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Effects of Smartphone use During Defecation and Smartphone Dependency on Incidence of Anal Disease in Adults

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ABSTRACT

This study aims to investigate whether adults who use smartphones during defecation have anal diseases and their smartphone dependencies. For 129 adults, whether to use a smartphone when defecating, defecation time, with or without anal disease and smartphone dependency were surveyed. When defecating, defecation time of the smartphone-using group showed a significant increase compared to the non-using group. The group with anal disease showed a significant difference in smartphone usage time during defecation, defecation time and smartphone dependency compared to the group without anal disease.

Keywords
Adults, Smartphones, Defecation time, Anal disease, Smartphone dependency

1. Introduction

Since the launch of 'iPhone' by Apple US in 2009, the use of smartphones has spread out explosively [1]. Smartphones represent a 'communication technology' that provides convergence of communication, information, broadcasting and computers and a cutting-edge system media device optimized for users as it can freely embody various applications [2]. Smartphones have also overcome space and time limitations and enabled ubiquitous approach to information and provided an environment with convenient text and video-oriented way of communication [3]. However, eventually many different types of problems have emerged due to excessive use of smartphones [4].

In terms of physical issues, use of smartphone adversely affects the mobility of the thumb and wrist joints [5] while over-dependency on smartphones results in turtle neck syndrome and herniated cervical disc [6, 7], headache and xeroma, loss of focus and sleep disorder [8, 9].

Another concern is the FOMO (Fear of missing out) syndrome, which refers to the increase in stress due to smartphone use where one feels anxiety towards missing out on an update or being missed out [10]. Nomophobia (NO MObile PHone PhoBIA), which refers to the discomfort or anxiety when not using virtual communication device such as PC, and 'digital dementia,' which indicates decrease in memory and judgment and cognitive ability regarding communication are also anticipated with the increased use of smartphones [7].

In a social perspective, excessive use of a smartphone blocks conversation and deteriorates family relationship, causing difficulties in forming interpersonal relationships as it makes people stop looking at each other [11, 12]. Moreover, a phenomenon of language destruction is emerging as teenagers and young adults prefer faster delivery of text messages [13].

Interestingly, the number of patients treated with anal disease increased approximately 3.5% from 618,542 in 2016 to 640,074 in 2019 [14]. Among anal diseases, hemorrhoid is a condition where hyperemia of the blood vessels in the enlarged mucous tissue in the anal sac results in

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swelling of the hemorrhoid tissue [17]. Hemorrhoid affects 39-52% of adults and is usually asymptomatic but can cause various symptoms including indolent hemorrhage, dislocation and inflammation [18]. It was reported in a study that poor bowel habits such as sitting on a toilet for a long time induce unnecessary increase in pressure and elevate the risk of anal disease [19]. Another study recommended to limit the frequency and duration of bowel activity to once a day and to 3-5 minutes [20]. Thus, it is known that various factors contribute to the incidence of hemorrhoids. According to the "2019 Statistics Report of Major Interventions Performed in Korea" of the National Health Insurance Service, hemorrhoidectomy was the third most frequently performed intervention with 168,779 cases performed that year [21]. Also, in a questionnaire on smartphone dependency conducted on 1,000 male and female subjects between 13 to 59 years old residing nationwide, 58.5% in 2014, 61.4% in 2017 and 65.5% in 2019 answered that they carry smartphones to the washroom, indicating that the number of people who use their smartphones in the washroom is increasing every year [22]. However, no studies have been conducted on the correlation between the use of smartphones during defecation and anal disease.

Therefore, this study was conducted to investigate the use of smartphone during defecation in adults, its variation according to the presence of anal disease and smartphone dependency.

2. Methods

2.1 Study Subjects and Period

For this study, data was collected through questionnaires from November 28, 2020 to November 30, 2020 on 129 subjects in their 20s to 50s.

2.2 Study Tool

2.2.1 Adult bowel activity questionnaire

The questionnaire on the bowel activity of adults contains 18 questions on demographics, presence of anal disease, mean defecation time, mean screen time spent during defecation, and most frequently used smartphone contents during defecation (up to 5 items can be selected).

2.2.2 Smartphone dependency questionnaire

The questionnaire used by Lee et al (2020) [23] was used to investigate smartphone dependency. The questionnaire contains 10 questions answered with a scale of 4 (1: Strongly disagree, 2: Disagree, 3: Agree, 4: Strongly agree).

2.3 Study Method

A Google form-engineered questionnaire was distributed to adults in their 20-50s through SNS and was collected after 2 days. The identification of "Mean smartphone screen time (per week)" varied according to the smartphone suppliers. A supplier provided the data of the day searched and another supplier provided the mean screen time for the week on a Saturday. To address this gap, the questionnaire was distributed on Saturdays. Subject consent was obtained after explaining the research objectives before performing the study.

2.4 Analysis Method

The data collected in this study were analyzed using IBM SPSS Statistics 25.0. A frequency analysis was performed on the demographics of subjects and frequency of use by contents. Also, an independent t-test was performed to determine the defecation time according to the use of

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smartphones during defecation and the difference in defecation time and screen time during defecation between the groups of subjects with or without anal disease. Pearson correlation analysis was performed to determine the mean screen time spent during defecation and smartphone dependency according to presence of anal disease. The statistical significance level (α) was 0.05 for all tests.

3. Results

3.1 Demographics

The most frequent age groups of the subjects from the highest percentage were 50s, 30s, 20s and 40s. For gender, 58 subjects (45.0%) were male and 71 subjects (55.0%) were female. The most frequent residence was Seoul, Gyeonggi-do, Incheon, Gangwon-do, Busan, Sejong, Chungcheongnam-do, Gyeongsangbuk-do, Gwangju, Jeju-do and lastly overseas (Table 1).

Table 1. Subject demographics (n = 129)

Demographics	Categories	N	%
Gender	Male	58	45.0
	Female	71	55.0
Age	20~29	27	22.5
	30~39	37	26.4
	40~49	24	15.5
	50~59	41	35.7
Residence	Seoul	68	52.7
	Gyeonggi-do	38	29.5
	Incheon	8	6.2
	Gangwon	4	3.1
	Busan	2	1.6
	Sejong-si	2	1.6
	Chungcheongnam-do	2	1.6
	Gyeongsangbuk-do	2	1.6
	Gwangju	1	0.8
	Jeju-do	1	0.8
	Overseas	1	0.8

3.2 Comparison of defecation time according to the use of smartphone during defecation

The difference in defecation time by use of smartphone during defecation was examined and the result showed that the defecation time of the group of subjects who use a smartphone during defecation (M=9.21, SD=6.36) was significantly longer than that of the group of subjects who do not use a smartphone during defecation (M=5.90, SD=3.58) ($p < 0.05$) (Table 2).

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Table 2. Comparison of defecation time according to the use of smartphone during defecation

Classification	Defecation time (Mean ± SD)	t (p)
Non-use (N=31)	5.90±3.58	2.757(.018*)
Use (N=98)	9.21±6.36	

Abbreviations: Unit: min.

*p < 0.05

3.3 Comparison of the defecation time and the screen time during defecation according to the presence of anal disease

The defecation time was compared according to the presence of anal disease without regard to the use of smartphone during defecation. The result showed that defecation time was significantly higher in the group of subjects with anal disease (M=12.68, SD=7.19) compared to the group of subjects without anal disease (M=7.24, SD=5.03) (p < 0.05). Screen time during defecation according to the presence of anal disease was also investigated. The result showed that the screen time of the group of subjects with anal disease (M=9.75, SD=7.78) was significantly higher than the group of subjects without anal disease (M=4.84, SD=5.59) (p < 0.001) (Table 3).

Table 3. Difference in defecation time and amount of time using smartphone during defecation by presence of anal disease

Classification	Presence of anal disease (Total = 129)		t (p)
	With anal disease (Mean ± SD)	No anal disease (Mea n± SD)	
Defecation time	12.68±7.19	7.24±5.03	4.584 (.029*)
Time using smartphone during defecation	9.75±7.78	4.84±5.59	3.791 (.030*)

Abbreviations: Unit: min.

*p < 0.05

3.4 The correlation between the mean screen time and smartphone dependency in two groups among the group of subjects who use smartphone during defecation divided by presence of anal disease

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The correlation between the mean screen time and smartphone dependency in two groups was examined in the two groups according to the presence of anal disease. The result showed that there was no significant correlation in all the items in the group of subjects without anal disease. In contrast, for the group of subjects with anal disease, 'I had a big argument with my family because of my use of smartphones' showed the most statistical significance (0.592), followed by 'I struggle with my academic or professional performance because of smartphones (0.489)', 'I experienced bad conflict with friends, colleagues and other social relationship (0.488)' , 'I struggle with keeping a proper screen time (0.469)', 'I fail whenever I try to reduce my screen time (0.463)', 'It is difficult to control my screen time (0.448)'. The items 'I feel a strong urge to use my smartphone' and 'I have experienced health issues due to my use of smartphones' did not show statistical significance.

Table 4. Correlation of mean screen time and smartphone dependency in groups with or without anal diseases (n = 98)

Dependency item / Usage time Mean	1	2	3	4	5	6	7	8	9	10
without Anal diseases (N=74)	0.144	0.203	0.135	0.171	0.192	0.207	0.107	-0.038	0.084	0.081
with Anal diseases (N=24)	0.463*	0.448*	0.469*	0.421*	0.421*	0.272	0.354	0.592	0.488*	0.489*

Abbreviations:1=I fail whenever I try to reduce my screen time , 2=It is difficult to control my screen time, 3=I struggle with keeping a proper screen time, 4=I have difficulties in concentrating on other work when I am next to a smartphone, 5=I cannot get the thought about my smartphone out of my head, 6=I feel a strong urge to use my smartphone, 7=I have experienced health issues due to my use of smartphones, 8=I had a big argument with my family because of my use of smartphones, 9=I experienced bad conflict with friends, colleagues and other social relationship , 10=I struggle with my academic or professional performance because of smartphones.

*p **<** 0.05, **p **<** 0.01

3.5 The frequency of use by contents in the group of subjects with anal disease that uses smartphone during defecation

The contents frequently used during defecation were examined in the group of subjects with anal disease that use smartphone during defecation and the result showed that text messaging (18 subjects, 15.0%) had the highest rate, followed by reading articles (17 subjects, 14.2%), SNS (15 subjects, 12.5%), watching videos (11 subjects, 9.2%), reading web comics and internet shopping (7 subjects, 5.8% respectively), playing games (6 subjects, 5.0%), listening to music (5 subjects, 4.2%), web fiction and phone call (2 subjects, 1.7% respectively) (Table 5).

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Table 5. The frequency of use by contents in the group of subjects with anal disease that uses smartphone during defecation (N=24)

Rank	Contents classification	Frequency of use
1	Message/Mobile messenger	18(15.0)
2	news article	17(14.2)
3	SNS	15(12.5)
4	Internet video	11(9.2)
5	Webtoon	7(5.8)
5	Shopping	7(5.8)
7	Game	6(5.0)
8	MUSIC	5(4.2)
9	Web novel	2(1.7)
9	call	2(1.7)

4. Discussions

In this study we investigated the use of smartphones during defecation and the defecation time and screen time according to the presence of anal disease in adults. We examined whether the use of smartphones affect defecation time. We also identified the contents most frequently used during defecation of the group of subjects with anal disease and determined the correlation between screen time and smartphone dependency of groups with or without anal disease.

The result showed that defecation time tends to increase with the use of smartphone during defecation. A marked increase to almost 2-fold was seen in the group of subjects using smartphone during defecation with 9.21±6.36 min compared to 5.90±3.58 min estimated in the control group. Secondly, not only the defecation time was increased in the group of subjects with anal disease (12.68±7.19 min) compared to the group of subjects without anal disease (7.24±5.03 min), but the screen time was also longer in the group of subjects with anal disease (9.75±7.78 min) than the other group (4.84±5.59 min). This is supported by the result of a previous study where the intra-abdominal pressure towards the anus increased due to the longer time spent in the washroom, which resulted in the reduction of venous circulation and eventually increased the incidence rate of anal disease [19]. The contents frequently used during defecation were examined and the result showed that text messaging (15.0%) had the highest rate, followed by reading articles (14.2%), SNS (12.5%), watching videos (9.2%), reading web comics and Internet shopping (5.8% respectively), playing games (5.0%), listening to music (4.2%), and web fiction and phone call(1.7% respectively). Text messaging and SNS had the highest percentage because the characteristics of the media where two-way interaction with multiple people takes place results in longer duration of use compared to one-way immersion of a person in a smartphone. Also, since the location of the activity is a washroom, the advantage of being able to communicate silently is one of the major factors that increase the frequency of smartphone usage

[24]. Lastly, although the correlation between the mean smartphone screen time and smartphone dependency was not significant in the group of subjects without anal disease that use smartphone during defecation, the correlation between the mean smartphone screen time and smartphone dependency was significant in the group of subjects with anal disease that use smartphone during defecation. This indicates that increase in smartphone dependency of the group of subjects with anal disease results in not only personal/mental problems including loss of control on screen time and difficulty to concentrate, but causes various problems including poor academic performance and conflict with family members. Considering that this dependency result is only significant in the group of subjects with anal disease, this factor may also affect the risk of anal disease. Overall, the use of smartphones during defecation increases defecation time and can potentially increase the risk of anal disease. The use of smartphones may not only trigger anal disease but also increase smartphone dependency, which may cause personal problems as well as social problems.

In terms of the limitations of this study, the generalization of the results of this study is limited as the number of subjects was limited and the gender and age of subjects were not evenly distributed. Regarding the question 'Have you experienced anal disease or currently having anal disease before or after the use of smartphones?' the possibility of subjects not telling the truth cannot be excluded. It is recommended that the correlation between smartphone usage and anal disease is studied regarding more diverse factors including season, life habits, nutrition and fluid intake. However, this study may be meaningful as this is the first study conducted on the correlation between the use of smartphones during defecation and the incidence of anal disease.

5. Conclusion

This study was conducted to investigate the use of smartphones during defecation and the presence of anal disease in adults. The following results were identified. Firstly, the defecation time of the group of subjects who use smartphone during defecation was significantly longer than the group who does not. Secondly, the defecation time and screen time of the group of subjects with anal disease were significantly increased compared to the opposing group. Third, the most frequently used smartphone contents the group of subjects with anal disease used during defecation listed from highest frequency were text messaging, reading articles and SNS. Fourth, in the group of subjects who use smartphone during defecation, only the group of subjects with anal disease showed statistically significant relationships between smartphone dependency and most of the factors. Conclusively, the result of this study showed that defecation time tends to increase with the use of smartphone during defecation. The group of subjects with anal disease not only had longer defecation time and longer screen time during defecation but also had high smartphone dependency.

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