Ortodontiye İlişkin Dünya Genelindeki İnternet Verilerinin Değerlendirilmesi: Google Trends Analizi

Assessment of Worldwide Internet Data on the interest in Orthodontics: A Google Trends Analysis

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ÖZ

Amaç: Çalışmanın amacı, tüm dünyada Google Trends arama verilerini kullanarak son 5 yılda ortodonti konusuna olan ilgiyi incelemektir.

Materyal ve Metot: 6 Temmuz 2020'de, Google Trends uygulamasında son beş yıldaki arama verileri tarandı. Arama sonuçları, tüm anahtar kelimeler için ayrı ayrı ve yeterli veriye sahip 26 ülke için ayrı olarak kaydedildi. Tüm arama sonuçlarının ortalaması alındı ve ülkeler için bir Google Trends Değeri (GTV) elde edildi. Bu veriler nüfus, Gayri Safi Yurtiçi Hâsıla (GDP) ve ülkelerdeki İngilizce bilgisi (İngilizce Yeterlilik Endeksi – EPI) ile ilişkilendirildi. Nüfus, GDP ve EPI ile Google Trends değerleri arasındaki korelasyon değerleri için Pearson korelasyon testi kullanıldı.

Bulgular: Tabloya göre, en yüksek GTV değeri ABD'de gözlenmiştir (65,33); Fransa'da en düşük GTV değeri görülmüştür. İstatistiksel analize göre, GTV ile hem nüfus hem de GDP ile EPI değerleri arasında pozitif bir korelasyon bulundu. Son olarak GDP ve EPI değerleri arasında pozitif korelasyon bulundu ve bu pozitif korelasyon istatistiksel olarak anlamlı bulunmuştur (p<0,05).

Sonuç: Ortodontiye olan ilgi ile nüfus arasında anlamlı bir ilişki bulunamamıştır. Gayri Safi Milli Hasıla ile İngilizce bilgi düzeyi arasında ise anlamlı bir pozitif ilişki vardır.

Anahtar Kelimeler: Google trends, internet verileri, ortodonti

ABSTRACT

Objective: The aim of study is to examine the interest in orthodontics in the last 5 years using Google Trends data all over the world.

Materials and Methods: On July 6, 2020, the Google Trends application was searched for the last five years. Search results were recorded separately for all keywords and separately for 26 countries with sufficient data. The mean of all search results is taken and a Google Trends Value (GTV) is obtained for the countries. These data were correlated with population, Gross Domestic Product (GDP) and knowledge of English (English Proficiency Index – EPI) in countries. Pearson correlation test was used for correlation values between Population, GDP and EPI with Google Trend values.

Results: According to the table, the highest GTV were observed in United States (65.33); lowest GTV were observed in France. According to the statistically analysis, a positive correlation was found between GTV with both population and GDP and EPI values. Finally, a positive correlation was found between GDP and EPI values and this positive correlation was statistically significant (p<0.05).

Conclusion: No significant relationship was found between the interest in orthodontics and the population. There is a significant positive correlation between the Gross National Product and the level of knowledge of English.

Keywords: Google trends, internet data, orthodontics

INTRODUCTION

Aesthetic treatments are becoming more and more important for the individuals of developed and developing countries. In the societies that have reached a certain level of economic development, the resources allocated in the aesthetic health sector increase, as well as the awareness of individuals about health.[1] It can also be said that the development of health services accelerates economic development.[1] There are many opinions about the high quality of life of the societies, the access of health services to the wider society, the participation of the labor force and the increase in the quality of health positively affect economic growth.[1]

There is a close relationship between orthodontic treatment and the level of economic and social development in society.[2] Investments in health services that increase the future dental health level of the society bring a more successful and healthy population structure which affect on patients perception of apperance.[3] One of the treatments applied for aesthetic and beauty purposes that deals with the appearance of people and the solution of an existing visual problem is orthodontic treatments.

Orthodontic treatment is an important part of oral health in modern life and improves oral health and quality of life by providing aesthetic, psychological functional benefits.[4] The recent increase of orthodontic treatment with aesthetic needs in developing countries with socio-economic development has become more popular and a common clinical procedure.[5] Orthodontic treatment prevelance ranges from 10-35% in developed countries surveys.[6,7] Therefore, national wide surveys have helped us understanding the changing trends on orthodontic treatment needs.[8-10]

In addition to surveys on the orthodontic changing trends with socioeconomic status, internet is a very important sources of health information.[11,12] Many people seek health information from internet sources. The internet is used by millions of people that has become a critical role for information globally.[13] The most common keyword driven search engine on internet is Google, provides Google Trends (GT) service that is able to analyze internet search in examining population behaviour since 2014.[14,15] Online search query data with Google Trends could help to assess precursors of behaviour changes distribution.[16] Although few studies have specifically evaluated the efficacy of social media on orthodontic treatment and marketing knowledge, hasn't been studied with the use of Google Trends data on changes internet searches globally over years.[17-19]

The aim of study is to examine the interest in orthodontics in the last 5 years using Google Trends data all over the world.

MATERIALS AND METHODS

Although the data to be used for the research is accessible to everyone, ethics committee permission was obtained. Our study approved by the local ethics committee of Antalya Education and Research Hospital (Date:03/07/2020, decision no: 203).

Google Trends is an online search tool that analyzes a specific search term entered into Google's search engine by total search volume. The interest over time is represented by numbers on the graph that reflect how many searches have been carried out for a search term, relative to the total number of searches done on Google over time. To explain further, those numbers do not represent the absolute search volume, because they are normalised data and presented on a scale from 0–100 in order to reduce data redundancy and improve data integrity. Each point on the graph is divided by the highest point and multiplied by 100. When there is not enough data, 0 (normalised data) is shown. In regard to regional interest, the numbers represent the search volume relative to the highest point on the map, which is always 100 (normalised data).

On July 6, 2020, the Google Trends application was searched on Google for the last five years (06.07.2015-06.07.2020). Search results were recorded separately for all keywords and separately for 26 countries with sufficient data. The distribution of the countries with sufficient popularity data for the keywords "Orthodontics", "Orthodontic Treatment" and "Orthodontist'' is shown in Figure 1-3. Search terms have been made separately for other languages that are most spoken in the world. Although Chinese, Spanish, Hindi and Turkish were also searched, Google Trends did not have enough data, as these languages were limited to specific regions. That's why only English was preferred for keywords.

Countries that do not have sufficient data and do not include Google Trends were excluded. The mean of all search results is taken and a Google Trends Value (GTV) is obtained for the countries. These data are correlated with population, Gross Domestic Product (GDP) and knowledge of English in countries. Population numbers of countries are taken from Wikiland

website. On the other hand, the Gross Domestic Product (GDP) is regulated in dollars according to the data announced by the International Monetary Fund (IMF) for 2018. The level of knowledge of English is based on the most recent 2019 data of the annual EPI (English Proficiency Index) data. The EPI is an index for non-native English speakers. EPI of countries such as USA, Ireland, Australia, Canada, UK and New Zealand whose native language is English are accepted as 100.

Pearson correlation test was used in Minitab Statistical Program for correlation values between Population, Gross Domestic Product and English Proficiency Index with Google Trend values. In addition, in the Minitab Statistics Program, the point distribution chart of Google Trend data according to Population, Gross Domestic Product and English Proficiency Index was also prepared (Figure 1).

RESULTS

The highest GTV were found in United States (100), Australia (64), and Canada (59) when Google Trends searched for "orthodontics." The graph of all GTV and their distribution on the map is shown in Figure 2 (A). When the term "orthodontist" was searched for Google Trends, the highest GTV were found in Holland (100), United States (64) and New Zealand (58). The graph of all GTV and their distribution on the map is shown in Figure 2 (B). The highest GTV were found in Saint Helena (100), Ireland (70) and United Arab States (68) when Google Trends searched for "orthodontic treatment". The distribution of all GTV and their distribution on the map is shown in Figure 2 (C). The average of the GTV obtained for the three search terms and the population, GDP and EPI values of the 26 countries are shown in Table 1. According to the table, the highest GTV were observed in United States (65.33), Ireland (56.66), Australia (51.33), Canada (51) and United Kingdom (40.66); lowest GTV were observed in Germany (2.33), South Korea (2), Spain (1), Italy (1), France (1).

The correlation values between population, GDP and EPI and GTV are shown in Table 2. According to the table, a positive correlation was found between GTV with both population and GDP and EPI values. However, while the positive correlation between GTV and population was not statistically significant (p>0.05), the positive correlation between GTV and GDP and EPI values was statistically significant (p<0.05). A negative correlation was found between population and GDP and EPI

values, although it was not statistically significant (p<0.05). Finally, a positive correlation was found between GDP and EPI values and this positive correlation was statistically significant (p<0.05).

DISCUSSION AND CONCLUSION

Orthodontics is a branch of dentistry aiming to correct the crowding of teeth, malocclusion of maxillary and mandibular teeth and facial skeletal disorders.[20] Orthodontics also helps to preserve oral health by treating these problems.[20,21] Crowding teeth aesthetically affect the facial appearance of people. Malpose and crowding teeth pose a risk of dental calculus formation and tooth caries due to difficulty in cleaning. For these reasons, orthodontic problems affect health not only for aesthetic purposes.[19,20]

With the aesthetic (lingual orthodontics, clear aligners etc.) orthodontic applications that will become more widespread and cheaper in the near future, the interest in orthodontic treatment is increasing.[19-23] Day after day, more brackets have been seen in adults rather than children.[24] Long treatment times and non-aesthetic appearance of brackets, which are considered as the most important disadvantage of orthodontic treatments, are no longer a problem thanks to technological advances in health.[25] Invisible brackets (aligner treatments),[26] lingual brackets[27] and transparent (porcelain-sapphire) brackets,[26] which have become widespread in recent years, make the adult person prefer orthodontic treatments. Orthodontic treatment can be performed at any age without aesthetic concern. These treatments, which have reached much more favorable costs than before, do not force the budgets of the patients.[27,28]

In addition, it is possible to achieve a more natural smile with short-term orthodontic treatments made before aesthetic corrections such as implant or lamina teeth which are very popular applications in dentistry. The teeth that should be in their ideal place for a beautiful smile design may be mis-positioned in the jaw due to early tooth loss. Unfortunately, an aesthetic prosthesis is not possible. However, if the prosthesis is corrected by orthodontic treatment before, then a beautiful smile aesthetic can be provided with lamina or zirconium. In cases with maxillary and mandibular retrognathism or prognathism, congenital or subsequent trauma with deformity of maxilla or mandible, corrections to be made by plastic surgery are now performed without orthodontic treatment.

Internet is the main source of information for patients in the 21st century, especially health. Orthodon-

tic treatments, treatment prices, doctors' advice on many issues, such as patients search the Internet. The interest in orthodontic treatments is increasing day by day. An increasing number of internet users search information on internet search engines every day. Google trends has been used monitoring individuals behavior interests and provided search volume data.[29] This study aimed searching Google Trends about Orthodontics from 2014 to 2019 using the online search query internet data for behavior changes distribution at all over the world.

Internet use and prevelance are affected by the country's income level, development and health status. Mishra and Newhouse find that increased access to information on the Internet will likely have positive effects on health outcomes.[30] Our results show that interest in orthodontics via internet is considerable and consistent. As expected, there is a close relationship between orthodontic treatment and economic and social development level in societies. The highest searching values regarding Orthodontics have been reached in higher economic development countries.

In our findings, it is expected that the GTV in developed countries with very high GDP are also expected to be high. The reason for this situation is that preventive treatments are covered by health systems, especially in developed countries such as Europe countries, and the problems that may occur if the patient does not comply with regular controls and preventive treatments are out of the scope of health insurance. Therefore, orthodontic treatments are particularly expensive. Therefore, interest in orthodontics may have been found less in patients' internet searches.

As the income level of the people increases and the level of education increases, they pay more attention to their external appearance. Studies have shown that the most attention to the teeth of people at the first sight. Therefore, oral care and thus orthodontics are affected by factors such as income level and education level.

As a conclusion, we think that Google Trends alone is not enough to evaluate the interest in orthodontics. We can say that there is a high interest in orthodontics in internet data in countries with a high level of knowledge of English. However, no significant difference was found between the number and income level of the population and interest in orthodontics.

Ethics Committee Approval: Our study approved by the local ethics committee of Antalya Education and Research Hospital (Date: 03/07/2020, decision no: 203).

Conflict of Interest: No conflict of interest was declared by the authors.

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Table 1. Google Trends values, population, Gross Domestic Product and English Proficiency Index of countries in worldwide.

		Google Trends Value (GTV) (Mean)	Population	Gross Domestic Product (GDP) ($)	English Proficiency Index (EPI)
1	**United States**	65.33	326.579.090	62.606	100
2	**Ireland**	56.66	4.857.000	76.099	100
3	**Australia**	51.33	23.111.910	56.352	100
4	**Canada**	51	35.141.542	46.261	100
5	**United Kingdom**	40.66	66.040.229	42.558	100
6	**Holland**	34	17.302.923	53.106	70.27
7	**United Arab States**	33.66	8.264.070	40.711	48.19
8	**New Zealand**	30.33	4.931.490	41.267	100
9	**South Africa**	27.66	52.981.991	6.377	65.39
10	**Philippines**	23.33	106.420.000	3.104	60.14
11	**Maleysia**	23.33	29.784.600	10.942	58.56
12	**India**	22.66	1.352.709.900	2.036	55.49
13	**Saudi Arabia**	21	29.195.895	23.566	41.6
14	**Pakistan**	21	202.481.272	1.555	51.41
15	**Egypt**	19.33	100.000.574	2.573	47.11
16	**Bangladesh**	17.66	166.846.775	1.745	48.11
17	**Belgium**	13	11.449.656	46.724	63.09
18	**Thailand**	9	69.146.609	7.187	47.61
19	**Singapur**	8.66	5.310.000	64.041	66.82
20	**Indonesia**	7	266.566.600	3.871	50.06
21	**Brazil**	3.66	211.739.461	8.968	50.1
22	**Germany**	2.33	82.979.100	48.264	63.77
23	**South Korea**	2	50.219.669	31.346	55.04
24	**Spain**	1	46.733.038	30.697	55.46
25	**Italy**	1	60.890.120	34.260	55.31
26	**France**	1	67.372.000	42.878	57.25

Table 2. Correlation values of population, Gross Domestic Product and English Proficiency Index with Google Trends values.

	Google Trends Value (GTV)	Population	Gross Domestic Product (GDP)
Population	0.022 P=0.909 NS	-	-
Gross Domestic Product (GDP)	0.484 P=0.008 **	-0.326 P=0.085 NS	-
English Proficiency Index (EPI)	0.764 P=0.000 ***	-0.131 P=0.497 NS	0.691 P=0.000 ***

P:Pearson correlation test; Low (± 0.01 <r <± 0.5); Moderate (± 0.5 <r <± 0.5); High Correlation (± 0.8 <r <± 1);
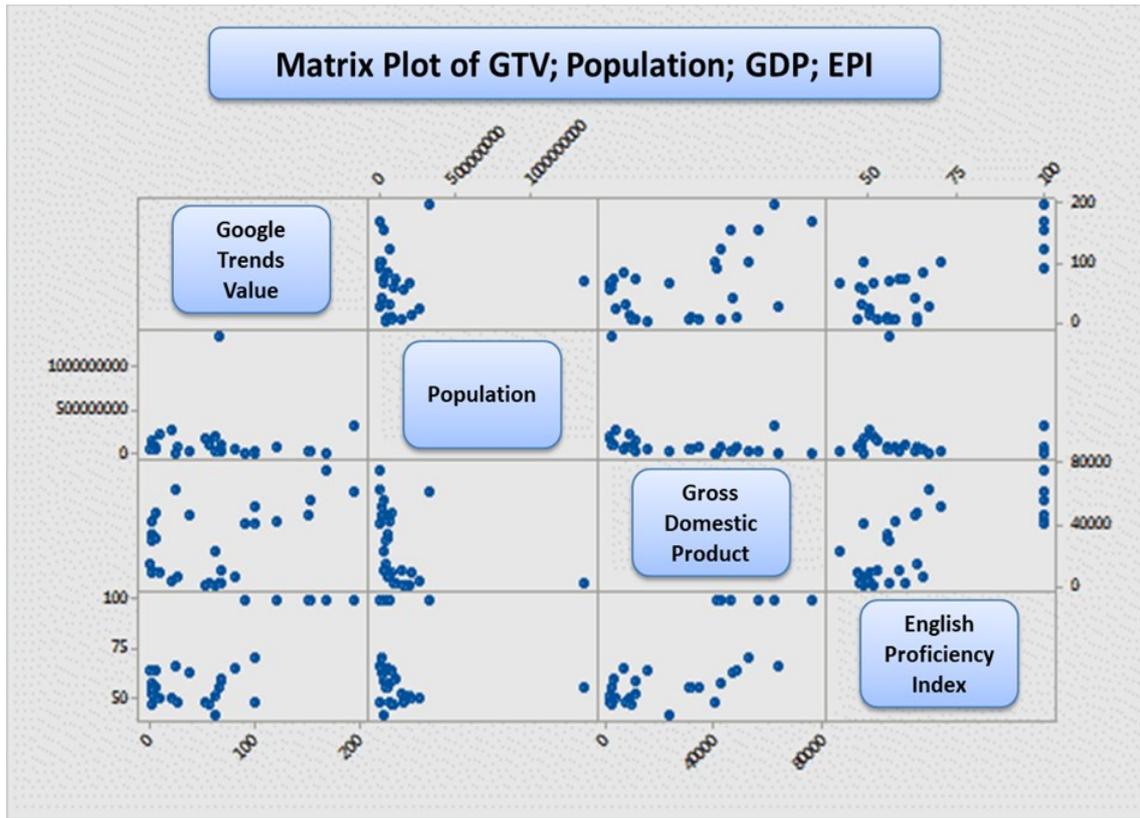*p<0.05; **p<0.01; ***p<0.001; p>0.05: NS (not significant).

Figure 1. The distribution graphics of Google Trends values with population, Gross Domestic Product and English Proficiency Index.
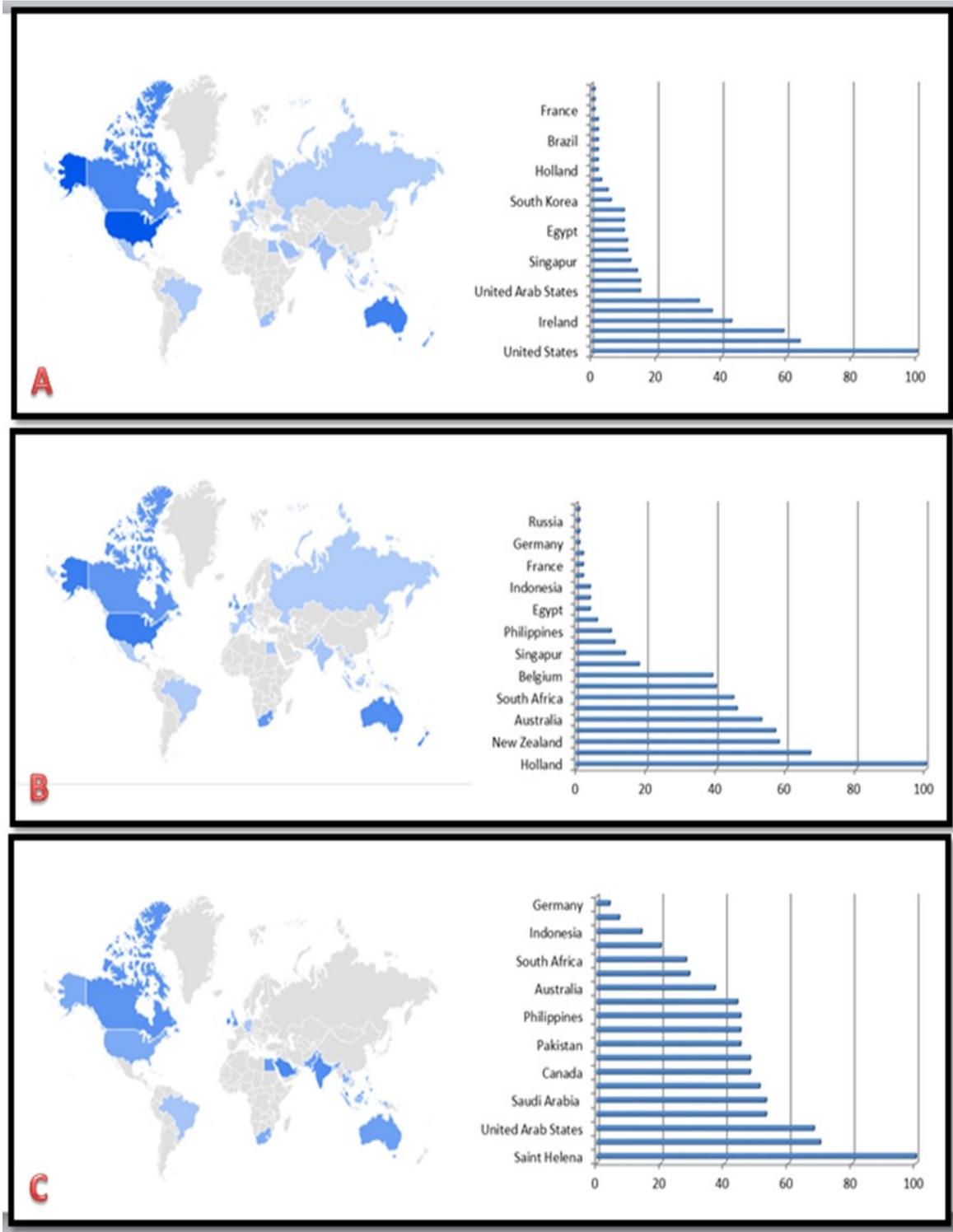
Figure 2. Distributions of search results of the term ''Orthodontics''(A), ''Orthodontists''(B) and ''Orthodontic Treatment''(C) in worldwide.