**0.000***	**0.000***	**0.000***	**0.000***
Correlation pair		**Correlation (r)**	**p-value (p2)**			
DISCERN & JAMA		0.939	0.000*			
DISCERN & GQS		0.928	0.000*			
DISCERN & FKGL		0.621	0.000*			
DISCERN & FKRS		-0.674	0.000*			
DISCERN & HCS		0.928	0.000*			
JAMA & GQS		0.965	0.000*			
FKGL & FKRS		-0.958	0.000*			
HCS & FKRS		-0.752	0.000*			

*1Kruskal-Wallis Test (p1), 2Spearman Rho Correlation Analysis (p2), p<0.05
SD: Standart deviation, GQS: Global quality score, FKGL: Flesch-Kincaid grade level, FKRS: Flesch reading ease score, HCS: Haglund content score

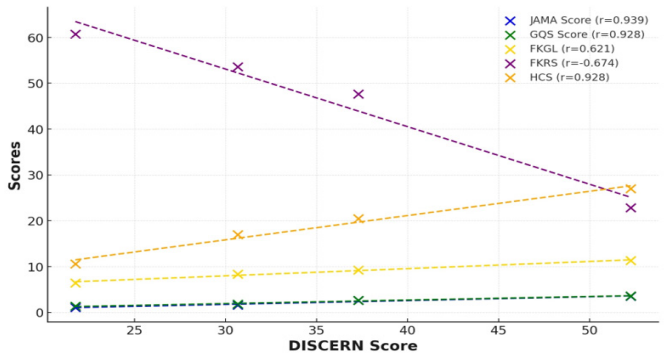

Figure 2. The correlation between DISCERN and other assessments

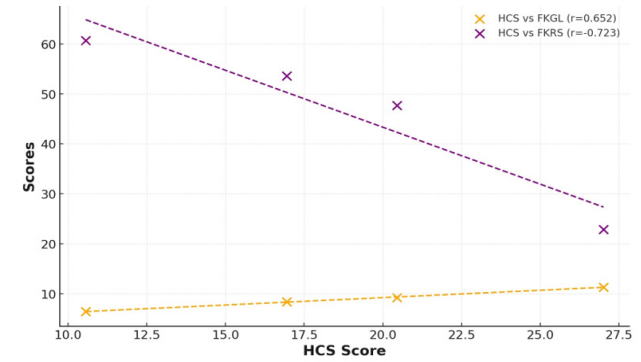

Figure 3. Correlation between TCS scores, FKGL scores, and FCRS scores
FKGL: Flesch-Kincaid grade level, FKRS: Flesch reading ease score, HCS: Haglund content score

The average JAMA benchmark result has been 2.15±1.07 on a scale of 4, comparable to findings in prior studies.[26] The low JAMA scores may be due to the absence of references or resources on most websites. The results of the current study revealed a significant positive association between the DISCERN scores and the JAMA benchmark values, with the statistical significance level reaching p<0.05. This could be because the JAMA benchmark parameter evaluation uses the DISCERN scale's two items—the publication date and the availability of references—to establish the ultimate score.

The average FKGL assessment was 9.35±2.15 and the average FCRS evaluation was 47.10±19.25, according to the present study. After comparing the FKGL score to the sixth-grade level of reading recommended by the NIH[27], the data shows that it is around 3.5 points higher. The insufficient readability and quality of online information have been extensively discussed in medical literature, particularly within the field of orthopaedics. While 38 studies were reviewed by Cassidy and Baker[28] in 2016 for readability, only 2-5% of the sites included in these studies were rated as having a reading level below sixth grade. A comparable study investigating online materials regarding ankle arthrodesis identified merely 7 out of 98 results (7.1%) as being at an appropriate reading level.[29] The FCRS score derived from this study indicates thatthe data found on the internet was "difficult to read," suggesting that

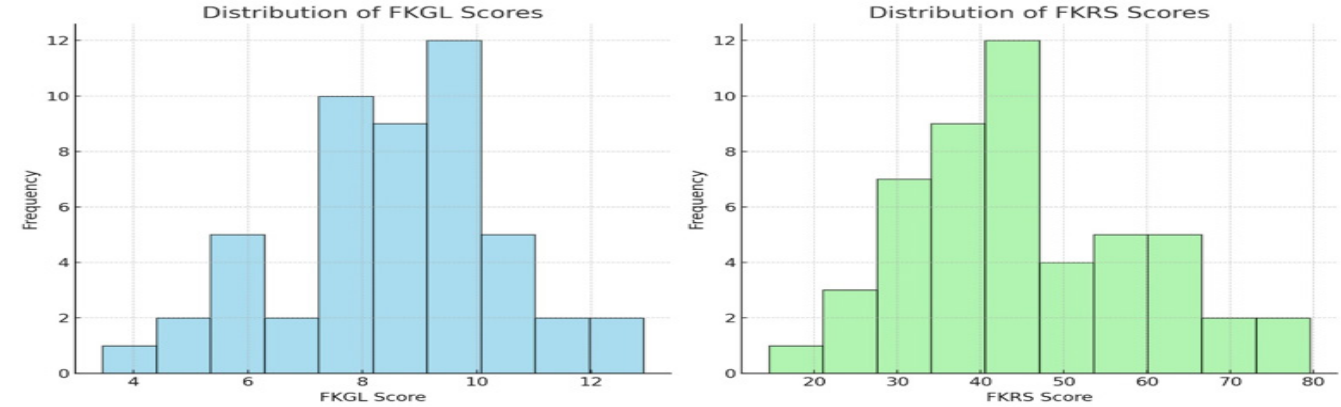

Figure 4. The distribution of readability scores (FKGL and FKRS) across the evaluated websites
FKGL: Flesch-Kincaid grade level, FKRS: Flesch reading ease score

Table 4. Evaluation of scores based on the presence of HON code

HON status	DISCERN score (Mean±SD)	JAMAscore (Mean±SD)	GQS score (Mean±SD)	FKGL (Mean±SD)	FKRS (Mean±SD)	HCS (Mean±SD)	p-value
Absent	31.50±11.50	1.80±0.90	1.95±1.05	9.15±2.20	46.80±18.50	17.50±7.50	
Present	43.50±11.00	2.65±0.85	2.90±0.95	9.05±2.05	47.90±17.50	23.00±6.20	
p-value	**0.003***	**0.011***	**0.005***	0.810	0.740	**0.019***	

HON: Health on the net, SD: Standart deviation, GQS: Global quality score, FKGL: Flesch-Kincaid grade level, FKRS: Flesch reading ease score, HCS: Haglund content score

patients require almost a high school-level English proficiency to adequately understand the knowledge available on the internet.

Consistent with the literature, the level of quality of online articles having a HON code was superior, reinforcing the notion that the content of HON code-compliant websites can be trusted to deliver higher quality information.[30-32] The content assessed concerning websites with a HON code exhibited markedly superior DISCERN, JAMA, GQS, and TCS scores compared to those lacking a HON code. On the other hand, websites with HON codes performed similarly to those without in terms of FKGL and FCRS ratings.

Limitations

This study's content score may be lacking in thoroughness because it was developed with the help of two orthopaedic doctors. The evaluation involved only two orthopedic specialists, which may limit the generalizability of the findings. Although patients may seek information through audiovisual mediums, this research did not evaluate it as it solely focused on web-based text content. Because the Internet is always evolving, search results and ranking positions are not always consistent. The study included only three search engines (Google, Yahoo!, Bing); incorporating more platforms could enhance the comprehensiveness of the analysis. Lastly, the lack of a survey assessing orthopedic specialists' knowledge about Haglund deformity leaves a gap that future research should address.

CONCLUSION

Consistent with earlier research, this study discovered that most of the informative websites did not have high-quality information, even if the number of such websites has increased. There were websites that provided better quality information, particularly academic ones, but their content was sometimes difficult to interpret. As far as we know, this is the first study specifically examining online information about Haglund deformity. This study can thus provide a valuable perspective on evaluating online resources, which may play a crucial role in supporting balanced interactions between patients and healthcare providers. Future studies should involve more orthopedic specialists and include additional search engines to broaden the scope and reliability of findings. Conducting surveys on orthopedic specialists' knowledge of Haglund deformity would also provide valuable insights to bridge gaps between clinical expertise and online information.

ETHICAL DECLARATIONS

Ethics Committee Approval

As this article does not contain any studies with human participants or animals by any of the authors, no ethics committee report is required.

Informed Consent

As this article does not contain any work with human participants or animals by any of the authors, informed consent is not required.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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