Worsening of attitudes toward epilepsy following less influential media coverage of epilepsy-related car accidents: An infodemiological approach

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ABSTRACT

To evaluate changes in the attitudes of nonmedical university students toward epilepsy in 2015, the present study compared the results of questionnaire surveys from four different time periods: before media coverage of epilepsy-related car accidents (2008–2010), during a period of abundant media coverage (2011–2012), after media coverage (2013–2014), and after novel media coverage (2015). The nonmedical students that completed the questionnaire were divided into four groups: 2008–2010, 2011–2012, 2013–2014, and 2015. The rates of students that had read or heard about epilepsy decreased significantly in 2015 compared with those in 2013–2014. Attitudes toward epilepsy had also worsened in 2015. The rates of students that would not oppose their children playing with or attending school alongside children with epilepsy and those who thought that people with epilepsy should be hired in the same way as other people had decreased significantly in 2015 compared with those in 2011–2012 and 2013–2014. Analyses of information-seeking behavior on the Internet showed that the increase in Google search volume and Wikipedia page views was much less in 2015 than in 2011 and 2012. These findings suggest that familiarity with epilepsy had worsened even after media coverage of novel epilepsy-related car accidents. This suggests that media coverage in 2015 was less influential than that in 2011 and 2012.

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1. Introduction

There is still a great deal of misunderstanding regarding epilepsy, even in developed countries [1–6]. This may be partly because limited information on epilepsy is presented to the general public compared with that on other common diseases, such as malignancies, diabetes, and cardiovascular diseases. However, epilepsy-related car accidents (ERCAs) tend to be sensationalized in the media and on the web and attract a great deal of attention from people outside the medical field. In Japan, two serious ERCAs occurred between 2011 and 2012. In Kanuma city in April 2011, a mobile crane driven by a person with epilepsy ran over a group of elementary school children; six of whom died (2011 Kanuma accident). In Kyoto city in April 2012, a car driven by a person with epilepsy rushed into a crowded crossing. Seven pedestrians and the driver died, and another 11 were injured (2012 Kyoto accident). These ERCAs were broadcast in the media as "breaking news", therefore, many people without a medical background were exposed to information on epilepsy as well as on ERCAs.

Our research group conducts an annual questionnaire survey among university students in nonmedical fields to investigate their attitudes

toward epilepsy [7,8]. Our previous studies showed that media coverage of ERCAs positively influenced familiarity with and attitudes toward epilepsy [7] and that these improvements persisted even though the media coverage of ERCAs decreased from 2013 through 2014 [8]. These observations suggest that ERCAs in the media may provide opportunities to disseminate correct knowledge regarding epilepsy, even if it is associated with an unfortunate incident.

Some ERCAs occurred in Japan in 2015, the most striking of which occurred in Tokyo in August 2015 (2015 Tokyo accident), 3 months prior to the latest survey. In this ERCA, a car driven by a doctor with epilepsy ran onto a sidewalk, resulting in 1 death and 4 injures. The media coverage of this accident was less sensational than that associated with the 2011 Kanuma and 2012 Kyoto accidents. There was also controversy in the media and on the web regarding the issuance of driver's licenses to people with epilepsy, although there seemed to be fewer discriminatory statements than before. It is possible that novel media coverage about ERCAs may alter the familiarity with and attitudes toward epilepsy among people without a medical background.

The Internet has become an important source of health information, with millions of people using web search engines to seek health-related information every day. Google is one of the most popular search engines and is presumed to be used by the general public to obtain health-related information. Trend data of the number of Google searches for a specific term can be obtained from Google Trends, an online tool provided by

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Google (Japanese version: https://www.google.co.jp/trends/). Wikipedia is the most popular free online encyclopedia and is also likely to be used to find health-related information. The number of page views per day can also be obtained using an online tool: Wikipedia Article Traffic Statistics (http://stats.grok.se/). Trends of information-seeking behavior on the Internet can be useful to determine the impact of media coverage on the general public.

To evaluate changes in the attitudes of university students without a medical background toward epilepsy in 2015, the results of a questionnaire were compared among four different time periods: before media coverage of ERCAs (2008–2010), during a period of abundant media coverage (2011 and 2012), after media coverage (2013 and 2014), and after novel ERCAs (2015). In addition, we evaluated the impact of each ERCA based on the trends of information-seeking behavior on the Internet.

2. Methods

2.1. Questionnaire survey

The present study builds on our previous work [7,8]. We have conducted an annual survey evaluating familiarity with and attitudes toward epilepsy among students attending Juntendo University School of Health and Sports Science since 2008. The survey is administered every year via a short, structured questionnaire prior to a lecture on basic knowledge regarding neurological diseases among children given by one of the authors (AO or SA). Each student only completes the questionnaire once. All students are informed that the results of the questionnaire may be presented at academic meetings or published in scientific journals. The age and sex of the participants are included in the questionnaire, but no other personal information that could be used to identify the participants is included. The present study was approved by the ethics committee of Juntendo University Faculty of Medicine.

The questionnaire consisted of 7 questions adopted from a previous report ([9]; Table 1): the first 4 questions assessed familiarity with epilepsy, and the subsequent 3 evaluated attitudes toward epilepsy. These questions were answered as "Yes", "No", or "Neither". Blank answers were rare (at most 8) and were excluded from the final analyses. The last question was on knowledge of the three ERCAs occurring between 2011 and 2015. A brief description of each accident was added to Question 8, which was answered as "I know about it in detail"/"I know about it roughly"/"I do not know about it".

The present study focused on chronological changes in the rates of positive answers after the decrease in media coverage of epilepsy-related car accidents. Answers of "Yes" to Questions 1, 2, 3, and 6 and "No" to Questions 4, 5, and 7 were considered to be positive. To clarify

the effects of media coverage on attitudes toward epilepsy, we divided the participants into two groups: the "Do not know" group consisted of those that answered "I do not know about it" regarding all 3 ERCAs in Question 8. The others, i.e., those that knew about at least one accident roughly or in detail, were included in the "Know" group.

Using these questions, this study aimed to determine whether the attitudes of nonmedical students toward epilepsy have changed in recent years. The students that participated in this survey were divided into four groups according to the year in which they completed the survey: 2008–2010 (preaccident era; prior to the 2011 Kanuma accident), 2011–2012 (media coverage era; when 2011 Kanuma and 2012 Kyoto accidents were broadcast frequently), 2013–2014 (postmedia coverage era; when no ERCAs occurred), and 2015 (novel accident era; when the 2015 Tokyo accident was broadcast).

The rate of positive answers in 2015 was compared with those in 2008–2010, 2011–2012, and 2013–2014. Primarily, chi-square tests were conducted to identify significant differences among the rates of the four periods. If the chi-square tests revealed a significant difference ($p < 0.05$), then the rates of positive answers to each question were analyzed further; additional chi-square tests were used to compare 2015 with 2008–2010, 2011–2012, and 2013–2014. To allow for multiple comparisons, a Bonferroni correction was applied, and significance levels of 0.05 and 0.01 corresponded to p-values of 0.0166 and 0.0033, respectively. In addition, the rates of positive answers were compared between the "Know" and "Do not know" groups to clarify the influence of awareness to media coverage, the influence of media coverage on awareness of epilepsy, and the relationship between media coverage and awareness of epilepsy.

2.2. Infodemiological analysis

An infodemiological analysis was performed in the Japanese language, as the general public in Japan is unlikely to look for health-related information in English or other foreign languages. All keywords were input into Google Trends in Japanese characters. Wikipedia pages written in Japanese were investigated.

2.2.1. Google Trends

The keyword "*tenkan*" (Japanese translation of epilepsy) was entered into the "Google Trends" main page (accessed on July 23, 2016). Our research focused on the period between January 2010 and June 2016. To compare search volume trends, we also entered the following keywords: "*kou ketsu atsu*" (Japanese translation of hypertension), "*tou nyou byou*" (Japanese translation of diabetes mellitus), and "*dai dou myaku kai ri*" (Japanese translation of aortic dissection). The first two were chosen as representatives of well-known common health problems, and the third was chosen because the media reported on a traffic accident caused by a person with aortic dissection in February 2016. In this accident, a person hit by a car and the driver died, and another 10 people were injured. The results returned by Google Trends were normalized and presented on a scale from 0 to 100. Each point on the graph represented a relative search volume during each month divided by the search volume at the highest point, which was set at 100. No filters were applied to obtain trend curves of the search volume.

2.2.2. Wikipedia Article Traffic Statistics

The keyword "*tenkan*" was entered into Wikipedia Article Traffic Statistics to obtain the number of page views each month. The data were obtained during the period between January 2010 and December 2015 (accessed on July 23, 2016). Data after January 2016 were not available when we accessed the Wikipedia Article Traffic Statistics. The number of page views in each month was integrated into a trend curve using Excel 2013 (Microsoft, Redmond, WA).

Table 1
The questionnaire used in this study.

Q1.	Have you ever read or heard about a disease called epilepsy?
Q2.	Is there anyone with epilepsy among your acquaintances?
Q3.	Have you ever witnessed a person having an epileptic seizure?
Q4.	Do you think that epilepsy is a mental disorder?
Q5.	Do you oppose your kids to playing or attending school with children with epilepsy?
Q6.	Do you think that people with epilepsy should be hired in the same way as other people?
Q7.	Do you oppose your kids marrying a person with epilepsy?
Q8.	Do you know the following car accidents caused by persons with epilepsy?
	A. Tokyo accident
	B. Kyoto accident
	C. Kanuma accident

Questions 1 to 7 were answered in terms of "Yes"/"No"/"Neither".
Question 8 was answered by each case in terms of "I know it in detail"/"I know it roughly"/ "I do not know it".