Assessment of the Quality and Readability of Web-Based Arabic Health Information on Third Molar Impaction: Infodemiological Study

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Abstract

Objective: To review and evaluate the level of information on the oral manifestations of third molar impaction that is available online, as well as its quality, readability, and content.

Methods: An online search was conducted using three different search engines and two distinct search terms about the oral manifestations of third molar impaction. The first 100 websites for each search engine and term were analyzed in duplicate. We use the available websites if there are fewer than 100 websites in each engine. Three different tools were used to assess the quality of each website. First, the DISCERN tool, second, the *Journal of the American Medical Association* (*JAMA*) website analysis standards, and third, the Health on the Net (HON) Seal. Four different measures were used to evaluate readability: the Flesch Reading Ease Score (FRES), the Flesch Kincaid Grade Level (FKGL), the Simplified Measure of Gobbledygook (SMOG), and the Coleman-Liau Index (CLI).

Results: 19 websites out of 600 remained after applying the exclusion criteria for the two keywords among three different search engines. overall DISCERN scores for all 19 websites were 2.2 ± 1.4. The HON seal was presented only on two websites. Only 5 (26.3%) out of 19 websites achieved all four *JAMA* criteria. The FRES measure revealed that only 7 out of 19 websites had a standard level of readability, while the remaining 12 had readability scores ranging from difficult to very difficult.

Conclusion: The Information about third molar impaction that is currently available online is typically of poor quality and contains little information about the related oral manifestations. The readability of the information that was available online failed to meet the standards that would enable the public to easily understand and read it. The current study's shortcomings must be addressed to create a web-based resource for the oral manifestation of third molar complications.

Keywords: Third Molar; Wisdom Tooth; Impaction; Online Information; Quality; Readability

Abbreviations

JAMA: *Journal of the American Medical Association*; HON: Health on the Net; FRES: Flesch Reading Ease Score; FKGL: Flesch Kincaid Grade Level; SMOG: Simplified Measure of Gobbledygook; CLI: Coleman-Liau Index

Introduction

Third molars, commonly known as wisdom teeth, are the last set of molars to emerge, typically appearing in late adolescence or early adulthood. Third molar complications are one of the most common complications that may results from different causes either

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developmental and/or pathological changes [1]. Problems often arise when these teeth do not have enough room to grow properly, leading to a range of dental complications including infection, impaction, dental caries, gingival and periodontal inflammation, cysts and tumor formation, and less commonly can lead to nerve damage and pathological fracture [2]. The prevalence of third molar complications such as impaction ranges from 16.7% to 68.6% with no sex or racial predominance [3]. Previous reports found that Pericoronitis was found mostly in third molar teeth with vertical and distal inclinations while caries was found mainly in mesially tipped third molars [1]. Some studies, however, have reported a higher frequency in females than males [4]. In Saudi Arabia, it has been reported that incidence of third molar impaction is about 32.3% among thousand patients with no sex predilection [5]. However, different reports estimated higher values (40.5%) as prevalence of third molar impaction in the western region of Saudi Arabia [6].

Multiple classifications are used to estimate age based on the radiographic developmental signs of third molars, with the key differences being in the number of development stages and milestones. Furthermore, several methods have been used to classify impaction, in which impaction is described based on the level of impaction, the angulations of the third molars, and the relationship to the anterior border of the ramus of the mandible [7]. The common symptoms of third molar pathology are pain, swelling, and trismus; a characteristic of this pathology is the difficulty for the patient to refer to the upper or lower teeth as innervation supply may be difficult for patients to determine the exact location or origin of related pain [2]. The implementation of clinically relevant therapeutic modalities for patients with symptomatic third molars impaction has been advocated among several reports and variety of techniques can be employed according to the clinical and radiological assessment of the cases [8].

The internet has become a primary source of health information for many individuals, particularly in areas where access to healthcare professionals may be limited. This is especially true for dental health issues like third molar (wisdom tooth) complications. However, the availability of inaccurate, poor quality, and difficult-to-read information online can augment the risk of consuming low-quality information and hamper the person-professional relationship. Therefore, online information might need to be more accurate and help patients' participation in clinical decision-making related to their healthcare needs and the risks and benefits of the treatment options being considered.

Of note, multiple research studies have been conducted on dental variety of oral health-related aspects such as implants, denture hygiene, caries control, periodontal disease and many other health-related information needs [8-15]. However, for third molar impaction, the related Arabic content has not been investigated yet hence, this research will undertake a comprehensive assessment of Arabic web-based information on third molar impaction. By critically evaluating the credibility, accuracy, and readability in relevance to the available online resources, this study will provide a foundation for enhancing the accessibility and quality of oral health-related information in the Arabic language.

Methods

Search strategy

An online search was conducted using these three different search engines: Google, Bing, and Yahoo!. The searches were carried out in August 2024 using two distinct search terms: "Third molar impaction", "Wisdom tooth impaction". The first 100 websites for each search engine and term were analyzed in duplicate. and we will use the available websites if there are fewer than 100 websites in each engine. The following exclusion criteria were applied: websites with only commercial content, forums, videos, online medical dictionaries, non-Arabic links, websites with non-working links, non-related content, and websites containing links to scientific articles or book reviews [12]. The websites identified were categorized according to affiliation (nonprofit organizations, companies, academic centers, or professional associations) and specialization (entirely or partially related to the impaction of third molar). The content type (medical findings, clinical trials, human interest, and questions and answers) was also classified. And if the authors of the included websites provided information on their professions.

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Quality assessment

Three different tools were used to assess the quality of each website. First, the DISCERN tool, second, the *Journal of the American Medical Association* (*JAMA*) website analysis standards, and third, the Health on the Net (HON) Seal. The DISCERN tool is reliable for evaluating the quality of health information that is available online [16]. It comprises 16 questions, each representing a distinct quality criterion that can be divided into three parts. The first part (questions 1-8) assesses the credibility of the publication. The second part (questions 9-15) provides detailed information about treatment options. The third part (Question 16) describes the overall quality based on the answers to parts one and two [16]. The answers to the questions were based on reviewer judgment, and two reviewers independently rated all sites. The *JAMA* benchmark is used to assess the quality of the websites [17]. It depends on four core standards to evaluate the websites: authorship (requires the authors and contributions), attribution (references for all contents and sources), disclosure (potential conflict of interest, website ownership), and currency (when the content was posted and updated). The Health On the Net (HON) is a code of ethics for medical websites. The sites that met the necessary standards were allowed to display the HON code.

Readability assessment

Readability is defined as the measure of reading comprehension required to understand a written text [18]. Four different measures were used to evaluate readability: the Flesch Reading Ease Score (FRES), the Flesch Kincaid Grade Level (FKGL), the Simplified Measure of Gobbledygook (SMOG), and the Coleman-Liau Index (CLI). Both FRES and FKGL were calculated by dividing the total number of words by sentences, which also determined the average number of syllables in each word [19]. The SMOG index calculates the number of polysyllabic words in three samples of ten sentences: 10 in the beginning, 10 in the middle, and 10 at the end of the text. The Coleman-Liau Index (CLI) was calculated using the average number of letters per 100 words and the average length of the sentences [20].

Statistical analyses

All statistical analysis was performed using Microsoft Excel Version 2023 (MS Excel 2023) and tabulated as mean ± standard deviation of the mean.

Results

Search strategy

The search strategy generated 9,981,000 websites for "Wisdom teeth impaction and 7,997,000 by searching "Third molar impaction" on the Google, Yahoo and Bing search engines. For each term, the first 100 websites from each search engine were included. Of the first 600 websites of the two search terms. Nineteen websites out of 508 remained after applying the exclusion criteria for the two keywords among three different search engines (Figure 1). 410 websites out of 600 were scientific articles, 30 websites had non-related content, and 19 websites with non-working links. 25 websites required a subscription. 9 websites with non-Arabic language. and 10 advertising website and 5 only video websites. However, only 19 websites remained for final evaluation after excluding duplicated websites. Google shows the highest content for all the search terms with fewer duplicated and nonworking links compared to Bing and Yahoo. Regarding the search terms "Wisdom teeth impaction" shows the most relevant websites to the patient with all search engines (n = 11) followed by "Third molar impaction"(n = 8). Figure 1 shows a summary of the search results.

For the websites category, first the affiliation: 5 websites (26.3%) were non-profit websites, 5 websites (26.3%) were commercial, and only 1 (5.2%) were either governmental, universities and/or hospitals. Medical facts were included on most websites. However, 3 of the
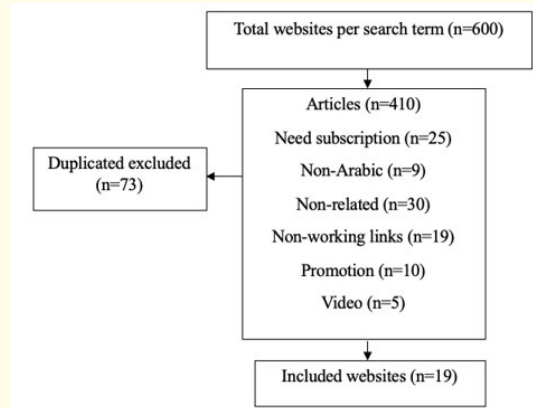
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Figure 1: Summary of the search result.

sites included clinical trials, and only 2 websites were questions and answers. Regarding the content presentation, there is one video-related content of the websites, and only 6 websites include images. A summary of website categorization is shown in table 1.

Category	Criteria	Number of websites (%)
Affiliation	Commercial	5 (26.3%)
	Non-profit organization	5 (26.3%)
	Governmental	1 (5.2%)
	University/medical Center	1 (5.2%)
Specialization	Exclusively related	0
	Partly related	19 (100%)
Content type	Medical facts	17 (89.4%)
	Clinical trials	3 (15.7%)
	Human interest stories	0
	Question and answer	2 (10.2%)
Content presentation	Image	6 (31.5%)
	Video	1 (5.2%)
	Audio	0

Table 1: Summary of the websites' categorization.

Quality assessment

The mean and standard deviation (SD) overall DISCERN scores for all 19 websites were 2.2 ± 1.4 (Table 2). Only two websites obtained a 5 overall score, but most of the websites (52.6%) obtained a 1 overall score, and 26.3% of the websites achieved a 3 score. In the reliability section, the Poorest response was related to question one ("Are the aims clear?"), and in the treatment options section, it was ("Does it provide support for shared decision-making?") 63.1% of the websites achieved 1 score in these two questions. The HON seal

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was presented only on two out of the 19 websites. Only 5 (26.3%) out of 19 websites achieved all four *JAMA* criteria, 4 (21%) websites achieved three of the *JAMA* criteria, and 8 (42.1%) websites achieved two of the *JAMA* criteria. Most of the websites (89.4%) achieved the attribution and disclosure benchmark (Figure 2).

Domain	DISCERN question	Mean (SD)
Reliability	Q1. Explicit aims	1.33 (± 0.23)
	Q2. Aims achieved	1.5 (± 0.12)
	Q3. Relevance	2.9 (± 0.43)
	Q4. Explicit sources	4.1 (± 1.6)
	Q5. Explicit date	3.38 (± 1.3)
	Q6. Balanced and unbiased	3.6 (± 1.6)
	Q7. Additional sources	1.7 (± 1.2)
	Q8. Areas of uncertainty	2.22 (± 1.17)
Treatment options	Q9. How treatment works	2.9 (± 1.03)
	Q10. Benefits of treatment	2.5 (± 0.92)
	Q11. Risk of treatment	1.3 (± 0.96)
	Q12. Effects of no treatment	1.6 (± 0.98)
	Q13. Effects on quality of life	1.7 (± 0.63)
	Q14. All alternatives described	2.8 (± 1.37)
	Q15. Shared decision	1.7 (± 0.95)
Overall rating		2.2 (± 1.4)

Table 2: *Means and standard deviation (SD) scores for DISCERN.*
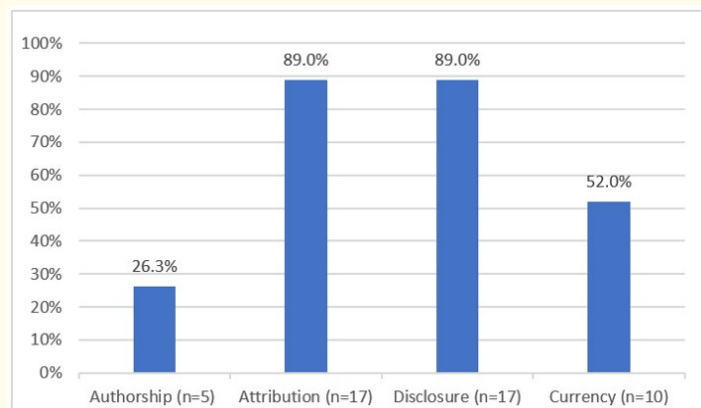
Figure 2: *The JAMA benchmarks achieved by number and percentage of the 19 websites.*

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Readability

Regarding the readability assessment, FRES showed a range of scores from 1 to 55 with a mean of 25.31 (± 12.4). FKGL ranged from 6.6 to 19 with a mean score of 11.9 (± 2.4), SMOG ranged from 4 to 15.2 with a mean score of 9 (± 2.85) and CLI ranged from 6 to 12 with a mean score of 11.2 (± 2.14). The FRES measure revealed that only seven out of 19 websites had a standard level of readability, while the remaining 12 had readability scores ranging from difficult to very difficult (Figure 3).
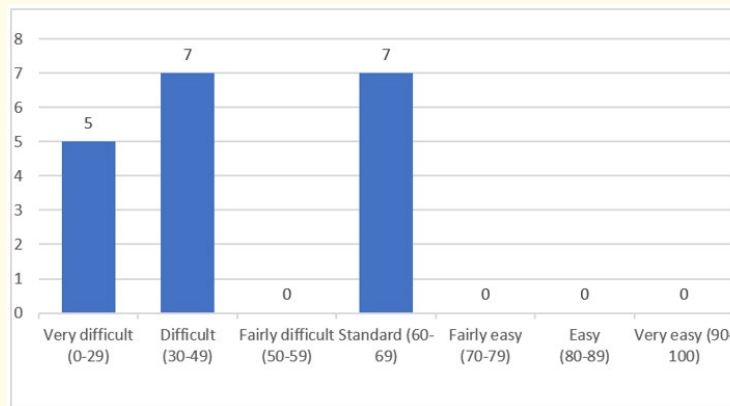

Figure 3: *The number of websites per reading easiness grade based on Flesch Reading Ease Scores.*

Discussion

As evident, patients commonly use the Internet to look for and gather health-related information. Although the reliability of online health information is often questionable, many patients continue to rely on it [21]. Studies have shown that patients consider online information about their medical condition as good or better than that provided by healthcare professionals [22]. Despite the increasing demand for online health information in Arabic-speaking regions, the quality and readability of such content remain questionable. Ensuring that Arabic-speaking patients have access to accurate, reliable, and easy-to-understand information is vital for informed decision-making regarding dental health. This assessment aims to explore the current state of web-based Arabic health information on third molar impaction, focusing on its quality and readability. The future growth of this phenomenon relies on factors such as the patient's ability to utilize the Internet effectively and comprehend the information provided by caregivers. The presentation of information, which encompasses availability, quality, and ease of use, also plays an important role. However, there is currently no data on the usefulness of the information available online about the third molar impaction for patients or parents. Therefore, this study aimed to review and evaluate the level of information of third molar impaction that is available online, as well as its quality, readability, and content.

Evaluating the quality of web-based health information typically involves several key criteria: accuracy, completeness, credibility, and reliability and these tools have been investigated widely in literature among several health-related aspects. However, assessing readability, especially in Arabic, presents unique challenges. Tools such as the Flesch Reading Ease Score and the Simple Measure of Gobbledygook (SMOG) Index are often used for English-language content but have limited applicability for Arabic due to differences in language structure and grammar [23,24]. The quality of Arabic health information on third molar impaction and its related complications varies significantly across different websites. Current results were in line with previous evidence that reported considerable level of difficulty reading related content [10,25,26]. Furthermore, professional medical websites, particularly those affiliated with dental associations or universities, tend to offer more accurate and comprehensive information. They usually cover a range of topics, including symptoms of impaction, treatment

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procedures, and potential risks associated with third molar extractions. Unfortunately, present results highlighted that considerable number of websites (26.3%) were commercial, and only 1 (5.2%) were either governmental, universities and/or hospitals.

Undoubtedly, the online information could be an invaluable resource for both patients and healthcare providers as it can be used to educate patients about treatment procedures and show guidelines from professional societies, all of which lead to better understanding and subsequent positive participation in treatment decisions. Thus, using such available information must be carefully employed and weighed against the potential negative impacts of receiving medical information without context and/or with low level of accuracy and reliability [27].

It is evident that the Internet is considered the primary resource for health information [28] hence providing high-quality medical information is very important because inaccurate information can lead to serious health consequences for the patient. Most of the available online information found to be related to medical websites, dental clinic pages, and health forums as they used to be the most common sources for such information. However, the accuracy and completeness of content on these platforms often differ. Conversely, such online sources and forums provide outdated information, often lacking in scientific references or professional authorship transparency like the HON seal [15]. These sources may omit crucial details about third molar complications, such as the differences between various impaction types (e.g. horizontal, vertical, angular) or the potential for nerve damage post-extraction [29]. Furthermore, the absence of references to reputable dental literature raises concerns about the credibility and reliability of the information provided.

Oral manifestations of third molar impaction present mostly when permanent teeth erupt [30]. The literature reports that oral manifestations could differ widely [31]. In general, patients use the web widely to search for health issues and to explore the medical aid and expected treatment outcomes [32]. A survey of Arabic health websites also reveals that many fail to properly address post-operative care and management, which are essential for patient understanding and successful recovery. This gap in quality indicates a need for more professionally curated content that meets the educational requirements of the general public and aligns with current dental health guidelines [33]. Truly, this can have a critical effect on the person's decision and related health status [34].

The quality and reliability of the assessed websites were low to moderate using the DISCERN rating and *JAMA* benchmarks, which are validated and commonly used tools to evaluate the quality of online content [35]. The websites that were analyzed had a mean DISCERN score of 2.2 (± 1.4), which indicates that the quality of the available websites was low to moderate. Only 26.3% of the websites met the full *JAMA* benchmarks. Several studies addressing various diseases related to oral health have revealed similar findings [8,27,36]. Although the HON seal concentrates on evaluating transparency and quality, it does not examine how accurate online health information is and hence its suggested to disclose the source and qualifications of the content creators rather than specifically evaluate the mentioned information. However, current results reported only two (10.5%) of the analyzed websites displayed the HON code seal. As aforementioned, present results highlighted the urgent need to enhance the quality and reliability of the available Arabic online information regarding the complications of third molar impaction; its symptoms, treatment options, and post-operative care. Such efforts should be directed to improve the quality and readability of Arabic health information on third molar complications, it is essential to involve dental professionals in content creation and ensure that all information is supported by credible sources. Websites should provide thorough, up-to-date coverage of symptoms, treatment options, and post-operative care.

Conclusion

The information regarding the third molar impaction that is currently available on the internet is frequently of low quality and offers scant details on the associated problems and viable treatments. The most current research indicates that the readability of the content that was made available online did not satisfy the requirements necessary for the general public to be able to comprehend and read it with ease. The oral signs of third molar impaction are therefore likely to be difficult for people to understand and locate reliable information about, as well as the condition's possible effects on their health. Hence current study recommends further enhancement of the related content in order to provide a more trustworthy web-based resource for the oral manifestation of third molar impaction.

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Conflicts of Interest

Funding Support

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