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Abstract

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Keywords

Credibility, Usability, Arabic Language, Accuracy, Oral Contraceptive Pills, Quality, Online Information

Quality assessment of online medical information on oral contraceptive pills in arabic language websites, a cross-sectional study[†]

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Abstract

Many people nowadays seek the health information they need online, as an alternative to professional medical consultation. The current manuscript aims to evaluate the quality of the online information on oral contraceptive pills in Arabic websites. In this cross-sectional study, the term “oral contraceptive pills” in the Arabic language was fed to popular search engines. A list of 45 websites was evaluated in terms of accuracy/completeness, credibility and usability. The analyzed data demonstrated that most websites provide incomplete information about important issues, like efficacy, safety, instruction for administration, and when to use backup methods, which might result in the delivery of misinformation and the consequent occurrence of unwanted pregnancy. In the majority of the websites, the articles were prepared by anonymous authors with unknown qualifications and expertise, and without providing any citations, which questions the reliability and correctness of the provided information. Moreover, most websites did not declare the source of their funding and the organization behind the websites, which opens the door for a possibility of a conflict of interest and the exploitation of the websites for marketing purposes. On the other hand, most websites fairly fulfilled the usability criteria, as they were designed with a clear, consistent and legible layout of information, with easy navigation and information finding. In conclusion, the majority of the websites in the Arabic language provide information on oral contraceptive pills, which is inadequate, none reliable, none credible and seriously vulnerable to inaccuracy and conflict of interest.

Keywords: Oral Contraceptive Pills, Quality, Online Information, Arabic Language, Accuracy, Credibility, Usability.

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INTRODUCTION

Over the last two decades, there was a worldwide revolutionary increase in the use of the internet in all aspects of life, especially among young adults. Health information is one of the most frequently sought topics. Data from the Second Osteopathic Survey of Health Care in America (OSTEOSURV-II), which was performed to measure the prevalence of Internet use as a mechanism for obtaining health information in the United States, showed that half of the patients are feeling comfortable using the Internet as a health information resource [1]. In Canada, the internet is used as a source for health in-

formation by more than two-thirds of people [2]. Likewise, about half of the web users in France used the Internet for health purposes [3]. Research carried out by the Oxford Internet Institute has shown 71% of the UK population have sourced health information online [4]. As the use of the internet increases, the debate about its merits and demerits continues. The advantages of internet use as a source of health information include convenient access to a massive volume of information, ease of updating information, and the potential for interactive formats that promote understanding and retention of information. However, the accuracy and quality of information on the Internet are essential especially

when related to health, as inaccurate information could be harmful [5, 6].

Contraception use is known for humans for long periods of time. In 2019, it is estimated that among 1.9 billion women of reproductive age (15-49 years) living in the world, 1.1 billion have a need for family planning, that is, they are either current users of contraceptives or have an unmet need for family planning. The most commonly used methods of contraception worldwide are female sterilization and male condoms while oral contraceptive pills (OC) are used by 16% of users [7]. These methods vary according to region. In Spain, about 10% of women aging 15-30 years were using OC in 2012 [8]. In Canada, OC are the most commonly used method of reversible contraception; three-quarters of whom take OC at some point in their lives [9]. The availability of high-quality online information about OC use is essential for several reasons. It has been shown to improve compliance with medical instructions, and avoid complications and misuse [10]. Indeed, previous literature has suggested that women may have knowledge gaps and misconceptions about contraceptives. Previous research has shown that providing women with information about combined hormonal contraceptive not only improves their knowledge and awareness of risks but also allows them to make a more informed choice [11, 12]. Studies have also reported that receiving information about contraception has encouraged women to opt for alternative methods than those they had initially considered [12, 13].

The use of contraceptives in the Arab world countries is variable. For example, in Tunisia, which has a history of an active family planning program, contraception use reaches a rate of 60%, while in resource-poor countries such as Mauritania, Sudan and Yemen, rates of contraceptive utilization are quite low [7]. Arabic website users demonstrate significant interest in general reproductive health issues, suggesting a need for the availability of Arabic-language health education resources through the Internet [14]. At the same time, there are striking concerns about the credibility, correctness, and completeness of the available online medical information, especially in the current time, in

which people have easy access to the internet and are feeling more self-confident and more independent in obtaining ready-to-use health information, which might render them vulnerable to miseducation and consequent health problems [2]. To our knowledge, no previous studies were performed to assess the quality of online information on OC in Arabic language websites. In this study, we aim to 1) assess the accuracy/completeness, credibility, and usability of Arabic online content on OC; 2) assess the correlation between these three parameters; and 3) examine the extent to which the quality of information and the correlation across the three parameters varies according to the type of information provider.

METHODS

Study design

The current cross-sectional study systematically analyzes the available medical information on the oral contraceptive drugs in Arabic websites during the period from September to November 2017.

Methods and procedures

The search for the websites was conducted by using the three most popular search engines, according to (searchenginewatch.com), Google, Yahoo and Bing. The Google settings were configured to use the Palestine domain (<https://www.google.ps/>). Likewise, the Arabic interface for Yahoo (Yahoo-Maktoob) and Bing were always used. The study imitated what an average web user would do to find online medical information on oral contraceptives. Therefore, the entered search keywords were the Arabic names for "oral contraceptive pills"; "حبوب منع الحمل، أقراص منع الحمل"

The first one hundred search results for each search trial on the three search engines were collected. The search results were pooled in one list and exclusion criteria were applied, so that we excluded the repeated websites, none Arabic websites, websites that do not provide medical information of OC, websites that required user fees or signing-in, online forums, YouTube videos and websites that provide only links to other websites or references. A total of 45 websites were re-

tained for analysis. The medical information on OC were analyzed and evaluated regarding accuracy and completeness. In addition to that, the current study also evaluated other general website features, that are indirectly important for the quality of the provided online health information, such as the authors of the texts and website funding that are important for the credibility of the provided medical information. Moreover, the study evaluated some technical items that are important for the usability of the website.

Website quality evaluation

The current investigation adopted the evaluation criteria and methodology that were implemented by a well-written work by Neumark *et al.*, 2012 [15]. Accordingly, the quality of each website was assessed based on three main parameters: accuracy/completeness, credibility, and usability.

Accuracy and completeness

This section investigated the accuracy and completeness of key information, such as efficacy (the probability of becoming pregnant despite taking the OC pills as instructed); effectiveness in the first year of use (the probability of becoming pregnant during the first year of initiating OC use); describing the dosing frequency; the reversibility of the contraceptive activity; the situations when there would be a need for using backup contraceptive methods, what to do in case of missing a pill or being late in starting a new pack; the effects of certain common health conditions (like diarrhea or vomiting) on the efficacy of OC pills, and the respective protective measures; the safety and common side effects (mood changes, nausea, vomiting, headaches, fatigue, breast pain/tenderness, weight gain); the explanation that OC pills can never protect against sexually-transmitted diseases. A 4-point scale was used to measure the achievement of the 13 criteria; inaccurate information is given a score of -1; absent information is given a score of 0; partially presented information is given a score of 1, and the complete and accurate information is scored 2. The total achieved score for each website was calculated from a total maximum score of 26 [15]

The total possible maximum score for this section was 26 (2 scores x 13 criteria), that is if a website could provide complete accurate information on each of the 13 criteria it would take a total score of 26, then the scores were transformed into marks expressed as percentages ($\left(\frac{\text{score}}{26}\right) \times 100\%$), for example, if a website achieved 13 scores, then it would get a mark of $\left(\frac{13}{26}\right) \times 100\% = 50\%$.

CREDIBILITY

The health on the net foundation has developed a code (HONcode) that aims to establish standards for the conduct of the websites, in order to provide a measure for the reliability of the online health information. HONcode consists of eight principles concerning the (I) authorship (identity, qualifications and expertise of the author), (II) complementarity of the provided information in the webpage with that provided by the existing healthcare provider, (III) patient privacy protection, (IV) attribution (references to the included health information), (V) justifiability (provide evidence for any claim regarding the use of specific treatment or commercial products), (VI) transparency (provide clear contact information that could be used by visitors who seek further information or support), (VII) financial disclosure (revealing the identity of the funding parties, whether commercial or non-commercial), (VIII) advertising policy (the reader can easily differentiate between the promotion-independent information and the promotional material, in addition to the potential relationship between the funding parties and the provided content) [15, 16].

Based on the above mentioned eight principles, a set of 14 criteria was developed. Each criterion was evaluated on a 3-point scale; an absent criterion was given 1 point; a partially addressed criterion was given 2 points, and a fully addressed criterion received 3 points, and computed on a composite. For each website, the obtained points were calculated and divided by the total possible points, 42, and then converted into a percentage scale. For example, if a website

collected 30 points, then it would get a mark of $\left(\frac{30}{42}\right) \times 100\% = 71.4\%$.

USABILITY

Minervation Health Consultancy company developed the LIDA validation instrument for healthcare websites. The instrument consists of a section that evaluates the usability of the websites that might affect the time-effectiveness of a search for specific medical information, in other words, how easy it would be for an average health information seeker to find what he/she is looking for [17]. The University of Michigan also provided a website evaluation checklist that also consists of a section for website usability evaluation [18]. Based on the LIDA validation instrument and Michigan website evaluation checklist, a set of 11 criteria was developed. Each item was assessed on a 3-point scale the same way as described for the credibility parameter above [15].

Websites Classification

The websites were classified into three categories; promotional and commercial websites (PCW) for product or service marketing; health portals (HP) which are specialized for providing health information; and lifestyle and women's websites (LSWW) that are specialized for providing information on women's health and well-being [15].

Statistical analysis

For all of the evaluated websites and for each website category, the mean scores,

standard deviations (SD), ranges, and percentages were calculated. In addition, Pearson correlation coefficients of the three evaluated parameters were estimated for all website categories. Statistical analyses were performed using SPSS 16.0.

Results

Accuracy/completeness

As shown in table1, in general, around 32% of the evaluated websites did not provide any information on the key items listed under the parameter of accuracy/completeness. 46% of the websites provided partial information, 21.7% provided complete accurate information and less than 1% of the websites provided inaccurate information. Accurate and complete information on the efficacy and effectiveness of OC was provided by 22.2% of the websites. Only 20% provided complete and accurate information on safety, while 71.1% provided incomplete information. In addition, 73.3% of the websites provided partial information on the reversibility of OC. Interestingly, the information that OC do not protect against STIs was absent in 73.3% of the websites. Moreover, complete accurate information on the instruction of OC use and when to take a missed pill was provided by only 20% and 22.2% of the websites respectively. Surprisingly, less than 20% of the websites provided information on the different common conditions where backup contraception methods are required.

Table (1): The frequency and percentage of websites that met accuracy/completeness criteria.

Criteria	Inaccurate information (%)	Information not presented (%)	Information partially presented (%)	Information accurate & complete (%)
Information on OC efficacy	0	7(15.6)	28(62.2)	10(22.2)
Information on OC effectiveness	1(2.2)	5(11.1)	29(64.4)	10(22.2)
Information on OC safety	1(2.2)	3(6.7)	32(71.1)	9(20)
Information on Reversibility of OC	0	9(20)	33(73.3)	3(6.7)
Indication to use OC daily	0	11(24.4)	17(37.8)	17(37.8)
Indication that OC do not protective against STIs	0	33(73.3)	0	12(26.7)

	Criteria	Inaccurate information (%)	Information not presented (%)	Information partially presented (%)	Information accurate & complete (%)
	Side effects described	0	6(13.3)	16(35.6)	23(51.1)
	Instructs to take a pill daily until the pack is finished; when to re-start use 0	0	14(31.1)	22(48.9)	9(20)
	When to take a missed pill	0	16(35.6)	19(42.2)	10(22.2)
10	Back-up method recommended during initial OC use	0	17(37.8)	24(53.3)	4(8.9)
11	Back-up method recommended if missing a pill	0	15(33.3)	21(46.7)	9(20)
12	Back-up method recommended if late starting a new pack	0	22(48.9)	20(44.4)	3(6.7)
13	Back up method recommended in case of diarrhea or severe vomiting	0	29(64.4)	8(17.8)	8(17.8)

Credibility

Based on the data presented in table 2, the authorship of the medical information texts in the evaluated websites was disclosed in 28.9%. However, around 80% of them did not provide any information on the expertise and qualification of the authors. In addition, 75.6% of the websites did not mention whether the information reflects the author's own opinions. Moreover, most websites (73.3%) did not point out that the provided information does not replace health profes-

sional advice. Also, 73.3% of the websites provided incomplete information about the organization behind it. Interestingly, as many as 86.7% of the websites declared information about the implemented privacy policy, and 75.6% of them provided complete information on the date of content creation or modification. Disappointedly, the majority of the websites (88.9%) did not provide any citation for the stated information, and most of them (64.4%) did not declare the source of funding.

Table (2): The frequency and percentage of websites that met credibility criteria.

#	Credibility criteria	Criteria absent (%)	Criteria partially addressed (%)	Criteria fully addressed (%)
1	Authorship disclosed	28(62.2)	4(8.9)	13(28.9)
2	Authorship expertise on the subject	35(77.8)	2(4.4)	8(17.8)
3	Authorship qualifications stated	36(80)	1(2.2)	8(17.8)
4	OHI reflects the author's opinion only	34(75.6)	9(20)	2(4.4)
5	OHI does not replace health professional advice	33(73.3)	11(24.4)	1(2.2)
6	Website purpose and intended audience stated	6(13.3)	29(64.4)	10(22.2)
7	Information about the organization behind the website presented	7(15.6)	33(73.3)	5(11.1)
8	Privacy policy declared	4(8.9)	2(4.4)	39(86.7)
9	Date of creation and last modification	10 (22.2)	1(2.2)	34(75.6)
10	Sources of health content cited	40(88.9)	3(6.7)	2(4.4)

#	Credibility criteria	Criteria absent (%)	Criteria partially addressed (%)	Criteria fully addressed (%)
11	OHI describes/refers to scientific evidence	19(42.2)	22(48.9)	4(8.9)
12	Several alternatives/treatments described	20(44.4)	23(51.1)	2(4.4)
13	Webmaster contact information	0	18(40)	27(60)
14	Available sources of funding declared	29(64.4)	10(2.2)	6(13.3)

Usability

As shown in table 3, around 26.7% of the websites used a clear and legible layout of the information and provided audience-appropriate content. 37.8% of the websites provided easily identified links and buttons, of which 53.3% indicated where they lead. In addition, the searched information was easily found in 33% of the websites. The majority

of the websites (88.9%) provided an easy way to return to the homepage, and 24.4% of them provided a consistent function of navigational links, while in 55.6% of them the user could easily determine the current location in the website. Around half of the websites were built with consistent structure and design.

Table (3): The frequency and percentage of websites that met usability criteria.

#	Usability criteria	Criterion not fulfilled (%)	Criterion partially fulfilled (%)	Criterion fully fulfilled (%)
1	A Clear and legible layout of information	2(4.4)	31(68.9)	12(26.7)
2	Audience appropriate content	1(2.2)	32(71.1)	12(26.7)
3	Easy to identify links and buttons	3(6.7)	25(55.6)	17(37.8)
4	Links and buttons indicate where they lead	0	21(46.7)	24(53.3)
5	Navigation clear and well structured	1(2.2)	26(57.8)	18(40)
6	Easy to find needed information	2(4.4)	28(62.2)	15(33.3)
7	Consistent function of navigational links	5(11.1)	29(64.4)	11(24.4)
8	Easy to return to homepage	0	5 (11.1)	40(88.9)
9	Easy to determine the current location in the site	1(2.2)	19(42.2)	25(55.6)
10	Consistent site structure (categories or organization of pages)	1(2.2)	21(46.7)	23(51.1)
11	Consistent website design	1(2.2)	20(44.4)	24(53.3)

Correlation of website quality parameters and website categories

According to criteria 6, 7 and 14 of the credibility parameter, 22.2% of the websites were LSWW, 35.6% were PCW and 42.2% were HP. Figure-1 demonstrates the average score for each website category in each of the three main evaluation parameters. The highest achieved score for all of the website categories was "usability" (about 80%). The average achieved scores for the "accuracy and completeness" parameter was between 34-

48% with the lowest score achieved by the LSWW, while the credibility scores were between 49-55%.

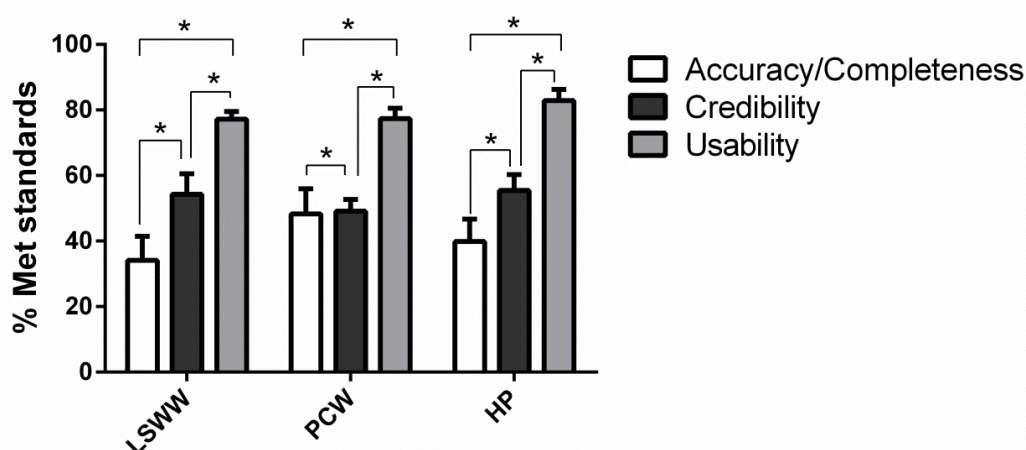


Figure (1): Correlation of website categories with the achieved quality criteria. The data demonstrate that accuracy and completeness was the least achieved criterion. Abbreviation definitions, lifestyle and women's websites (LSWW), promotional and commercial websites (PCW), health portals (HP). $n = 10-19$, the data is presented as mean \pm SEM, * $p < 0.05$.

DISCUSSION

The widespread use of internet nowadays, the easy internet access and the availability of a huge number of websites in many languages might have encouraged many people all over the world to search for the information they need by themselves, including information related to drugs and disease treatment. Although this can improve the awareness and knowledge of the patients about their health conditions and the drugs they use, which can improve patient's compliance [19, 20], this can, on the other hand, carry some potential risks including learning inaccurate or misleading information, but there are limited available data on the negative outcomes resulting from such activities [21, 22]. Therefore, many researchers are now focusing on studying the quality of online health information in different languages in order to define and characterize the challenges, limitations and risks. Such studies can be helpful for the low-makers and the regulatory authorities set legislations and take measures that can force the website owners to improve the quality of their websites and the validity/credibility of the provided information. In addition, these studies can provide guidelines for the online-health information authors, and deliver a message for the average website readers that they should discuss

what they read on the websites with their specialized health care providers.

The greatest concern about the data collected on the accuracy and completeness of the online data about OC was that the majority of the criteria were partially provided or absent in the online texts, which can give a wrong impression for the reader that all the required information are provided, and therefore reduce the motivation to refer to a specialized health care provider, which carry the risk for unwanted pregnancy with the respective social, ethical, legal and religious consequences. For example, the need for the use of contraception backup methods during the initial use of OC, when missing some pills, when late to start a new pack, or when the woman is suffering a health condition, such as diarrhea and vomiting. In addition, most of the websites provided incomplete information on the efficacy and effectiveness of OC, therefore, many readers will not be well-informed about the possibility of getting pregnant. Surprisingly, in the majority of the websites, the articles were authored either by anonymous authors or authors with unknown expertise and qualifications, which is associated with a greater risk of delivering wrong information. In addition, most of the websites do not state that the information they provide does not replace a health professional advice, which might give a high level of confidence

in the information by the readers that they might not feel it necessary to verify or discuss the information with professional health care providers like physicians and pharmacists. Moreover, most of the websites provided incomplete information about the purpose of the website, the organization behind it and the funding sources, therefore a reader cannot speculate the motivation and intention behind the information, and whether it is formulated for marketing purposes or contain some conflict of interests. However, the majority of the websites clearly declared their privacy policy, which can comfort the patients and gain the reader's trust. Strikingly, the majority of the websites did not provide any citation or scientific references for their claims, which raises serious concerns about the credibility of the information.

The usability criteria were the most fulfilled among the other investigated parameters. The layout of the majority of the websites was acceptably clear and legible with consistent design and structure, and the content was written by a language that is understandable by the average audience, and in a way that the needed information can be generally easy to find. In addition, most of the websites were well-structured and provided navigational links and buttons for easy navigation forward and backward was easy.

A limitation of this study was that the evaluation of certain parameters on the websites was dependent on the investigator's own evaluation skills. However, the collected data was verified by two investigators separately so that the impact of this limitation on the results of the study would be minimized as much as possible. Moreover, we fed popular spoken Arabic keywords in the search engines that an average internet user is likely to use, but this cannot exclude the possibility that some users might feed other higher-order keywords. However, as the search engines normally search phrases, single words and closely related words, we think that this limitation might not significantly affect the outcome of this study.

CONCLUSION

In conclusion, the data demonstrated that the majority of the Arabic websites that provided medical information on the oral contra-

ceptive pills lack enough accuracy and credibility, and therefore comprise a serious risk for misinforming the online health information seeker, and might carry potential negative subsequent health, social, legal and religious consequences.

The legislative authorities in the Arab countries should undertake responsibility and pass laws that control the quality of the online medical contents and obligate the website owners to be legitimately responsible for their published medical content. Moreover, the health organizations and associations should undertake the responsibility to provide the public with open-access credible online Arabic medical content that is comprehensive, well structured, user-friendly, and that fulfills the website's quality criteria. Also, there is a need to improve public awareness about the significance and danger of the non-credible online medical information, and to educate them about the importance to discuss the online medical information with their professional healthcare providers before they act according to it.

COMPETING INTERESTS

The authors declare that they have no competing interests

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Appendix:

Table 4: list of the evaluated websites with the URL of each one

Website Number	Website's URL
1	https://rqueeqa.com/pregnancy/contraceptive-pills.html
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17	<p>https://www.altibbi.com/%D9%85%D8%B5%D8%B7%D9%84%D8%AD%D8%A7%D8%AA-%D8%B7%D8%A8%D9%8A%D8%A9/%D8%A7%D9%84%D8%AD%D9%85%D9%84-%D9%88%D8%A7%D9%84%D9%88%D9%84%D8%A7%D8%AF%D8%A9/%D8%AD%D8%A8%D9%88%D8%A8-%D9%85%D9%86%D8%B9-%D8%A7%D9%84%D8%AD%D9%85%D9%84</p>
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26	<p>http://vb.elmstba.com</p>
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32	<p>http://www.ibtesamah https://www.altibbi.com/%D9%85%D8%B5%D8%B7%D9%84%D8%AD%D8%A7%D8%AA-%D8%B7%D8%A8%D9%8A%D8%A9/%D8%A7%D9%84%D8%AD%D9%85%D9%84-%D9%88%D8%A7%D9%84%D9%88%D9%84%D8%A7%D8%AF%D8%A9/%D8</p>

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33	https://www.altibbi.com/%D9%85%D8%B5%D8%B7%D9%84%D8%AD%D8%A7%D8%AA-%D8%B7%D8%A8%D9%8A%D8%A9/%D8%A7%D9%84%D8%AD%D9%85%D9%84-%D9%88%D8%A7%D9%84%D9%88%D9%84%D8%A7%D8%AF%D8%A9/%D8%AD%D8%A8%D9%88%D8%A8-%D9%85%D9%86%D8%B9-%D8%A7%D9%84%D8%AD%D9%85%D9%84
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43	http://www.infomed-me.com/node/94729
44	http://www.se7ety.com/ar/Articles/ArticleDetails.aspx?ID=627 http://www.se7ety.com/ar/Articles/ArticleDetails.aspx?ID=627
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