



Applied nutritional investigation

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

Sevim Çimke Ph.D.^{a,*}, Dilek Yıldırım Gürkan M.Sc.^b^a Department of Children Nursing, Yozgat Bozok University, Yozgat, Turkey^b Department of Public Health Nursing Yozgat Bozok University, Yozgat, Turkey

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ABSTRACT

Objective: The aim of this study was to determine the interest in vitamin use during the COVID-19 pandemic using 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 humeral immunity of pediatric patients [9]. Although vitamins C and E strengthen the immune

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*Corresponding author. Tel.: +90 354 242 10 34; Fax: +90 354-242 10 38.

E-mail address: sevim_cimke@hotmail.com (S. Çimke).

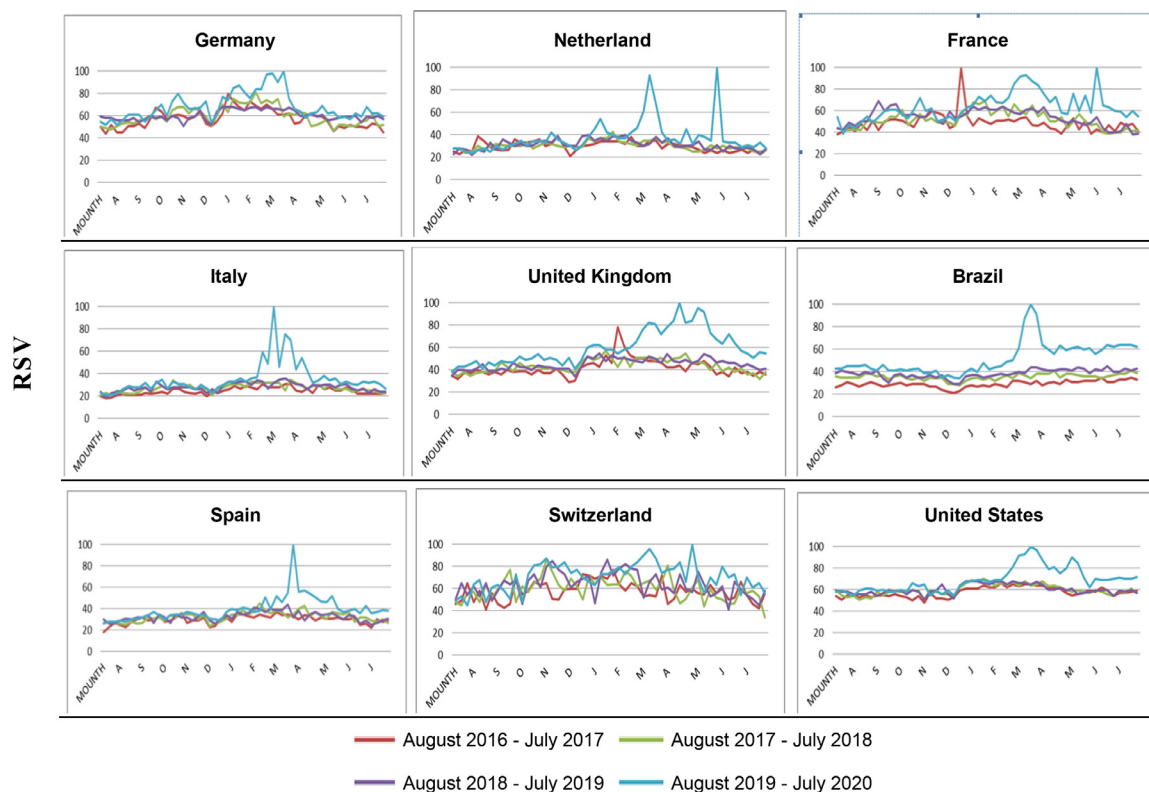


Fig. 4. RSVs of the word "vitamin" in some countries according to month and year. RSV, relative search volume.

In Turkey, the word "vitamin" reached the highest RSV in winter, which may be due to people's tendency to use vitamin supplements owing to the cooling of the weather and the increase in influenza infections. There are seasonal differences around the world. However, in the studies, it was generally determined that they increased in January and February, during which the weather is cold, and decreased after May, as the weather warmed up (Fig. 2).

The first COVID-19 case was reported in China in December 2019. After this date, it spread rapidly and cases were observed in many parts of the world. The World Health Organization declared a pandemic on March 11, 2020. Furthermore, the first COVID-19 case in Turkey was reported on March 11, 2020. In the study, the search on vitamins in Turkey, around the world, and in some countries increased rapidly in March 2020, unlike other years, and all search RSV values for vitamins in 2020 were significantly higher than in previous years (Fig. 1, 2, and 4; Table 1). Furthermore, in the study, searches for vitamin, immunity, and COVID-19 were evaluated comparatively. The RSV values of the three search words increased rapidly in March 2020. Nevertheless, searches such as "COVID-19 vitamin D," "vit D and covid," "vitamin D coronavirus," "vitamin C and coronavirus," "Vitamin C sources," "Strengthening the immune system in children," "Drugs that disrupt immunity," "What to eat to strengthen the immune system," "The best drug to strengthen immunity," "herd immunity," and "Coronavirus" showed an increasing trend. Based on these results, it can be concluded that the increasing trend in March 2020 is an indicator of the public's search for information to protect against COVID-19. In Turkey, the word "Sambucus nigra" is also an increasing trend. It is reported that *Sambucus nigra*, with a rich content of vitamin C [25], has a positive effect on strengthening the immune system [26]. This result indicates that people may have turned toward herbal supplements to strengthen the immune system.

Some vitamins are indicated to be effective in strengthening the immune system [2,23]. During the COVID-19 pandemic, the media frequently has mentioned that these vitamins contribute to both protection from disease and the healing process in case of illness [11–16]. Accordingly, in the study, a comparative search was conducted to determine the tendency toward vitamins that have positive effects on strengthening the immune system. The interest in the types of vitamin both worldwide and in Turkey shows seasonal characteristics. The tendency toward vitamin D was determined to be the highest in the winter in Turkey. This result can be attributed to people's need for supplementary products for vitamin D owing to the lack of sunlight in the winter months. The tendency toward all types of vitamins decreased in summer. The tendency toward vitamin C increased in the spring both in Turkey and worldwide. The tendency toward all types of vitamins increased in 2020 and differed significantly from previous years. In particular, the tendency toward vitamin C reached 100 RSVs. Vitamin C, or ascorbic acid, is a water-soluble food that cannot be synthesized by humans. Vitamin C acts as an antioxidant that can scavenge reactive oxygen species, and thus it protects biomolecules such as proteins, lipids, and nucleotides from oxidative damage and dysfunction. Vitamin C accumulates in leukocytes at concentrations 50 to 100 times higher than in plasma. **It is well known that vitamin C provides a preventive benefit in infectious disease. Vitamin C supplementation supports respiratory defense mechanisms, prevents viral infections, and has antihistamine properties that can improve flulike symptoms as well as reducing the duration and severity of infections.** This essential protective effect against respiratory tract infections has made vitamin C an attractive target for COVID-19 [27].

Vitamin D reached the second highest RSV value. A fat-soluble vitamin, vitamin D has a vital role in modulating both innate and