

COMPREHENSIVE EFFECTS OF A NOVEL INFORMATION SYSTEM TO MITIGATE MACULAR DEGENERATION

Seong-Ran Lee

Department of Medical Information, Kongju National University

Abstract: *This study measures the comprehensive effectiveness of a novel information system to mitigate macular degeneration. The data were surveyed through questionnaires and interviews from October 7 to December 2, 2019. The subjects of the study were 106 people who visited the general hospital ophthalmology located in Chungcheongnam-do. The general information of study participants was analyzed by X^2 -test. The macular degeneration status before and after the information system is analyzed as t-test. The results of this study are as follows. Firstly, 64.2% of the experimental group showed significantly insufficient sleep conditions than 52.8% of the control group ($X^2=5.71$, $p<.05$). Secondly, chiropractic pressure around the eye increased significantly after application than before information was applied ($t=-7.58$, $p<.01$). Thirdly, the symptoms of macular degeneration continued to decrease after two days of system application than before information system application. In conclusion, we confirm that the application of a novel information system is effective in mitigating macular degeneration. Therefore, the results of the research are expected to contribute to the treatment of other eye diseases.*

Keywords: *Macular degeneration, Information system, Sleep conditions, Chiropractic pressure, Treatment*

1. INTRODUCTION

The nerve tissue at the center of the inner retina of the eye is called the macula[1],[2]. Most of the eye cells are gathered here, and it is also the center of the ecliptic where the objects form. The macular is the most sensitive part of the retina. It plays a very important role in vision. Macular degeneration is a disease that causes vision impairment due to a change in the macular region located in the inner retina of the eye. It is the greatest risk factor for macular degeneration, which usually occurs in patients in their 60s and older. The cause of macular degeneration is hypoxia in the retina due to accumulation of hydrophobic wastes due to aging[3],[4]. Figure 1 shows the incidence of macular degeneration by year. It has increased every year since 2012 and is close to 70% in 2020. Figure 2 shows the incidence of macular degeneration by age.

The macular degeneration causes the neurons in the macular region to slowly degenerate. If patients develop a disease in the macula, they will see severe vision loss and black spots in their central vision. The problem of vision caused by the bending of the retina to be flattened is transformed. Macular degeneration reduces vision as the macula decreases in function due to aging, genetic factors, toxicity, and inflammation. As macular degeneration progresses, the center of things becomes invisible[5],[6].

Therefore, it is important to prevent the progression of macular degeneration. To mitigate macular degeneration, it is necessary to apply a novel information system. Most of the previous studies have studied the quality of life for macular degeneration patients. Therefore, this study measures the comprehensive effectiveness of a novel information system to mitigate macular degeneration. Through this, this can help maintain healthy eyes and treat other eye diseases.

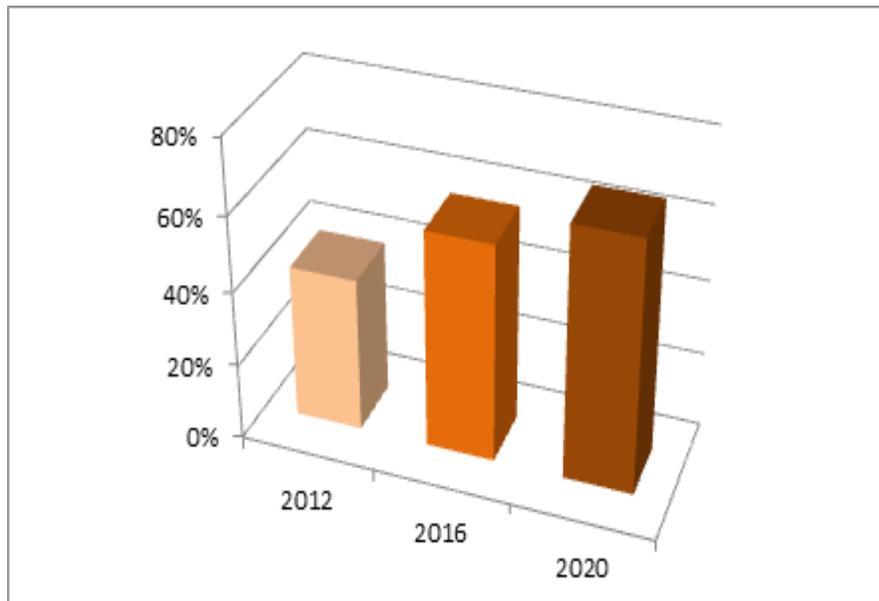


Figure 1. Incidence Rate of Macular Degeneration by Year

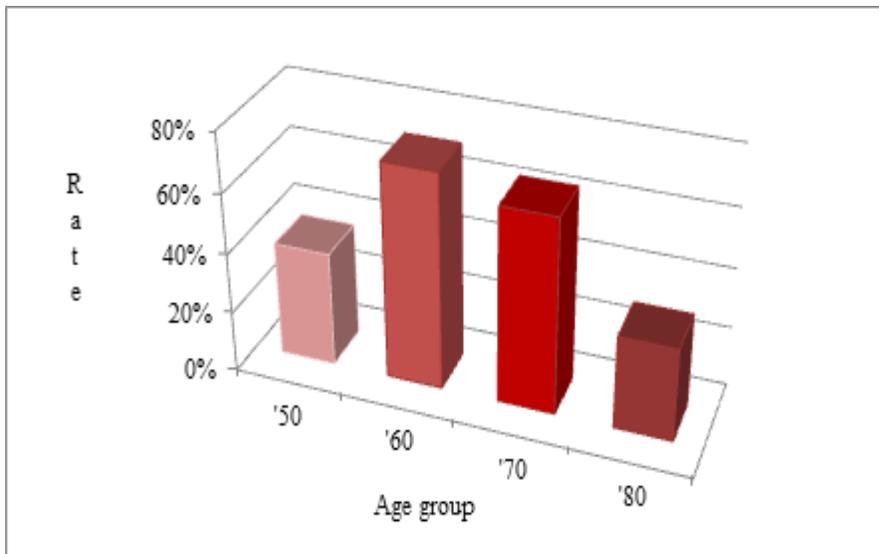


Figure 2 Incidence Rate of Macular Degeneration by Age

2. MATERIAL AND METHODS

2.1. Strategic Measures to Mitigate Macular Degeneration

Figure 3 presents strategic measures to mitigate macular degeneration. 1) Framework of strategic measures to mitigate macular degeneration 2) Seeking ways to strengthen the macula 3) Introduction of a novel information system 4) Application of a novel system to mitigate macular degeneration 5) Before and after the application of a novel system to mitigate macular degeneration 6) An analysis of the application results of a novel system for mitigating macular degeneration 7) Measurement of the persistence of macular degeneration treatment effects 8) Application of derived results to other eye diseases

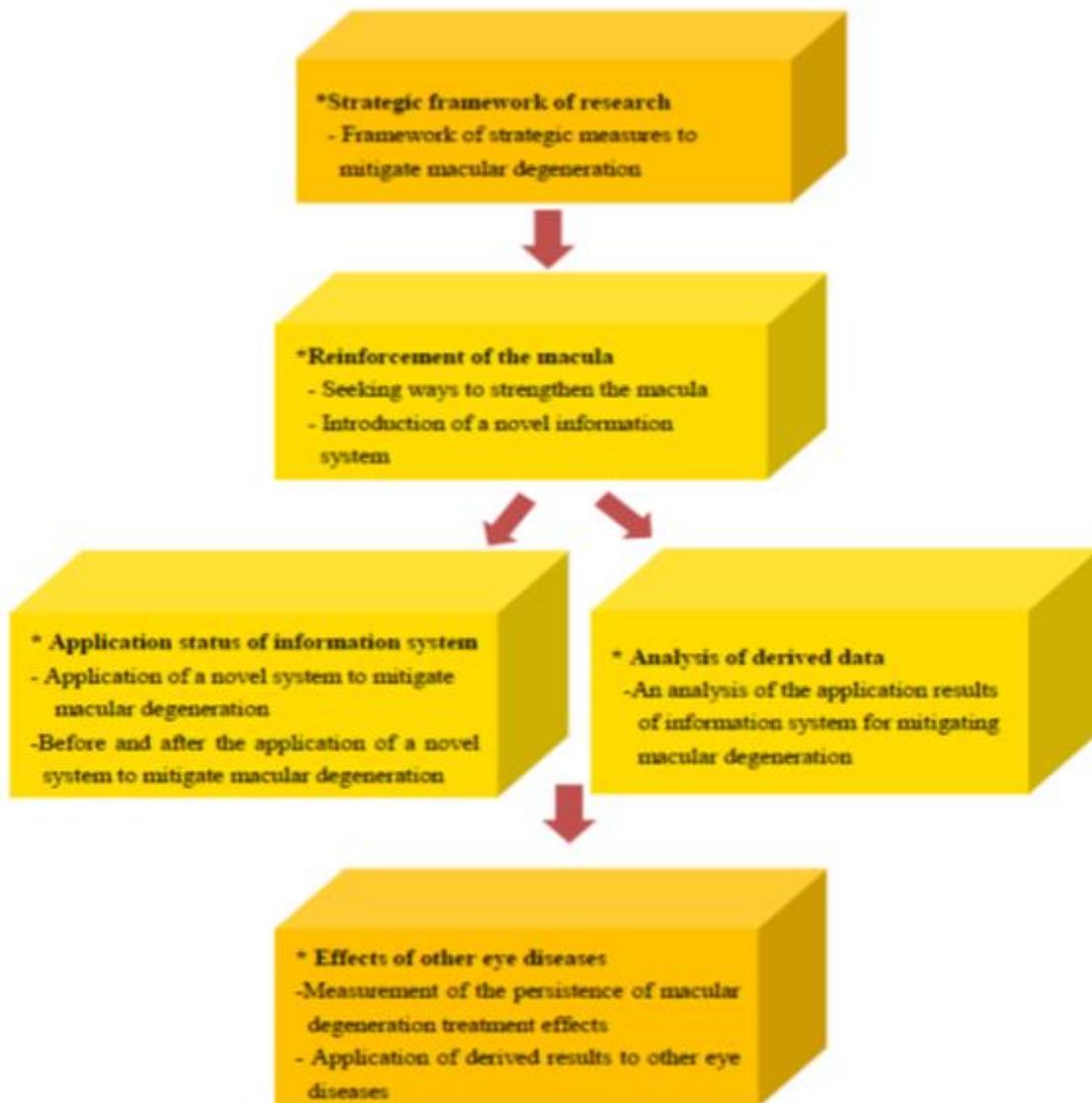


Figure 3. Strategic Measures to Mitigate Macular Degeneration

2.2. Materials and Ethical Situations

The data were surveyed through questionnaires and interviews from October 7 to December 2, 2019. The subjects of the study were 106 people who visited the general hospital ophthalmology located in Chungcheongnam-do. The study conducted the survey with the consent of the subjects according to the research ethics. The objectives and procedures for this study are described. Precautions for completion of the questionnaire were also explained.

The questionnaire indicated that it would not be used anywhere other than this study. This study can only be participated if the subjects agree.

2.3 Tools for Research

This study is a tool to measure the effectiveness of system application for macular degeneration treatment. We analyzed it using the Likert 5-point scale. The higher the score, the more positive the situation is for the treatment of macular degeneration. In the previous study, the Cronbach's α was .861, and in this study, it was .892, which was higher.

2.4. Methods

The general information of study participants was analyzed by X²-test. The macular degeneration status before and after the information system is analyzed as t-test. The time change of macular degeneration symptoms is analyzed by t-test.

3. Results

3.1. General Characteristics of Subjects in This Study

Table 1 shows the general characteristics of the subjects. In the case of using information media for more than 10 hours, 34.0% of the experimental group were found to be higher than 20.8% of the control group. 64.2% of the experimental group showed significantly insufficient sleep conditions than 52.8% of the control group (X²=5.71, p<.05).

Table 1. General Characteristics of Subjects in This Study

Variables	Experimental group	Control group	X ²
	N(%)	N(%)	
Age			
≤49	6(11.3)	8(15.1)	11.47
50-59	12(22.6)	13(24.5)	
60-69	19(35.8)	15(28.3)	
≥70	16(30.2)	17(32.1)	
Information media time 전체듣기			
More than 5 Hours	12(22.6)	19(35.8)	7.52
Less than 5-10 hours	23(43.4)	23(43.4)	
More than 10 hours	18(34.0)	11(20.8)	
Gender			
Men	25(47.2)	29(54.7)	2.96
Women	28(52.8)	24(45.3)	
Sleep			
Sufficient,	19(35.8)	25(47.2)	5.71*
Insufficient	34(64.2)	28(52.8)	
Ophthalmic disease			
Yes	36(67.9)	22(41.5)	1.38**
No	17(32.1)	31(58.5)	
Total	53(100.0)	53(100.0)	

*p<.05, ** p<.01

3.2. The status of macular degeneration before and after applying the information system

Table 2 shows the status of macular degeneration before and after the application of the information system. Eye-warming behavior was significantly higher after application than before the information system was applied (t=-2.93, p<.01). Chiropractic pressure around the eye increased significantly after application before information was applied (t=-7.58, p<.01).

Table 2. The Status of Macular Degeneration Before and After Applying the Information System

Items	Before	After	t
	Mean±S.D.	Mean±S.D.	
Eye-warming behavior	17.38±3.62	49.71±2.75	- 2.93**
Chiropractic pressure around the eye	25.62±1.47	54.93±1.48	-7.58**
Blinking eyes	29.17±4.95	59.04±3.65	- 4.29**
Ingestion of bilberry	16.45±2.61	41.39±0.73	-1.53**
Drinking marigold flower Tea	14.39±0.85	46.82±0.59	-2.6 -5.28**

Eating sweet potatoes	36.15±4.02	53.94±3.72	-1.64*
Carrot intake	38.42±1.36	56.72±1.48	-3.81*
Finger pressure	13.85±0.74	58.39±3.63	-5.93**
Shoulder pressure	36.96±4.19	59.05±3.84	-1.27**
Foot massage	27.03±1.68	52.41±1.59	-4.58**
Neck massage	24.15±0.30	55.63±0.72	-6.91**
Eye rest frequently	30.74±5.28	58.95±4.34	- 1.73**
*p<.05, ** p<.01			

3.3 State of Time Change in Macular Degeneration Symptoms

Figure 4 shows the time change of macular degeneration symptoms. The symptoms of macular degeneration continued to decrease after two days of system application than before information system application. However, it increased after 16 days of information system application and decreased again after 24 days(p<.05).

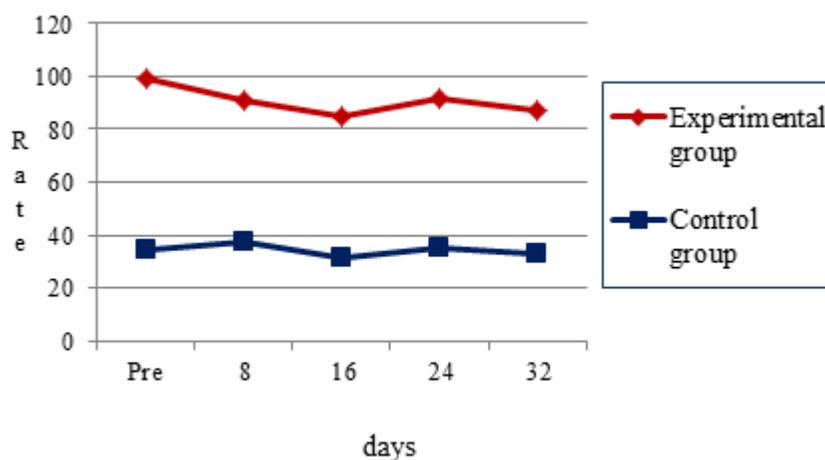


Figure 4. The State of Time Change in Macular Degeneration Symptoms

3.4. Vision Status Over Time

Figure 5 shows the state of vision over time. It has been shown that vision improves continuously over time after application than before information system is applied. In particular, it has improved dramatically since the 16th when the information system was applied.

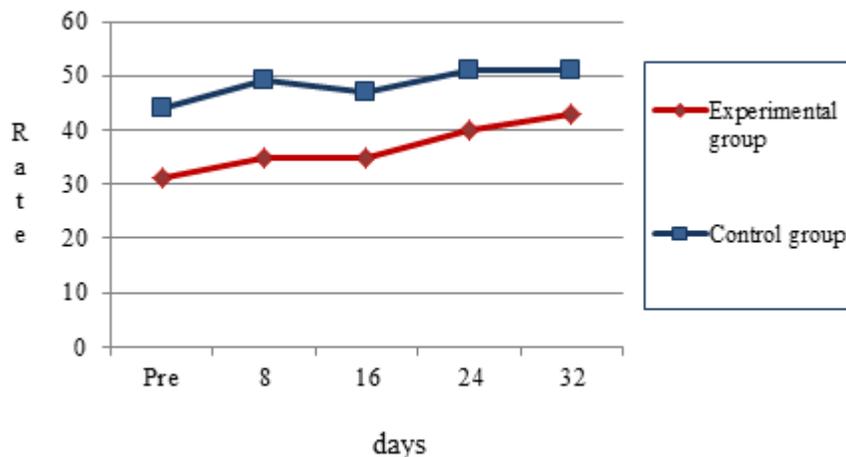


Figure 5. Vision Status Over Time

4. DISCUSSION AND CONCLUSION

This study measures the comprehensive effectiveness of a novel information system for mitigating macular degeneration. As a result of this study, frequent eyes blinking behavior increased significantly after application than before information application. This behavior reduced macular degeneration over time. This study showed similar results to previous studies on cataracts[7],[8]. Using a smartphone for a long time can cause fatigue in the eyes, deteriorate vision, or promote aging. Especially in the dark, using a smartphone for a long time causes eye diseases such as macular degeneration. Therefore, people should often blink to relieve eye fatigue.

As a result of the study, bilberry increased significantly after the application of the system than before the application of the information system. If patients eat bilberry, their macular degeneration decreases and their eyesight improves than when they don't eat it. The anthocyanin in the bilberry helps the circulation of blood vessels around the retina, which helps the retina health. Marigold flower tea can also improve eye health and reduce macular degeneration. Marigold is rich in lutein, which helps to treat the eyes by constructing retina, macula, and lens. This study showed similar results as a prior study of glaucoma[9],[10]. In conclusion, we confirm that the application of a novel information system is effective in mitigating macular degeneration. Therefore, the results of the research are expected to contribute to the treatment of other eye diseases.

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