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Abstract

Background: Rosacea is an inflammatory skin disease that is chronic in nature. In addition to the physical symptoms, there are substantial quality of life issues that patients with rosacea experience, largely due to the visible nature in which rosacea manifests.

Objective: The purpose of this study was to describe the content related to rosacea in highly viewed English- and Spanish-language videos on YouTube.

Methods: We coded identifying information for each video and categories including characteristics of rosacea, clinical solutions, and alternative solutions. The 100 YouTube videos examined were viewed 18.5 million times between 2006 and 2020, and 57.3% (10,652,665/18,592,742) of these views were of consumer videos.

Results: Videos posted by consumers more often promoted or were trying to sell a product or procedure (32/55, 58% of consumers vs 10/31, 32% of medical professionals and 4/14, 29% of television, internet, news, or entertainment sources; P=.03) and more frequently mentioned the use of makeup or other ways to cover up rosacea (30/55, 55% of consumers vs 6/31, 19% of medical professionals and 2/14, 14% of television, internet, news, or entertainment sources; P<.001). Videos sourced from medical professionals more often mentioned medication (17/31, 55%) than videos uploaded by consumers (14/55, 25%) or TV, internet, news, or entertainment sources (3/14, 21%) (P=.01).

Conclusions: Given that rosacea is experienced differently for each person, consumer advice that works for one individual may not work for another. There is a need for reliable videos on rosacea to emphasize this and clarify misconceptions.

KEYWORDS
rosacea; YouTube; social media; skin disease; skin; chronic; dermatology

Introduction

Rosacea is an inflammatory skin disease that is chronic in nature [1]. The cause of rosacea is unknown and the pathophysiology is inadequately comprehended [1]. Current statistics indicate that this is a prevalent problem, with an estimated 416 million adults affected [2] worldwide and an estimated 16 million individuals with rosacea in the United States [3]. Recent research has led to improved understanding of the common triggers and symptomology of this widely experienced issue. Triggers of rosacea include genetic and environmental factors [1], and patients are often encouraged to monitor environmental triggers closely to avoid the onset of symptoms.

The most commonly identifiable symptom of rosacea includes redness or flushing in the face, but the range of symptoms can be variable and are broken down into subtypes. The American Academy of Dermatology has identified 4 subtypes: (1) subtype 1, which is characterized by visible redness, flushing, and blood
vessels; (2) subtype 2, in which acne-like breakouts are common; (3) subtype 3, which is rare and involves thickening skin that can result in rhinophyma, a thickened and bulbous nose; and (4) subtype 4, which affects the eyes with issues ranging from burning and stinging to the development of cysts [4]. It is possible to experience more than one subtype at a time. Naturally, because subtypes are varied and may overlap, treatments are dependent upon related symptoms and patient experiences [5]. These treatments include but are not limited to topical therapies [6-9], antibiotics [10], laser and pulsed light therapies [11-15], and reconstructive surgery [16,17].

In addition to the physical symptoms, there are substantial quality of life issues that patients with rosacea experience, largely due to the visible nature in which rosacea manifests [4]. Much has been written and researched about the medical aspects of rosacea, such as causes, prognosis, and treatment, but the psychological impact of the condition is infrequently discussed and of great importance to those with this condition. With limited ability to control triggers and the lack of a cure, patients are challenged with a lifelong chronic condition that alters their facial appearance, which often impacts their self-esteem and quality of life, especially when the rosacea is severe [18-21].

Current research suggests that 90% of Americans use the internet [22], and many consumers search the web for information related to their health. YouTube is a highly popular medium for sharing information through videos, with an estimated 2 billion unique users [23]. Studies of YouTube are prevalent on a variety of health issues and issues concerning the skin specifically [24-27]. The purpose of this study was to describe the content related to rosacea in highly viewed English- and Spanish-language videos on YouTube.

**Methods**

The 100 videos with the most views on YouTube were identified using the keyword “rosacea” on May 31, 2020, and were recorded and coded. Videos in English and Spanish were included in the study. Six videos were not reviewed, as they were in a language other than English or Spanish, and they were replaced with the next 6 videos in English or Spanish.

Metadata were identified for each video, including the URL, source of video upload (consumer, medical professional, television- or internet-based news, or entertainment television), number of views, length of video in minutes and seconds, date of upload, language in which the video was recorded, and whether the video featured a medical doctor. A fact sheet from the American Academy of Dermatology was used to create coding categories for content [4]. Categories included characteristics of rosacea, clinical solutions, and alternative solutions.

Characteristics of rosacea included a general description of the condition, triggers and flare-ups of rosacea, the fact that rosacea is more common among women, and the impact of rosacea on the quality of life, such as feelings of frustration, embarrassment, worry, low self-esteem, anxiety, and depression. Mentions by subtype were noted. Specific details of the symptom subtype are noted below. Clinical solutions included mentions of surgery for thickened skin, laser treatment, medication, measures to protect against the sun, a potential cure, and the promotion of products or procedures. Skin care tips and mentions of makeup to cover the skin were included in the alternative solutions category. Responses were coded as “yes” or “no” for whether the video mentioned each of the above characteristics or solutions.

Frequencies and percentages of all categorical variables were calculated, and means, standard deviations, and ranges were determined for the number of views and video length. Video source was recoded as consumer, medical professional, or combined television-based news and entertainment television. Chi-square tests and analysis of variance were used to assess possible associations between video source and the characteristics and content of the videos. Authors EJS and CJ each coded half the videos and then coded a random 10% subset to ascertain interrater reliability. Using Cohen κ (κ=0.92), interrater reliability was shown to be excellent. Because human subjects were not involved in this study, this protocol was not reviewed by an institutional review board, per the policies at William Paterson University and Columbia University.

**Results**

The 100 YouTube videos examined were viewed 18.5 million times between 2006 and 2020, and 57.3% (10,652,665/18,592,742) of these views were of consumer videos (Table 1).
Table 1. Characteristics of YouTube videos (N=100) about rosacea by video upload source.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total (N=100)</th>
<th>Consumer (n=55)</th>
<th>Medical professional (n=31)</th>
<th>Televisions- or internet-based news and entertainment television (n=14)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Video characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Views, n (%)</td>
<td>18,592,742 (100)</td>
<td>10,652,665 (57.3)</td>
<td>5,527,057 (29.2)</td>
<td>2,513,020 (13.5)</td>
<td>N/A&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Views, mean (SD)</td>
<td>185,927 (205,020)</td>
<td>193,685 (205,962)</td>
<td>175,066 (210,611)</td>
<td>179,501 (202,362)</td>
<td>.45</td>
</tr>
<tr>
<td>Views, range</td>
<td>33,076-1,407,672</td>
<td>40,254-1,407,672</td>
<td>42,443-1,003,575</td>
<td>33,076-782,574</td>
<td>N/A</td>
</tr>
<tr>
<td>Video length (min), mean (SD)</td>
<td>10.53 (8.92)</td>
<td>11.45 (8.60)</td>
<td>9.20 (7.53)</td>
<td>9.93 (12.60)</td>
<td>.42</td>
</tr>
<tr>
<td>Video length (min), range</td>
<td>0.82-46.17</td>
<td>0.83-46.17</td>
<td>0.82-25.93</td>
<td>1.60-43.32</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Video upload date, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td>2006-2010</td>
<td>6 (6.0)</td>
<td>3 (5.5)</td>
<td>2 (6.5)</td>
<td>1 (7.1)</td>
<td></td>
</tr>
<tr>
<td>2011-2015</td>
<td>35 (35.0)</td>
<td>16 (29.1)</td>
<td>10 (32.3)</td>
<td>9 (64.3)</td>
<td></td>
</tr>
<tr>
<td>2016-2020</td>
<td>59 (59.0)</td>
<td>26 (47.3)</td>
<td>19 (61.3)</td>
<td>4 (28.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Language of video, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.03</td>
</tr>
<tr>
<td>English</td>
<td>78 (78.0)</td>
<td>40 (72.7)</td>
<td>29 (93.5)</td>
<td>9 (64.3)</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>22 (22.0)</td>
<td>15 (27.3)</td>
<td>2 (6.5)</td>
<td>5 (35.7)</td>
<td></td>
</tr>
<tr>
<td>Features a medical professional, n (%)</td>
<td>33 (33.0)</td>
<td>1 (1.8)</td>
<td>27 (87.1)</td>
<td>5 (35.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Characteristics of rosacea, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included general description of rosacea</td>
<td>65 (65.0)</td>
<td>31 (56.4)</td>
<td>22 (71.0)</td>
<td>12 (85.7)</td>
<td>.09</td>
</tr>
<tr>
<td>Mentions triggers and flare-ups</td>
<td>52 (52.0)</td>
<td>23 (41.8)</td>
<td>19 (61.3)</td>
<td>10 (71.4)</td>
<td>.07</td>
</tr>
<tr>
<td>Mentions rosacea is more common in women</td>
<td>9 (9.0)</td>
<td>5 (9.1)</td>
<td>1 (3.2)</td>
<td>3 (21.4)</td>
<td>.14</td>
</tr>
<tr>
<td>Mentions impact on quality of life</td>
<td>30 (30.0)</td>
<td>19 (34.5)</td>
<td>7 (22.6)</td>
<td>4 (28.6)</td>
<td>.51</td>
</tr>
<tr>
<td>Mentions subtype 1 signs and symptoms&lt;sup&gt;b&lt;/sup&gt;</td>
<td>65 (65.0)</td>
<td>31 (56.4)</td>
<td>22 (71.0)</td>
<td>12 (85.7)</td>
<td>.09</td>
</tr>
<tr>
<td>Mentions subtype 2 signs and symptoms&lt;sup&gt;c&lt;/sup&gt;</td>
<td>65 (65.0)</td>
<td>30 (54.5)</td>
<td>23 (74.2)</td>
<td>12 (85.7)</td>
<td>.04</td>
</tr>
<tr>
<td>Mentions subtype 3 signs and symptoms&lt;sup&gt;d&lt;/sup&gt;</td>
<td>33 (33.0)</td>
<td>12 (21.8)</td>
<td>14 (45.2)</td>
<td>7 (50.0)</td>
<td>.03</td>
</tr>
<tr>
<td>Mentions subtype 4 signs and symptoms&lt;sup&gt;e&lt;/sup&gt;</td>
<td>14 (14.0)</td>
<td>6 (10.9)</td>
<td>3 (9.7)</td>
<td>5 (35.7)</td>
<td>.04</td>
</tr>
<tr>
<td><strong>Clinical solutions, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentions surgery for thickened skin</td>
<td>3 (3.0)</td>
<td>1 (1.8)</td>
<td>0 (0.0)</td>
<td>2 (14.3)</td>
<td>.03</td>
</tr>
<tr>
<td>Mentions laser treatment</td>
<td>22 (22.0)</td>
<td>8 (14.5)</td>
<td>11 (35.5)</td>
<td>3 (21.4)</td>
<td>.08</td>
</tr>
<tr>
<td>Mentions medication</td>
<td>34 (34.0)</td>
<td>14 (25.5)</td>
<td>17 (54.8)</td>
<td>3 (21.4)</td>
<td>.01</td>
</tr>
<tr>
<td>Mentions sun protection</td>
<td>40 (40.0)</td>
<td>17 (30.9)</td>
<td>18 (58.1)</td>
<td>5 (35.7)</td>
<td>.05</td>
</tr>
<tr>
<td>Mentions a cure</td>
<td>8 (8.0)</td>
<td>5 (9.1)</td>
<td>1 (3.2)</td>
<td>2 (14.3)</td>
<td>.41</td>
</tr>
<tr>
<td>Promotes or sells a product or procedure</td>
<td>46 (46.0)</td>
<td>32 (58.2)</td>
<td>10 (32.3)</td>
<td>4 (28.6)</td>
<td>.03</td>
</tr>
<tr>
<td><strong>Alternative solutions, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promotes an alternative treatment</td>
<td>31 (31.0)</td>
<td>17 (30.9)</td>
<td>8 (25.8)</td>
<td>6 (42.9)</td>
<td>.52</td>
</tr>
<tr>
<td>Mentions skin care tips</td>
<td>54 (54.0)</td>
<td>32 (58.2)</td>
<td>17 (54.8)</td>
<td>5 (35.7)</td>
<td>.32</td>
</tr>
<tr>
<td>Mentions makeup or other ways to cover up rosacea</td>
<td>38 (38.0)</td>
<td>30 (54.5)</td>
<td>6 (19.4)</td>
<td>2 (14.3)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

<sup>a</sup>N/A: not applicable.

<sup>b</sup>Subtype 1 signs and symptoms: flushing and redness, particularly in the center of the face; visible broken blood vessels and spider veins; skin that is swollen, very sensitive, or may sting and burn; rough, dry, or scaling skin; and skin that tends to flush or blush easily.

<sup>c</sup>Subtype 2 signs and symptoms: acne-like breakouts that tend to come and go and are found in the areas where the skin is very red, oily skin or skin that is very sensitive or may sting and burn, visible broken blood vessels and spider veins, and plaques with raised patches of skin.
dSubtype 3 signs and symptoms: bumpy skin or skin that begins to thicken, particularly on the nose, chin, forehead, cheeks, and ears; visible broken blood vessels and spider veins; oily skin; and large pores.
eSubtype 4 signs and symptoms: rosacea in the eyes where the eyes appear watery or bloodshot, feel gritty, burn or sting, itch, or are dry and sensitive to light; blurry or decreased vision; and visible broken blood vessels or a cyst on the eyelid.

The mean number of views was 185,927 (SD 205,020), and the mean length of the videos was 10.53 minutes (SD 8.92 minutes). Most videos were uploaded between 2016 and 2020 (59/100, 59.0%), recorded in English (78/100, 78.0%), and did not feature a medical professional (67/100, 67.0%).

Consumer videos less often mentioned signs and symptoms of subtypes 2 and 3 (subtype 2: 30/55, 55% of consumers vs 23/31, 74% of medical professionals and 12/14, 86% of television or internet; \(P=0.04\); subtype 3: 12/55, 22% of consumers vs 14/31, 45% of medical professionals and 7/14, 50% of television or internet; \(P=0.03\)). Videos posted by consumers, however, more often promoted or were trying to sell a product or procedure (32/55, 58% of consumers vs 10/31, 32% of medical professionals and 4/14, 29% of television, internet, news, or entertainment; \(P=0.03\)) and more frequently mentioned the use of makeup or other ways to cover up rosacea (30/55, 55% of consumers vs 6/31, 19% of medical professionals and 2/14, 14% of television, internet, news, or entertainment; \(P<0.001\)). Videos sourced from medical professionals more often mentioned medication (17/31, 55%) than videos uploaded by consumers (14/55, 25%) or television, internet, news, or entertainment sources (3/14, 21%) \((P=0.01)\). Videos uploaded from a television, internet, news, or entertainment source more often mentioned subtype 4 (5/14, 36% vs 6/55, 11% of consumers and 3/31, 10% of medical professionals; \(P=0.04\)) and surgical treatments for thickened skin (2/14, 14%) compared with consumer (1/55, 2%) and medical professional (0/0, 0%) videos \((P=0.03)\).

**Discussion**

To our knowledge, this is the first study to examine the content of both English and Spanish rosacea videos on YouTube. The majority of the 100 most popular rosacea YouTube videos were uploaded by consumers. Thus, medical professionals should be aware that consumer opinions and thoughts on rosacea are accessed more often than professional materials. The type of information presented in the videos analyzed also varied depending on the source. Videos sourced from medical professionals were most likely to mention information on medication and the use of sun protection as treatments for rosacea, while videos sourced from consumers were most likely to mention information on alternative treatments like the use of makeup to cover up rosacea. Research indicates that cosmetics can exacerbate rosacea [28-30], and as such, the prevalent makeup tutorials related to covering rosacea could be promoting products that cause flares. In addition, rather than focusing on avoiding triggers, this content focused on hiding symptoms. Within the context of the connection between self-esteem and body image [31], research is delving further into rosacea’s social and emotional fallout. Patients may avoid social situations, retreat from relationships, or think negatively about themselves as a result of their symptoms. An increase in symptoms of depression and anxiety related to the severity of the rosacea have been reported [19]. Women are more likely to be diagnosed with rosacea, exacerbating the gaps in self-esteem that already exist between men and women [32], suggesting that, for women, a holistic approach to treating the condition may be warranted to affect both the psychological and physical manifestations of the disease [33].

Further, the videos sourced from consumers were also found to be the most likely to include information to sell a product. This discovery highlights that consumers may have various underlying motivations to upload videos on rosacea, such as commercial sponsorship, which might result in the communication of misinformation to increase sales of a sponsored product to treat rosacea. Analysis of the videos revealed that the accuracy and reliability of the information found in the videos varied greatly. This is best highlighted by the videos that included information on a cure despite the fact that there is no cure for rosacea. The findings of this study are similar to a prior study of rosacea on a variety of internet sources, including YouTube videos, which concluded that internet sources could contain peer-generated content that was harmful or misleading [34].

This study has limitations that warrant mention. The cross-sectional design indicates that data were only collected at one point in time, and given the fact that content on the internet is in flux, the most popular videos could change over time. Additionally, this study only included videos in English and Spanish despite videos being available in an array of languages. Further, there is no way to delineate who viewed each video and the reason they did so. Therefore, the study strictly offers insight on the content and coverage of information in the widely viewed videos on YouTube. Nonetheless, this study offers insight into the content available on YouTube about rosacea. Given that rosacea is experienced differently for each person, consumer advice that works for one individual may not work for another. There is a need for reliable videos on rosacea to emphasize this and clarify misconceptions. Further study is needed on the accuracy and reliability of information on rosacea in videos sourced by consumers, as well as on the factors that influence consumers to create and upload videos on rosacea for YouTube.

**Conflicts of Interest**

None declared.

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http://derma.jmir.org/2021/1/e24517/


YouTube for Press. YouTube. URL: https://www.youtube.com/about/press/ [accessed 2020-08-23]


Public Interest in a Potentially Harmful, Non–Evidence-Based “Wellness” Practice: Cross-Sectional Analysis of Perineum Sunning

Abstract

Background: Perineum sunning/tanning is a potentially harmful yet popular new health trend cultivated by a viral social media post, famous public figures, and subsequent media coverage.

Objective: Our primary objective is to evaluate public interest in perineum sunning.

Methods: Using an observational study design, we extracted data from Google Trends for the terms “perineum sunning,” “perineum tanning,” “Metaphysical Meagan,” and “Josh Brolin”; and Twitter (via SproutSocial) for “perineum sunning” and “perineum tanning” from November 1, 2019, to December 31, 2019. UberSuggest was used to investigate monthly search volumes and user engagement. We used data from Google Trends and Twitter to construct autoregressive integrated moving average (ARIMA) models to forecast public interest in perineum sunning and perineum tanning had the post on social media never occurred. Next, we performed an integral function to calculate the cumulative increase in “perineum tanning” from the day after the post occurred to the end of the year as the area between the forecasted values and the actual values. Using Welch t tests, we compared forecasted and actual values for “perineum sunning” and “perineum tanning” using Twitter and Google Trends data over 1-, 2-, and 4-week periods after the social media post to determine if the increased volumes were statistically significant over time. Lastly, we monitored Google Trends for “perineum sunning” and “perineum tanning” through September 30, 2020, to capture trends during the summer months.

Results: Before the Instagram post went viral, there was no search interest in perineum sunning. ARIMA modeling for perineum tanning forecasted no increase in searches (0.00) if the post had not gone viral, while actual interest conveyed a relative cumulative increase of 919.00% from the day the post went viral through December 31, 2020. The term “perineum sunning” was mentioned on average 804 (SD 766.1) times daily for this 7-day period, which was also significantly higher than predicted (P ≤.03), totaling 5628 tweets for these 7 days. The increased volume of tweets and relative search interest from Google Trends remained significantly higher for both terms over the 1-, 2-, and 4-week intervals. User engagement showed that nearly 50% of people who searched for “perineum sunning” were likely to click a returned link for more information. Continued observance of search interest in perineum sunning demonstrated interest spikes in the summer months, June and July 2020.

Conclusions: Google Trends and Twitter data demonstrated that one social media post claiming non–evidence-based health benefits of regular sun exposure—without the use of sunscreen—generated significant public interest. Medical journals, dermatologists, and other health care professionals are obligated to educate and correct public misperceptions about viral wellness trends such as perineum sunning.
Introduction

Social media may positively affect health behaviors or propagate potentially harmful health information [1,2]. On October 21, 2019, posts on the social media platform Instagram boasted that perineum sunning would improve focus, augment hormonal regulation, increase libido, regulate circadian rhythm, and enhance health and longevity. These posts claimed that only 30 seconds of perineum sunning was equivalent to one day’s worth of sun exposure while also recommending against sunscreen use when perineum sunning [3]. The original post went viral in late November via Twitter, and again in December after well-known actor Josh Brolin received media coverage for the severe sunburn to his anogenital area after attempting perineum sunning.

Given the high potential for sunburns and cutaneous cancers resulting from this practice, our primary objective was to investigate the effects of social media and news coverage of perineum sunning on public interest by examining internet search volume, trends, and engagement, using publicly available data. A more informed understanding of the influence of social media on public search interest in potentially harmful practices like perineum sunning may assist dermatologists and medical journals when developing social media strategies to directly combat medical misinformation.

Methods

Google Trends [4] was used to collect daily relative search interest from November 1, 2019, to December 31, 2019, for “perineum sunning,” “perineum tanning,” “Metaphysical Meagan” (the Instagram user who published the original post), and “Josh Brolin” (who appeared in news stories on December 3, 2019, after getting a severe sunburn while performing this practice). Search interest from Google Trends is provided as a relative measure of total searches from 0-100 estimated from the highest peak within a given time frame. To explore public interest beyond Google Trends, we performed keyword searches for “perineum sunning” and “perineum tanning” occurring on Twitter via SproutSocial [5], a social media analytics platform. We also used UberSuggest [6] to collect monthly internet search volumes and user engagement (defined as a person clicking on the links returned from the search) for the terms “perineum sunning” and “perineum tanning.”

Using Google Trends and Twitter data, we constructed autoregressive integrated moving average (ARIMA) models to forecast predicted values of relative search interest and tweets for the terms “perineum sunning” and “perineum tanning” from November 25, 2019, to the end of the year if the post on social media had not occurred. Next, we calculated the average number of tweets and Google Trends relative search interest for the terms “perineum sunning” and “perineum tanning,” and using Welch’s t tests, compared them to their respective forecasted values over 1-, 2-, and 4-week periods after the social media post to assess if the increased volumes were statistically significant over time. Using an integral function, we calculated the cumulative area between the forecasted baseline and the actual relative search interest data to provide the relative increased search interest through December 31, 2019, for “perineum sunning” from Google Trends. Lastly, Google Trends was monitored for the terms “perineum sunning” and “perineum tanning” through September 30, 2020, to capture public interest trends during the summer months. All analyses were conducted in R, version 3.2.1 (The R Foundation).

Results

Relative search interest for the four search terms through the end of 2019 are compared in Figure 1.

Based on the first 24 days of November, the ARIMA model forecasted that no interest (0.0) would have arisen in “perineum sunning” for the rest of the year if the social media post had not happened.

Relative search interest for perineum sunning and perineum tanning peaked the day after the social media post went viral. Keyword usage on Twitter showed that tweets significantly increased the day following the post with an increase of 2064 (95% CI 2054-2074) tweets over the predicted value (1) for perineum sunning. For the first 7 days after the post went viral, actual search interest for perineum sunning and perineum tanning were on average 42% (SD 33.0) and 43.6% (SD 35.9) higher than predicted, respectively. Additionally, the term “perineum sunning” was mentioned on average 804 (SD 766.1) times daily for this 7-day period, which was also significantly higher than predicted ($P<.03$), totaling 5628 tweets for these 7 days. The increased volume of tweets and relative search interest from Google Trends remained significantly higher for both terms over the 1-, 2-, and 4-week intervals (Table 1).
Figure 1. Google Trends analysis of the terms “perineum sunning,” “perineum tanning,” “Metaphysical Meagan,” and “Josh Brolin,” from November 1 to December 31, 2019.

Table 1. Differences of means between actual and forecasted data from 1, 2, and 4 weeks after the social media post.

<table>
<thead>
<tr>
<th>Search term</th>
<th>Actual, mean (SD)</th>
<th>Forecast, mean (SD)</th>
<th>t test (df)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(df=6); P value</td>
<td>(df=13); P value</td>
<td>(df=27); P value</td>
<td></td>
</tr>
<tr>
<td>Google Trends</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perineum sunninga (%)</td>
<td>0 (0)</td>
<td>42.0 (33.0)</td>
<td>-4.2; .001</td>
<td>-4.3; &lt;.001</td>
</tr>
<tr>
<td>Perineum tanninga (%)</td>
<td>0 (0)</td>
<td>43.6 (35.9)</td>
<td>-3.2; .02</td>
<td>-5.9; &lt;.001</td>
</tr>
<tr>
<td>Twitter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perineum sunningb</td>
<td>2.8 (7.52)</td>
<td>804.1 (766.1)</td>
<td>-2.8; .03</td>
<td>-3.4; .004</td>
</tr>
<tr>
<td>Perineum tanningb</td>
<td>0.1 (0.0)</td>
<td>36.1 (37.4)</td>
<td>-2.5; .04</td>
<td>-3.6; .003</td>
</tr>
</tbody>
</table>

a Data reflects average daily relative search interest (0%-100%).
b Data reflects average daily number of actual tweets.

The area under the curve (shaded in Figure 2) for “perineum tanning” indicated a cumulative increased interest of 919.00% from the day the post went viral to the end of the year.

Monthly search volumes from UberSuggest show no search interest in “perineum sunning” or “perineum tanning” before the post went viral on November 25, 2019. After the post, search volumes for the search terms “perineum sunning” and “perineum tanning” increased from 0 in October to a combined 52,599 searches for the remaining days in November and climbed to 67,598 searches in December. User engagement showed that nearly half of the individuals who searched for “perineum sunning” or “perineum tanning” were likely to click a returned link for more information. Search trends for perineum sunning showed additional spikes in the week of June 6 (29% of the original search interest peak), June 28 (60% of the original search interest peak), and July 5 (50% of the original search interest peak) (Figure 3).
**Discussion**

**Principal Findings**

Our results show that one Instagram post, a subsequent viral tweet, and mainstream media coverage generated significant interest in perineum sunning. This new proposed health trend appeared in over 250 articles from numerous media outlets, which spurred others to engage in the behavior. For example, actor Josh Brolin attempted perineum sunning, which resulted in a severe sunburn to his anogenital area. Other iconic figures such as the famous American music producer Diplo, popular health author and entrepreneur Dave Aspery, and American actress Shailene Woodley have all shared their experience of perineum sunning through news media. Despite being deemed a “wellness” technique, the mainstream attention garnered by perineum sunning could lead to harmful health consequences.

Our trends analysis demonstrates continued public search interest in “perineum sunning” and “perineum tanning” for almost a year since the original post on October 21, 2019. Continued search interest in perineum sunning showed a resurgence during the summer months. This finding is concerning because UV exposure increases during the summer, and the solar radiation during these months has the greatest intensities of UV-B [7]. Additionally, Tripathi et al [8] found an increase in the prevalence and costs associated with sunburn-related emergency department visits, especially during...
the months of June, July, and August. While this study did not explore intent to act, if increased search interest during these summer months resulted in more people attempting this practice, they would be exposing themselves to more dangerous levels of UV radiation. While unsure why other spikes of public interest in perineum sunning occurred, we speculate that continued interest is being generated through social media platforms and ongoing news media coverage. Regardless of the reasons for the increased interest, our study suggests that people are continuing to search for perineum sunning, which may lead to higher rates of cutaneous malignancies and poorer health outcomes if more people attempt this unsafe wellness trend.

Exposure of skin to the UV rays present in sunlight has acute and chronic effects that can occur at doses of UV light that are nonerythemogenic. Short-term effects are sunburn (ranging from solar erythema to vesiculation/bullae formation) and tanning. Long-term effects include photoaging and UV-induced tumor formation [9,10]. It is well known that UV exposure is the most obvious risk factor for cutaneous malignancies such as melanoma, basal cell carcinoma, and squamous cell carcinoma [11]. To make matters worse, melanomas in less visible areas, such as the buttocks and perineum, have worse prognosis independent of tumor characteristics and visibility on self-skin examinations [10]. Furthermore, perineum skin is still vulnerable to risk of sunburn and, over time, cancer formation. To our knowledge, no study has shown perineal skin to have a special ability to generate more vitamin D production than other areas of the skin, nor is there any human evidence that sunning this specific area promotes positive changes in mood, increases libido, and improves regulation of hormones or circadian rhythm. Promotion of health misinformation, such as perineum sunning, via social media is quickly becoming a public health threat.

Non–evidence-based health trends and medical misinformation originating on social media are recognized challenges with serious public health implications (eg, antivaccination campaigns), which can place a significant burden on medical professionals and health care systems in one day, as our results show. Protecting the value of accurate medical information is of utmost importance as science and health information can be strategically manipulated by social media while perpetuating misinformation [12]. Strategies to combat the spread of misinformation require a collaborative approach involving medical journals, researchers, and physicians [13]. Doctors and health care professionals are encouraged to use social media platforms—the source of the majority of misinformation—as educational tools to promote accurate medical information and protect the integrity of online health information [14].

Along with health care professionals, journals must also be proactive in coordinating efforts to address public health misinformation that may harm the general public. We agree with Armstrong et al [15] and recommend journals publish articles with the intention of educating and redirecting public behavior at pertinent times when widespread dissemination of health misinformation has occurred. The Journal of Medical Internet Research, and its sister journal JMIR Dermatology, are two examples of journals that seem to be dedicated to publishing research focused on combating medical misinformation and raising awareness concerning the quality of health information on the internet [1,16-19]. For example, one study recently published by JMIR Dermatology evaluated the quality of sun-protection information by examining the most popular YouTube videos covering sunscreen [16]. Here the authors concluded that content about sunscreen use was often negative or failed to include important sunscreen use recommendations. Low-quality information surrounding sunscreen use, coupled with our study’s results, further demonstrates the need for a collaborative approach to combat medical misinformation, especially in risky sun behaviors.

Limitations
Our study is limited by its cross-sectional design and should not be generalized. While Google Trends has been used to examine increased public interest and subsequent actions [20,21], our study did not determine intent. Therefore, future research in social media health trends may consider collecting participant surveys of intent to act after viewing the post. Lastly, by using Google Trends, we could only calculate relative search volumes.

Conclusion
Our findings suggest that it took only 24 hours for a potentially dangerous “health” trend to capture the spotlight of mainstream media outlets—an alarming exposé in the power of social media concerning perineum sunning. Additionally, continued observance of the search interest in perineum sunning showed a resurgence during the summer months. Exposure to sunlight is dangerous, and sensitive areas such as the perineum have worse prognosis even when detected during skin examinations. Dermatologists and physicians in other fields of medicine should be aware of perineum sunning and should consider that its popularity may warrant additional inquiry about sun exposure and tanning during patient encounters.


Abbreviations

ARIMA: autoregressive integrated moving average
Original Paper

Instagram Content Addressing Pruritic Urticarial Papules and Plaques of Pregnancy: Observational Study

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Abstract

Background: Pruritic urticarial papules and plaques of pregnancy (PUPPP) is the most commonly diagnosed pregnancy-specific dermatosis. It presents with intense pruritus and can be difficult to manage, which encourages mothers to look to social media for camaraderie and advice.

Objective: This study aimed to characterize the sources and thematic content of Instagram posts in order to define influential groups of users. Our goal was to determine the status of online discourse surrounding PUPPP and elucidate any potential space for health care provider intervention via creation of Instagram accounts dedicated to information dissemination for patient populations.

Methods: Three hashtag categories were selected (#PUPPP, #PUPPPs, and #PUPPPrash), and the top public posts from each were analyzed and organized by source and by thematic content. The numbers of likes and comments were also recorded.

Results: Among the top 150 posts in each hashtag category, only 428 posts in total were eligible for this analysis. Majority (316/428, 73.8%) of posts were created by mothers who experienced PUPPP. These posts were testimonial accounts in nature. A small fraction of posts (14/428, 3.3%) were generated by physician accounts. Posts from blogs with extensive followings garnered the most attention in the form of likes and comments.

Conclusions: Mothers experiencing PUPPP comprised the majority of accounts posting under the hashtags selected. The most common themes included pictures of the rash and personal testimonies. Posts under blog posts received the most likes and comments on average. There is space for physician and health care specialists to improve their social media presence when it comes to discourse surrounding PUPPP. Patients are seeking out communities on social media, like Instagram, in order to have questions answered and obtain advice on management. Accounts with large followings tend to have more likes and more comments, which encourages information dissemination and awareness. Thus, we suggest that physicians create content and potentially partner with blog-type accounts to improve outreach.

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KEYWORDS
pruritic urticarial papules and plaques of pregnancy; dermatology; rash; pregnancy; obstetrics; dermatosis; Instagram; social media; patient education
Introduction

Pruritic urticarial papules and plaques of pregnancy (PUPPP) is the most common pregnancy-specific dermatosis affecting about 1 in 200 pregnancies [1]. It is also known as polymorphic eruption of pregnancy. PUPPP is more common in primiparous women and is characterized by erythematous papular lesions that classically arise within the confines of striae distensae on the gravid abdomen [1,2].

Typically, the eruptions begin on the abdomen and can spread to the thighs, arms, and buttocks, with onset occurring typically in the third trimester [3,4]. Symptoms tend to resolve 7 to 10 days postpartum [4]. However, this rash can be very pruritic, extensive, and difficult to manage for patients, especially in multiple gestation cases [4]. Many mothers try antipruritus creams and medications, with little or short-lasting relief. This could be one factor driving mothers with PUPPP to seek support in various outlets, including social media.

Social media has taken the spotlight in recent years as a tool for human interaction, which has changed how we learn from and engage with peers. Particularly within younger generations that grew up with internet access, it is increasingly common to find that people turn to social media for information and advice. A recent survey found that 72% of people reported turning to the internet to look up health information within the last year [5]. The convenience of the internet at the tips of our fingers has made it a preferred source for many Americans searching for answers.

Social media has become a way for patients with various unique conditions to post and find camaraderie with others who have similar afflictions, including during pregnancy [6]. We must be cognizant of the power that social media has to influence our decision-making ability in this regard [7,8]. Endorsements on social media sites, such as Instagram, have been shown to activate reward centers of the brain, making social media a powerful tool for peer influence [8]. According to Instagram’s webpage, it boasts of having over 1 billion users worldwide. The Pew Research Center generated an estimate that roughly 72% of American adults have at least one social media account and that 37% have an Instagram account as of 2019 [9]. Creating posts for Instagram is free, and posts can be made available to the public. This makes the app a cost-effective and efficient way for health care specialists to widely distribute quick medical information to the public at large. In light of this, it is important to analyze how patient populations interact with content on social media so that we can determine whether there is space for health care professionals to provide evidence-based medical information and quell patient skepticism about information they are finding online.

PUPPP is a lesser publicized affliction, and thus, its discussion is not common in the public arena despite its relatively high prevalence in pregnant and postpartum mothers [1]. The rash can dramatically impact mothers during pregnancy and alter their experience. We hope to be able to shed some light on what information is being distributed on popular social media sites. In this study, we seek to characterize posts regarding PUPPP circulated on Instagram from the public. It is our goal to determine what discourse is generated by and for these pregnant mothers in order to define a potential space for increased physician and health care provider intervention, education, and advocacy.

Methods

Data Collection

Using the Instagram app, hashtag-based key terms were searched and identified (n=3: #PUPPP, #PUPPPs, and #PUPPPRash). Note that capitalization does not make a difference on the app hashtag search function; thus, “#PUPPP” yields the same result as “#puppp.”

The top 150 posts from each tag were selected for analysis from all public posts. To be included in the study, the picture’s caption had to include information or opinions regarding PUPPP. We excluded posts that were considered private because they would not be readily accessible to the public when using Instagram’s search function. We excluded posts that had irrelevant material (ie, posts about puppies that were tagged within the #puppp thread and posts that did not include content regarding PUPPP) or were repeat tags (ie, posts tagged in the #puppp and #puppps categories). With these criteria, two of the tag categories yielded fewer than 150 posts that qualified for the study.

Data Analysis

Each post was assigned exclusively to a category based on source. The categories included the following: (1) mother, (2) physician/health care provider, (3) health care organization, (4) company/product, and (5) blog/blogger (Table 1). For further clarification, the category for physician/health care provider was scrutinized even further to determine if posts were from physicians or other providers such as midwives and doulas. In order for a post to be determined to be from a mother, caption information was taken into account and designation was granted if first person language was used. Many of these posts were accompanied by “selfies” that contributed to the decision of assigning a post to the mother category.

Characterization of the thematic content of each post was then determined by the team. Thematic content was categorized nonexclusively, meaning that each post could be assigned to more than one category based on image content as well as accompanying caption content. These categories included the following: (1) testimony, (2) educational information, (3) picture of PUPPP rash, (4) therapy advice & guidance, (5) blog post, and (6) product promotion (Table 1).
Table 1. Stratification methodology of Instagram posts that met the inclusion criteria.

<table>
<thead>
<tr>
<th>Post source categories (exclusive assignment)</th>
<th>Thematic content categories (nonexclusive assignment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mother</td>
<td>1. Testimony</td>
</tr>
<tr>
<td>2. Physician/health care provider</td>
<td>2. Educational information</td>
</tr>
<tr>
<td>3. Health care organization</td>
<td>3. Picture of PUPPPb rash</td>
</tr>
<tr>
<td></td>
<td>6. Production promotion</td>
</tr>
</tbody>
</table>

aIndividual posts could be placed exclusively in one category based on their source but were nonexclusively categorized by content of the post.
bPUPPP: pruritic urticarial papules and plaques of pregnancy.

The numbers of comments and endorsements or “likes” were recorded for each post after the characterization process. The average numbers of likes and comments were then calculated within each tag category.

Results

Tags

As of November 23, 2020, there were 2100 posts tagged with #PUPPP, 599 posts tagged with #PUPPPs, and 189 posts tagged with #PUPPPrash, which were publicly available on Instagram (totaling 2888 posts).

Table 2. Post source categorization.

<table>
<thead>
<tr>
<th>Tag category</th>
<th>Post source, n (%)</th>
<th>Health care organizations</th>
<th>Physicians and health care providers</th>
<th>Companies</th>
<th>Blogs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mothers (N=150)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#PUPPP (N=150)</td>
<td>134 (89.3%)</td>
<td>9 (6.0%)</td>
<td>7 (4.7%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>#PUPPPs (N=141)</td>
<td>132 (93.6%)</td>
<td>1 (0.7%)</td>
<td>0 (0%)</td>
<td>8 (5.7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>#PUPPPrash (N=137)</td>
<td>50 (36.5%)</td>
<td>2 (1.5%)</td>
<td>7 (5.1%)</td>
<td>20 (14.6%)</td>
<td>58 (42.3%)</td>
</tr>
<tr>
<td>Overall (N=428)</td>
<td>316 (73.8%)</td>
<td>12 (2.8%)</td>
<td>14 (3.3%)</td>
<td>28 (6.5%)</td>
<td>58 (13.6%)</td>
</tr>
</tbody>
</table>

In all categories, except for #PUPPPrash, mothers themselves were the predominant posters of content regarding PUPPP. In #PUPPPrash, the largest portion of content and discussion involved blogs (58/137, 42.3%), most of which were identified as “maternity lifestyle blogs” where women share experiences, advice, and information regarding pregnancy and motherhood to their followers (Table 2).

Only 14 posts came from health care providers overall, seven of which were from physicians licensed with an MD (Doctorate in Medicine) or DO (Doctorate in Osteopathic Medicine) medical degree (Table 2). The other seven advertised themselves as mid-level providers, such as nurse practitioners, lactation consultants or midwives, and doulas. This content made up 3.3% (14/428) of the overall number of posts.

#PUPPP had the majority of posts from accounts deemed as “health care organizations,” such as a public account, @skincancerderminstitute, a dermatology clinic. Nine of the 12 posts coming from health care organizations were in this tag group. Other organizations represented were centered on pregnancy and women’s health.

The “companies” category, which we defined as any account tied to a business that advertised a product or service that they themselves sell and/or provide for financial gain, was most prominent in the #PUPPPrash category, comprising 14.6% (20/137) of all posts analyzed (Table 2). Of the 28 posts from companies, 20 were found under #PUPPPrash.

Thematic Content Analysis

All posts were categorized nonexclusively into six categories based on the content in the image or the caption associated with the image.

By and large, the category “testimony” comprised a majority of the posts across all three tag groups. Out of all 428 posts, 309 (72.2%) were classified as a "testimony" based on the content within the caption provided by the poster. This meant that 72.2% of all posts contained personal accounts and anecdotes from mothers who had experienced PUPPP during one or more of their pregnancies (Table 3). Most of these testimonies were mothers describing their journeys, expressing
frustration with the pruritic rash, and providing encouragement to their followers who may be experiencing the same affliction.

Table 3. Analysis of thematic content of posts in each tag category and overall (N=428).

<table>
<thead>
<tr>
<th>Theme</th>
<th>Tag category</th>
<th>#PUPPP, n</th>
<th>#PUPPPs, n</th>
<th>#PUPPPrash, n</th>
<th>Across all tags, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testimony</td>
<td>PUPPP</td>
<td>91</td>
<td>94</td>
<td>124</td>
<td>309 (72.2%)</td>
</tr>
<tr>
<td>Education</td>
<td>PUPPPs</td>
<td>20</td>
<td>8</td>
<td>1</td>
<td>29 (6.8%)</td>
</tr>
<tr>
<td>Therapy advice</td>
<td>PUPPP</td>
<td>10</td>
<td>14</td>
<td>5</td>
<td>29 (6.8%)</td>
</tr>
<tr>
<td>Blog post</td>
<td>PUPPPs</td>
<td>0</td>
<td>11</td>
<td>89</td>
<td>100 (23.4%)</td>
</tr>
<tr>
<td>Production promotion</td>
<td>PUPPPs</td>
<td>15</td>
<td>23</td>
<td>5</td>
<td>43 (10.0%)</td>
</tr>
<tr>
<td>Picture of rash</td>
<td>PUPPP</td>
<td>58</td>
<td>55</td>
<td>115</td>
<td>228 (53.3%)</td>
</tr>
</tbody>
</table>

*Posts were nonexclusively categorized, that is, each post could be tallied in more than one of the six themes represented.*

Posts were given a designation under the category “education” if they provided objective and factual medical information about PUPPP. Posts in this category, for example, included infographics, diagrams, and other texts that would provide information to moms about what PUPPP is, what the symptoms are, and what standard treatment includes, and/or provide epidemiological information. A popular fact included frequently in educational posts was that about 1 in 150 to 200 women will be affected by PUPPP [1,3].

Overall, 228 (53.3%) posts contained a picture of a rash directly. Pictures of a rash included an exposed abdomen with signs of PUPPP. Within the PUPPPrash tag, one picture of one blogger’s rash was reposted 78 times with a copied caption. In the PUPPP and PUPPPs groups, pictures were all personal, meaning they were of the user’s own rash.

Another important finding was that 100 of the 428 (23.4%) posts were from an account that advertised being a blog (Table 3). Blog posts either came from blog accounts, such as accounts that advertised being a “personal” or “maternity” blog, or from mothers who were self-promoting their own personal blogs. Of these 100 posts, 89 were found under the PUPPPrash tag.

Table 4. Likes and comments broken down by tag category.

<table>
<thead>
<tr>
<th>Tag category</th>
<th>Mean number of endorsements</th>
<th>Mean number of comments</th>
<th>Range for the number of likes</th>
<th>Range for the number of comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>#PUPPP</td>
<td>50.53</td>
<td>10.46</td>
<td>0-458</td>
<td>0-65</td>
</tr>
<tr>
<td>#PUPPPs</td>
<td>67.39</td>
<td>8.57</td>
<td>1-1452</td>
<td>0-46</td>
</tr>
<tr>
<td>#PUPPPrash</td>
<td>2371.52</td>
<td>34.34</td>
<td>4-38,350</td>
<td>0-389</td>
</tr>
</tbody>
</table>

The PUPPPrash group had the highest average number of likes but also had the largest range of likes from 4 to 38,350. This category had 10 posts with more than 10,000 likes and 32 posts with between 1000 and 9999 likes. No other category had a post with more than 10,000 likes. PUPPPrash also had the highest average number of comments per post with a range of 0 to 389 (Table 4).

Of note, the PUPPPrash category also had the highest concentration of blog accounts (Table 3). These accounts tended to have more followers, which may have accounted for the higher number of likes and comments per post.

Discussion

Principal Findings

The presence of PUPPP on the social media app Instagram is significant yet small in comparison to the estimated number of pregnancies affected each year. With a little under 3000 posts available to the public on the popular app and around 3.7 million births in the United States annually, there appears to be a gap in discourse surrounding this common dermatosis [10]. A search on the Instagram interface reveals that other sequelae of pregnancy, such as hyperemesis gravidarum, have more dedicated posts. For example, searching
#hyperemesis gravidarum on Instagram returned approximately 49,200 posts as of November 30, 2020. Despite the low census of posts for PUPPP, the posts included in this analysis represented a diverse pool of sources as well as themes. Interestingly, the overwhelming majority of posts came from mothers who were affected by the rash. These posts tended to contain testimonial captions and frequently included pictures of the mother’s own rash. Based on caption analysis, most of these testimonial posts were intended to bring awareness to a condition that is considered “embarrassing” by many moms. Posts would include candid accounts of the mothers’ experiences with combating PUPPP. Posts like this help to normalize the discourse and make others feel more comfortable discussing their rash with their followers. Some moms even included pictures of their exposed rash. These vulnerable pictures could put others at ease if the rash looks similar to their own. Overall, these testimonial posts really highlight the community’s honesty with PUPPP and willingness to share their experiences for the benefit of others.

The amount of posts coming from health care professionals made up a small fraction of the sample (14/428, 3.3%). As a potential space for physicians to impact the public beyond their clinical domain, this analysis has made it apparent that there is room for improvement on the part of physicians to guide online discussion. Only 14 of all 428 posts were from professional health care providers, and only seven of those were from physicians (Table 2). A post that is created by a trained medical professional might be viewed as more credible by the public than a post from a layperson, meaning these posts could be more influential. The posts that did come from these accounts tended to be educational in nature with the goal of teaching followers about PUPPP. Again, only a small percentage of posts offered educational material signaling a place for growth for specialists who see and treat patients with PUPPP.

The posts that this study found to garner the most attention, in the form of likes and comments, were blog posts, although they made up only 23.4% (100/428) of the posts across all three investigated tags. Some of these posts gained tens of thousands of likes and hundreds of comments. The blog accounts that many of these “high-earning” posts came from boasted large followings, which may have been a contributing factor for the greater interaction of these posts than posts from any one mother. This makes sense given that Instagram’s algorithm puts pictures from accounts you follow into one’s home feed. Therefore, the more followers an account has, the more interaction its posts will receive. Many of the blogs that earned the most likes were advertised as maternity blogs, and the posts dealt with topics and issues for expecting mothers as well as new mothers. It is possible that mothers who have experienced complications during their pregnancy seek out and follow pregnancy-specific blogs on Instagram in the hope of finding camaraderie and reassurance in their peers and influential users.

Clinical Applications and Conclusions

This study demonstrated that there is a considerable presence on Instagram of the most common dermatosis specific to pregnancy, PUPPP. We were able to examine this common skin condition of pregnancy through the unique lens of publicly available Instagram content. Through the use of hashtags on the popular social media app, we found that mothers with PUPPP readily expressed their experiences, asked questions, and shared advice with their followers. At times, these moms would even share their opinions on various treatments and therapies as well and generate dialogue among one another. Importantly, there are very few physicians actively posting clinically valid information about the rash, which could address many of the questions and concerns that these mothers pose online. Health care professionals, such as dermatologists and obstetricians, should be aware of this social media presence and consider increasing their influence on applications since a high number of patients turn to internet communities for support.

One suggestion we propose is for physicians to increase their social media presence by creating public professional accounts that display their credentials [13]. In this way, physicians can advertise their professional accounts to the existing clientele and reach patient populations beyond those that they personally serve. Once an account is established, posts can be made that combine informative graphics with educational text. Therefore, if physicians generate more content and use hashtags so that their posts are searchable, they could reach a larger audience all of the most recent posts will show up on the content feed. This is part of a new initiative by social media companies to stop the spread of misinformation.

On Instagram, we are not able to definitively determine the age or gender of the person posting the content as this information is not distributed by each user’s account. This limited our analysis particularly when looking at the posts coming from mothers affected by PUPPP. Access to the demographic information of the mothers would have given us a better idea of what audience characteristics are better represented on Instagram.

There is future potential for a similar study to analyze the content of the comment sections. Previous studies have demonstrated that examining user comments on social media can provide an in-depth view of questions and concerns brought up by patients [11,12]. Characterization of the comments from followers in order to discover the nature of supportive or inquisitive feedback under each post could strengthen the argument that patients are seeking quality medical information on Instagram. A dive into the nuances of conversation between followers and posters could further elucidate the exact needs and curiosities of patients opting to research conditions on social media.

Clinical Applications and Conclusions

This study demonstrated that there is a considerable presence on Instagram of the most common dermatosis specific to pregnancy, PUPPP. We were able to examine this common skin condition of pregnancy through the unique lens of publicly available Instagram content. Through the use of hashtags on the popular social media app, we found that mothers with PUPPP readily expressed their experiences, asked questions, and shared advice with their followers. At times, these moms would even share their opinions on various treatments and therapies as well and generate dialogue among one another.

Importantly, there are very few physicians actively posting clinically valid information about the rash, which could address many of the questions and concerns that these mothers pose online. Health care professionals, such as dermatologists and obstetricians, should be aware of this social media presence and consider increasing their influence on applications since a high number of patients turn to internet communities for support.

One suggestion we propose is for physicians to increase their social media presence by creating public professional accounts that display their credentials [13]. In this way, physicians can advertise their professional accounts to the existing clientele and reach patient populations beyond those that they personally serve. Once an account is established, posts can be made that combine informative graphics with educational text. Therefore, if physicians generate more content and use hashtags so that their posts are searchable, they could reach a larger audience.
interested in the topic. It might also behoove the physician to partner with bloggers, such as maternity bloggers in our case, in order to quickly gain visibility and reach a larger audience already seeking information and support [13].

The spread of misinformation has also become a topic of discussion in recent years as social media has become a dominant forum for peer conversation [13]. With the rise of social media as an arena for sharing, it has become apparent that perpetuation of incorrect medical statements may create mistrust and fear among patients [14]. Serious false information has been disseminated, such as the belief that vaccines cause autism, because physicians abuse the trust built. It is the duty of physicians, including physicians participating in online discourse, to ensure that facts are checked. Physicians are in a particularly unique position to create posts containing evidence-based information while also being key opinion leaders.

In a time where we have immediate access to any information through the internet, misinformation is rampant and physicians work hard to dispel concerns that patients bring in with them to the examination room. We suggest that clinicians build up their social media presence to offer legitimate responses and medical information to patients looking for quick answers before their next doctor’s appointment.

Conflicts of Interest
None declared.

References

Abbreviations
PUPPP: pruritic urticarial papules and plaques of pregnancy
Original Paper

Nonprescription Products of Internet Retailers for the Prevention and Management of Herpes Zoster and Postherpetic Neuralgia: Analysis of Consumer Reviews on Amazon

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Abstract

Background: Herpes zoster affects approximately 1 million people annually in the United States, with postherpetic neuralgia as the most common complication. The frequent prescription of opioids as the first-line medication for herpes zoster or postherpetic neuralgia contributes to the increasing health care costs of their treatment. Despite the advent of internet retailers providing alternative products for the prevention and management these conditions, there are limited studies on the availability, ingredients, and consumer preference for the products.

Objective: This study used the internet retailer Amazon to determine the availability of products for the management of herpes zoster and postherpetic neuralgia, and assessed consumer preference based on listed ingredients.

Methods: The internet retailer Amazon was used to perform a search for products related to “shingles” in September 2020. Top products sorted by reviews and ratings were determined to be either shingles-specific (including “shingles” in either the product title or description) or shingles-nonspecific. Analysis of price, rating, type of vehicle, and ingredients was performed. The types of vehicles, ingredients, and percentages of positive and negative reviews related to “shingles” of the product groups were analyzed with a two-tailed two-sample proportions Z-test to assess the difference between shingles-specific and shingles-nonspecific products. Statistical significance was judged at \( P<.05 \).

Results: The top 131 products among over 3000 products retrieved were determined based on a rating of 4 or more stars after searching for the term “shingles” on Amazon. Forty-six of the 131 products (35.1%) were shingles-specific. Shingles-nonspecific products were more likely to have positive reviews mentioning “shingles” \((P=.005)\). Vehicles, balms \((P=.02)\), and salves \((P=.04)\) were more likely to be shingles-specific, whereas tablets or capsules \((P=.002)\) were more likely to be shingles-nonspecific. Among the ingredients analyzed, aloe vera was the top-ranked ingredient, included in 29 of the 131 total products (22.1%). Aloe vera \((P=.01)\), lemon balm \((P<.001)\), vitamin E \((P=.03)\), and peppermint oil \((P=.008)\) were more likely to be included in the shingles-specific products, whereas magnesium \((P=.01)\) was more likely to be included in shingles-nonspecific products.

Conclusions: There is an abundance of products and ingredients being used for the management and treatment of shingles with certain ingredients preferred by consumers. There is a discrepancy between approved ingredients and the ingredients preferred by consumers. Furthermore, there are insufficient studies on ingredients used by consumers on internet retailers such as Amazon, and future studies can focus on the effectiveness of popular ingredients to decrease misinformation on the internet.

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KEYWORDS

Amazon; consumer preference; herpes zoster; postherpetic neuralgia; shingles; internet; customer; herpes; ingredients; treatment
Introduction

Shingles, or herpes zoster (HZ), is caused by reactivation of latent varicella zoster virus (VZV) in the sensory neurons, typically after the primary infection of chicken pox in childhood [1,2]. Previous studies have shown that more than 95% of adults across North America and Europe are at risk for HZ, and approximately 1 million people are affected by HZ in the United States annually [23]. Stress, aging, illness, medication, or other causes of decreased immunity can cause the activation of dormant VZV that commonly affects the cervical, thoracic, and trigeminal nerves [3,4]. Acute herpes zoster (AHZ) manifests as a painful blistering rash along a dermatome, initially presenting as a maculopapular rash that develops into vesicles and pustules [4,5]. Postherpetic neuralgia (PHN) is the most common complication of HZ, which is defined as the persistence of acute HZ pain in a dermatomal distribution that lasts over 3 months [1,3,6,7]. PHN is due to damage to the nerves from an inflammatory response caused by viral replication within the nerve [8]. PHN can cause allodynia, hyperalgesia, anesthesiasia, and other sensory deficits of the affected dermatome [3,9]. Owing to the debilitating nature of PHN, patients seek medications to manage the pain.

The therapies for AHZ include antivirals, corticosteroids as adjunctive therapy, acetaminophen or nonsteroidal anti-inflammatory drugs (NSAIDs) for analgesia, and capsaicin or lidocaine as topical treatment [8]. For PHN, first-line medications include calcium channel blockers (gabapentin and pregabalin), tricyclic antidepressants, and a lidocaine patch [10]. Second-line treatments include opioid analgesics and a capsaicin patch or cream [10]. A previous study showed that opioids were commonly prescribed as the initial treatment for PHN, followed by gabapentin, prescription NSAIDs, lidocaine patch, pregabalin, tricyclic antidepressant, topical lidocaine, and capsaicin, respectively [3].

However, with the advent of internet information and shopping through internet retailers such as Amazon, patients can now easily access nonprescription remedies for the rashes and neuropathic pain caused by shingles or PHN. Amazon has recently been utilized as a data source in studies to analyze consumer perception and preference for health-related products [11-13]. Some natural treatment choices offered on internet retailers have been studied for either PHN or neuropathic pain, including vitamins and nutrients such as zinc, licorice, honey, aloe vera, and St John’s wort [14-16]. However, most herbal remedies such as St John’s wort have not been assessed in proper clinical trials or have not been proven to be useful [17].

Given the readily available nonprescription options that claim effectiveness for shingles and PHN pain, it is important to understand what products are available for patients and the efficacy of the ingredients in these products. In this study, we evaluated the products that are available and preferred by customers through analyzing the vehicle types, ingredients, and customer reviews of shingles-related products sold on Amazon. Finally, we sought to understand the different factors and ingredients of products used for shingles or PHN prevention and treatment.

Methods

Amazon, the internet retailer, was accessed in September 2020 to search for products related to shingles. “Shingles” was used as the keyword to search in the “Health & Household” department of the website. The searches were screened for customer ratings of 4 stars and above. Products such as bandages or household items were excluded. Finally, only products that included the term “shingles” in the product title, description, Customer Reviews, or Customer Question and Answer were included in the final analysis. Product listings without mention of “shingles” in the product title, description, Customer Reviews, or Customer Question and Answer were excluded. For product listings with different quantities and sizes, only the listing with the most reviews was included. From the overall products, the average price, median price per unit, average ratings, average number of reviews, type of vehicle, and ingredients were determined. Several ingredients studied previously for shingles were analyzed in this study [14,17,18].

Two groups were derived from the original sample set. First, products that included the term “shingles” in either the product title or description were classified as shingles-specific products. Second, products that did not include the term “shingles” in either the product title or description, but included the term in either the Customer Reviews or the Customer Question and Answer sections were classified as shingles-nonspecific products. A two-tailed two-sample proportions Z-test was used to determine if a product specific to “shingles” was more likely to be a specific vehicle or to include certain ingredients. The numbers of positive and negative reviews in Customer Reviews including the term “shingles” were counted. The two-tailed two-sample proportions Z-test was also used to compare the means of percentages of positive and negative reviews among all reviews of products including “shingles” for shingles-specific and shingles-nonspecific products. A P value <.05 was considered to indicate a statistically significant difference.

Results

Over 3000 results were populated on the Amazon internet retailer when searching for the key term “shingles.” There were 742 results in the “Health & Household” department that received a rating of 4 stars and above. Among the 131 top-rated products, there was a total of 215,225 reviews with a median of 698 reviews (range 24-16,523 reviews) and an average rating of 4.4 (out of 5) stars with a median of 4.4 (range 4-4.9 stars). Different types of vehicles for shingles were counted and categorized. Among the 131 total products, 44 (33.6%) were creams or lotions, 30 (22.9%) were tablets or capsules, 11 (8.4%) were gels, 10 (7.7%) were balms, 8 (6.1%) were bath products, 7 (5.3%) were ointments, 6 (4.6%) were oils, 5 (3.8%) were salves, and the remaining 10 products (7.6%) included powders, wipes, pump dispensers, liquids, and sprays. Among all reviews for the products that mentioned “shingles,” there was an average of 82.6% positive reviews and 10% negative reviews.

Among the 131 products, 46 (35.1%) products that included “shingles” in either the title or product description comprised...
shingles-specific products and 85 (64.9%) that did not include “shingles” in either the title or product description comprised the shingles-nonspecific products. Table 1 shows the top 10 most reviewed overall shingles products and Table 2 shows the top 10 most reviewed shingles-specific products. Comparison of the two tables reveals only three products among both the top 10 most reviewed overall products and the top 10 most reviewed shingles-specific products: Leven Rose Store’s Jojoba Oil, Emuaid’s EmuaidMAX Ointment, and Quantum Health’s Super Lysine.

Table 1. Top 10 most reviewed overall products.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Manufacturer</th>
<th>Product name</th>
<th>Number of reviews</th>
<th>Mean rating (out of 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leven Rose Store</td>
<td>Jojoba Oil</td>
<td>16,523</td>
<td>4.7</td>
</tr>
<tr>
<td>2</td>
<td>Puriya</td>
<td>Mother of All Creams</td>
<td>11,139</td>
<td>4.3</td>
</tr>
<tr>
<td>3</td>
<td>Sun Essential Oils</td>
<td>Geranium</td>
<td>9046</td>
<td>4.2</td>
</tr>
<tr>
<td>4</td>
<td>Emuaid</td>
<td>EmuaidMAX Ointment</td>
<td>8974</td>
<td>4.0</td>
</tr>
<tr>
<td>5</td>
<td>Truremedy</td>
<td>Remedy Soap</td>
<td>8800</td>
<td>4.5</td>
</tr>
<tr>
<td>6</td>
<td>Mederma</td>
<td>Mederma Advanced Scar Gel</td>
<td>8063</td>
<td>4.2</td>
</tr>
<tr>
<td>7</td>
<td>Ramina</td>
<td>Natural Hemp Cream</td>
<td>6377</td>
<td>4.3</td>
</tr>
<tr>
<td>8</td>
<td>Puriya</td>
<td>Wonder Balm</td>
<td>6050</td>
<td>4.3</td>
</tr>
<tr>
<td>9</td>
<td>Quantum Health</td>
<td>Super Lysine</td>
<td>5875</td>
<td>4.6</td>
</tr>
<tr>
<td>10</td>
<td>NOW Foods</td>
<td>Double Strength L-Lysine</td>
<td>5607</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Table 2. Top 10 most reviewed shingles-specific products.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Manufacturer</th>
<th>Product name</th>
<th>Number of reviews</th>
<th>Mean rating (out of 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leven Rose Store</td>
<td>Jojoba Oil</td>
<td>16,523</td>
<td>4.7</td>
</tr>
<tr>
<td>2</td>
<td>Emuaid</td>
<td>EmuaidMAX Ointment</td>
<td>8974</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>Quantum Health</td>
<td>Super Lysine</td>
<td>5875</td>
<td>4.6</td>
</tr>
<tr>
<td>4</td>
<td>Blue Emu</td>
<td>Original Blue-Emu Super Strength</td>
<td>4723</td>
<td>4.5</td>
</tr>
<tr>
<td>5</td>
<td>Dermachange</td>
<td>Shingles</td>
<td>3254</td>
<td>4.2</td>
</tr>
<tr>
<td>6</td>
<td>Wild Naturals</td>
<td>Eczema &amp; Psoriasis Cream</td>
<td>2896</td>
<td>4.1</td>
</tr>
<tr>
<td>7</td>
<td>CleaveBody Organics</td>
<td>Hemp Relief Cream</td>
<td>2828</td>
<td>4.4</td>
</tr>
<tr>
<td>8</td>
<td>Era Organics</td>
<td>Relief</td>
<td>1885</td>
<td>4.0</td>
</tr>
<tr>
<td>9</td>
<td>Emuaid</td>
<td>Emuaid</td>
<td>1794</td>
<td>4.2</td>
</tr>
<tr>
<td>10</td>
<td>Frankincense &amp; Myrh</td>
<td>Neuropathy Rubbing Oil</td>
<td>1574</td>
<td>4.3</td>
</tr>
</tbody>
</table>

When analyzing customer reviews including “shingles” among the shingles-specific products, there was an average of 69.5% positive reviews and 10.1% negative reviews among the total shingles-related reviews per product. Among the shingles-nonspecific products, there was an average of 89.9% positive reviews and 10% negative reviews out of the total shingles-related reviews per product. Shingles-nonspecific products were more likely to have positive customer reviews mentioning “shingles” based on the Z-test analysis (P = .005), whereas there was no significant difference in negative customer reviews between shingles-specific and shingles-nonspecific groups (P = .99).

Out of the 46 shingles-specific products, 18 (39%) were creams or lotions, 7 (15%) were balms, 4 (9%) were oils, 4 (9%) were salves, 3 (7%) were tablets or capsules, 3 (7%) were gels, 3 (7%) were ointments, 1 (2%) was a bath product, and 3 (7%) were other products, including pump dispenser, spray, and liquid. Among the 85 shingles-nonspecific products, 27 (32%) were tablets or capsules, 26 (31%) were creams or lotions, 8 (9%) were gels, 7 (8%) were bath products, 4 (5%) were ointments, 3 (4%) were balms, 2 (2%) were oils, 1 (1%) was a salve, and 7 (8%) were other products, including powders, liquid, sprays, wipes, and solutions. Balms (P = .02) and salves (P = .04) were more likely to be shingles-specific, whereas tablets or capsules (P = .002) were more likely to be shingles-nonspecific.

Based on previous studies related to treatment for shingles, several ingredients were assessed from the products [14,17,18]. Among all 131 products, 29 (22.1%) contained aloe vera, 18 (13.7%) contained honey, 17 (13.0%) contained magnesium, 16 (12.2%) contained lemon balm, 14 (10.7%) contained L-lysine, 13 (9.9%) contained menthol, 11 (8.4%) contained lidocaine, 10 (7.6%) contained zinc, 9 (6.9%) contained oat straw extract, 7 (5.6%) contained St John’s wort, 6 (4.6%) contained licorice, 2 (1.5%) contained capsaicin, 2 (1.5%) contained Reishi mushroom, and 1 (0.8%) contained aspirin.
Out the 46 shingles-specific products, 16 (34.8%) contained aloe vera, 10 (21.7%) contained honey, 1 (2.2%) contained magnesium, 12 (26.1%) contained lemon balm, 5 (10.9%) contained L-lysine, 3 (6.5%) contained menthol, 2 (4.3%) contained lidocaine, 4 (8.7%) contained zinc, 2 (4.3%) contained oatmeal or oat straw extract, 4 (8.7%) contained St John’s wort, 3 (6.5%) contained licorice, and none of the products contained capsaicin, Reishi mushroom, or aspirin. Among the 85 shingles-nonspecific products, 13 (15.3%) contained aloe vera, 8 (9.4%) contained honey, 16 (18.8%) contained magnesium, 4 (4.7%) contained lemon balm, 9 (10.6%) contained L-lysine, 10 (11.8%) contained menthol, 9 (10.6%) contained lidocaine, 6 (7.1%) contained zinc, 7 (8.2%) contained oatmeal or oat straw extract, 3 (3.5%) contained St John’s wort, 3 (3.5%) contained licorice, 2 (2.4%) contained capsaicin, 2 (2.4%) contained Reishi mushroom, and 1 (1.2%) contained aspirin. Among all ingredients, aloe vera (P=0.01) and lemon balm (P<.001) were more likely to be included in shingles-specific products, whereas magnesium (P=0.01) was more likely to be included in shingles-nonspecific products.

Vitamins were assessed individually [15,16,18]. Among all 131 products, 4 (3.1%) included vitamin A, 3 (2.3%) included vitamin B2, 4 (3.1%) included vitamin B6, 2 (1.5%) included vitamin B9, 2 (1.5%) included vitamin B12, 15 (11.5%) included vitamin C, 3 (2.3%) included vitamin D, and 28 (21.4%) included vitamin E. Among the 46 shingles-specific products, 8 (17%) included vitamin C and 15 (33%) included vitamin E, whereas no products included vitamins A, B2, B6, B9, B12, or D. Of the 85 shingles-nonspecific products, 4 (5%) included vitamin A, 3 (4%) included vitamin B2, 4 (4%) included vitamin B6, 2 (2%) included vitamin B9, 2 (2%) included vitamin B12, 7 (8%) included vitamin C, 3 (4%) included vitamin D, and 13 (15%) included vitamin E. Vitamin E was more likely to be used in shingles-specific products (P=0.03).

Specific oils were assessed based off prior studies, including peppermint oil, geranium oil, and hemp oil [19-21]. Among all 131 products, 19 (14.5%) included peppermint oil, 5 (3.8%) included geranium oil, and 15 (11.5%) included hemp oil. Of the 46 shingles-specific products, 12 (26%) included peppermint oil, none included geranium oil, and 8 (17%) included hemp oil. Out the 85 shingles-nonspecific products, 7 (8%) included peppermint oil, 5 (6%) included geranium oil, and 7 (8%) included hemp oil. Peppermint oil was more likely to be included in shingles-specific products (P=.008).

Discussion

Principal Findings

With nearly 1 million cases of HZ diagnosed annually in the United States, HZ can affect up to 20% of individuals within their lifetimes [22,23]. HZ is a large health care burden, with opioids prescribed as the most common first-line treatment, further contributing to the already high health insurance cost of opioids [3]. Patients inflicted by PHN can spend 2-4 times more on health costs than patients with only HZ [24]. As such, internet retailers such as Amazon provide other options for the management and treatment of HZ or PHN that can provide relief for patients. However, with the wide variety of products and ingredients available, it can be difficult for patients to determine which products would be effective. This study showed that among the variety of vehicles available, Amazon customers preferred creams or lotions, which comprised 33.6% of the 131 products, with tablets or capsules coming in second comprising 22.9% of the 131 products. Tablets or capsules were more likely to be shingles-nonspecific products, whereas balms and salves were more likely to be shingles-specific products. This suggests a lack of consensus regarding products recommended for shingles and products that patients prefer.

Over 3000 products were retrieved when searching “shingles” on Amazon. “Shingles” was used as the keyword as it is a term more widely known in the general population. Among the products indicated for shingles treatment, there were also household cleaning products, which raises concern that such products are being suggested for shingles use on the internet retailer. Out of the 131 products, only 35.1% included products that specifically mentioned shingles in either the title or product description, and the majority (64.9%) of products did not. Furthermore, only 3 products from the top 10 most reviewed overall shingles products were within the top 10 most reviewed shingles-specific products. This highlights the discrepancy between products that are suggested for shingles use and products that are labeled for shingles use. When comparing customer reviews that mention shingles between shingles-nonspecific and shingles-specific products, shingles-nonspecific products were more likely to have more positive customer reviews (89.9%) compared with shingles-specific products (69.5%). This suggests that customer reviews play a larger role in product selection compared to a specified product indication for shingles. Interestingly, there was no significant difference in customer reviews of shingles-specific and shingles-nonspecific products, further compounding the importance of reviews in the consumer selection of products.

Various ingredients were analyzed that were previously studied in relation to shingles or PHN treatment. A 5% lidocaine patch and 0.075% capsaicin cream are among first- or second-line topical treatment options for PHN [8]. In our analysis of the 131 products, 8.4% contained lidocaine and 1.5% contained capsaicin. Of the shingles-specific products, only 4.3% contained lidocaine and none contained capsaicin, whereas of the shingles-nonspecific products, 10.6% contained lidocaine and 2.4% contained capsaicin. Lidocaine acts as a local anesthetic with a mechanism of action involving partial inhibition of voltage-gated calcium channels and reducing the discharge of activity in afferent pain receptors [25]. Lidocaine is considered a first-line therapy for PHN despite limited studies on its effectiveness [26,27]. The lidocaine products found in the Amazon products were between 4% and 5% in concentration; however, none of the top products recommended including lidocaine was a patch, which is recommended in the literature [8]. The products including lidocaine were creams, gels, or sprays, which suggests that lidocaine administered using these vehicles was preferred among customers instead of patches. Topical capsaicin is an activator of the TRPV1 channel of nociceptor nerve fibers, leading to an influx of calcium that decreases the function of nociceptor nerve fibers [25]. Studies

http://derma.jmir.org/2021/1/e24971/
have shown that a higher concentration of capsaicin was effective for PHN [28]. The concentration of capsaicin in the products found on Amazon was either 0.025% or 0.1%, whereas high-dose capsaicin products have a concentration of 8%. This may explain why capsaicin was not a highly preferred or recommended product as the smaller concentration only provides moderate relief for patients [25].

Other natural ingredients have been studied for their effects against HZ, such as licorice and Reishi mushroom [14]. Ingredients that have shown efficacy against herpes simplex virus (HSV) may also have a benefit for HZ, such as honey, aloe vera, and St John’s wort [14,29]. Licorice may be able to inactivate viral particles and was reported to show in vitro antiviral activity against VZV, although further studies are needed to evaluate its use as a topical agent [14]. Reishi mushroom was tested in a small clinical trial and a case study, demonstrating relief of pain [14]. Honey has shown faster healing times for patients with HSV infection, suggesting a possible benefit against HZ [14]. Aloe vera is a known ingredient for wound healing, and St John’s wort has shown antiviral activity against HSV-1 [14]. In this study, aloe vera was one of the top ingredients used among the 131 products, accounting for 22.1%, and is more likely to be used as an ingredient in shingles-specific products. This indicates that customers also prefer aloe vera for the treatment of shingles. Honey comprised 13.7% of all products, making it the second most likely included ingredient, suggesting that more studies should be performed to assess the efficacy of honey against HZ. St John’s wort, licorice, and Reishi mushroom were less commonly used as ingredients; however, more studies can reveal if these ingredients will be of benefit to patients with HZ or PHN. Lemon balm was also more likely to be included in shingles-specific products; despite few studies regarding the use of lemon specifically for this condition, it is likely preferred for shingles owing to its high vitamin C level.

Decreased immunity is a known risk factor for HZ and PHN, with nutritional deficiency being a major cause [18]. Vitamin and nutrient deficiencies, such as zinc and magnesium, and their effect on HZ have been studied to assess their efficacy as potential treatments [18,30,31]. Low vitamin C levels have been found to play a role in the development of herpes infection and PHN, with trials of intravenous vitamin C demonstrating efficacy in relieving pain [16]. Hypovitaminosis D has been associated with the development of neuropathic pain due to various mechanisms, including inflammatory processes and an increase of reactive oxygen species [15,32]. Vitamin B such as cobalamin (vitamin B12) was shown to be effective for painful neuropathies, and deficiency of folic acid (vitamin B9) causes peripheral neuropathy [33,34]. Vitamin E has also been shown to act as an analgesic in rat models with neuropathic pain [16]. Hypovitaminosis D has been associated with the development of neuropathic pain due to various mechanisms, including inflammatory processes and an increase of reactive oxygen species [15,32]. Vitamin B such as cobalamin (vitamin B12) was shown to be effective for painful neuropathies, and deficiency of folic acid (vitamin B9) causes peripheral neuropathy [33,34]. Vitamin E has also been shown to act as an analgesic in rat models with neuropathic pain [16].

Zinc deficiency has been shown to be a risk factor for PHN [30]. Magnesium has been found to block the N-methyl-D-aspartate receptor, which is associated with hypersensitivity [30,36]. Among the ingredients assessed, magnesium was more likely to be included in shingles-nonspecific products, whereas vitamin E was more likely to be included in shingles-specific products. Given the sparsity of studies on the efficacy of either magnesium or vitamin E, these results suggest that more studies are warranted for assessing these nutrients in the treatment of HZ and PHN. Vitamin C was the second-ranked nutrient among the 131 products, although it was not necessarily preferred in shingles-specific products despite studies showing its role in HZ and PHN. This discrepancy could be due to the lower concentration of vitamin C as either an oral supplement or within topical agents compared to a higher available systemic dose as an intravenous treatment.

Finally, certain oils were assessed, including peppermint oil, geranium oil, and hemp oil [19-21]. Peppermint oil was more likely to be used as an ingredient in shingles-specific products. The main ingredient of peppermint oil is menthol, which is commonly used for musculoskeletal pain [19]. The possible mechanism of action of peppermint oil is the inhibition of sensitized nociceptors [19]. However, few studies have assessed peppermint oil, thus, its common use in shingles-specific products warrants more studies on its effect on HZ and PHN. Geranium oil was found to relieve pain quickly in a small study [16]; however, it was not widely used in shingles products available on Amazon. Hemp oil was used a primary ingredient in several products (11.5% of 131 total products); however, few studies have focused on its effect for shingles. A small trial showed the effectiveness of a cannabinoid receptor agonist topical for PHN [21]. Given that it is commonly used, hemp oil should be further studied to better understand if it is effective for the treatment of shingles.

Limitations

The main limitation of the study is that not all of the products related to “shingles” from Amazon were included in the analysis since there was over 3000 products found. Only the top 131 products were included with products receiving a rating of less than 4 stars excluded. Furthermore, products that did not include “shingles” in either the product name, description, or mentioned in the customer reviews were excluded. This excluded products that were suggested by the internet retailer algorithm but may not have been suggested by the manufacturer or customers to be used for shingles. Another limitation was that only “shingles” was used as the keyword to narrow down the search based on what the general populace would search. Searching for “postherpetic neuralgia” and “herpes zoster” could potentially produce more results. Furthermore, we did not analyze all of the active ingredients used by all of the products analyzed. Finally, we did not compare ingredients of the products with the amount of positive and negative reviews related to “shingles” that the product received. This comparison would allow for further analysis of whether specific ingredients were perceived to be effective to the general population.

Conclusion

Our analysis of “shingles” products on the internet retailer Amazon demonstrated an abundance of products and available ingredients used for shingles treatment. Although there are already available treatments that are approved for the management of AHZ and PHN, because these are conditions that are typically managed by several treatments, understanding over-the-counter management would benefit patients. Using Amazon to understand what is available to and preferred by
customers can allow us to assess which ingredients require further studies to better educate our patients on what would be effective for AHZ and PHN and to target potential misinformation online.

Conflicts of Interest
None declared.

References


Abbreviations

AHZ: acute herpes zoster
HSV: herpes simplex virus
HZ: herpes zoster
NSAIDs: nonsteroidal anti-inflammatory drugs
PHN: postherpetic neuralgia
VZV: varicella zoster virus

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