Correspondence

Decreased public awareness of skin cancer during the coronavirus pandemic

Dear Editor,

An overall reduction in skin cancer diagnoses is being reported during the coronavirus pandemic.[1] The cause for this decline is yet unknown and is likely to be multifactorial. It may be due to longer processing times for non-coronavirus concerns at general practitioners and hospitals. Maybe fewer people are consulting the healthcare system with skin cancer suspicion, either because something is stopping them or because they do not have skin cancer in focus.

This study investigated whether there has been a decrease in public awareness of skin cancer during the coronavirus pandemic in 2020 compared to 2019. Additionally, the study examined if there has been a development through the pandemic. Therefore, public interest was investigated in the early phase and the latter part of 2020.

Internet traffic can be a proxy for public awareness.[2] Worldwide people search for health-related information online, which makes web search queries on Google Trends a valuable data source on health tendencies.[3]

The public awareness of skin cancer was investigated using Google Trends. Google Trends provides information on how many hits different terms had in a given week on Google. The highest interest on a search query is quantified as 100 relative search volume (RSV), decreasing to 0 RSV representing no interest (www.support.google.com/trends). Worldwide public query data for the following terms "skin cancer," "melanoma," "basal cell carcinoma," and "squamous cell carcinoma" between March 2019 and December 2020 were downloaded.

Data from the coronavirus pandemic from March 2020 to December 2020 were divided in an early and a late period of equal length, the early coronavirus pandemic being from March to July and the late being from August to December. The level of RSV for each web search query during the two parts of the pandemic in 2020 was compared to the level in the corresponding time period in 2019. Welch's t-test performed in IBM SPSS statistics version 25 (IBM, USA) was used to investigate if the mean RSVs were significantly different. P-values below 0.05 were considered significant.

The awareness of "skin cancer," "melanoma," "basal cell carcinoma," and "squamous cell carcinoma" was significantly reduced ($P < 0.001$) during the first 5 months of the pandemic compared to 2019 with a mean difference in RSV between -9 and -17.

In the latter part of 2020, smaller reductions in public awareness were found with a mean difference in RSV between -3 and -12. For "skin cancer," "melanoma," and "basal cell carcinoma," the reduction was statistically significant ($P \leq 0.002$). For squamous cell carcinoma, the reduction was statistically insignificant ($P = 0.092$). Table 1 presents all results.

It is very unlikely that there has been a real decline in skin cancer incidence in 2020.[1] The declining number of patients diagnosed with skin cancer during the coronavirus pandemic is most likely due to missed diagnoses. As a positive prognosis is highly dependent on a diagnosis being made at an early stage of the disease, it is important to re-establish timely skin cancer diagnosis.[4,5] To be able to do this, it is important to know the reasons for the delay. This study suggests decreased worldwide public awareness of skin cancer as part of the multifactorial cause. Awareness was particularly reduced in the first months of the pandemic and was still reduced in the latter part of 2020. Google Trends can be used to follow the interest in skin cancer during the continued coronavirus pandemic.

Ethical approval

No ethical approval from the Committee on Health Research Ethics was needed. The data used in this study were freely available information on trends.google.com and were completely anonymized.

Table 1 Reduction in relative search volume (RSV) for worldwide Google searches for skin cancer-related web search queries during the coronavirus pandemic in 2020 compared to the same time period in 2019

Web search query	Mean difference in RSV (P-value)	
	March–July 2020 compared to 2019	**August–December 2020 compared to 2019**
Skin cancer	-15 ($P < 0.001$)	-7 ($P < 0.001$)
Melanoma	-16 ($P < 0.001$)	-12 ($P < 0.001$)
Basal cell carcinoma	-17 ($P < 0.001$)	-11 ($P = 0.002$)
Squamous cell carcinoma	-9 ($P < 0.001$)	-3 ($P = 0.092$)

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COVID-19 vaccination: possible short-term exacerbations of oral mucosal diseases

Dear Editor,

The coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, has become a global pandemic burden with extreme health, social, and economic implications.[1] With the rapid development and release of vaccinations against the virus, questions have been raised in regard to unforeseen effects, which may have impacted patients' willingness to receive the vaccine.[2]

There are currently three vaccines authorized by the United States Food and Drug Administration (FDA) for emergency use and recommended to prevent severe illness: Pfizer/BioNTech (BNT162b2), Moderna (mRNA-1273), and Johnson & Johnson (JNJ-78436735).[1] The Pfizer/BioNTech and Moderna vaccines are mRNA vaccines, while the Johnson & Johnson vaccine is a viral vector vaccine. Both mRNA and viral vector vaccines are shown to upregulate T-cell-mediated immunity.[3] In clinical trials, it was noted that the Pfizer/BioNTech vaccine elicited a robust $CD8^+$ and T helper type 1 (Th1) $CD4^+$ cell response, with higher serum levels of IL-2, TNF-α, and IFN-γ.[4] Studies from animal models investigating the Moderna vaccine revealed benefits of using the mRNA-based vaccine, including T-cell responses characterized by increasing levels of IFN-γ.[3] Consequently, administration of vaccines could lead to a surge in conditions mediated by similar processes and inflammatory markers.[5]

Patients with a diagnosis of oral lichen planus may experience a flare in their condition after the administration of the vaccine. As oral lichen planus is a T-cell-mediated chronic inflammatory condition of unknown etiology, the inflammatory markers involved with immune response to the administration of the vaccine mirror those involved in the disease process itself.[4] Patients with other autoimmune or immune-mediated conditions, such as mucous membrane pemphigoid, bullous pemphigoid, pemphigus vulgaris, chronic ulcerative stomatitis, and lichen planus pemphigoides, among others, may experience an increase in their clinical manifestations and symptoms.

Many of our patients reported an increase in their oral mucosal disease symptoms shortly after vaccination, which may or may not have been directly related to the administration of the vaccine. The symptoms quickly resolved within 2–4 weeks, and the patient returned to their baseline disease expression. A 65-year-old female patient with multifocal lichen planus was asymptomatic and did not endorse any active skin or oral lesions. Past medical history was significant for hyperlipidemia. Medications included rosuvastatin and vitamin D supplementation. The patient had routine surveillance appointments with no disease expression noted on follow-up. Immediately following the administration of the COVID-19 vaccination, the patient experienced a flare-up of her oral lichen planus symptoms with increased soreness and inflammation in her left buccal mucosa. Approximately 3 weeks after her flare-up, her disease expression regressed to baseline, and she no longer endorsed any symptoms.

Although the vaccine may exacerbate symptoms of existing conditions in the short term, these can be managed appropriately and should not deter patients from receiving the first available vaccine, as vaccination reduces COVID-19-related morbidity and mortality.[5] At this time, there is no definitive evidence of long-term adverse effects against chronic mucosal diseases, but as healthcare professionals, we should be aware of this possibility and counsel our patients accordingly.

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