THE QUALITY OF ONLINE MEDICAL INFORMATION REGARDING HYPERTENSION

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Abstract: *The aim of this paper is to evaluate the completeness, accuracy and credibility of the medical information found online about hypertension and to compare the quality of the Romanian and English websites. This observational, cross-sectional study included 25 Romanian and 25 English websites. Pre-established inclusion and exclusion criteria were used for sample selection. Credibility was assessed using 12 criteria based on the eEurope 2002 expert recommendations. Completeness and accuracy of information were evaluated using a quality standard based on information from literature and guidelines. The credibility, completeness and accuracy scores were rated on a scale from 0 to 10. Student t test and Mann-Whitney U were used to compare the two languages subsamples. Spearman and Pearson's tests were applied to test the correlations. The threshold for statistical significance was set at 0.05. The average credibility score was 4.7 for the Romanian websites and 5.6 for English websites (p=0.0686). The average completeness score was 3.7 for the Romanian websites and 5.3 for English websites (p=0.0007). The average accuracy score was 3.88 for the Romanian websites and 3.62 for English websites (p=0.5215). Significant moderate intensity correlation was found between the Google rank and the accuracy of the Romanian websites (r=-0.5438, p=0.0050). The overall quality scores of the Romanian and English websites presenting information about hypertension were modest. This study found a correlation between the Google rank and the accuracy score of the Romanian websites but since this was the only significant correlation, the findings are not sufficient to infer general recommendations. The study suggests that knowing both Romanian and English doesn't offer a significant advantage in accessing high-quality online information about hypertension. The Google rank cannot be used as a quality indicator since there is no consistent correlation between it and the quality scores.*

Key words: *hypertension, Google, online information, accuracy, completeness, credibility*

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1. Introduction

Hypertension is the most widespread cardiovascular pathology, being responsible for millions of deaths annually due to complications and comorbidities. At the same time, in recent years, technology has made great leaps and, thanks to more and more increased availability, ease of access and global spread, the Internet has become the main (and most easily accessible) source of information for all fields, including for the medical one. This aspect required and continues to require the presence of some regulations/ quality criteria regarding various information on the Internet which the general user has access to, especially within sensitive topics such as diseases and treatments. Taking into considerations the information previously mentioned, this paper considers imperative a study intended to highlight the main benefits, disadvantages and risks to which the general population is exposed at the time of accessing the information available on the Internet about hypertension.

Hypertension represents a serious health issue. It can be considered both a disease and a risk factor for other pathologies (stroke, cardiac insufficiency, renal insufficiency, etc.) [1]. Hypertension, poorly treated, is a cause of premature deaths worldwide [2]. In 2015, the global prevalence of hypertension was 1.13 billion (in a total population of 7.3 billion) – being the most common cardiovascular disease [3]. Hypertension values and grade (last updated in 2018) are presented in Table 1 [3].

Classification of blood pressure   Table 1

Category/ Grade	Systolic blood pressure (mmHg)		Diastolic blood pressure (mmHg)
Optimal BP	<120	and	<80
Normal BP	120-129	and/or	80-84
High Normal BP	130-139	and/or	85-89
Hypertension Grade 1	140-159	and/or	90-99
Hypertension Grade 2	160-179	and/or	100-109
Hypertension Grade 3	≥ 180	and/or	≥110
Isolated Systolic Hypertension	≥140	and/or	<90

Hypertension is predominantly asymptomatic but may be detected through simple screening [3]. Chronic hypertension often affects the brain, the heart, the kidney and other organs and can lead to severe complications namely hypertension-mediated organ damage (stroke, cardiac insufficiency, renal insufficiency, haemorrhages, etc.) and hypertensive crisis [1].

Prevention plays a key role in hypertension evolution; unarguably the leading role in hypertension prevention consists in lifestyle changes (salt consumption reduction, limitation in alcohol intake, limitation in smoking, stress control, avoiding sedentarism, etc.) [1,3]. The aim of the treatment is to prevent the complications mentioned aforehand and consist in lifestyle changes and pharmacological treatment [4]. The last one includes angiotensin-converting-

enzyme inhibitors, angiotensin II antagonists, Ca-blockers, diuretics, beta blockers, and others.

2. Material and Methods

The present study is part of a larger investigation into the quality of online information comprising different pathologies and followed the same methodology with previously published papers [6-14]. This paper is an observational, cross-sectional study, which included 50 websites (25 in Romanian, 25 in English) obtained by searching the Internet. The "advanced Google search" function was first used to obtain only Romanian websites and then only English websites. The keywords used were "hipertensiune" for the Romanian search (17.05.2021) and "high blood pressure" for the English search (19.07.2021). Criteria for exclusion were as follows: websites that discuss the searched topic in less than 300 words, sponsored links, websites that contained exclusively audio or video data, unavailable websites at the time of the search, websites subject to registration or payment of a fee and news websites with short (intentionally incomplete) information. Data analysed included general characteristics (website's specialty, website's owner, purpose, type, medical paradigm), compliance with the eEurope 2002 credibility criteria (owner's name and mailing address, purpose or mission of the site, disclaimer that medical information presented on the websites does not substitute medical consultation, the method of financing the site, financial interest, regulation regarding privacy, owner's contact information, material's author and credential, bibliographic references, publication date, update date, the procedure by which quality is ensured, periodic update of the presented material), comprehensiveness (how complete is the information presented) and accuracy (how correct is the information presented). The medical information quality rating scale consisted of 30 items extracted from the Guide of the European Society of Cardiology, International Society of Hypertension Global Guidelines, Mic Tratat de Cardiologie [4], SEPHAR Study [5] and Lippincot Pharmacology Illustrated (5th edition, 2013). Two specialists in the cardiology field reviewed the extracted information. Statistical analysis included descriptive statistics (calculation of absolute and relative frequency of sites), calculation of credibility score, calculation of absolute, median and singular comprehensiveness and accuracy score, and calculation of relative scores from raw scores. Student t-test and Mann-Whitney U were used to compare the two language subsamples. Spearman and Pearson's tests were applied to test the correlations. The threshold for statistical significance was set at 0.05.

3. Results and Discussion

Romanian and English websites distribution by specialty showed that 80% of the analysed sites had a multiple specialty and 20% had a singular specialty discussed. 40% of the analysed Romanian website owners were private providers of medical services. The main purpose of the Romanian websites (84%) was commercial. 72% of the Romanian websites were company presentation sites. Medical paradigm distribution for the Romanian websites showed that 80% of sites discussed conventional medicine, 8%

discussed alternative medicine and 12% had a mixed paradigm. None of the Romanian websites were HON accredited. 60% of the English websites owners were an association or foundation. 92% of the English websites had an educational purpose. The majority of the English websites (64%) were a medical portal. Medical paradigm of the English websites was 48% conventional medicine, 48% mixed paradigm and in 4% of cases could not be identified. 64% of the English websites were HON accredited. The compliance of the Romanian and English websites with the eEurope 2002 credibility criteria is presented in *Figure 1*.
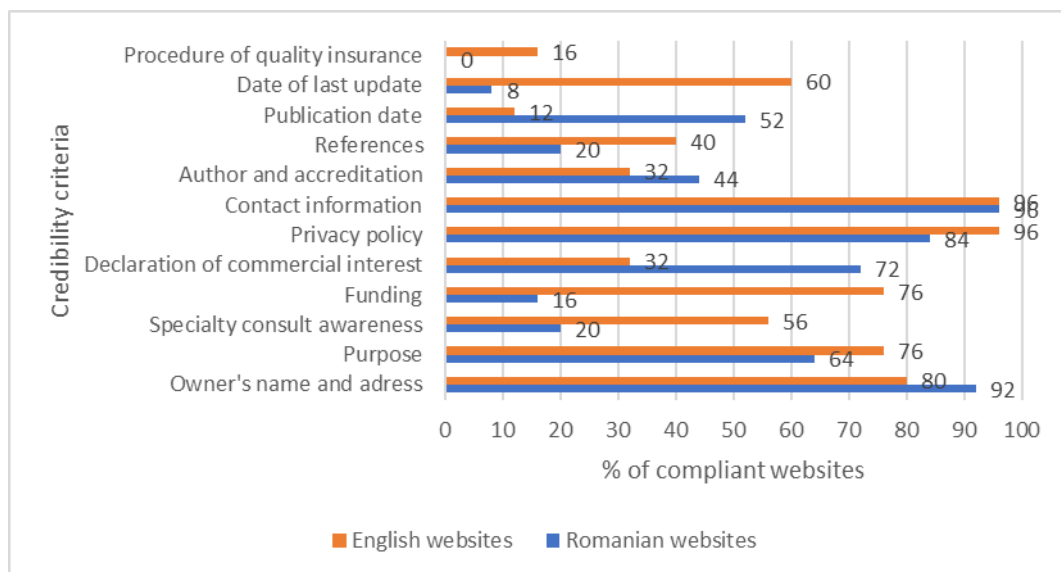

Fig. 1*. The compliance of the Romanian and English websites with the eEurope 2002 credibility criteria*

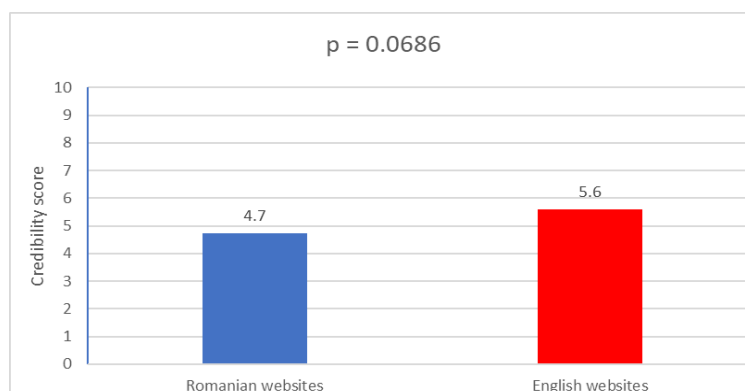Comparative values of the average credibility scores of Romanian and English websites are presented in *Figure 2*.

Fig. 2 *Comparative values of the average credibility scores of Romanian and English websites*

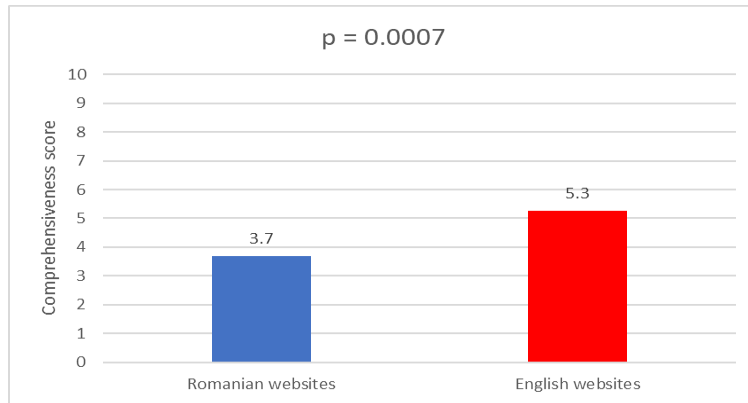Comparative values of the average completeness scores of Romanian and English websites are presented in *Figure 3*.

Fig. 3 *Comparative values of the average completeness scores of Romanian and English websites*

Comparative values of the average accuracy scores of Romanian and English websites are showed in *Figure 4*.
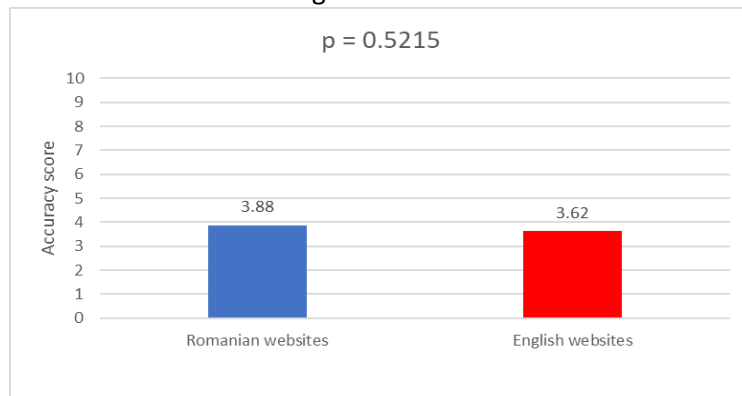

Fig. 4 *Comparative values of the average accuracy scores of Romanian and English websites*

Table 2 shows the results of the correlation tests between credibility, google rank, completeness and accuracy.

Correlation between Google rank and accuracy scores of the Romanian websites is illustrated in *Figure 5*.
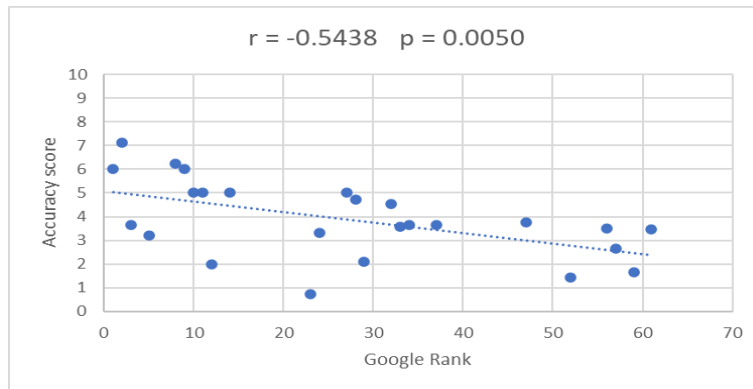
Fig. 5 *Correlation between Google rank and accuracy scores of the Romanian websites*

Correlations tests between credibility, Google rank, completeness and accuracy Table 2

Romanian websites			English websites	
Correlation	*R value*	*P value*	*R value*	*P value*
Credibility – Completeness	-0.1713	0.4129	0.06379	0.7620
Credibility - Accuracy	0.05769	0.7842	0.1169	0.5778
Google Rank – Completeness	0.09654	0.6462	-0.0195	0.9265
Google Rank - Accuracy	-0.5438	0.0050	-0.3812	0.061

Overall, the credibility scores were modest, meaning that websites contained half of the required criteria. Also, the credibility criteria were half fulfilled. Most of the websites presented contact information and privacy policies but lacked quality insurance procedures (none of the Romanian websites) and references. Completeness scores were also modest, meaning that websites contained half of the information they should have contained. Even though the English websites had significantly higher completeness scores compared to the Romanian websites (5.3 vs 3.7, p=0.0007), they were still in the middle zone of the scale; such an average completeness score suggests that users find only about half of the information considered useful and necessary regarding high blood pressure. Accuracy scores were low, meaning that the topics discussed on websites presented less than half of the required information.

The comparison between the average value of the credibility, completeness and accuracy scores of the Romanian and English websites highlights only one statistically significant difference (completeness, in favor of English websites) but, this cannot be used as a general recommendation since the average completeness value was modest (5.3). In fact, only a few English websites had a high completeness score (healthline.com, medicalnewstoday.com, nhsinform.scot, onhealth.com). The English website with the highest accuracy value was en.wikipedia.org (6.1). Concerning Romanian websites, the only one that stood out for completeness was servier.ro (7.3) and for accuracy medicina-interventionala.ro (7.1).

The correlation tests between credibility

scores and completeness/ accuracy scores did not show any statistically significant results therefore the credibility score was not a relevant criterion in highlighting comprehensible information about high blood pressure for the general population. The correlation tests between the Google rank and the completeness/ accuracy scores did not show any statistically significant results therefore the Google rank was not a relevant indicator of the completeness or accuracy of websites that discussed high blood pressure. The negative value of the correlations confirmed the expected tendency, websites with lower Google rank value (the first on the results page) had better scores but only one correlation was statistically significant. The correlation test between the Google rank and the accuracy scores of the Romanian websites showed a moderate negative correlation, statistically significant (r=-0.5438, p=0.0050), meaning that the lower the Google rank, the more accurate the information. Taking into consideration that the correlation test between the Google rank and the accuracy scores of the English websites showed a reduced negative correlation, statistically not significant (r=-0.3812, p=0.0601) remains the need for user education and the recommendation to ask for specialists' advice when using the Internet for medical documentation.

3.1. Limitations

When reviewing this paper, the following limitation must be taken into consideration: the usage of only one search engine (Google), the usage of only one keyword ("hipertensiune", "high blood pressure"), the Google rank (which can shuffle everyday), the fact that only Romanian and English websites were reviewed, the relative reduced number of analyzed websites and the subjectivity of the reviewers.

4. Conclusions

The overall quality scores of the Romanian and English websites presenting information about hypertension were modest.

The completeness score of the English websites was above the score of the Romanian websites, but the accuracy score was slightly higher for the Romanian websites.

Being proficient in both Romanian and English doesn't provide a noteworthy benefit when it comes to accessing high-quality information about hypertension online. The credibility score does not seem to be a relevant indicator of completeness and accuracy on websites that discuss hypertension.

No significant correlations were found between quality scores and Google Rank. The only exception is the correlation between the Google rank and the accuracy score of Romanian websites, where there is a statistically significant negative, moderate correlation. Since there is no consistent correlation between the Google Rank and the quality scores, this cannot be used as a quality indicator.

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