Original Article

Global Change in Interest toward Yoga for Mental Health Ailments during Coronavirus Disease-19 Pandemic: A Google Trend Analysis

Abstract

Background: With coronavirus disease (COVID)-19 pandemic, society is gripped with uncertainty and fear, inclining them toward Yoga to prevent mental health issues. Google Trends (GT) depicts the public interest of the community which may vary due to evolving policy dynamics of the COVID-19 pandemic. **Aim:** The aim was to study global public interest in Yoga for mental health during the COVID-19 pandemic. **Material and Methods:** Global time trends were obtained for *Yoga*, Anxiety, and Depression from November 1, 2019 to May 31, 2020 using GT. The time series analysis was done in three different time periods – pre-COVID-19 phase, transition period, and COVID-19 pandemic phase. Cross-correlation, Spearman rho, Friedman ANOVA test, and forecasting were used for analysis. **Results:** GT found a global change in the search queries for *Yoga*, anxiety, and depression during the three time periods. High burden COVID-19 countries – Italy, Spain, Russia, and Brazil had an increasing search trend for *Yoga*. During the COVID-19 phase, there was a significant positive correlation between the search trends of *Yoga* with depression ($r = 0.232$; $P < 0.05$) and anxiety ($r = 0.351$; $P < 0.05$), but higher anxiety and depression searches lead to lower Yoga searches at lag +6. Forecast projected a continuous increase in *Yoga* searches and anxiety queries. **Conclusion:** Google Trends captured a significant rise in interest of Yoga among the global community but diminished with time. Hence, the need for interventions to promote Yoga to be part of routine life and for making sure that people adhere to the Yoga practices on a continuous basis.

Keywords: *Anxiety, coronavirus disease-19, depression, Google Trends, Yoga*

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Introduction

The Coronavirus disease-2019 (COVID-19) pandemic has infected over 12 million people and caused the death of nearly 0.5 million people across the world.[1] The pandemic itself, and the uncertainty surrounding survival, is spurring an increase in psychological problems such as anxiety, depression, and other mental illnesses.[2,3] Previously, it has been found that the global burden of mental ailments is on the rise. In 2015, depression had affected nearly more than 322 million people worldwide.[4] In the same year, an estimated 264 million people were diagnosed with anxiety disorders, which was approximately 3.6% of the global population reflecting an increase of 14.9% since 2005.[4]

Research shows an imperative relationship between a person's mental and physical health. Many physical and mental health benefits can be elicited through the regular practice of yoga.[5-7] Yoga is practiced as asanas, and they help not only aligning the mind with the body but also an alternative to physical activity. The National Health Interview Survey reported *Yoga* as the most common complementary health approach among US adults in 2012 (9.5%) and 2017 (14.3%).[8] Mounting evidence shows that Yoga helps people practice healthy eating, improves sleep quality, reduces stress levels, and motivates people to quit addictions like alcohol consumption and smoking.[9-13]

In this era of technology, one of the major sources of information on Yoga is the "Google search engine". Google is one of the most common search engines and "Google Trends" was first introduced in 2006 used to understand and predict disease outbreaks and study policy impacts.[4-16] Policymaking and implementation during the COVID-19 pandemic has been dynamic.[17] In our study, we aim to assess the implications of global policy dynamics

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and COVID-19 pandemic on trends in mental health problems and Yoga across the world using GT analysis.

Materials and Methods

GT (http://google.com/trends) is an open-source online platform that analyses the search queries in Google according to its popularity relative to other search queries over a period of time. It presents the data in graphical formats to compare the relative search volumes (RSVs) of the different queries. Users can search for keywords in different geographic locations at different time periods with various search options such as YouTube searches, web searches, and news searches, to obtain a line graph for time trends and spatial distribution of the "Relative Search Volume" across the area selected.[18]

RSV is the proportion of the search query conducted relative to the total number of searches conducted during that specific time period. RSV value is normalized to a 0–100 scale (100 – highest proportion of all searches). In our study, global data was collected in terms of daily RSV, i.e., daily aggregated relative search volume using keywords.

GT "related queries," "related topics," and "MeSH" was used in searching for keywords. The GT was plotted for keywords "Yoga" searched as a "discipline;" "Anxiety" searched as "Anxiety + stress + worry + fear + COVID-19 anxiety-iyta-best friends-download-economy." When "Yoga" term was searched as a "discipline" because GT includes all its various synonyms available under the category of "Yoga discipline." Hence, Yoga was searched as discipline, and the addition of other synonyms for yoga was omitted. The terms such as stress, worry, and fear were included as synonyms for anxiety. The terms with break out searches in the "related queries section" of GT for anxiety were iyta, best friends, and download; they were excluded from the search for anxiety to capture nonbiased anxiety search patterns. In order to capture the anxiety searches exclusively to COVID-19, COVID-19 anxiety was added and the economy was removed from the search. "Depression" was searched as "Depression + sad + corona depression + COVID-19 depression - song - halsey - baby - economy," respectively. Keywords such as song, halsey, and baby were found related to depression searches in the "related queries" section of GT but found irrelevant to our study, hence were removed. The addition of COVID-19 depression and removal of the economy was done to bring exclusive search patterns for depression due to COVID-19.

On the basis of policy dynamics, the time period (November 1, 2019–May 31, 2020) for our study was divided into three phases, depending on the declaration of COVID-19 a pandemic and a Public Health Emergency of International Concern; (1) November 2019 to January 2020 (pre-COVID-19 phase) (2) January 31, 2020–March 11, 2020 (transition phase) and (3) March 12, 2020–May 31, 2020 (COVID-19 pandemic phase).

The impact of COVID-19 on the public interest of *Yoga* and mental ailments was assessed by projections of RSV. The statistical analysis was done using Statistical package for Social Sciences (SPSS),v20, USA. The graphical representations were analyzed with cross-correlation and Spearman rho to assess the correlation between mental health and Yoga. Spearman rho was used as RSV values were for yoga, depression and anxiety had a nonnormally distribution. The results from cross-correlation are achieved from product-moment correlations comparing the two-time series. Cross-correlations account for the time dependence between two variables, i.e., lag. Lag values depict the degree and direction of associations. A lag of –1 suggests that GT data for one variable have shifted backward by 1 day from the data of the other variable and the opposite is true for +1. Positive and negative correlation coefficients above average values after >1 lag period were considered significant. $P < 0.05$ was considered statistically significant. Friedman ANOVA was used to analyze the difference between the three groups considering the three groups related to each other based. ARIMA modeling was used for forecasting the trends for 6 months on public interest in mental health problems and Yoga.[19]

Results

We obtained the GT for Anxiety, Depression, and Yoga of 219 countries between November 1, 2019 and May 31, 2020. A positive trend was found in Yoga and anxiety searches after December 31, 2019, and a continuous increase in *Yoga* search queries after March 12, 2020. The sustained increase in *Yoga* search was found within a day of COVID-19 being declared as a pandemic. There was also an increase in the "Anxiety" and relative fall in the "Depression" search queries after March 11, 2020 [Figure 1].

Yoga searches had a positive correlation with anxiety ($r = 0.174$; $P < 0.05$) and a negative correlation with depression searches ($r = -0.167$; $P < 0.05$).

It was found that yoga and anxiety RSV had a positive cross correlation (lag = 0; $r = 0.253$ and lag = 6; $r = 0.432$) and

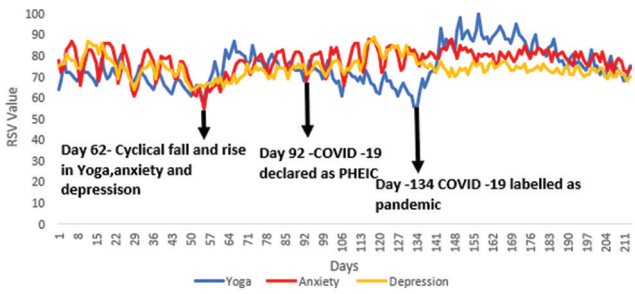

Figure 1: Time trend of Yoga, Depression, and Anxiety from time period November 1, 2019 to May 31, 2020

had a negative correlation at lag +6 (r = −0.492). Yoga and depression searches had a positive cross correlation (r = 0.087) at lag 0 and (r = −0.305) at lag-1. Anxiety and depression had positive cross correlation (0.503) at lag 0.

High burden COVID-19 countries, such as Spain (73), Russia (71), Brazil (49), France (49), and Italy (54) had a relatively higher positive surge in Yoga search queries, especially after it was declared a pandemic. Higher anxiety RSV values were found in the countries United Kingdom (47) and United States of America (47). Depression RSV values had a fall but had an irregular pattern but showed an increasing trend toward the end in countries such as India (49) and Pakistan (66) [Figure 2].

During pre-COVID-19 phase, the correlation between the Google searches for Yoga and anxiety (r = 0.190; P = 0.07) and with depression (r = 0.047; P = 0.658) was nonsignificant. During transition phase, there was a significant negative correlation between the searches conducted for Yoga with depression (r = −0.566; P = 0.01), and but nonsignificant in anxiety (r = −0.303; P = 0.06). During COVID-19 pandemic phase, there was a significant positive correlation between the search trends of Yoga with depression (r = 0.232; P < 0.05), and anxiety (r = 0.351; P < 0.05) [Figure 3].

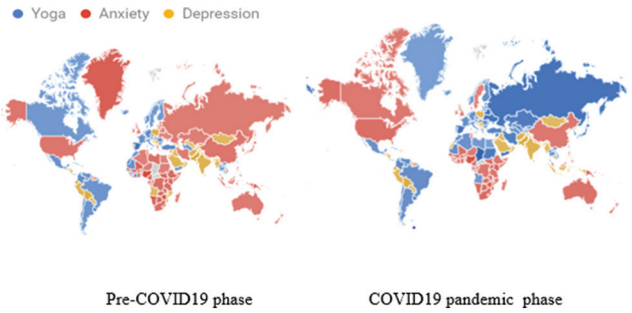

Figure 2: Global change in the search query of Yoga, Anxiety, and Depression during pre-COVID-19 phase (November 01, 2020–January 30, 2020) and COVID-19 pandemic phase (March 12, 2020–May 31, 2020). COVID-19: Coronavirus disease-19

During the pre-COVID-19 phase, there was a positive cross-correlation between yoga and anxiety at lag 0 (r = 0.01) and negatively correlated at lag period-1 (r = −0.516), i.e., higher yoga searches lead to lower anxiety searches 1 day later, while anxiety search increases with yoga search queries (lag +1; r = 0.503) 1 day later. Yoga and depression had a positive correlation at lag 0 (0.111) and had a negative correlation at lag period-1 (r = −0.330), i.e., higher yoga searches lead to lower depression searches 1 day later, while at lag period +1, depression search increases with yoga search queries (r = 0.361) 1 day later, but depression search increases with decrease in yoga search queries (lag +6 r = −0.298) 6 days later.

During the transition phase, there was a negative cross-correlation between yoga and anxiety searches at lag 0 (r = −0.182). Yoga and anxiety search queries are negatively correlated 1 day later (lag-1; r = −0.546), while the increase in anxiety searches increases with yoga searches 1 day later (lag +1; r = 0.551). Yoga and depression search queries were negatively cross-correlated at lag 0 (−0.556). Higher yoga search queries decrease depression search quires 1 day later (lag-1; r = −0.344) and higher depression searches increase with a decrease in yoga searches, 6 days later (lag +6; r = −0.364) [Figure 3].

During the COVID-19 pandemic phase, there was a positive cross-correlation between yoga and anxiety at lag 0 (0.182) and higher yoga searches relate to higher anxiety searches 6 days later (lag-6; r = 0.36). Higher anxiety searches lead to a decrease in yoga searches, 1 day later (lag +1; r = −0.524) and 6 days later lag +6 r = −0.488). Yoga and depression searches had a positive cross-correlation (lag 0; r = 0.200). An increase in yoga searches decreases depression searches, 1 day later (lag-1; r = −0.304), and an increase in depression searches decreases yoga searches, 6 days later (lag +6; r = −0.277).

The median for search queries of Yoga, depression, and anxiety was found to be significantly different between

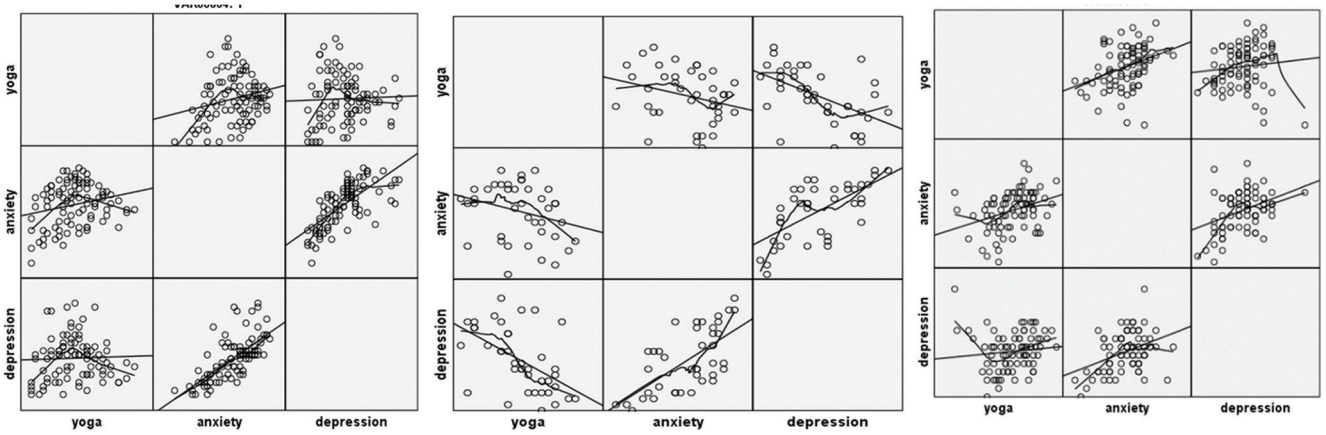

Figure 3: Correlation between Yoga with (a) Anxiety (b) Depression across the world during the time period: I = Pre-COVID-19 phase; II = Transition Phase; III = COVID-19 pandemic phase. COVID-19: Coronavirus disease-19

the three different time periods [Table 1]. As the pandemic continued, the forecast was based on using ARIMA (0, 1, 16) modeling, found that Yoga continued to raise interest with a time trend ranging from 72 (66–78) to 74 (23–125). It was also predicted that anxiety searches ranged from 75 (69–82) to 83 (71–96) and depression searches ranged from 70 (65–75) to 68 (50–85) [Figure 4].

Discussion

Our study used GT as a tool to understand the interest of the people in yoga, anxiety, and depression during phases of the COVID-19 pandemic.

A positive trend was observed in the Yoga search on two occasions – January 1, 2020 and March 12, 2020. Peak on the first occasion was observed during the postholiday time period which has been reported in previous studies.[20,21] Peak on the second occasion was observed may be due to COVID-19 pandemic which was found to be positively correlated with anxiety and depression searches, significantly. However, the positive correlation was weak but irrespective of low "*r*," *P* value in global scale samples

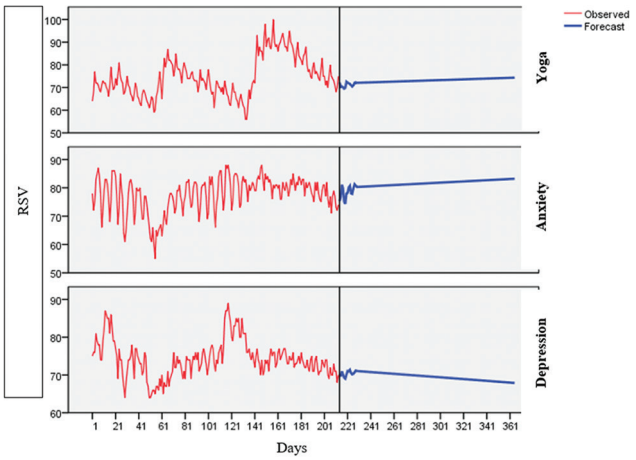

Figure 4: Forecast of Yoga, Anxiety, and Depression for June 2020 to December 2020

Table 1: Comparison of relative search volume of yoga, depression, and anxiety during: I=Precoronavirus disease-19 phase; II=Transition phase; III=coronavirus disease 19 pandemic phase*

Variable	Time period	Median	*P*
Yoga	I	72	0.01**
	II	68	
	III	83	
Depression	I	74	0.01**
	II	77	
	III	74	
Anxiety	I	76	0.01**
	II	81	
	III	81	

*Friedman ANOVA, **$P<0.05$ statistically significant

cannot be ignored. Although on both occasions, the positive trends of yoga searches diminished with time, it may be due to a lack of perseverance or diminished interest.

Significant changes in the search patterns for Yoga and the mental health issues of depression and anxiety were observed between the three phases of the study. The increase in anxiety and depression may be due to the fact that the spread of the novel SARS-CoV-2 virus brought on a situation of uncertainty throughout the world. Concerns related to changing lifestyles and constant social media-driven messages may have increased anxiety in people. Although limited mental health data are available from countries at this stage, available studies have reported an increase in mental health issues like stress and anxiety due to COVID-19.[22-24]

Our study found that during the pre-COVID-19 phase, there was no statistically significant correlation between the increase in Google search for anxiety or depression and Yoga. In the transition phase, Google search for Yoga was inversely correlated significantly, with the search for depression, whereas with progression into the COVID-19 pandemic phase, an increase in Google searches for anxiety or depression was significantly associated with the search for Yoga. It could be due to people initiated their search toward healthy life choices like yoga to keep ailments away. The reason for this could also be the "lock down" imposed in many countries during the COVID-19 pandemic phase and the notion that Yoga may improve immunity to help fight the COVID-19 infection. Some studies have reported that Yoga brings balance to the mind and body and can be used as a complementary therapy to reduce stress, depression and aid recovery during stressful situations such as cancer, radiotherapy treatments.[25-30]

It is likely that we may have to live with the stressful pandemic, but our forecasts highlight that yoga searches will continue to increase as evidence shows that physical activity keeps the mental ailments away.[31] Our study found that during the pandemic, the depression and anxiety searches increase with a decrease in yoga searches. Hence, it may be due to a lack of perseverance or motivation that highlights the need for interventions such as special yoga programs for making sure that people adhere to the regime on a continuous basis.

Strengths

Our study uses GT with keywords, Diagnostic and Statistical Manual Of Mental Disorders, divides mental health issues into various categories such as anxiety disorders and depressive disorders, but for the general public, these conditions may not be very different from one another, hence the keywords used for our study were the emotional symptoms that the people would search on Google.[32] However, the results corroborate with studies that have been conducted in the past. Hence, it appears

that the results can be generalized. Our study provides an overall picture of the two mental health ailments anxiety and depression across the world and increased interest in Yoga during the COVID-19 pandemic. Our study highlights the need to address mental health issues and the need to facilitate yoga resources.

Limitations

Although our study used the most appropriate keywords for the Google search, there is a possibility of underestimation of the trends in our study. In addition, the results in our study capture the interest of the people using internet services and Google search only. As it is a correlational study, a relationship can only be hypothesized but warrants further research into the topic. Although the correlation between Yoga and anxiety or depression search across the world was relatively weak, the associations were statistically significant. It may be due to intergeographic variation in the search patterns during COVID-19.

Conclusion

GT is a useful tool in the field of digital epidemiology and can be used to assess public interest and sentiment during pandemics. GT shows that during the COVID-19 pandemic yoga search queries increased among people across the globe. Although there was a rise in the anxiety and depression queries as well, there was a substantial rise in the interest toward a healthier lifestyle choice of Yoga during the pandemic, which shows a positive sign for the times to come. Hence, there is a need for interventions for the general public to promote Yoga to be part of their routine life and for making sure that people adhere to the Yoga practices on a continuous basis.

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Ethical clearance

It was not applicable as secondary data were used for analysis.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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