Article

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Abstract: Introduction. Headache is a common public health problem, but its burden could be avoided by raising headache awareness and the appropriate use of acute medication and prophylactic medication. Few reports on raising headache awareness in the general public have been reported, and there are no reports on headache awareness campaigns through social networking services (SNS), or social media, in Japan. We prospectively performed a headache awareness campaign from March 2022 through 2 SNS, targeting nurse and wind instrumental musicians, because they are with high headache prevalence. **Methods.** Through the 2 SNS, the article and video were distributed, respectively. The article and video described the 6 important topics for the general public about headaches, which were described in the Clinical Practice Guideline for Headache Disorders 2021. Just after reading or watching them as e-learning, we performed online questionnaire sheets to investigate the awareness of the 6 topics through the 2 SNS. The awareness of the 6 topics before and after the campaign was evaluated. **Results.** In the SNS nurse-senka, we obtained 1191 responses. Women comprised 94.4%, and the median (range) age was 45 (20 to 71) years old. Headache sufferers were 63.8%, but only 35.1% had consulted doctors. In the SNS Creatone, we got the response from 134 professional musicians, with 77.3% of women. The largest number of respondents were in their 20s (range 18-60 years old). Headache sufferers were 87.9%. Of them, 36.4% had consulted doctors, 24.2% were medication-overuse headache. The ratios of individuals who were aware of the 6 topics significantly increased from 15.2%-47.0% to 80.4-98.7% after the online questionnaire in both SNS (p < 0.001, all). **Conclusions.** We conducted this headache awareness campaign through e-learning and an online survey via 2 SNS. The ratios of individuals who were aware of the 6 topics about headaches significantly increased 1 month after e-learning. Our results suggest that e-learning and online survey can improve headache awareness. The materials in this campaign can be installed into smartphone applications and further spread on SNS, leading to strong influence. With rapid digital transformations such as online telemedicine and artificial intelligence diagnosis, raising awareness will be more efficient and effective and should be important.

Keywords: education; medication-overuse headache (MOH); migraine; online; prevention; rational analgesic-use for headache; social networking services; social media

Introduction

Migraine is a public health problem, [1,2] and it is described in the International Classification of Headache Disorders 3rd edition (ICHD-3).[3] Migraine prevalence is 0.9-9.5%.[4–10] The economic and social impacts of migraine on productivity are starting to be recognized.[11–13] Still, there was an unmet need for migraine care: 89.8% of respondents had never taken preventative medicine for headaches, and 36.5% had been hesitant to consult doctors.[6] Most headache sufferers presumably manage the pains by taking over-the-counter (OTC) medicines.[14] Additionally, when people with

headaches consult a doctor, only neuroimaging is done to rule out organic or emergent disorders, and the diagnostic for a detailed primary headache and its treatment is inadequate. Even when diagnosing primary headaches, clinicians lack the necessary treatment understanding, which leaves patients dissatisfied.[14] Inappropriately using OTC medications and insufficient headache medical resources may result in chronic migraine and medication-overuse headache (MOH) [15].

By promoting headache awareness and the appropriate use of acute medication and preventative medication, this significant public health issue could be averted. Raising headache awareness not only among headache sufferers who routinely consult doctors but also among the general public, including headache sufferers who never come to the hospital and non-headache sufferers, is important. Few reports on raising headache awareness in people without headaches have been reported.[11,15–17] In this context, we prospectively performed a headache awareness campaign through social networking services (SNS), or social media, and evaluated headache awareness effects on the SNS users, including individuals both who had and did not necessarily have headaches.

Materials and Methods

Campaign procedure

Itoigawa General Hospital, in cooperation with SMS Corporation, and Regnition, held this headache awareness campaign prospectively from March 2022. The leading target groups were nurses and wind instrumental musicians because headaches are common in nurses[18] and wind instrumental musicians.[19] There are major SNS for nurses and wind instrumental musicians in Japan. The former one is called "nurse-senka" (https://knowledge.nurse-senka.jp/), with 1 million nurse users and 4 million page views per month. The latter one is called "Creatone" (https://www.creatone.jp/), on which 3000 users can communicate with professional musicians, and they can learn and be taught by professionals online or by e-learning videos.

This campaign emphasizes 6 important topics based on the Clinical Practice Guideline for Headache Disorders 2021 [14] (**Table 1**). An article in SNS nurse-senka (https://knowledge.nurse-senka.jp/500343) and a video in SNS Creatone (https://www.youtube.com/watch?v=tkfOALn5vGU) were created, explaining the 6 topics. Through the 2 SNS, the article and video were distributed, respectively. Just after reading or watching them as e-learning, we performed online questionnaire sheets to investigate the awareness of the 6 topics **(Table 1)** through the 2 SNS. The users read and answered them online. After a month, we again asked the users to answer the same online survey sheet and measured the awareness ratio of the 6 topics. The users did not acquire any honorarium and responded on a voluntary basis. We also asked, "why most headache sufferers do NOT consult doctors?" as choice questions. Age and headache characteristics were also collected, and MOH diagnosis was made in the same way in the previous studies [4,5,7].

Table 1. Topics and survey sheet.

These are the medical facts as stated in the Clinical Practice Guideline for Headache Disorders 2021. Please read and respond to the following question.		
Topic number	**Statement**	**Question (choose the answers)**
Topic 1	The economic loss caused by headaches, including interference with work, schoolwork, and household chores, has become a social problem.	Yes, I was aware. / No, I was not aware.
Topic 2	The economic loss due to reduced performance in studies and work caused by headaches (presenteeism) is greater than the economic loss due to missed school or work caused by headaches (absenteeism).	Yes, I was aware. / No, I was not aware.

Topic 3	Headache is a symptom; it can be caused by any number of diseases (example: migraine, tension-type headache)	Yes, I was aware. / No, I was not aware.
Topic 4	If you have migraine attacks more than twice a month, if you have strong headaches more than three days a month, or if you take painkillers more than 10 days a month, you should consult doctors.	Yes, I was aware. / No, I was not aware.
Topic 5	There are two important treatments for headaches: (1) acute and (2) prophylactic medications.	Yes, I was aware. / No, I was not aware.
Topic 6	There is a "medication-overuse headache," in which the headache returns and worsens by taking painkillers for more than 10 days a month.	Yes, I was aware. / No, I was not aware.

Valid responses were those that filled in all the items in the survey sheet. The questionnaire sheets with one or more blank answers were also excluded from this study.

Statistical methods

A Chi-square test compared the ratio of the individuals who were aware of the 6 topics before and after the online survey. A two-tailed $p < 0.050$ was defined as statistically significant. We used SPSS software version 28.0.0. (IBM, New York, USA).

Ethical aspects

Itoigawa General Hospital Ethics Committee approved this study (approval number 2022-2, 2022-3). There were no names or other personally identifying information in the anonymous survey. The volunteers were given a copy of the online survey form that detailed the study's objectives. If they wanted to take part in the study, they had to fill out the survey form. They were allowed not to participate if they did not want to do so by being asked to submit a blank sheet or not to try. The users did not acquire any honorarium and responded on a voluntary basis. All procedures were carried out following the Helsinki Declaration. To protect patient privacy, all identifiable patient data was removed from the database.

Results

In the SNS nurse-senka, we obtained 1191 responses. Women comprised 94.4%, and the median (range) age was 45 (20 to 71) years old. Headache sufferers were 63.8%, but only 35.1% had consulted doctors. In the SNS Creatone, we got the response from 134 professional musicians, with 77.3% of women. The largest number of respondents were in their 20s (range 18-60 years old). Headache sufferers were 87.9%. Of them, 36.4% had consulted doctors, 24.2% were MOH, and 75.9% experienced disturbance of music performance due to their headaches.

The ratios of individuals who were aware of the 6 topics significantly increased from 15.2%-47.0% to 80.4-98.7% after the online questionnaire in both SNS ($p < 0.001$, all) **(Table 2)**. The questionnaire results of "why most headache sufferers do NOT consult doctors?" are shown in **Table 3**. The results seemed similar in both groups.

Table 2. Survey results through social networking services for nurses and professional musicians.

These are the medical facts as stated in the Clinical Practice Guideline for Headache Disorders 2021. Please read and respond to the following question.					
Users		**SNS for nurses**		**SNS for professional musicians**	
Topic number	**Statement**	**Ratio of "I was aware" before e-learning through SNS**	**Post 1 month**	**Ratio of "I was aware" before e-learning through SNS**	**Post 1 month**
Topic 1	The economic loss caused by headaches, including interference with work, schoolwork, and household chores, has become a social problem.	27.9%	93.6%	18.2%	84.8%
Topic 2	The economic loss due to reduced performance in studies and work caused by headaches (presenteeism) is greater than the economic loss due to missed school or work caused by headaches (absenteeism).	22.0%	94.8%	15.2%	88.9%
Topic 3	Headache is a treatable disease.	30.3%	98.7%	21.2%	84.8%
Topic 4	If you have migraine attacks more than twice a month, if you have strong headaches more than three days a month, or if you take painkillers more than 10 days a month, you should consult doctors.	41.0%	97.1%	47.0%	80.4%
Topic 5	There are two important treatments for headaches: (1) acute and (2) prophylactic medications.	40.1%	95.8%	21.2%	91.8%
Topic 6	There is a "medication-overuse headache," in which the headache returns and worsens by taking painkillers for more than 10 days a month.	36.8%	92.2%	39.4%	90.9%

SNS; social networking services. The ratios of awareness were improved after 1 month, $p<0.001$ by chi-square test.

Table 3. The questionnaire results of "why most headache sufferers do NOT consult doctors?".

Reasons	Response rate by users in SNS for nurses (n=1191)	Response rate users in SNS for wind instrumental musicians (n=134)
Because I don't think headaches are sick enough to go to the hospital.	38.37%	77.3%
Because taking time off from work or school to see a doctor would cause inconvenience to others.	68.84%	45.5%
Because I cannot take time to visit a hospital during the daytime on weekdays.	62.30%	48.5%
Because my headache will go away if I just persevere.	24.43%	50.0%
Because people around me tell me to be patient.	8.14%	12.1%
Because doctors and co-medical staffs will not be kind to me even if I go to the hospital.	17.29%	15.2%
Because over-the-counter medicines are sufficient.	41.22%	62.1%
Because I do not know that there are prophylactic medicines to prevent headaches.	25.77%	40.9%
Because I feel that my headache does not interfere with my daily life.	17.71%	19.7%

SNS; social networking service.

Discussion

We conducted this headache awareness campaign through 2 SNS. The ratios of individuals who were aware of the 6 topics significantly increased after the e-learning and online survey (p < 0.001, all). Our results suggest that e-learning and online survey through the SNS could raise headache awareness among the SNS users.

In March 2004, the World Health Organization and the Global Campaign against Headache jointly launched the initiative.[20] The campaign was conceptualized in 3 steps; 1) Knowledge for awareness, 2) Awareness for action, and 3) Action for change. The details are described in **Table 4**. This campaign is still well underway around the world.

Table 4. The three strategic objectives of the Global Campaign against Headache.

	Strategic objective	Purpose	Action
1	Knowledge for awareness	Establish what it is that requires change	Adduce and collate evidence of the scope and scale of the global burden of headache
2	Awareness for action	Agitate to create desire for change	Promote awareness, among politicians, health-care providers, employers, schools and the general public, of headache disorders as remediable causes of public ill health and disability, and high financial cost
3	Action for change	Propose and justify the change to be instigated	Develop evidence-based, adaptable recommendations for intervention, justified by cost-effectiveness analysis

In this context, although the education program for doctors and headache sufferers has been widely performed, only 4 campaigns were performed to inform the general public about headaches; education at university,[17] public education,[16] a national MOH awareness campaign,[15] and leaflet distribution at the mass vaccination and e-learning through schools.[11] However, not all the campaigns succeeded. Under the complex media environment, consumer-generated media such as weblogs and SNS have been used rather than mass media.[21,22] Therefore, we assume that passively informing the general public via mass media was not influential because non-headache sufferers may not be interested in the headache burden. Therefore, this headache awareness was conducted using the SNS consisting of user groups that would potentially have a high headache prevalence. Our campaigns were not mandatory; we asked for free-will participation on the SNS. We aimed to recruit as many participants as possible by targeting a population with a high headache prevalence and by explaining the 6 topics in a way that was easy to understand for nurses and wind instrumental musicians on each SNS. We may need to devise further ways to increase participation in the future, such as advertisements and point programs.

We mention future prospects. Under the COVID-19 pandemic, our headache awareness campaign can be performed without face-to-face communication to avoid infection. Also, our materials used for awareness-raising can be installed into smartphone applications of headache diary[23,24] and further spread on SNS, leading to strong influence. Furthermore, with rapid digital transformations such as online telemedicine[25] and artificial intelligence diagnosis,[26] raising awareness will be more efficient and effective and should be important.

We herein described limitations. This campaign was performed in specific SNS, so user demographics are skewed and may be difficult to generalize for all SNS. In addition, our study can have responder bias due to the collection method employed. Therefore, the results did not necessarily reflect those of all users. The ratio of headache sufferers seemed high among the responders in this study. Also, a certain number of people who were not interested in headaches did not participate in the e-learning and survey.

Conclusions

We conducted this headache awareness campaign through e-learning and online survey via 2 SNS. This is because the SNS consists of user groups that would potentially have a high headache prevalence. The ratios of individuals who were aware of the 6 topics about headaches significantly increased 1 month after e-learning ($p < 0.001$, all). Our results suggest that e-learning and online survey can improve headache awareness. The materials in this campaign can be installed into smartphone applications and further spread on SNS, leading to strong influence. With rapid digital transformations such as online telemedicine and artificial intelligence diagnosis, raising awareness will be more efficient and effective and should be important.

Conflicts of Interest: The authors report no conflicts of interest concerning the materials or methods used in this study or the findings presented in this paper. No sources of financial or material supported were given. This article and contents of this study were not published nor presented previously.

Abbreviations

ICHD-3:	International Classification of Headache Disorders 3rd edition
MOH:	medication-overuse headache
OTC:	over-the-counter
SNS:	social networking services
TTH;	tension-type headache
WHO:	World Health Organization

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