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Applied nutritional investigation

Determination of interest in vitamin use during COVID-19 pandemic using Google Trends data: Infodemiology study

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ABSTRACT

Objective: The aim of this study was to determine the interest in vitamin use during the COVID-19 pandemic usıng Google Trends data.
Method: Searches were made between January 1, 2016 and August 30, 2020. First, the word “vitamin” was searched. Additionally, the search words "vitamin," “COVID-19,” “immunity,” and Vitamin D,” “Vitamin C,” “Vitamin E,” and “Vitamin A” were searched comparatively. Search was made in Turkish (in Turkey) and English (in world). Additionally, the word “vitamin” was translated into some countries’ languages and was searched. Relative search volumes (RSVs) obtained in searches are presented with graphics. RSVs, downloaded as .csv were transferred to SPSS. Descriptive data was given as numbers and percentages. Kruskal-Wallis analysis was used to determine the difference of RSVs according to years and seasons. Additionally, queries arising related to search words were presented.
Results: Findings from the present study determined that the trend toward vitamins reached 100 RSVs in March 2020, when COVID-19 was declared a pandemic. Vitamins D and C were the most frequently searched vitamin types in Turkey and worldwide. It was determined that searches consisting of a combination of COVID-19 and vitamins were made.
Conclusion: Vitamins attract public interest globally. Seasonal variation and COVID-19 shaped the popularity of vitamins both worldwide and in Turkey. The search frequency was highest in the autumn and spring, but the largest search related to all search terms was determined to be in March 2020. Interest in vitamins has increased since the beginning of the COVID-19 pandemic.

Introduction

The COVID-19 outbreak, first reported on January 13, 2020 in Wuhan, China, has become a serious public health problem that has spread to many continents and countries in a short time [1]. The lack of immunity against this newly emerging virus increases the damaging effect of the disease. COVID-19 affects the immune system by producing a systemic inflammatory response, or cytokine release syndrome [2].

COVID-19 causes symptoms of infection such as fever, cough, shortness of breath, and respiratory distress within an average of 2 to 14 d after infecting humans [3]. In more severe cases, COVID-19 can cause pneumonia, severe acute respiratory syndrome, kidney failure, and death [4]. Although COVID-19 affects everyone from newborns to persons 65 years and older, it has been shown that the most serious consequences occur in individuals with chronic diseases, older individuals, and those with weak immune systems [5]. There is no known treatment for COVID-19 and vaccines have begun to be brought to market in January 2021. Because there is no known treatment and because the rollout of vaccines is slow, individual measures are very important to prevent the disease. Mask wearing, social distancing, and good hand hygiene are the primary measures for preventing disease [5]. However, the most important prophylactic approach against COVID-19, which causes serious damage to the immune system and fatal consequences in people with weakened immune systems, is strengthening of the immune system. There are many vitamins and trace elements necessary for the normal functioning of the immune system [6,7]. It has been shown that supplementation of these vitamins has a positive effect on strengthening immunity [8]. Supplementation with vitamins A and D after influenza vaccination increased the humerus immunity of pediatric patients [9]. Although vitamins C and E strengthen the immune

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system owing to their high anti-inflammatory and antioxidant effects [1,10], it has been reported that vitamin D has an effect that can disrupt viral cellular infection by interacting with angiotensin converting enzymes (ACEs) [10]. It is thought that vitamins D and C play an important role in determining the results of COVID-19 in many studies conducted to determine the efficacy of vitamins in the prognosis of COVID-19 [11–16].

Individuals looking for ways to potentially protect themselves from the rapidly spreading COVID-19 epidemic, or to mitigate its effects after it being diagnosed with it, often turn to vitamins. The beneficial effects of vitamins on the immune system are emphasized in the media, and interested individuals search for information about the effects of vitamins, sources of vitamins, and products they can use. Today, the Internet has become one of the first options when searching for information. The majority of society uses the Internet to quickly access the information they seek. They want to learn as much as they can and often do not spend time with knowledge that requires expertise [17]. The use of Internet data has become an integral part of health informatics over the past decade and can be useful when analyzing and predicting human behavior [18]. The search for data derived from the Internet for epidemiologic purposes is called *infodemiology* (knowledge epidemiology). Infodemiology processes data from search engines, forums, and websites [19].

Google is the most widely used website in Internet crests. Therefore, Google Trends [20], which provides analysis of Google search data, has been used in many studies to analyze the public's search behavior [21]. Google Trends can show information trends, networking on the Internet, and changes that can have a negative or positive effect on public health.

Google search data has been used in many studies to predict the COVID-19 outbreak and its effects [21]. In this study, it is aimed to predict the tendency of society to use vitamins through Google Trends.

Research questions

1. Has interest in vitamins differed over the years?
2. Does interest in vitamins differ according to the seasons?
3. Did the COVID-19 pandemic increase interest in vitamins?

Material and methods

The study data were obtained from the Google Trends website provided by Google. Google Trends provides a time-series index of the volume of queries users entered into Google in a given geographic area. Google Trends indicate normalized results (0–100), which are compared with the maximum value for particular queries during search intervals. Data can be reached separately according to years, days, and geographic areas. Furthermore, it is able to present comparisons between different terms with graphs. It is capable of comparing of five keywords at a time [20,22].

Because Google Trends updated data acquisition methods after 2015, searches were conducted in 2016 and beyond [20]. First, the search word "vitamin" was used. Second, the search words "vitamin", "COVID-19," and "immunity" were searched comparatively. Finally, "Vitamin D," "Vitamin C," "Vitamin E," and "Vitamin A," which are reported to be effective for strengthening the immune system, were searched comparatively [23] Searches in Turkish (for Turkey) and in English (for the world) are made as. Additionally, in some countries where COVID-19 is common, the search for "vitamin" was translated into their own language.

Analysis

Relative search volumes (RSV) values obtained in searches are presented in the figures. The graphic axis ran from August 1 to July 31. Analyses were made by transferring RSV values downloaded as .csv to an SPSS statistics program. Descriptive data are given as number and percentages. In determining the difference of RSV value according to years and seasons, Kruskal–Wallis analysis was used. Bonferroni correction was used to determine which group caused the difference. Additionally, rising queries related to search words are presented with an expression table.

Results

Figure 1A shows the RSVs for "vitamin" in Turkey. The average RSV for "vitamins" for 5 y from January 2016 to September 2020 was 54.6 + 11.6 (min 26–max 100; Table 1). Analysis of the distribution of searches within the year shows that it started to increase in September, decrease after May, and reached its peak at the end of October. Considering the seasonal characteristics of exploration in Turkey, the RSVs of the word "vitamins" are the lowest in summer (45.2 ± 9.8) and the difference was statistically significant ($P < 0.001$).

The RSVs of the word "vitamin" varied by years, and the highest RSVs were in 2020 ($P < 0.001$; Table 1). Within the past 5 y, the searches reached 100 RSVs only in March 2020.

There has been an increasing trend in searches related to the word "vitamins" such as "some brands associated with the vitamin", "vitamin D" and "vitamin C," "black elder," "sources of vitamins," and "usage of vitamins" in Turkey (Table 2).

In Figure 1B, the words "vitamin," "immunity," and "COVID-19" were searched comparatively. The figure shows that the RSV values of the three search words also peaked in March 2020. Additionally, there has been an increasing trend in searches related to the word "immunity" such as "Strengthening the immune system in children,", "Drugs that disrupt the immune system," "What to eat to strengthen the immune system," "The best drug to

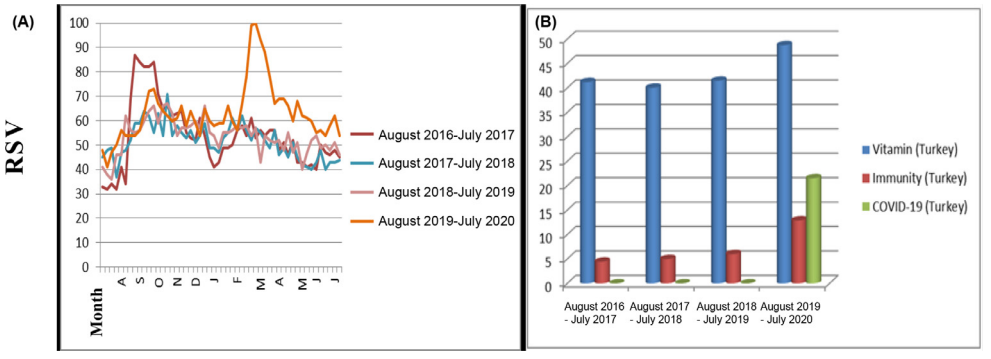

Fig. 1. (**A**) Relative search volumes obtained using search word "vitamin" in Turkey. (**B**) Mean of relative search volumes obtained using search words "vitamin," "Immunity (bağışıklık)," and "COVID-19" in Turkey. RSV, relative search volume.