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Proceeding Paper

Did the COVID-19 Pandemic Change News Keywords Associated with Obesity? †

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Abstract: The World Health Organization (WHO) declared the COVID-19 pandemic on 11 March 2020. As COVID-19 has spread, lockdowns have been declared all over the world, including the United States, Europe, Asia, Africa, and South Korea. Consequently, it has changed daily life rapidly, including "social distancing". In particular, the Korea National Health and Nutrition Examination Survey (2020) confirmed that the prevalence of obesity (≥19 years old) was 31.4% in 2011, 33.8% in 2019, and 38.3% in 2020, indicating a rapid increase after the outbreak of COVID-19. It is a critical issue in health science to identify the differences in potential factors for obesity before and after the COVID-19 pandemic particularly because many previous studies showed that obesity increased the infection risk of COVID-19 and, even after infection with COVID-19, people with obesity suffered from higher severity and mortality rates than people who had a normal weight or were underweight. Consequently, this study aimed to identify keywords formed in society and how they changed by web-crawling South Korean media (news) and using "obesity" as a keyword. Diabetes, hypertension, health management, eating habits, physical activity, and protein were derived from the frequency analysis regardless of period. The results indicated that these keywords were used a lot in news articles on obesity. This study examined the flow of entire text data by showing the frequency of word occurrence in the entire documents or each document through the frequency analysis of South Korean media news on obesity. The results of this study are meaningful because they present the direction of obesity management measures in the future by identifying the changes in keywords in obesity news articles before and after the COVID-19 pandemic declaration.

Keywords: COVID-19 pandemic; obesity; topic modeling; text mining

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1. Introduction

The World Health Organization (WHO) declared a global pandemic of COVID-19 on 11 March 2020 [1]. As COVID-19 spread, lockdown was declared in many countries, including South Korea, and social distancing has continued. As non-face-to-face services increase in daily life, more people are staying at home and it has resulted in a decrease in physical activities. As the COVID-19 pandemic has decreased eating-out and going-out and increased the consumption of processed foods, convenience foods, and delivery foods, nutrient intake and eating habits have changed [2–4]. This phenomenon has led to weight gain and aggravated lifestyle. It is believed that these issues affect daily life greatly because they could lead to mental and physical problems.

Due to these changes, the National Health and Nutrition Examination Survey (2020) conducted in South Korea reported that the prevalence of obesity in the population of 19 years or above was 31.4% in 2011, 33.8% in 2019, and 38.3% in 2020, indicating that it increased rapidly after the outbreak of COVID-19. As shown, obesity is becoming a serious problem and is emerging as a social issue.

The text mining technique targets text data accumulated for a long time such as news, and it is a valuable method because it can discover social and cultural issues and reveal temporal changes [5,6]. It is necessary to discover macroscopic trends in language, society, and culture by identifying the increasing or decreasing trend in language use frequency and understanding the correlation between them [5]. Particularly, it is useful to carefully examine a certain usage pattern of specific words.

Consequently, this study aimed to identify keywords formed in society and how they changed by web-crawling South Korean media (news) and using "obesity" as a keyword.

2. Materials and Methods

This study used BIGKinds (www.bigkinds.or.kr (accessed on 1 March 2022)), the news archive site of the Korea Press Foundation, to collect data necessary for analysis and the media to be analyzed were 52 news media (11 metropolitan newspapers, 28 regional newspapers, 8 economic magazines, and 5 broadcasting companies). The analysis period was divided into before and after the declaration of a pandemic for efficient data analysis. This study defined the pre-COVID-19 pandemic declaration from 28 February 2019 to 10 March 2020, and the post-COVID-19 pandemic declaration from 11 March 2020 to 31 December 2021. "Obesity" was used as the search word for data collection. The outline of the study progress is shown in Figure 1. After data collection, keywords irrelevant to analysis were deleted and data were classified into the two periods. Frequency analysis was conducted using this dataset and the frequency was visualized using R's ggplot.

Figure 1. Study overview.

3. Results

3.1. Frequency Analysis of Pre-COVID-19 Pandemic Declaration

Table 1 shows the results of the frequency analysis on news articles published before the COVID-19 pandemic declaration. "Health (580 times)" appeared the most, followed by "Public Health Center (521 times)", "Hypertension (467 times)", "Diabetes (452 times)", "Obesity (409 times)", "Eating Habits (391 times)", "Dietary Life (324 times)", "Health Management (305 times)", "Obesity Rate (284 times)", "Disease Outbreak (262 times)", "Physical Activity (240 times)", "Lifestyle (232 times)", "Protein (218 times)", "Prevention (197 times)", and "Weight (189 times)" in the descending order. The results derived keywords related to diseases (e.g., hypertension and diabetes), which could be caused by obesity, and those related to eating habits, dietary life, health management, physical activity, and lifestyle that could influence obesity. Figure 2 is a graphical visualization of the top 15 frequencies during the pre-COVID-19 pandemic declaration.

Table 1. Top 15 frequencies before the COVID-19 pandemic declaration.

Words	Frequencies	Words	Frequencies	Words	Frequencies
Health	580	Eating Habits	391	Physical Activity	240
Public Health Center	521	Dietary Life	324	Lifestyle	232
Hypertension	467	Health Management	305	Protein	218
Diabetes	452	Obesity Rate	284	Prevention	197
Obesity	409	Disease Outbreak	262	Weight	189

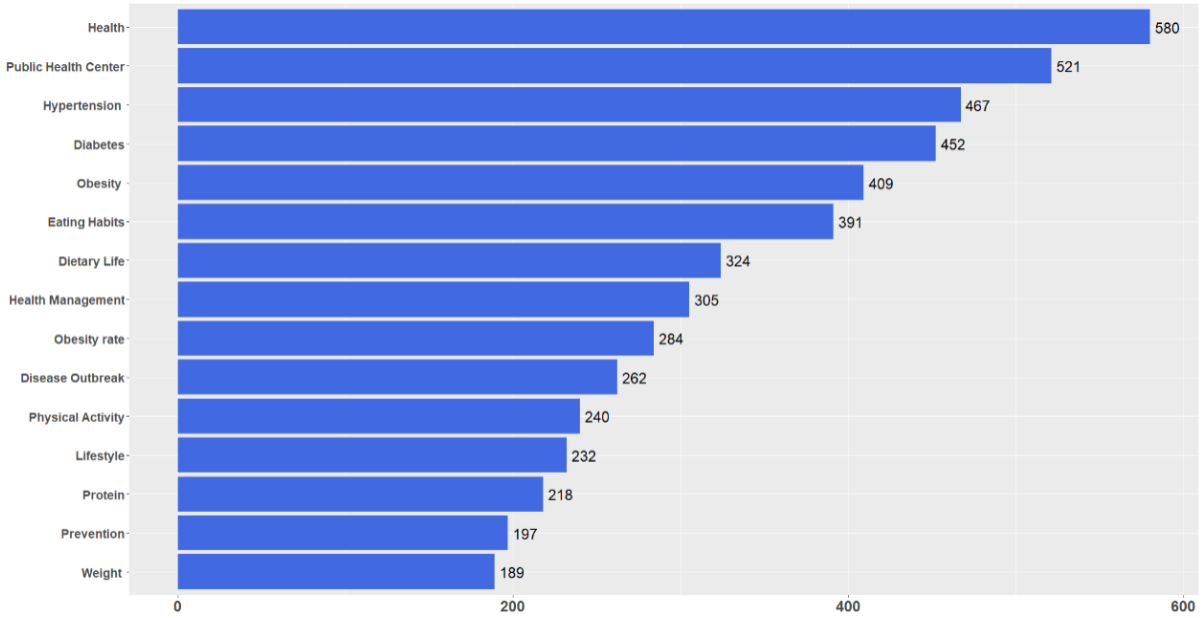

Figure 2. Frequency bars before the COVID-19 pandemic declaration.

3.2. Frequency Analysis of Post-COVID-19 Pandemic Declaration

Table 2 presents the results of the frequency analysis on news articles published after the COVID-19 pandemic declaration. "COVID-19 (2,179 times)" appeared the most, followed by "Diabetes (655 times)", "Hypertension (570 times)", "Public Health Center (440 times)", "Health (379 times)", "Disease Outbreak (365 times)", "Health Management (346 times)", "Eating Habits (343 times)", "Physical Activity (321 times)", "Possibility (320 times)", "Obesity (311 times)", "Cardiovascular (299 times)", "Protein (291 times)", "Complications (265 times)", and "Hyperlipidemia (229 times)" in the descending order. Disease-related keywords (e.g., complications and hyperlipidemia) were added, and health-related keywords tended to decrease, which is different from the results before the COVID-19 pandemic declaration. Diabetes, hypertension, health management, eating habits, physical activity, and protein were derived from the frequency analysis regardless of the period. The results indicated that these keywords were used a lot in news articles on obesity. Figure 3 is a graphical visualization of the top 15 frequencies after the COVID-19 pandemic declaration.

Table 2. Top 15 frequencies after the COVID-19 pandemic declaration.

Words	Frequencies	Words	Frequencies	Words	Frequencies
COVID-19	2179	Disease Outbreak	365	Obesity	311
Diabetes	655	Health Management	346	Cardiovascular	299
Hypertension	570	Eating Habits	343	Protein	291
Public Health Center	440	Physical Activity	321	Complications	265
Health	379	Possibility	320	Hyperlipidemia	229

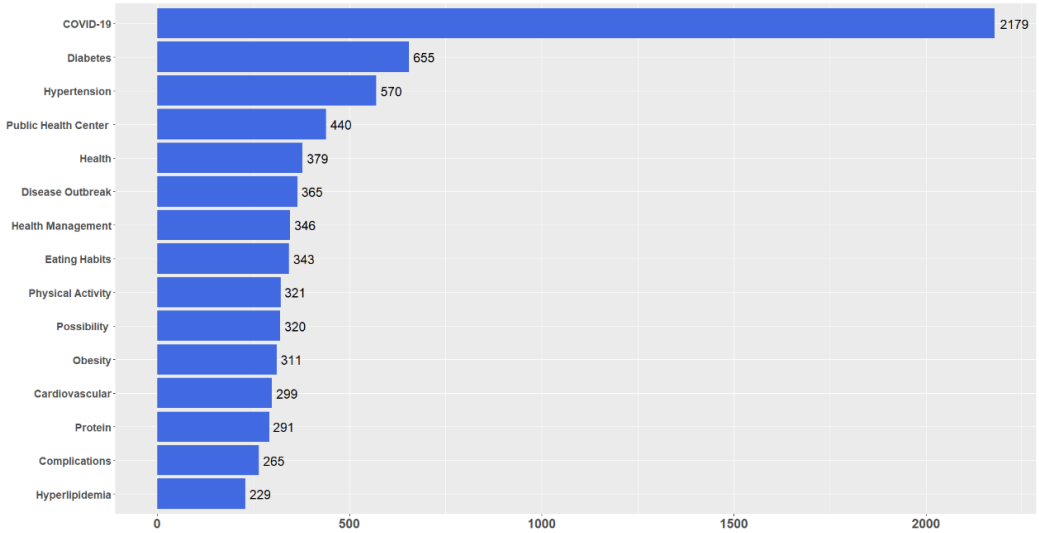

Figure 3. Frequency bars after the COVID-19 pandemic declaration.

4. Conclusions

This study examined the flow of entire text data by showing the frequency of word occurrence in the entire documents or each document through the frequency analysis of South Korean media news on obesity. The results of this study are meaningful because they present the direction of obesity management measures in the future by identifying the changes in keywords in obesity news articles before and after the COVID-19 pandemic declaration.

Future studies will examine the changes in topics related to "obesity" based on the COVID-19 pandemic period after identifying keywords and finding main topics using the LDA topic modeling. Future studies shall also identify the distributions of groups by grouping individuals based on similarity through text clustering, build models based on deep learning algorithms, and compare the text classification performance of these models.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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