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Public interest in healthy lifestyle changes before and during the COVID-19 pandemic: Google Trends analysis

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Abstract

Introduction. Healthy lifestyle behaviour is accepted as a non-pharmacological approach in the management of diseases. During the pandemic, individuals started to use the Internet to get information and protect their health.

Method. The identified healthy lifestyle terms were searched in the Google Trends (GT) for the last five years in five countries: Brazil, France, Turkey, the UK, and the USA.

Analysis. Kruskal Wallis test was used in comparing countries, and the Dunn test was used to determine the group that caused the difference. The Mann-Whitney U test was used to compare before and during the pandemic.

Results. While there was a decrease in the frequency of searches for healthy nutrition after the pandemic compared to before the pandemic in Turkey, the USA and the UK, there was an increase in Brazil. The increased frequency of searches for alcohol cessation after the pandemic was statistically significant in the USA, Brazil

and the UK. In Turkey, the USA, and Brazil, the increase in the frequency of searches for the physical exercise topic after the pandemic compared to before the pandemic was statistically significant.

Conclusion. It can be concluded that during the pandemic, there was a significant increase in public interest in most of the healthy lifestyle terms in the five countries identified and there was an awareness to adopt a healthy lifestyle.

Introduction

COVID-19, caused by novel coronaviruses, has been a global pandemic for more than two years. COVID-19 is transmitted to individuals by droplet transmission, causing respiratory diseases ranging from inflammatory symptoms in the upper respiratory tract to fatal severe pneumonia (Hibino and Hayashida, 2022). After the World Health Organization declared the pandemic (World Health Organization, 2020), the measures taken to prevent transmission, namely curfew, working from home and social isolation, have significantly affected lifestyle (Ding et al., 2022). In addition, the closure of outpatient clinics, postponement of elective operations, and the fact that all units of health institutions were busy with COVID-19 caused patients and individuals with health problems to start using different tools such as books, television and the Internet to get information in order to protect their health (Sevgili and Baytaroglu, 2021).

Healthy lifestyle can be defined as making choices in daily life that are appropriate for one's health status by controlling behaviour that may affect one's health (Zehirlioglu and Mert, 2020). Lifestyle is an important determinant of health and the lack of a healthy lifestyle predisposes people to public health problems (Fabbian et al., 2021). The importance of managing disease risk with lifestyle behaviour is also stated in the guidelines published by international organizations such as the American Diabetes Association (2018), the World Health Organization (2021), and the European Heart Association (Visseren et al., 2021). Lifestyle is accepted as a multidimensional structure including nutrition, physical activity, coping with stress, environment (physical and social) (European Lifestyle Medicine Organization, 2022).

The Internet is increasingly used as a source of health information and for changes in lifestyles by those searching information about specific conditions (Donar and Aydan, 2021; Fabbian et al., 2021). Google Trends is a free public online portal from Google that allows users to interact with Internet search data. Google Trends provides data on geographic and temporal patterns in search volumes for user-specified terms (Nuti et al., 2014). Infodemiology is the science of the distribution and determinants of information on the Internet or in a population, with the ultimate goal of informing public health and public policy, and uses non-clinical databases such as Web searches to allow the study of a population's interest in multiple health issues (Eysenbach, 2009; Fabbian et al., 2021). It is the most widely used tool for studying public interest in health topics (Mavragani et al., 2018). In the study by Lee et al. (2021), public interest in immunisation during the COVID-19 pandemic was investigated in Google Trends. In a study using Google Trends for dynamic prediction of Zika virus outbreaks, it was shown that the predicted data were quite similar to the actual data during the outbreak (Teng et al., 2017). Fabbian et al.'s study looked at global interest in the terms obesity, alcohol and cigarettes and reported that the world's citizens have a high interest in obesity, smoking and alcohol (Fabbian et al., 2021).

The aim of this study was to analyse Web search trends in the last five years in the top five countries that reported the highest number of cases in the COVID-19 pandemic (Brazil, France, the UK, the USA, and Turkey),

regarding the public's interest in lifestyle changes such as quitting alcohol, engaging in physical exercise, losing weight, adopting healthy nutrition, quitting smoking, and coping with stress.

Literature review

Google Trends is a reliable tool for predicting changes in human behaviour using trends from Web-based searches. Therefore, it is also used in health behaviour research (Kan et al., 2018). In a study conducted in the United States, it was reported that real-world data can be calculated by converting Google Flu Trends estimates one week before the Centers for Disease Control and Prevention (CDC) reports actual influenza cases (Martin et al., 2014). In a global study using Google Trends data to investigate whether lifestyle diseases have seasonal patterns, it was found that there is serious seasonal comorbidity in hypertension, obesity, asthma, and fibrosis diseases (Patel et al., 2018). A systematic review found that 60% of Google Trends studies focused on infectious diseases and general population behaviour (Nuti et al., 2014). Data from Google Trends COVID-19 data has also formed the basis for many studies. A study using Google Trends, which examined the impact of the COVID-19 pandemic on food safety and diet-related lifestyle behaviour mentioned that limited exercise affects diet, people turn to foods that boost immunity, and outdoor activities are replaced by sedentary indoor behaviour (Mayasari et al., 2020). In another study, in the second wave of interest in the COVID-19 pandemic in Iran, Italy, and South Korea, the main finding is that Google Trends predicts an increase in new cases (Strzeleck, 2020). A study using Google Trends to track Google searches for mental health in the United States reported a pandemic-related increase in searches for anxiety symptoms such as deep breathing and meditation, and for remote treatments for anxiety (Hoerger et al., 2020). Cases of hand, foot, and mouth disease in Japan were studied using Google Trends before and during COVID-19. It was found that public awareness of hand, foot, and mouth infections increased during the COVID-19 pandemic, with strong correlations between the search topic and hand, foot, and mouth infection indicated (Niu et al., 2022).

Lifestyle has changed because of the restrictions that the pandemic COVID-19 brought to daily life. These lifestyle changes have been the subject of scientific publications. In a study conducted with nine hundred ninety-five participants in India, it was found that the COVID-19 pandemic led to improved eating patterns, healthier foods were consumed, but physical activity decreased significantly and one-third of the participants gained weight due to an increase in screen time and sitting (Chopra et al., 2020). A study conducted in Turkey found that eating patterns, physical activity, and sleep habits were negatively affected during the COVID-19 pandemic, stress levels and cigarette consumption increased, and more than half of the participants gained weight (Korkmaz Aslan et al., 2022). In a study that examined lifestyle changes during the first wave of the COVID-19 epidemic, it was reported that 19.3% of participants shifted to a healthier lifestyle and 12.3% shifted to an unhealthy lifestyle (Werf et al., 2021). It was found that during the COVID-19 pandemic, people in West Java were more likely to wash their hands, exercise regularly, sunbathe in the morning, consume more vegetables and fruit, and take vitamins or supplements to increase stamina (Annashr et al., 2022).

In line with this literature review, it is reasonable to use Google Trends data in scientific research because it can predict society's interest in disease and health and even epidemics. There are studies in the literature that the COVID-19 pandemic affects lifestyle, but no study was found that examined Google Trends data to track society's interest in a healthy lifestyle. Therefore, this study planned to analyse the public's interest in healthy lifestyle in the last five years in the five countries that reported the highest number of COVID-19 cases.

Theoretical framework

This study is based on the theory of Pender's health promotion model, which is one of the

most comprehensive and predictive models of health promoting behaviour in the general population (Pouresmali et al., 2021). Although this study is based on Pender's health promotion model, it aims to analyse public interest using Google Trends data rather than theories, which is consistent with the approach taken.

Pender's health promotion model

This model was developed by Nola J. Pender in 1982. It focuses on promoting health and empowering people to achieve good health. This model is a theoretical perspective that determines health factors and their relationships with health promoting behaviour so that effective improvement in the quality of life and health status of patients can be observed (Habibzadeh et al., 2021). It explains the components of lifestyle-related health promotion behaviour. This model is based on expectancy-value theory and social-cognitive theories. According to expectancy-value theory, people are more likely to achieve the goals whose outcomes they value. According to social cognitive theories, thoughts, behaviour, and environment are concepts that constantly interact with each other. People's thoughts control their behaviour (Bahar and Acıl, 2014).

Internet users' behaviour in searching for healthy lifestyle information and their awareness of health promotion needs have been associated with Pender's model, which supports the pursuit of knowledge for health, now available through the Internet. It is well known that a healthy lifestyle boosts immunity (Akbayram et al., 2021). Due to the uncertainty and fear that the pandemic COVID-19 has caused in people, the idea of strengthening immunity has been associated with the social cognitive theory.

Research questions:

1. Has the Internet search volume related to healthy lifestyles changed over the past five years in the five countries where the COVID-19 outbreak is most prevalent?

2. Is there a difference between the countries before and during the pandemic in terms of search volume related to healthy lifestyles?

Methods

Google Trends data

Google Trends is a free public Internet-based application that allows global or local interest searches on targeted search terms. It normalises search data, making it easier to compare terms. To compare the relative popularity of searches, each data point is divided by the sum of searches for the geography and time period it represents. The resulting numbers are scaled from 0 to 100 based on the ratio of a topic to all searches across all topics. Low-volume search terms appear as '0' and indicate no searches, while '100' represents the highest search activity for a given keyword or string. Google Trends does not provide actual search numbers, but instead provides a metric of interest over time. In this case, a value of 100 is the highest popularity for the term, a value of 50 means the term is half as popular, and a value of 0 means that there is not enough data for the term. Case values are converted to the range 0 to 100 for consistency (Google Support, 2022; Kurian et al., 2020).

The data in this study were collected from Google Trends between March 4 and March 11, 2022. In our study, the date ranges refer to the period from January 1, 2017 to December 29, 2019 for 'before-pandemic', December 30, 2019 to December 26, 2021 for 'during the pandemic'. Keywords related to healthy lifestyle, which are valid in all chronic diseases, were determined by the authors in line with the literature. These keywords are: *lose weight*, *healthy nutrition*, *quitting alcohol*, *quit smoking*, *coping with stress*, and *physical exercise*. While selecting countries other than Turkey, the first five countries most affected by the COVID-19 pandemic were selected according to World Health Organization data. These countries are the USA, India, Brazil, France, and the UK (World Health Organization, 2022). However, since the Devanagari writing system is used in India, this country was excluded. After translating the keywords into foreign languages, the accuracy of the keywords was

confirmed by consulting native speakers. The study was completed with the USA, Brazil, France, the UK and Turkey. All keywords were analysed in Google Trends using 'Country names', 'All categories', 'Google Web search' filters. The keywords were searched in each country's own language.

Turkish	**English**	**French**	**Portuguese**
Kilo verme	Lose weight	Perdre du poids	Perder peso
Sağlıklı beslenme	Healthy nutrition	Alimentation saine	Alimentação saudável
Alkolü bırakma	Quitting alcohol	Éviter l'alcool	Reduzir o álcool
Sigarayı bırakma	Quit smoking	Arrêter de fumer	Parar de fumar
Stresle baş etme	Coping with stress	Gérer le stress	Lidar com o estresse
Fiziksel egzersiz	Physical exercise	Exercice physique	Exercício físico

Table 1: Healthy lifestyle changes search terms

The date range of January 1, 2017 to December 26, 2021 was determined as the last five years and the data was saved as an excel file.

Ethics committee permission was not required for this study as all data were publicly and freely available online.

Statistical analyses

IBM SPSS Statistics 22 program was used for statistical analyses while evaluating the findings obtained in the study. The compatibility of the parameters with normal distribution was evaluated by Kolmogorov-Smirnov and Shapiro Wilk tests and it was determined that the parameters did not show normal distribution. Kruskal-Wallis test was used for comparisons of parameters between countries and Dunn's test was used to determine the group causing the difference. Mann Whitney U test was used in pre-pandemic and during pandemic comparisons. Significance was evaluated at $p<0.05$ level.

Results

Before the pandemic, the average *lose weight* searches in Turkey were significantly lower than in the US, Brazil and the UK (p Turkey-US=0.001; p Turkey-Brazil=0.001; p Turkey-UK= 0.001; $p<0.05$). During the pandemic, the average *lose weight* searches in Turkey were significantly lower than in the US, Brazil, the UK and France (p Turkey-US=0.001; p Turkey-Brazil= 0.001; p Turkey-UK= 0.001; p Turkey-France=0.036; $p<0.05$).

In Turkey, there was no significant change in the frequency of searches for the topic of *lose weight* during the pandemic compared to before the pandemic ($p>0.05$), while there was an increase in the frequency of searches for the topic in the USA, the UK and France compared to before the pandemic (p=0.001, p=0.003, p=0.001, respectively). In Brazil, there was a decrease in the frequency of searches for the topic of *lose weight* during the pandemic compared to before the pandemic (p=0.001; $p<0.05$). In Turkey, the USA and the UK, there was a decrease in the frequency of searches for the topic of *healthy nutrition* during the pandemic compared to the pre-pandemic period (p=0.001, p=0.001 p=0.001); while in Brazil, there was an increase (p=0.001; $p<0.05$).

No significant change was observed in France (p>0.05) (Table 2).

	Lose weight			Healthy nutrition		
	Before pandemic Mean±SD (median)	During pandemic Mean±SD (median)	[2]p	Before pandemic Mean±SD (median)	During pandemic Mean±SD (median)	[2]p
Turkey	46.32±9.97 (45)[a]	43.99±13.29 (43)[a]	0.099	31.14±14.68 (28)[a]	22.71±9 (21)[a]	0.001*
USA	69.21±13.08 (75)[b]	75.82±14.46 (79)[b]	0.001*	71.43±11.6 (72)[b]	64.55±11.94 (65)[b]	0.001*
Brazil	63.83±8.74 (64)[c]	59.26±10.43 (59)[c]	0.001*	48.52±17.73 (48)[c]	62.78±18.98 (65)[b]	0.001*
United Kingdom	63.78±12.95 (67)[c]	68.87±16.27 (70)[b]	0.003*	56.59±16.99 (55)[d]	47.8±13.74 (49)[c]	0.001*
France	45.61±8.02 (46)[a]	51.48±13.58 (51)[d]	0.001*	40.75±16.16 (40)[e]	37.8±13.59 (37)[d]	0.245
[1]p	0.001*	0.001*		0.001*	0.001*	

[1]Kruskal Wallis test *[2]Mann Whitney U Test* **p<0.05*

NOTE: Different letters in the columns indicate differences between countries.

Table 2: Evaluations on the frequency of searches for the terms 'lose weight' and 'healthy nutrition'

There was a difference in the frequency of searches for the topic of *quit smoking* between countries before the pandemic (p=0.001; p<0.05). It was significantly lower in Turkey than in the US, Brazil and France (p Turkey-US=0.001; p Turkey-Brazil=0.001; p Turkey-France=0.001; p<0.05). Compared to the pre-pandemic period, there was a decrease in the frequency of *quit smoking* searches in Turkey, the USA, Brazil and the UK (p:=0.001, p=0.001, p=0.001, p=0.001, p=0.003; p<0.05) and a significant increase in France (p=0.001; p<0.05).

In Brazil, the average number of searches for *alcohol cessation* was significantly lower than in the US and the UK (p Brazil-US= 0.001; p Brazil-UK= 0.008; p<0.05). In Turkey, the decrease in the frequency of searches for the topic of *quitting alcohol* during the pandemic compared to the pre-pandemic period was statistically significant (p=0.010; p<0.05), while the increase in the USA, Brazil and the UK was statistically significant (p=0.001, p=0.001, p=0.001, p=0.001) (Table 3).

	Quit smoking			Quitting alcohol		
	Before pandemic	During pandemic		Before pandemic	During pandemic	
	Mean±SD (median)	Mean±SD (median)	[2]p	Mean±SD (median)	Mean±SD (median)	[2]p
Turkey	40.8±18.23 (36)[a]	22.5±10.85 (20)[a]	0.001*	17.96±20.5 (21)[a]	13.72±16.22 (17)[a]	0.010*
USA	57.27±7.52 (57)[b]	45.71±6.17 (45)[b]	0.001*	41.19±10.39 (40)[b]	52.83±10.91 (53)[b]	0.001*
Brazil	67.19±8.57 (68)[c]	57.43±8.8 (57)[c]	0.001*	26.22±15.93 (25)[c]	48.98±19.75 (46)[bc]	0.001*
United Kingdom	46.52±10.64 (45)[a]	42.85±8.32 (42)[b]	0.003*	32.26±13.82 (30)[d]	43.39±16.69 (41)[c]	0.001*
France	52.51±14.2 (51)[d]	57.55±12.81 (57)[c]	0.001*	-	-	
[1]p	0.001*	0.001*		0.001*	0.001*	

[1]Kruskal Wallis test *[2]Mann Whitney U Test* **p<0.05*

NOTE: Different letters in the columns indicate differences between countries.

Table 3: Evaluations on the frequency of searches for 'quit smoking' and 'quitting alcohol'

Before the pandemic, the average number of searches for coping with stress was lower in Brazil than in Turkey, the US, the UK and France (p Brazil-Turkey=0.004; p Brazil-US=0.001; p Brazil-UK=0.001; p Brazil-France= 0.001; p<0.05). During the pandemic, the average number of searches for coping with stress was lower in Brazil than in Turkey, the USA, the UK and France (p Brazil-Turkey=0.002; p Brazil-USA=.001; p Brazil-UK=0.012; p Brazil-France= 0.001; p Brazil-France= 0.001; p<0.05) (Figure 1).

The increase in the frequency of searches for coping with stress during the pandemic compared to before the pandemic in Turkey, the USA and Brazil was statistically significant (p=0.001, 0.035, p=0.001, p=0.001; p<0.05, respectively). In the UK, the decrease in the frequency of searches for coping with stress during the pandemic compared to before the pandemic was found to be significant (p=0.001; p<0.05); in France, there was no statistically significant change in the frequency of searches for coping with stress during the pandemic compared to before the pandemic (p=0.052; p>0.05).

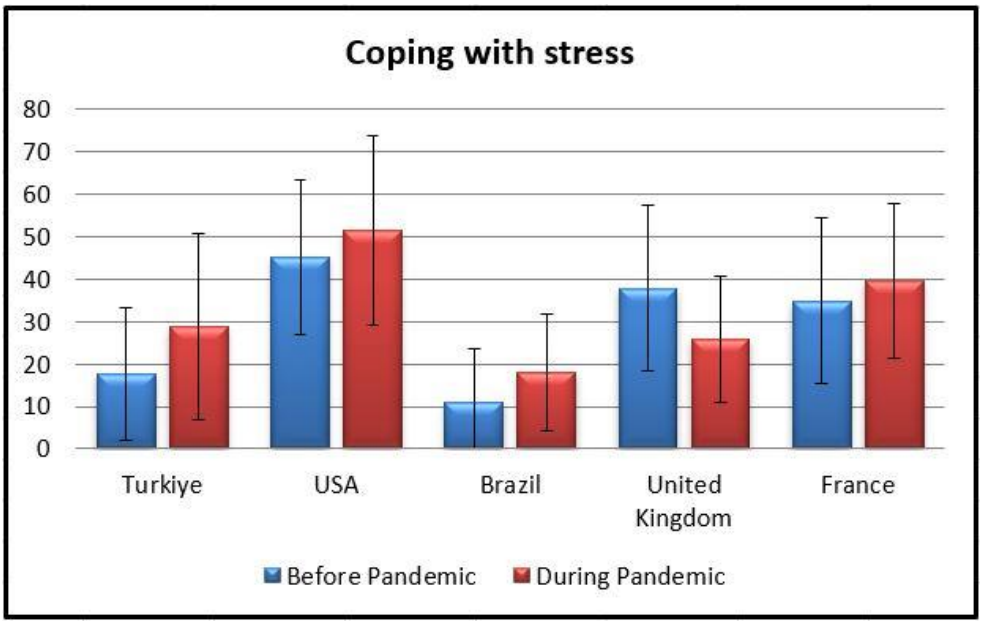

Figure 1. Frequency figure of searches for 'coping with stress' before and during the pandemi

Before the pandemic, the average number of searches for *physical exercise* in Turkey was significantly lower than in the USA, Brazil and France (p Turkey-US=0.001; p Turkey-Brazil=0.001; p Turkey-France=0.001; p<0.05). During the pandemic, the average number of searches for *physical exercise* in Turkey was significantly lower than in the USA, Brazil and France (p Turkey-USA=0.001; p Turkey-Brazil= 0.001; p Turkey-France=0.001; p<0.05).

In Turkey, the USA and Brazil, the increase in the frequency of searches for *physical exercise* during the pandemic compared to before the pandemic was statistically significant (p=0.001, p=0.001, p=0.001, p=0.001; p<0.05, respectively) (Figure 2). In the UK, there was no statistically significant change in the frequency of searches for the *physical exercise* topic during the pandemic compared to before the pandemic (p=0.112; p>0.05), while in France, there was a decrease in the frequency of searches for the topic during the pandemic compared to before the pandemic (p=0.001; p<0.05).

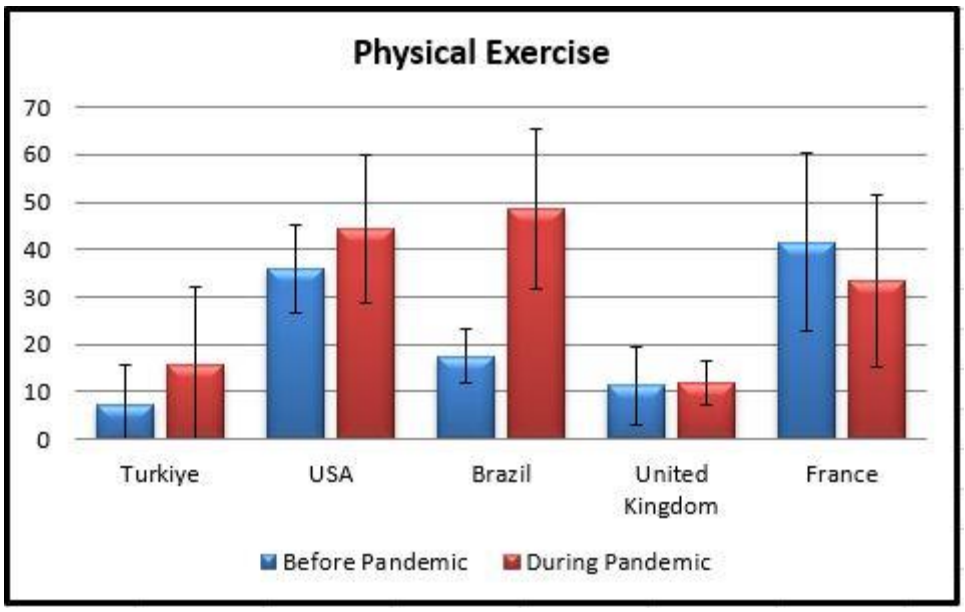

Figure 2. Frequency figure of searches for 'physical exercise' before and during the pandemic

Discussion

Web searches are analysed to investigate public interest in health issues. Google Trends detects public interest, the data is not suitable for epidemiological use, but a Google Trends study (Fabbian et al., 2021) compared Google Trends search scores with the World Health Organization's Global Health Observatory data and found a high correlation between Google Trends data and epidemiological data. This result supports that Google Trends data can be formalized. In this study, we determined that the Google Trends for lifestyle changes such as quitting alcohol, physical exercise, losing weight, healthy nutrition, quitting smoking and coping with stress differed before and during the pandemic.

We found that the term *lose weight* increased significantly in the US, the UK and France during the pandemic (Table 2). In the pandemic, measures such as working from home and curfews, have led people to a sedentary life. Therefore, it is thought that there is an increase in search terms. In the Long-Term Future Prevalence of Obesity in European Countries study, the prevalence of obesity in France was 24.1% in women and 24.5% in men, while the prevalence of obesity in the UK was 24.1% in women and 24.5% in men, and it was reported

that obesity has become a major health problem in Europe (Janssen et al., 2020). Studies have reported that COVID-19 is more severe in individuals who are overweight or obese, and the need for intensive care and invasive ventilation increases (Cuschieri and Grech, 2020; Mcmichael et al., 2020; Ryan et al., 2020; Simonnet et al., 2020). The fear and anxiety of the society against COVID-19 disease, whose treatment has not yet been clarified, may also cause the desire to lose weight.

This study found that there was a significant increase in search interest for the term *healthy nutrition* only in Brazil, a significant decrease in search frequency in Turkey, the USA, the UK and no statistically significant change in France. A proper and healthy diet strengthens the immune system against infections caused by viruses. In addition, one knows that individuals with a healthy and balanced diet have a lower incidence of infection (Aman and Masood, 2020). In a study, the correlation between the rate of consumption of fermented food products and COVID-19 mortality rate was examined and it was reported that for each g/day increase in the average national consumption of fermented vegetables, the risk of death for COVID-19 decreased by 35.4% (Fonseca et al., 2020). In a study conducted in 1368 volunteers over the age of 18 in Brazil, it was reported that breakfast was eaten less, dinners were heavier, bakery products, frozen and fast food consumption increased, and vegetable and fruit consumption decreased during the pandemic (Souza et al., 2021). Another study involving 45161 people in Brazil reported similar results that ultra-processed food intake, cigarette and alcoholic beverage consumption increased (Malta et al., 2020). It was reported in these studies that the Brazilian society's nutrition during the pandemic was unhealthy and unbalanced, but it was reflected in Google Trends data that the society was interested in this issue even if they did not follow a healthy diet. Pandemic-related quarantine is a stressful event and affects eating habits. At the same time, a nationwide curfew due to the pandemic, unlimited access to food for most individuals, and being forced to stay at home for long periods of time may have potentially changed eating habits (Sidor and Rzymsk, 2020). The significant decrease in the frequency of healthy diet searches in Turkey, the USA and the UK may be due to pandemic stress. In the aftermath of the pandemic, people may have sought healthy recipes rather than the term *healthy diet* to boost their immunity because they spent more time at home. Therefore, the data for the term *healthy diet* may be low.

A significant increase in the frequency of searches for the *quitting alcohol* term during the pandemic was found in the USA, the UK and Brazil. Studies conducted in the US and the UK found that alcohol consumption increased during COVID-19 (Garnett et al., 2021; Litt et al., 2021; Souza et al., 2021). High alcohol consumption causes the immune system to weaken and the body to be more susceptible to COVID-19 (Calina et al., 2021). The fact that alcohol consumption increased in countries where the *quitting alcohol* term increased significantly in the Google Trends during the pandemic confirms the Google Trends data. Individuals who consume too much alcohol may have felt the need to quit alcohol because it is harmful to health. Individuals may have conducted such a research to get rid of the harms of alcohol.

Smoking is known to be associated with adverse outcomes related to COVID-19. In a systematic review, it was reported that smoking patients hospitalised due to COVID-19 had a 2-9 times higher risk of serious COVID-19 complications compared to non-smokers (Vardavas and Nikitara, 2020). A Google Trends study, which was screened worldwide on whether there was an increased interest in quit smoking in the first months of the pandemic, reported that there was no trend of increased interest (Heerfordt and Heerfordt, 2020). Similarly, in this study, we found that there was a decrease in the frequency of searching for the term *quit smoking* compared to before the pandemic in Turkey, Brazil, the UK, and the USA. France was the only country with a significant increase in the term *quit smoking* compared to the before pandemic period (Table 3). In addition, since smoking is seen as

a way of coping with stress for many people, they may not have felt the need to quit smoking. This may have led to a decrease in the frequency of search. At the beginning of the pandemic, some scientific publications (Changeux et al., 2020) stated that nicotine protects against COVID-19 or that smokers are less likely to contract COVID-19 (Farsalinos et al., 2020). Later publications refuted this thesis and proved the opposite. However, this unproven work was even featured in mainstream news bulletins. Therefore, it has been thought people did not have the thought of quitting smoking.

During the pandemic, the fear of contracting the virus, the lack of specific treatment, the high mortality rate associated with the virus, and uncertainty about when the virus will be brought under control are the main factors that have been found to be highly responsible for increased psychological distress and even more serious mental health problems. Economic loss, disruption of daily routine, inability to participate in social activities, and constant exposure to negative news have made the pandemic crisis an unmanageable source of stress (Lakhan et al., 2020). In this study, the frequency of searches for the *coping with stress* term in Turkey, the USA, and Brazil was found to increase significantly during the pandemic (Figure 1). In the USA, pandemic-related stress was reported to be moderately associated with both depression and anxiety (Kujawa et al., 2020).

It was observed that the frequency of searches for the *physical exercise* term increased during the pandemic in Turkey, the USA and Brazil (Figure 2). Physical exercise promotes changes in cell morphology and function of the immune system and induces changes in the expression pattern of pro- and anti-inflammatory cytokines (Improta-Caria et al., 2021). Physical activity is recognised as a non-drug practice for the prevention and treatment of psychological, physical and/or metabolic diseases (da Silveira et al., 2021). Considering that exercise is essential during the pandemic, it is important to promote regular physical exercise to prevent disease during social isolation. Studies conducted during the pandemic reported that physical activity decreased (Ammar et al., 2020; Bagcı et al., 2021). Working from home, switching to distance education, and curfews within the scope of pandemic measures have forced individuals to live sedentary lives. Public service announcements were published by the Ministry and health professionals on social media to raise awareness about inactivity and other negative consequences of the pandemic. Again, to prevent the effects of inactivity, free online exercise programs are offered for people to benefit from. Therefore, it is thought that the frequency of searching for *physical exercise* may have increased in order to stay active and protect against the negative effects of inactivity, especially during the restrictions.

Limitations of the study

The study contains possible limitations. The terms to search in Google Trends for healthy lifestyle changes were selected by the researchers in accordance with the literature. The terms for healthy lifestyle behaviours may be expanded. This is also a limitation. This could include bias, as Internet users will also search for other terms. Other limitations of our study include limited Internet access in some regions, lower Internet access in older age groups, and inability to identify searcher demographic characteristics. For analytics, we used weekly relative search volumes (RSV) rather than daily volumes, which may have resulted in some loss of detail. Although valuable insights can be gained with Google Trends, a key limitation is that it is always a measure of search patterns and not actual behaviour; therefore, conclusions and estimates should always come with this caveat.

Conclusion

In this study, it can be concluded that there was a significant increase in public interest in most of the healthy lifestyle terms in the five countries identified and there was an awareness to adopt a healthy lifestyle during the pandemic. Interest in the term *quit smoking* was found to be less than the other terms. Infodemiology can be an effective tool to investigate public interest in a particular topic. Google Trends data can help health

professionals to prevent diseases with the information obtained, to ensure that the society has access to accurate information, and to intervene early in health-damaging habits. As mentioned in the limitations, the terms for lifestyle behaviour can be expanded. For example: more comprehensive studies can also be conducted using terms such as good sleep habits, health responsibility, interpersonal relationships, self-actualisation, etc. Conducting comprehensive studies evaluating more countries will contribute to the effective management of situations affecting the society such as epidemics.

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