

## The Impact of COVID-19 on Pediatric Adenoid Hypertrophy in Beijing

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## Abstract

**Objective:** Since the outbreak of COVID-19, wearing masks and frequent hand washing have become common phenomena. The purpose of this study was to explore the impact of such lifestyle changes on adenoid hypertrophy in children in Beijing.

**Methods:** Baidu Index platform was used to search with adenoid hypertrophy as the keyword, and the search volume of terms from 2017 to 2021 was recorded weekly. Meanwhile, the visits to adenoid hypertrophy in the otolaryngology department of Blinded for review in the same period were collected and compared and analyzed.

**Results:** (1) Baidu index indicated that the following group to adenoid hypertrophy was mainly parents of childbearing age, and female parents paid more attention; (2) From 2017 to 2019, the online attention and outpatient visits of adenoid hypertrophy increased year by year. After the COVID-19 outbreak, the increasing trend declined and stagnated.

**Conclusions:** After the outbreak of COVID-19, epidemic prevention policies (wearing masks, hand hygiene, reducing movement of people, etc.) have a certain inhibitory effect on adenoid hypertrophy.

**Keywords:** Adenoid Hypertrophy, COVID-19, Baidu Index Platform, Masks, Hand Hygiene.

## 1. Introduction

Since December 2019, a series of atypical pneumonia cases appeared, which were identified as Coronavirus Disease 2019 (COVID-19), an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), now became a global concern [1]. In January 2020, the COVID-19 epidemic began in Beijing [2]. The promulgation and implementation of various epidemic prevention measures have had a huge impact on the daily life of the public, and may also affect the occurrence and prevalence of various diseases.

Adenoid hypertrophy is a common disease in children, as the nasopharynx is both a respiratory channel and a drainage channel for nasal and sinus secretions, as well as a drainage area for the eustachian tube, middle ear, and mastoid process. When adenoidal hypertrophy is present, it can lead to OSA, persistent secretory otitis media, and sinusitis in children, which can seriously affect their quality of life [3].

In recent years, with the popularity of smartphones and computers, the Internet plays an increasingly important role in information dissemination and science popularization. According to the 48th Statistical Report on the Development of Internet in China in 2021 [4], by June 2021, the number of Internet users in China has reached 1.011 billion, the Internet penetration rate is 71.6 percent, and the number of search engine users in China has

reached 795 million, accounting for 78.7 percent of the total Internet users. Baidu is the world's largest Chinese search engine and is the preferred search tool for most Internet users in China. Studies have found that people may lie for various reasons in daily life, so there may be bias in conventional statistical analysis methods, while in the face of the Internet, people usually express their real needs [5].

Following the COVID-19 outbreak, more children were asked to wear masks, go to crowded places less frequently and pay more attention to hand hygiene, the effect of which on adenoid hypertrophy is unknown. The main objective of this study was to infer changes in the population of adenoid hypertrophy attendances before and after the outbreak of COVID-19 and to explore potential influencing factors by using the Baidu index and the number of adenoid hypertrophy outpatient visits at the Blinded for review.

## 2. Materials and Methods

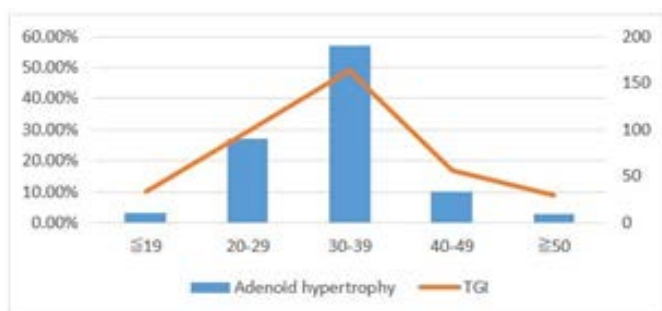
A retrospective observational study was conducted between Blinded for review and the Baidu Index, over 5 years between January 2017 to December 2021. Based on Baidu Index (<https://index.baidu.com>), we chose Beijing as the research object, use adenoid hypertrophy (Adenoid Hypertrophy) as the keyword, and recorded the search volume of terms weekly. Meanwhile, we collected the demand map, population portrait, and other

related information. Blinded for review is one of the largest children's hospitals in Beijing, the number of children diagnosed with adenoid hypertrophy was collected from the Information department of this hospital at the same time, and the number of visits was calculated by week. SPSS 26.0 software was used for statistical analysis, and a correlation analysis was conducted between the data obtained from the Baidu platform and the number of outpatient visits. Meanwhile, the volume of search data and the number of outpatient visits were compared before and after the COVID-19 outbreak.  $P < 0.05$  was considered to be statistically significant.

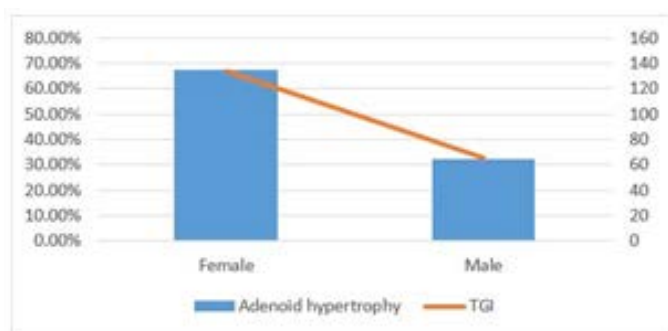
### 3. Results

#### 3.1. Public concern about adenoid hypertrophy in Beijing

We can see the distribution of the population who most care about adenoid hypertrophy in Figure 1 and Figure 2, the blue columns represent the proportion of the Baidu search engine. TGI, or target group index, can represent the needs of specific Internet users. When  $TGI > 100$ , it indicates that the demand is more consistent with the group [6].



**Figure 1:** Age distribution of the population who cared about adenoid hypertrophy.



**Figure 2:** Sex distribution of the population who cared about adenoid hypertrophy.

According to Figure 1, people aged 30-39 years are most concerned about adenoid hypertrophy, accounting for 56.82%, followed by those aged 20-29 years, accounting for 26.90%, those aged 40-49 years, accounting for 10.08%, and those aged under 19 years and over 50 years are relatively low. The results showed that the parents of children were mainly concerned about adenoid hypertrophy, especially the parents of childbearing age. From Figure 2, males account for 32.44% and females for 67.56%, the TGI value of females (134.26) is higher than that of

males (65.3), indicating that females have a higher demand for adenoid hypertrophy.

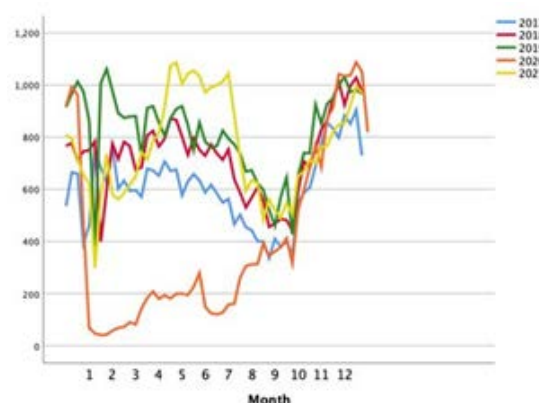
#### 3.2. Analysis of Baidu Index data

We analyzed Baidu search data from 2017 to 2021 and found that online attention for adenoid hypertrophy increased year by year from 2017 to 2019. After COVID-19, there was no significant increase in online attention, as shown in Table 1.

	M±SD	P*
2017	258.58±31.48	0.045
2018	275.96±52.94	0.008
2019	300.81±39.50	0.523
2020	288.71±129.79	0.342
2021	270.58±42.04	

**Table 1:** Comparison of Baidu search volume in different years, \*indicates that the P value is the comparison between the value of the current year and that of the next year.

#### 3.3. Analysis of outpatient visits



**Figure 3:** The trend of outpatient visits for adenoid hypertrophy from 2017 to 2021.

We analyzed the number of outpatient visits with adenoid hypertrophy as the diagnosis between 2017 and 2021 and found that the number of outpatient visits with adenoid hypertrophy before COVID-19 increased from 2017 to 2019 ( $P = 0.000$  and  $0.004$ , respectively). In 2020, the number of patients with adenoid hypertrophy decreased significantly ( $P=0.000$ ) and increased again in 2021, as shown in Figure 3 and Table 2. However, the comparison between the data in 2019 and 2021 showed no significant difference,  $P=0.116$ .

	M±SD	P*
2017	607.60±143.11	0.000
2018	726.56±149.40	0.004
2019	815.60±161.04	0.000
2020	396.58±338.47	0.000
2021	761.04±189.05	

**Table 2:** Annual comparison of outpatient data of adenoid hypertrophy, \*indicates that the P value is the comparison between the value of the current year and that of the next year

### 3.4. Correlation analysis between Baidu Index data and outpatient data

We conducted a correlation analysis between Baidu index search volume and outpatient visits and obtained their R values each year. From 2017 to 2021, their R values were 0.875, 0.781, 0.851, 0.243, and 0.782 respectively ( $P=0.079$  in 2020,  $P < 0.01$  in other years). It can be seen that in 2020, the year of the COVID-19 pandemic, the correlation was poor, as shown in Figure 4, and good for the rest of the years.



**Figure 4:** Trends of Baidu Index data and Outpatient data from 2017 to 2021.

The author further divided the data for 2020 into the first half and the second half and conducted a comparative analysis again. It was found that there was a significant correlation between Baidu search volume and outpatient visits from January to June in 2020 ( $R$ -value was 0.885,  $P < 0.01$ ), while there was no significant correlation between them from July to December in 2020 ( $R$ -value was 0.017,  $P=0.928$ ). In the second half of 2020, the number of outpatient visits gradually increased, while Baidu search volume showed no obvious trend of increase.

### 4. Discussions

In this study, we analyzed the distribution of people concerned about adenoid hypertrophy by counting the amount of Baidu Index data and the number of outpatient visits for adenoid hypertrophy over the five years from 2017 to 2021, summarised the correlation between the attention to adenoid hypertrophy and the number of outpatient visits and compared the changes about the Baidu data and the number of visits before and after the COVID-19 outbreak. Through this study, we found that the search volume of the Baidu index has a good correlation with the consultation of adenoid hypertrophy, which can predict the consultation of patients well and can reflect the prevalence of adenoid hypertrophy.

Baidu Index is a measurement index based on Internet users' search data, and its actual meaning is proportional to the total number of searches, which can quantitatively reflect the search trend of a certain keyword [7]. Based on the data of the Baidu Index platform, we found that the number of searches for adenoid hypertrophy increased year by year before the epidemic of COVID-19, indicating that the public paid more and more attention to adenoid hypertrophy and maybe the incidence of adenoid hypertrophy was also increasing year by year. With the popularity of COVID-19, adenoid hypertrophy search volume

growth has been curbed, in the first half of 2020, Baidu Index search volume significantly decreased, but from July appeared to an obvious increase, in the same period in the Tiktok appeared a series of adenoid hypertrophy of the science short video, get a lot of attention and forwarding. It shows that the network plays a very important role in the transmission of scientific knowledge. How to use big data to explore the public's real demand for diseases, and to build a popular science platform, is a problem we need to pay attention to.

Based on the analysis of outpatient visits, we found that before the epidemic of COVID-19, the number of patients treated for adenoid hypertrophy was increasing year by year, and there was a precipitous decline in 2020, and then it recovered to the level of 2019. According to the current data, the epidemic of COVID-19 has suppressed the growth momentum of adenoid hypertrophy, but the data are still few. We still need to record and analyze how the disease will change with the trend of the subsequent epidemic and the change in epidemic prevention policies.

Through the comparative analysis of Baidu search volume and outpatient visits, we can find that the correlation is good before the epidemic of COVID-19, which also indicates that online attention can reflect the disease situation of patients in the real world. But in 2020, the first year of COVID-19, the correlation changed markedly. There was a significant correlation between the number of outpatient visits and Baidu search in the first half of the year, both of which decreased significantly, indicating that the number of patients may have decreased, and the public's focus of attention may have shifted due to the impact of the epidemic. In the second half of the year, the correlation changed significantly. With the stabilization of the COVID-19, the number of outpatient visits gradually increased, while the value of Baidu search in July and August was significantly higher than that of each year, possibly influenced by popular science videos, which may be a reason for the poor correlation between the two. Since the COVID-19 pandemic, wearing masks, washing hands frequently, and reducing people gathering has become the new watchwords of our lives. It has been reported that high medical mask compliance, early use of masks, and combination with enhanced hand hygiene can reduce the incidence of respiratory infections in the community [8]. As we know, the occurrence of adenoid hypertrophy is highly correlated with upper respiratory tract infection, so a decrease in the incidence of respiratory tract infection is also highly likely to reduce the occurrence of adenoid hypertrophy. It can be seen from the data in this paper that after the outbreak of COVID-19, both the online searches for adenoid hypertrophy and the increase in outpatient visits declined, indicating that wearing masks, hand hygiene, and reducing the gathering and movement of people have a good impact on respiratory infection-related diseases.

Respiratory viruses are mainly transmitted by droplets/aerosols, or by touching the eyes, nose, mouth, and other areas by virus-carrying hands. Masks have an indisputable role in the spread of respiratory viruses. But there are many types of masks, are they all effective in preventing the spread of respiratory infections? A study of seven COVID-19 patients showed that N95 and KF94 masks were significantly superior to surgical masks in inhibiting

the transmission of SARS-COV-2 in patients [9]. N95 and KF94 masks of blocking effect are the best and surgical masks also have a better blocking effect, they can prevent the spread of influenza virus droplets, and reduce the coronavirus detection in large droplets and aerosol [10]. For a commercial or homemade face mask, due to the materials and the thickness are different, there is no uniform standard, and its protective effect remains controversial [11]. Therefore, surgical masks are recommended for daily protection in communities.

Hand washing also plays an important role in curbing the spread of disease. It has been reported that hand washing can reduce diarrhea by about 30% [12]. After the outbreak of COVID-19, WHO recommends frequent hand washing to avoid infection, with soap or a hand sanitizer containing 60% alcohol as an option. However, frequent exposure to alcohol-based hand sanitizer in children under 12 years can have adverse effects. Even small amounts of alcohol can cause alcohol poisoning that is responsible for confusion, vomiting, drowsiness, and in severe cases, respiratory arrest and death [13]. Therefore, it is recommended that children, especially infants and young children, avoid using alcohol-based hand sanitizers in their daily health care.

From this paper, we can see that with the improvement of the epidemic situation, the population has become lax in prevention measures such as wearing masks and washing hands frequently. Since the second half of 2020, the Baidu index search volume of adenoid hypertrophy and the number of medical visits have gradually increased. This indicates that wearing a mask and washing hands frequently can reduce the number of visits for adenoid hypertrophy to a certain extent. It is also suggested that for children, especially those aged 3 to 5 years, it is necessary to wear masks and wash hands frequently, which may reduce the incidence of adenoid hypertrophy.

Our research only focused on the Baidu search engine and cannot describe netizens' attention to other platforms, such as Weibo, and Tiktok. And we need to record and analyze more data to observe the impact of COVID-19 prevention measures on adenoid hypertrophy.

## 5. Conclusion

There is a good correlation between the search volume of the Baidu index and the number of outpatient visits. The changing trend of the Baidu index can reflect the actual demand of patients. The outbreak and prevalence of COVID-19, as well as the promotion and implementation of epidemic prevention measures, have had a certain impact on the occurrence and prevalence of adenoid hypertrophy in children. At present, it has a restraining effect on the growth and prevalence of the disease. Daily use of medical masks, social distancing, and attention to hand hygiene may reduce the incidence of adenoid hypertrophy.

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