

Analysis of YouTube Content on Oral Disease Information about the Elderly

Ji-Won Kim*, Hanna Gu*, Hye-Jin Kwon, Jeong-Hyun Lim, and Hee-Jung Lim[†]

Department of Dental Hygiene, The Graduate School of Health Science, Eulji University, Seongnam 13135, Korea

Background: The elderly have, a higher disease morbidity than other age groups due to a decrease in resistance to the disease and have complex diseases, so care should be taken. Accordingly, it is considered important to provide information for improving the health of the elderly. Health information plays an important role in individual health promotion and education, so the degree of exposure to information about oral health of the elderly is expected to have a significant impact on understanding and acquiring information on oral content videos on the importance, prevention, and management of oral health of the elderly in the future.

Methods: This study analyzed video content related to oral diseases of the elderly in a total of 150 videos uploaded on YouTube from January 1, 2012 to May 13, 2021, using a total of three books of dental hygiene for the elderly.

Results: Forty-nine broadcasters accounted for the most of this information. Among the information providers, there were two dental hygienists. They accounted for 1.3% of all the information providers. The highest number of dental hygienists who broadcasted information was 42 in 2019. The average number of views was 37,303 periodontal diseases, the highest. Among the videos, dry mouth was the most common with 34 oral diseases.

Conclusion: The number of images for each disease varies, so it seems that information should be provided in various ways. Dental hygienists should widely improve oral health knowledge by providing various dental hygiene management images for each oral disease to improve the oral health of the general public. In addition, based on the information of the Health Insurance Review and Assessment Service, the development and provision of content should be actively carried out so that people can obtain the information they desire.

Key Words: Consumer health information, Dental care for aged, Elderly, Oral diseases

Introduction

In 2017, the elderly population in Korea accounted for 14.2% of the total population, and as a result, South Korea become an aged society. According to Statistics Korea¹⁾, in 2025, Korea is expected to become a “super-aged society”, with the elderlies accounting for 20.3% of the total population. Aging is associated with loss of physical and physiological functions, and oral health is closely related to the general health²⁾. Poor oral care was associated with poor general health³⁾, and therefore, the functional loss of

oral health is a key factor impairing the quality of life in individuals. In addition, the World Health Organization (WHO)⁴⁾ defined oral health as “having functional, natural, and satisfactory teeth that enable eating, talking, and engaging in social activities without pain, disability, and discomfort throughout life, there by distributing to overall well-being”. As such, oral health was suggested as an essential component of general health, well-being, and social roles. However, as the age increases, oral health care tends to be neglected with a common belief that oral disease is simply caused by aging⁵⁾. Poor oral health

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†Correspondence to: Hee-Jung Lim, <https://orcid.org/0000-0002-4738-3032>

Department of Dental Hygiene, The Graduate School of Health Science, Eulji University, 553, Sanseong-daero, Seongnam 13135, Korea
Tel: +82-31-740-7228, Fax: +82-31-740-7352, E-mail: cindy-1109@eulji.ac.kr

*These authors contributed equally to this work.

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management can further aggravate oral diseases, and thus, awareness of oral health must be improved in the public.

Compared to other age groups, the elderly has a higher morbidity and complex diseases caused by their decreased resistance to diseases. Thus, elderly must carefully manage their health⁶⁾, and this requires access to information. Health information is fundamental for maintenance of health, management and prevention of diseases, and promotion and education of health. Moreover, the use of health information effectively enhances the understanding of disease symptoms, conditions, and treatment⁷⁾. Following the development of information and technology since the 2000s, health-related information can be readily accessed at a desired time and place. This has enabled appropriate use of health information for better management of own's health⁸⁾.

According to WiseApp⁹⁾, among many applications such as KakaoTalk, Naver, YouTube, and Facebook, YouTube was the most used video app in Korea in both 2019 and 2020. In the distribution of YouTube users by generation for one month in 2021, more users in their 50s (28.7%) used the YouTube app than those in their 10s (13.4%) and 20s (17.2%)¹⁰⁾. In addition, the total usage time of the YouTube app was 25.4% in those in their 50s compared to 20.6% in those in their 10s and 23.3% in those in their 20s¹⁰⁾, suggesting that the middle-age and elderly populations frequently use YouTube. The number of YouTube users and usage time of YouTube of the elderly is expected to increase further in the near future, and the level of exposure to information on oral health will have significant effects on understanding and acquisition of information on oral health in the elderly.

In previous studies on YouTube, 11 dance creators in Korea underwent interviews on motivation, purpose, and channel status for analysis of subscribers and viewers to understand the current trend of media dance content¹¹⁾, and 125 museum channels in Korea and Europe were analyzed for the number of subscribers, number of views, and trends of popular content to seek future strategies and contents for museums¹²⁾. Furthermore, to promote the Korean traditional culture and awareness of Korean traditional clothing in foreign countries, 325 contents were analyzed for the year of upload, number of views, content,

subject, and video length. As such, studies on the analysis of the current trend and status of YouTube video contents have been conducted¹³⁾; however, there is a lack of studies on oral health videos for elderly on YouTube as health information is increasingly becoming more important in the aging population.

Therefore, the purpose of this study as to analyze information provider, provision time, and number of view of videos on YouTube to understand the current status of videos related to oral diseases in the elderly on YouTube. In addition, by analyzing dental hygiene management in videos on oral disease, this study aimed to evaluate which oral health management methods have been explained to the general public and which diseases require further information. This study ultimately intended to prepare base data for systematic development of future videos on the importance of oral health and prevention and management of diseases in the elderly for promotion of oral health.

Materials and Methods

1. Methods

In this study, a total of 150 video contents related to oral diseases in the elderly uploaded on YouTube January 1, 2012 to May 13, 2021 were analyzed. The analyzed videos contained information on one of the seven oral diseases in the elderly classified in Geriatric Dental Hygiene. The selection criteria were as follows.

(1) The three volumes of Geriatric Dental Hygiene were used to classify oral diseases and respective dental hygiene management in the elderly^{2,6,14)}. A total of seven oral diseases (periodontitis, dental caries, dry mouth, oral cancer, eating disorder and dysphagia, tooth loss, denture stomatitis) and 15 dental hygiene management methods (oral exercise, smoking cessation, bad breath treatment, dietary management, intra- and extra-oral massage, prosthetic treatment and implants, abstention from drinking, regular oral examination, professional dental plaque management, fluoride application, self-dental plaque management, aspiration pneumonia prevention training, denture use and management, dryness-relieving dietary habits, drug treatment) was classified.

(2) The number of videos, information provider (groups, companies, broadcasters, individuals), information provision time, total number of views, and dental hygiene management ratio were analyzed for each of the classified diseases. For information provider, individuals were classified into medical and non-medical personnel, and medical personnel working in dentistry were evaluated as dentists or dental hygienists. For the number of views, the average number of views of videos on each oral disease was evaluated.

(3) Each of the oral disease names was searched on YouTube. All videos that showed up on search were analyzed, and those that were not related to the elderly were excluded. The following synonyms of the classified oral diseases were also searched for analysis: gingivitis or “pung-chi” for periodontitis, tooth cavity for dental caries, mouth dryness for dry mouth, swallowing disorders and dysdipsia for eating disorder and dysphagia, edentulism for tooth loss, and denture-induced stomatitis for denture stomatitis. After searching the synonyms, only those videos that were related to the elderly were selected as well. As a result, a total of 150 videos were included in the analysis.

(4) The three volumes of Geriatric Dental Hygiene were used to classify possible dental hygiene management methods for the diseases. The following methods were classified: five diseases manageable by self-dental plaque management (periodontitis, dental caries, dry mouth, eating disorder and dysphagia, denture stomatitis), five diseases manageable by regular oral examination (periodontitis, dental caries, dry mouth, oral cancer, denture stomatitis), three diseases manageable by professional dental plaque management (periodontitis, dental caries, denture stomatitis), seven diseases manageable by dietary management (periodontitis, dental caries, dry mouth, oral cancer, eating disorder and dysphagia, tooth loss, denture stomatitis), four diseases manageable by prosthetic treatment and implant (periodontitis, dental caries, tooth loss, denture stomatitis), four disease manageable by smoking cessation (periodontitis, dental caries, dry mouth, oral cancer), three diseases manageable by intra- and extra-oral massage (periodontitis, dry mouth, eating disorder and dysphagia), four diseases manageable by denture use and

management (dental caries, eating disorder and dysphagia, tooth loss, denture stomatitis), four diseases manageable by dryness-relieving dietary habits (dental caries, dry mouth, oral cancer, denture stomatitis), two diseases manageable by fluoride application (dental caries, denture stomatitis), three diseases manageable by oral exercise (dental caries, dry mouth, denture stomatitis), one disease manageable by each of bad breath treatment and drug treatment (dry mouth), one disease manageable by aspiration pneumonia prevention training (eating disorder and dysphagia), and one disease manageable by abstinence from drinking (oral cancer).

2. Data analysis

The collected videos were analyzed using 2017 IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA). Frequency analysis was conducted, and binary multiple response analysis was conducted for all dental hygiene management methods from one video.

Results

1. Number of videos per oral disease

A total of 150 videos on oral diseases in the elderly was analyzed. Dry mouth and periodontitis were discussed in 34 (22.6%) and 26 (17.3%) videos, respectively. In contrast, oral cancer was the least discussed in nine (6.0%) videos. The mean number of views was the highest for periodontitis at 37,303 and the lowest for oral cancer at five (Table 1).

Table 1. Total Number of Images and Average Number of Views for Each Oral Disease

| Oral diseases | Value (n=150) | View count (n) |
|----------------------------|---------------|----------------|
| Periodontitis | 26 (17.3) | 37,303 |
| Dental caries | 17 (11.3) | 1,151 |
| Xerostomia | 34 (22.6) | 9,603 |
| Oral cancer | 9 (6.0) | 5 |
| Eating-swallowing disorder | 18 (12.0) | 2,229 |
| Tooth loss | 23 (15.3) | 10,915 |
| Denture stomatitis | 23 (15.3) | 2,984 |

Values are presented as number (%) or mean only.

2. Number of video information providers

Broadcasting companies uploaded the greatest number of videos at 49 (32.7%), and non-medical personnel uploaded the least number of videos (12 videos, 8.0%). Among those videos uploaded by medical personnel, dentists and dental hygienists uploaded the most and least number of videos at 18 (12.0%) and 2 (1.3%) videos, respectively (Table 2).

Table 2. Total Number of Information Providers per Video

| Category | Value (n=150) |
|--|---------------|
| Broadcasters (KBS, SBS, YTN, etc) | 49 (32.7) |
| Medical person | |
| Dentist | 18 (12.0) |
| Dental hygienist | 2 (1.3) |
| Etc (physician, family medicine doctor, etc) | 16 (10.7) |
| Company | 35 (23.3) |
| Organization | 18 (12.0) |
| Non-medical person | 12 (8.0) |

Values are presented as number (%).

3. Oral disease management per dental hygiene management methods

A total of 209 videos on dental hygiene management was observed after multiple response analysis (Table 3).

Self-dental plaque management was recommended the most for periodontitis in 14 videos and the least for eating disorder and dysphagia in one video. Regular oral examination was recommended the most for periodontitis in 10 videos and the least for dry mouth in one video. Professional dental plaque management was recommended the most for periodontitis in six videos and the least for denture stomatitis in two videos. Dietary management, prosthetic treatment, and smoking cessation were recommended the most for eating disorder and dysphagia in seven videos, for tooth order in 22 videos, and for oral cancer in six videos, respectively. Intra- and extra-oral massage was the most recommended method for dry mouth in seven videos and was recommended the least for periodontitis and eating disorder and dysphagia in only one video. Denture use and management was the most recommended intervention for tooth loss and denture stomatitis in nine videos. In contrast, denture use and

Table 3. Dental Hygiene Management for Each Oral Disease

| Category | Type (n=209) | | | | | | |
|--|---------------|---------------|------------|-------------|----------------------------|------------|--------------------|
| | Periodontitis | Dental caries | Xerostomia | Oral cancer | Eating-swallowing disorder | Tooth loss | Denture stomatitis |
| Self-dental biofilm management | 14 | 11 | 2 | - | 1 | - | 5 |
| Regular oral examination | 10 | 5 | 1 | 3 | - | - | 10 |
| Professional-dental plaque management | 6 | 3 | - | - | - | - | 2 |
| Diet management | 4 | 1 | - | 4 | 7 | 1 | - |
| Prosthetics and implants | 3 | 1 | - | - | - | 22 | 1 |
| No smoking | 1 | 1 | 2 | 6 | - | - | - |
| Oral and external massage | 1 | 0 | 7 | - | 1 | - | - |
| How to use and care for dentures | - | 4 | - | - | 1 | 9 | 9 |
| Dry-relieving eating habits ^a | - | 3 | 12 | 0 | - | - | 2 |
| Fluoride coating | - | 3 | - | - | - | - | 1 |
| Oral exercise | - | 1 | 8 | - | - | - | 3 |
| Halitosis treatment | - | - | 6 | - | - | - | - |
| Drug treatment | - | - | 5 | - | - | - | - |
| Pneumonia prevention training | - | - | - | - | 2 | - | - |
| No drinking | - | - | - | 4 | - | - | - |

Values are presented as number only.

-: not available.

^aEating clean foods such as vegetables and fruits, caffeine such as coffee or tea reduce intake, chew xylitol gum, drink plenty of water.

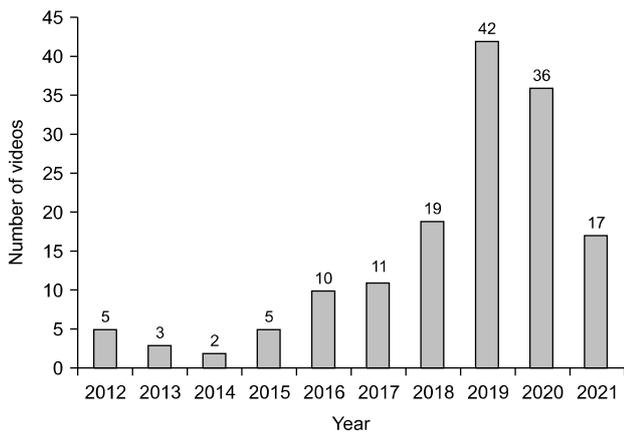


Fig. 1. Relationship between the timing of information provision and the number of videos.

management was suggested to treat eating disorder and dysphagia in only one video. Dryness-relieving dietary habit was the most commonly recommended method for dry mouth in 12 videos. Fluoride application was recommended the most for dental caries in three videos and the least for denture stomatitis in one video. Oral exercise was the most recommended method for dry mouth in eight videos. On the other hand, oral exercise was recommended the least for dental caries in one video.

Bad breath treatment, drug treatment, aspiration pneumonia prevention training, and abstention from drinking were recommended for dry mouth in six videos, for dry mouth in five videos, for eating disorder and dysphagia in two videos, and for oral cancer in four videos, respectively.

4. Information provision time per year

In 2016, 2017, and 2018, 10, 11, and 19 videos on oral diseases in the elderly were uploaded, respectively. In 2019, a total of 42 videos was uploaded, which was more than two-fold greater than that uploaded in 2018 (Fig. 1).

Discussion

Korea has become an aged society in 2017 with the elderly accounting for 14.2% of the total population¹⁾. Following such increase, interest in information for improvement of the elderly health is also increasing. In particular, although oral health is a part of overall health, it

is closely related to the general health and is essential for the well-being of the elderly²⁾. Herein, we analyzed YouTube videos on oral disease information in the elderly, and the results were as follows.

The most common information provider was broadcasting companies (KBS, SBS, YTN, etc.) with 49 (32.7%) videos. These broadcasting companies mostly uploaded small clips of broadcasted contents rather than one long video. This seems to have increased the number of uploaded videos. A total of 36 (24.0%) videos has been uploaded by medical personnel, among which included two (1.3%) videos uploaded by dental hygienists. Therefore, dentists and dental hygienists who are experts in oral health must actively upload more videos on oral diseases in elderly. In particular, dental hygienists must put more effort to improve oral health. However, in the current dentistry curriculum, education on the elderly is only available in certain universities. Thus, as dental hygienists lack the required oral health knowledge and skills, the curriculum must be expanded and modified¹⁵⁾.

Our findings showed that the number of videos uploaded in 2019 was double that uploaded in 2018. According to Socialerus¹⁶⁾, a Korean YouTube data analysis service company, the number of cumulative subscribers and views increased significantly in 2019. This has subsequently led to quantitative growth and increased upload of videos. However, as only YouTube was analyzed in this study, the results may have included bias. Therefore, other media platforms must also be analyzed in the future.

Herein, videos on periodontitis had the highest number of views. According to the statistics on outpatient frequent disease in 2020 by the Health Insurance Review and Assessment Service (HIRA)¹⁷⁾, periodontitis was the most common disease in the elderly over the age of 60. This may explain the public's interest in the prevention and management of periodontitis. Among a total of 26 videos on management of periodontitis, self-dental plaque management was the most suggested intervention in 14 (53.8%) videos. In a previous study by Han¹⁸⁾, using interdental cleaning tools such as dental floss and interdental toothbrushes with brushing was helpful in preventing periodontitis. Therefore, these educational videos on the

effects, benefits, and use of dental care products such as dental floss and interdental toothbrushes for self-dental plaque management would have provided motivation to develop the habit of preventing periodontitis.

Among a total of 17 videos on dental carries, 11 (64.7%) and five (29.4%) videos were on self-dental plaque management and regular oral examinations, respectively, suggesting that self-dental plaque management was suggested more often. In a study by Jang and Kim¹⁹⁾, lack of oral examination for a year led to poor subjective awareness of oral condition and high decayed, missing, and filled teeth, indicating the importance of regular oral examinations. In addition, regular oral examinations may also help patients acknowledge the importance of brushing methods and oral health products. Thus, it would be important to improve awareness of regular oral examinations for prevention of diseases than treatment purposes.

Among a total of 34 videos on dry mouth, 12 (35.3%) and 8 (23.5%) videos were on dryness-relieving dietary habit and oral exercise, respectively. The Korea Pharmaceutical Information Center recommended dietary improvement as a lifestyle guidance method to treat dry mouth²⁰⁾. This may have led to many videos on dietary habits to relieve dryness such as drinking a lot of water and eating fruits. In addition, in a study by Jeon et al.²¹⁾, oral exercise was an effective method for dry mouth regardless of the age, medications, residence type, use of dentures, and income level, which may be related to the high number of videos on oral exercise.

In contrast, oral cancer was the least discussed disease, being mentioned in only nine videos. In 2020 National health-interested Disease Statistics for elderlies over the age of 60, information on oral cancer showed the highest demand among different oral diseases. Interestingly, the number of videos on YouTube was not proportional to the reported demand on oral cancer²²⁾. In addition, the mean number of views for videos on oral cancer was the lowest in this study. The incidence rate of oral cancer accounts for 3 to 5% of all cancers, which is significantly lower than that of other oral disease. This may have contributed to low access to information and related videos, leading to a low number of views. Therefore, videos uploaders must

produce content according to the demand for information on oral diseases.

Among the videos on dental hygiene management for oral cancer, six (66.6%) and four (44.4%) videos recommended smoking cessation and abstinence from drinking/dietary management, respectively. Smoking is well-known to have significant negative effects on oral cancer and respiratory cancer²³⁾. Kwon et al.²⁴⁾ reported that more than 75% of patients with oral cancer were smokers and drinkers, and Kim²⁵⁾ reported that drinking and smoking lead to synergistic effects. Therefore, it is believed that the related videos were uploaded to show the correlation between oral cancer and smoking and drinking and raise awareness of the public.

Our findings showed that a total of 18 videos on eating disorder and dysphagia was uploaded on YouTube, including seven (38.9%) videos on dietary management for recommended intervention. So and Ko²⁶⁾ recommended dietary management for eating disorder and dysphagia in the elderly. In the elderly, decline in physiological and physical functions due to aging leads to difficulties in swallowing. Thus, accordingly, many videos seem to recommend controlling nutrition intake for treatment.

Tooth loss was discussed in a total of 23 videos. Among them, 22 (95.7%) videos recommended prosthetic treatment and implants to treat tooth loss. According to HIRA, the number of individuals eligible for coverage of implants by the health insurance has increased following the increase in the number of patients with tooth loss. As a result, the public's interest has grown, which may explain the high number of videos on prosthetic treatment and implant for tooth loss²⁷⁾. Furthermore, in videos on prosthetic treatment and implant, treatment technique was often discussed. This may be attributed to the improved level of medical knowledge of the public, leading to increased interest and relevant videos. However, for accurate health information, it is necessary to provide not only treatment techniques, but also information on oral changes due to tooth loss and self-management methods after prosthetic treatment. Thus, various videos need to be uploaded.

In 23 videos on denture stomatitis, regular oral examination was recommended the most in 10 (43.5%) videos. According to Shin²⁸⁾, unstable dentures can cause

ulcers and pain. The alveolar bone of the gingiva with missing teeth is gradually absorbed and cause the denture to become unstable. As a result, dentures are highly likely to be damaged, deformed, or worn. Thus, many videos may have emphasized the importance of regular examinations.

Our results showed that the videos on YouTube did not provide various types of information for each of the oral diseases. Korea is rapidly becoming a super-aged society, and accordingly, oral health experts such as dental hygienists who are educators of oral health management for patients²⁹⁾ must have the knowledge and communication skills about elderly patients and understand the relationship between oral and general health. Therefore, to provide dental hygienists with professional oral health knowledge, the current dentistry and dental hygienist curriculums must be modified.

Several limitations must be considered in the interpretation of this study's findings. First, the viewer information could not be obtained due to the nature of YouTube. Thus, distribution and preference by age groups could not be evaluated. Second, the YouTube algorithm leads to the discovery of new videos for every search, which may have caused us to miss some videos during the search. Additionally, although oral diseases are closely related to systemic disease, this study was conducted only on videos related to oral diseases. Therefore, follow-up studies must conduct interview surveys and questionnaires for the general public to thoroughly evaluate the demands of different age groups. Moreover, studies must perform detailed analysis of contents such as the accuracy of information on home remedies that have been not proved through professional studies and conduct communication analysis through the comments. Despite these limitations, this study is the first to investigate dental hygiene management for the elderly among many studies on YouTube. Our findings would provide the basic data for development and research in the future where health would be an important topic of interest following to the aging of the population. Therefore, future studies must expand the scope of search period for content analysis and not limit the content to oral diseases, but also evaluate the physical, social, and mental health of the elderly.

Notes

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Ethical approval

This study is a review-based study and does not require an IRB review.

Author contributions

Conceptualization Hee-Jung Lim. Data acquisition: all the authors. Formal analysis: all the authors. Funding: Hee-Jung Lim, Ji-Won Kim, and Hanna Gu. Supervision: Hee-Jung Lim and Hanna Gu. Writing-original draft: all the authors. Writing-review & editing: Hee-Jung Lim. All authors approved the final manuscript.

ORCID

Ji-Won Kim, <https://orcid.org/0000-0003-4002-9011>

Hanna Gu, <https://orcid.org/0000-0003-0412-0600>

Hye-Jin Kwon, <https://orcid.org/0000-0001-5136-1744>

Jeong-Hyun Lim, <https://orcid.org/0000-0001-9163-9237>

Hee-Jung Lim, <https://orcid.org/0000-0002-4738-3032>

References

1. Statistics Korea: 2020 Statistics for the elderly. Retrieved September 20, 2021, from http://kostat.go.kr/portal/korea/kor_nw/1/1/index.board?bmode=read&aSeq=385322.
2. Kim YK, Park JR, Yu JH, et al.: Geriatric dental hygiene. Komoonsa, Seoul, pp.44-56, 2020.
3. Choi YJ, Kwon SJ, Ryu HG: The effect of geriatric oral health on health status and social activity in Ulsan Province. *KJHSM* 6: 185-193, 2012. <https://doi.org/10.12811/kshsm.2012.6.1.185>
4. World Health Organization: The definition of oral health. Retrieved September 20, 2021, from <https://www.who.int/mediacentre/news/releases/2004/pr15/en/>.
5. Richmond S, Chestnutt I, Shennan J, Brown R: The relationship of medical and dental factors to perceived general and dental health. *Community Dent Oral Epidemiol* 35: 89-97, 2007.

- <https://doi.org/10.1111/j.1600-0528.2007.00296.x>
6. Kang BW, Kim NH, Park JR, et al.: Geriatric dental hygiene. Koonja, Seoul, pp.29, 2012.
 7. Kim MH, Kim KW, Lee KS: Association between oral health and oral health-related quality of life among the elderly. J Dent Hyg Sci 14: 488-494, 2014.
<https://doi.org/10.17135/jdhs.2014.14.4.488>
 8. An ST, Lee JY: Older adults' health promotion via mobile application: the effect of self-efficacy and social stigma. KJCS 63: 113-142, 2019.
<https://doi.org/10.20879/kjcs.2019.63.2.004>
 9. WISEAPP/WISERETAIL: The video app that Koreans use the most. Retrieved September 29, 2021, from <https://m.post.naver.com/viewer/postView.nhn?volumeNo=28906183&memberNo=32291422&searchKeyword=%EC%9C%A0%ED%8A%9C%EB%B8%8C&searchRak%20=7>
 10. WISEAPP/WISERETAIL: Those in their 50s or older use YouTube the most on their smartphones. Retrieved September 29, 2021, from <https://m.post.naver.com/viewer/postView.nhn?volumeNo=30777994&memberNo=32291422>.
 11. Kim KH: Analysis of personal media dance content- focused on YouTube. KSD 78: 25-39, 2020.
<https://doi.org/10.21317/ksd.78.3.2>
 12. Choi JE, Kim M: A study on the current status and utilization of YouTube and contents of museum. KSBDA 20: 647-660, 2019.
<https://doi.org/10.47294/KSBDA.20.5.47>
 13. Chang MJ: Analysis of the state of traditional Korean costume on YouTube. JKTC 22: 115-123, 2019.
<https://doi.org/10.16885/jktc.2019.12.22.4.115>
 14. Park MS, Kim SA, Kim JA, et al.: Geriatric dental hygiene. Daehannarae, Seoul, 2012.
 15. Kim YJ, Jang JH, Cho JW: Analysis of current status of curriculum for geriatric dental hygiene in Korea. J Korean Soc Dent Hyg 20: 865-874, 2020.
<https://doi.org/10.13065/jksdh.20200080>
 16. Socialerus: 2019 Korea YouTube data insight analysis report. Retrieved September 29, 2021, from <http://scr.me/Report/2019/>.
 17. Healthcare Bigdata Hub: Such as frequency statistics of diseases. Retrieved September 29, 2021, from <http://opendata.hira.or.kr/op/opc/olapHifrqSickInfo.do>.
 18. Han SJ: Evaluation of the association between dental floss and interdental brush use and periodontal health inequality reduction: among Korean adults. J Korean Soc Dent Hyg 21: 129-140, 2021.
<https://doi.org/10.13065/jksdh.20210013>
 19. Jang YJ, Kim NS: Relationship of oral health behavior to subjective oral health status and the DMFT index in Korean adults. J Korean Soc Dent Hyg 11: 499-509, 2011.
 20. Korea Pharmaceutical Information Center: Xerostomia (dry mouth). Retrieved September 29, 2021, from https://www.health.kr/researchInfo/pharmreview.asp?search_value=%EA%B5%AC%EA%B0%95%EA%B1%B4%EC%A1%B0&HV_Scroll=1&search_term=all&paging_value=1&setLine=10&firstSearch=true.
 21. Jeon YJ, Choi JS, Han SJ: The effect of dry mouth improvement by oral exercise program in elderly people. J Korean Soc Dent Hyg 12: 293-305, 2012.
<https://doi.org/10.13065/jksdh.2012.12.2.293>
 22. Healthcare Bigdata Hub: National health interested disease statistics. Retrieved September 29, 2021, from <http://opendata.hira.or.kr/op/opc/olapMfrmIntrsInnsPList.do>
 23. Han JH, Kim EK, Lim SH, Kim CH: Literature review on the incidence and risk factor of oral cancer. J Dent Hyg Sci 12: 451-458, 2012.
 24. Kwon HK, Cha IH, Lim SJ, Choi CH, Kim BI: Risk factors for oral cancer; a case-control study. J Korean Assoc Oral Maxillofac Surg 28: 395-400, 2002.
 25. Kim GS: Recent occupational diseases such as 97-oral cancer-laryngeal cancer and tonsil cancer. KIIHA 241: 6-13, 2008.
 26. So JS, Ko SM: Understanding and practice of eating-swallowing disorder. J Korean Dent Assoc 56: 287-295, 2018.
<https://doi.org/10.22974/jkda.2018.56.5.004>
 27. Healthcare Bigdata Health Analysis: Family month special healthcare big data analysis. Retrieved September 29, 2021, from <https://www.hira.or.kr/bbsDummy.do?pgmid=HIRAA020041000100&brdScnBlt%20No=4&brdBltNo=9819>
 28. Shin SY: Postinsertion adjustment procedures of removable partial dentures. J Dent Rehabil Appl Sci 29: 384-390, 2013.
<https://doi.org/10.14368/jdras.2013.29.4.384>
 29. Korean Dental Hygienists Association: Introduction of dental hygienists. Retrieved September 29, 2021, from <https://www.kdha.or.kr/introduce/dentalhygienist.aspx>