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Online Depiction of Urticaria Is Often Flawed and Does Not Reflect the Spectrum of Clinical Manifestation

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Urticaria · Online media · Google · Shutterstock · Angioedema · Photographs

Abstract
Introduction: The internet is a popular source of health information including images of disease manifestations. Online photographs of skin lesions may aid patients in identifying their disease, if these pictures are of good quality and of the disease they claim to show. If not, patients may be at risk of delayed diagnosis, misdiagnosis, and suboptimal treatment. For urticaria, the mismatch rate and quality of online pictures are unknown. The objective of this study was therefore to evaluate the content and quality of online images of urticaria. ***Methods:*** The search term "urticaria" was applied to Google Images and Shutterstock. The top 100 photographs from each search engine were retrieved on October 9th, 2022. Illustrations, drawings, and heavily edited photographs were excluded. Each image was evaluated for patient characteristics, characteristics of urticarial lesions, and image quality. ***Results:*** Across 194 unique images of urticaria (after removing duplicates), 35 (18.0%) did not depict urticarial lesions, and 38 (19.6%) were ambiguous. Less than two-thirds of images 121 (62.4%) showed bona fide urticarial lesions. Pictures of urticarial lesions under-represented children and did not reflect female preponderance of the disease. Images predominantly depicted urticaria lesions on Caucasian skin (59.8%) and were typical of spontaneous rather than inducible urticaria. Only 3 (1.5%) pictures showed angioedema, a common clinical sign in patients with urticaria. The overall quality of online urticaria pictures was mostly good or very good. ***Conclusion:*** Physicians and patients should be aware that one in five online pictures of urticaria does not show urticarial skin lesions, and children, females, non-Caucasian patients, inducible urticaria, and angioedema are under-represented. These findings should prompt efforts to improve the accuracy and representativeness of online urticaria pictures.

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Introduction

Urticaria is a common skin condition characterized by the presence of itchy wheals/hives and/or angioedema [1, 2]. The lifetime prevalence of urticaria is estimated to be 20% for acute urticaria (duration ≤6 weeks) and 1–4.4% for chronic urticaria (CU, duration >6 weeks) [1, 3]. Given its high prevalence, it is reasonable to expect that a vast amount of information on urticaria is available on the internet. Indeed, a Google search for urticaria, hives, wheals, itch, and angioedema in February 2023 yielded 70 million (M), 593M, 6M, 1.5 billion, and 25M results, respectively.

In recent years, it has become increasingly popular to seek out health information online [4]. This is particularly true for patients with CU. A recent study found that more than 75% of patients with CU use the internet to obtain information about their disease [5]. Online health information is conveniently free and easy to access, thus making the internet, rather than a physician, the first source of information for most patients [6]. For visual specialties like dermatology, online photographic images may aid patients in self-identifying their condition and assist diagnosing by non-specialized health care professionals.

This is very applicable for urticaria, given that it is a clinical diagnosis with characteristic manifestations of the skin. Urticarial wheals present as superficial swelling of the skin with a pale or erythematosus appearance surrounded by reflex erythema. Acute and chronic spontaneous urticaria come with wheals of various shapes and sizes and are often round or ring-shaped. In contrast, the shape of wheals in chronic inducible urticaria (CIndU) is driven by trigger exposure of the skin, with linear wheals in symptomatic dermographism, for example. Wheals in cholinergic urticaria are often small (1–3 mm) and pinpoint shaped [7]. Angioedema is characterized by a pronounced swelling of the deeper layers of the skin or mucous membranes.

Although the internet can be a valuable source of information, patients and physicians should be aware that it is also a platform of health-related misinformation [8–10]. It is, therefore, important to critically appraise online information on urticaria as misconception may lead to delayed diagnosis, suboptimal treatment, reduced compliance, and discord between physicians and patients [11].

To our knowledge, the online depiction of urticaria has not previously been investigated. The aim of this study was, therefore, to evaluate the content and quality of online images of urticaria.

Materials and Methods

Search Strategies

We applied the search term "urticaria" to two popular search engines for photographs, Shutterstock (https://www.shutterstock.com) and Google Images (http://www.images.google.com). Shutterstock is a leading provider of stock photos for companies, media, and marketing agencies. Google is the most popular search engine worldwide.

The top 100 photographs on both search engines were retrieved on October 9th, 2022. Illustrations, drawings, and heavily edited photographs were excluded. The search was done using an incognito web browser with all cookies cleared to avoid personalized search hits and an US American virtual private network to allow for a more global search.

Data Collection and Analysis

Retrieved photographs were screened independently by two medical doctors from the urticaria outpatient clinic at a university hospital, Urticaria Center of Reference and Excellence (UACRE) [12]. After removal of duplicates, 194 unique photographs were evaluated for (1) patient characteristics, (2) characteristics of urticarial lesions, and (3) image quality. Presence of wheals and angioedema was evaluated according to international guidelines [1]. Any disagreements were handled through discussion until consensus was achieved. A scientific ethics approval was not necessary for this study as all data were publicly available. Frequency analysis for each variable was done in IBM SPSS Statistics version 25.

Results

One in five pictures of urticaria on the internet does not show wheals or angioedema, the hallmark skin lesions of urticaria. Across all 194 urticaria photographs, 35 (18.0%) did not depict urticarial lesions, i.e., wheals and/or angioedema. Of these, 6 pictures showed a scratching hand motion on normal skin, and 29 pictures showed skin lesions typical for other dermatological conditions including eczema, herpes, and morbilliform skin eruptions.

One in five photographs (19.6%) displayed skin lesions that were likely wheals but indeterminable based on the photographs alone, i.e., without real-life examination of the skin or a history for confirmation. Only slightly more than half of all photographs (62.4%) showed unequivocal urticarial skin lesions.

Of the photographs that displayed likely and unequivocal urticarial skin lesions, urticarial wheals were most often depicted on the extremities (54.1%) with an erythematous appearance (78.6%) and visible superficial swelling (73.0%) of the skin. Wheals that are typical, in shape, for CSU were more common as compared to

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Table 1. Overview of urticarial lesions of photographs retrieved from Shutterstock and Google Images

Variable	Total (n = 194)	Shutterstock (n = 99)	Google Images (n = 95)
Picture shows urticaria lesion, *n* (%)			
Yes/unequivocal	121 (62.4)	61 (61.6)	60 (63.2)
Maybe/likely	38 (19.6)	15 (15.2)	23 (24.2)
No	35 (18.0)	23 (23.2)	12 (12.6)
Location[a], *n* (%)			
Unknown	65 (40.9)	8 (10.5)	57 (68.7)
Known	94 (59.1)	68 (89.5)	26 (31.3)
Extremities	86 (54.1)	48 (63.2)	38 (45.8)
Front trunk	25 (15.7)	9 (11.8)	16 (19.3)
Back trunk	56 (35.2)	32 (42.1)	24 (28.9)
Genitals/buttocks	0 (0.0)	0 (0.0)	0 (0.0)
Face			
Eyes	3 (1.9)	1 (1.3)	2 (2.4)
Lips	1 (0.6)	0 (0.0)	1 (1.2)
Tongue	0 (0.0)	0 (0.0)	0 (0.0)
Forehead	2 (1.3)	2 (2.6)	0 (0.0)
Cheeks	5 (3.1)	4 (5.3)	1 (1.2)
Chin	4 (2.5)	4 (5.3)	0 (0.0)
Wheals[a], *n* (%)			
Not shown	2 (1.0)	1 (1.0)	1 (1.1)
Shown	155 (97.5)	74 (97.4)	81 (97.6)
Pale wheals	60 (37.7)	25 (32.9)	35 (42.2)
Erythematous wheals	125 (78.6)	60 (78.9)	65 (78.3)
Superficial swelling	116 (73.0)	59 (77.6)	57 (68.7)
Number of wheals[a], *n* (%)			
0	3 (1.9)	2 (2.6)	1 (1.2)
<20	49 (30.8)	22 (28.9)	27 (32.5)
20–50	53 (33.3)	28 (36.8)	25 (30.1)
>50	54 (34.0)	24 (31.6)	30 (36.1)
Wheals typical for spontaneous urticaria[a], *n* (%)	128 (80.5)	65 (85.5)	63 (75.9)
Wheals atypical for spontaneous urticaria[a], *n* (%)	41 (25.8)	18 (23.7)	23 (27.7)
Annular	13 (8.2)	4 (5.3)	9 (10.8)
Linear	14 (8.8)	9 (11.8)	5 (6.0)
Diffuse	6 (3.8)	1 (1.3)	5 (6.0)
Papular	8 (5.0)	4 (5.3)	4 (4.8)
Confined to contact	0 (0.0)	0 (0.0)	0 (0.0)
Other	2 (1.3)	2 (2.6)	0 (0.0)
Angioedema[a], *n* (%)	3 (1.9)	0 (0.0)	3 (3.6)
Itch, *n* (%)			
Scratch marks	21 (10.8)	13 (13.1)	8 (8.4)
Scratching hand	34 (17.5)	28 (28.3)	6 (6.3)

[a]Only pictures with unequivocal or likely urticarial lesions depicted.

wheals indicative of CIndU (80.5% vs. 25.8%, respectively; some pictures showed both). As for the number of wheals visible in photographs, around a third displayed less than 20 wheals (30.8%), between 20 and 50 wheals (33.3%), and more than 50 wheals (34.0%). Only 3 (1.5%) of 194 analyzed urticaria pictures showed angioedema (Table 1).

Most Photographs Are of Skin Lesions of Adult, Female, and Caucasian Patients

Of all photographs, more than half (59.8%) showed skin lesions of Caucasian patients, whereas less than 10% were of Asian, Hispanic/Latino, or African/American patients. One-third of photographs (30.4%) did not allow for the identification of the ethnicity of patients. Of the photographs that

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Table 2. Overview of patient characteristics of photographs of urticaria retrieved from Shutterstock and Google Images

Variable	Total (*n* = 194)	Shutterstock (*n* = 99)	Google Images (*n* = 95)
Gender, *n* (%)			
Female	41 (21.1)	26 (25.7)	15 (15.8)
Male	35 (18.0)	20 (20.2)	15 (15.8)
Unknown	119 (61.3)	53 (52.5)	66 (69.5)
Age, *n* (%)			
Child/adolescent	20 (10.3)	12 (12.1)	8 (8.4)
Adult	86 (44.3)	54 (54.5)	32 (33.7)
Unknown	88 (45.4)	33 (33.3)	55 (57.9)
Ethnicity, *n* (%)			
Caucasian	116 (59.8)	54 (54.5)	63 (66.3)
Asian	7 (3.6)	7 (7.1)	0 (0.0)
Hispanic/Latino	11 (5.7)	4 (4.0)	7 (7.4)
African/American	2 (1.0)	0 (0.0)	2 (2.1)
Other/unknown	59 (30.4)	34 (34.3)	25 (26.3)

allowed conclusions on the gender of patients (39%) and on whether they were adults or not (54.6%), 41 were of females (53.4%) and 86 were of adults (81.1%; Table 2; Fig. 1).

Most Photographs of Urticarial Skin Lesions on the Internet Are of Good Quality

The overall quality of photographs of urticaria analyzed was good (45.9%) or very good (26.8%). Of all photographs of urticaria analyzed, 75.8% were in focus, and none were blurred. The resolution was good in 71.6% of photographs, with a marked difference between Shutterstock and Google Images (100% vs. 42.1%). Lighting was most often average (47.9%) or good (44.8%). Photographs retrieved from Shutterstock were generally of better quality compared to Google Images (Table 3).

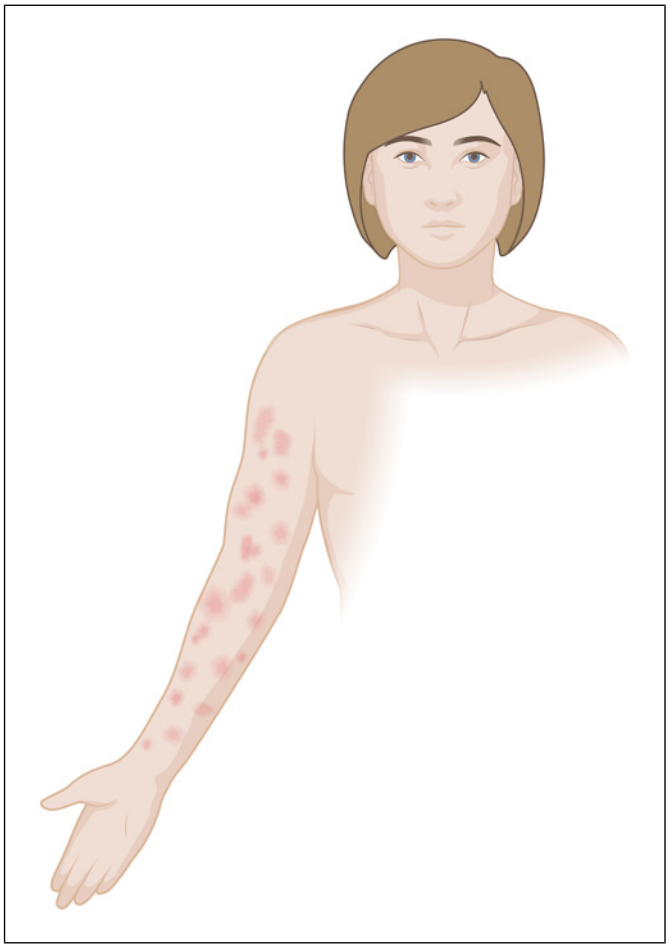

Fig. 1. Stereotypical online depiction of urticaria.

Discussion

The most important finding of this study is that the online depiction of urticaria is not comprehensive and often incorrect, thus misinforming viewers and inviting misconception. A noteworthy proportion of photographs did not display urticarial lesions, making online depiction of urticaria inaccurate and misleading. This is consistent with previous research, which has shown that the majority of health information online is suboptimal and that misinformation is prevalent [9, 10]. This stresses the importance of creating awareness around possible health misinformation online and promoting trustworthy sources, such as

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Table 3. Reviewer assessment of quality of photographs retrieved from Shutterstock and Google Images

Variable	Total (*n* = 194)	Shutterstock (*n* = 99)	Google Images (*n* = 95)
Lesion is in focus, *n* (%)			
Disagree	3 (1.5)	2 (2.0)	1 (1.1)
Neither agree/disagree	44 (22.7)	25 (25.3)	19 (20)
Agree	147 (75.8)	72 (72.7)	75 (78.9)
Blurry picture, *n* (%)			
Disagree	171 (88.1)	96 (97.0)	75 (78.9)
Neither agree/disagree	23 (11.9)	3 (3.0)	20 (21.1)
Agree	0 (0.0)	0 (0.0)	0 (0.0)
Resolution, *n* (%)			
Bad	22 (11.3)	0 (0.0)	22 (23.2)
Average	33 (17.0)	0 (0.0)	33 (34.7)
Good	139 (71.6)	99 (100)	40 (42.1)
Lighting, *n* (%)			
Bad	14 (7.2)	3 (3.0)	11 (11.6)
Average	93 (47.9)	42 (42.4)	51 (53.7)
Good	87 (44.8)	54 (54.4)	33 (34.7)
Overall quality of photo, *n* (%)			
Very poor	3 (1.5)	0 (0.0)	3 (3.2)
Poor	20 (10.3)	0 (0.0)	20 (21.1)
Neither good nor poor	30 (15.5)	7 (7.1)	23 (24.2)
Good	89 (45.9)	54 (54.5)	35 (36.8)
Very good	52 (26.8)	38 (38.4)	14 (14.7)

UCARE platforms dedicated to educating patients and physicians (https://ucare-4u.com/en/home-en/; https://ga2len-ucare.com/levelup-educational-program/).

Furthermore, angioedema and non-typical wheals were sparsely represented online. Among patients with CU, almost 1 in five patients exhibit CIndU [13], and around 40–60% of patients experience angioedema [14]. The presence of CIndU and angioedema in CU has been associated with more severe disease and higher impairment of quality of life. It is, therefore, important to identify these less frequent manifestations of urticaria.

Patients with urticaria are stereotypically depicted online as Caucasian adult women with typical configurations of wheals. This is consistent with typical demographic features of patients with CSU, although photographs did not reflect female preponderance of the disease. It is, however, not a comprehensive representation of patients with urticaria as AU is more common than CU and more prevalent among children, where gender distribution is equal [3, 15]. The lack of representation of urticaria in patients with darker skin is also inadequate, as several studies have found higher prevalence of urticaria in non-Caucasian patients [3, 15, 16]. Erythema is a key symptom of urticaria but may not always be visible in darker skin types. This highlights a general issue of underrepresentation of diverse ethnicities in the medical field. In dermatology, people of darker skin color may be subject to suboptimal treatment and misdiagnosis due to limited physician training and exposure to diverse skin types [17–19].

Online photographs of urticaria are generally of good but suboptimal quality. Photographs retrieved from Google Images were more likely to be of poor quality and unsuitable for diagnostic purposes. Physicians and patients should be aware that, despite the convenience and popularity of using Google, it may be more beneficial to obtain photographic images of skin lesions from other search engines and websites.

Strengths and Limitations

This is, to our knowledge, this first systematic study of online photographic content on urticaria. Its strengths include that each photograph was independently evaluated by two trained UCARE physicians with experience in assessing urticarial skin lesions. The limitations of our study include its cross-sectional design as internet content is regularly updated. There is also a risk of regional differences, although we tried to account for this by using a virtual private network. Other lay terms for urticaria such as "hives" or "wheals" could also have been relevant to include in our search. We cannot rule out that some pictures represented mimickers of urticarial lesions due to the lack of history and physical examination.

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It would be relevant to evaluate the written content of health information related to urticaria on Google and investigate the depiction of urticaria on other visual platforms online such as Instagram and YouTube. Future studies should also investigate how exposure to online misinformation may affect health-related behavior among patients with urticaria.

Due to the widespread trend of using the internet for obtaining health information, it is important for physicians to be aware of the content patients are exposed to. Accurate and reliable information may be beneficial for the physician-patient relationship and enhance patient engagement in managing their disease, whereas misinformation can potentially be harmful [11, 20]. Future directions should focus on promoting reliable sources and improving the representation of urticaria in children, in people of color, angioedema, and non-typical configurations of wheals. This could help improve diagnostic accuracy and patient outcomes.

Conclusions

Physicians and patients should be aware that the depiction of urticaria on the internet is incomprehensive and that 1 in 5 photographs that claim to depict urticarial lesions do not. This underlines the importance of critically evaluating online information, the need for accurate representation, and promotion of more trustworthy sources.

Key Message

The depiction of urticaria on the internet is incomprehensive and flawed.

Statement of Ethics

A scientific ethics approval was not necessary for this study as all data were publicly available.

Conflict of Interest Statement

The authors have nothing to declare.

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Author Contributions

D.G.Z.: conceptualization, methodology, formal analysis, investigation, visualization, and writing – original draft, J.A.S.: investigation, validation, and writing – review and editing. N.H.P.: investigation and writing – review and editing Z.A.: methodology and writing – review and editing. E.K. and M.M.: writing – review and editing. S.F.T.: conceptualization, methodology, writing – review and editing, and supervision.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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