

Hardian-Artikel-C4

by Hardian Hardian

Submission date: 29-Mar-2023 12:54PM (UTC+0700)

Submission ID: 2049763011

File name: 2020122115235116_2020_1023.pdf (183.47K)

Word count: 3687

Character count: 19296

ORIGINAL ARTICLE

Improvement of Sleep Quality by Autonomous Sensory Meridian Response (ASMR) Stimulation Among Medical Students

Hardian Hardian¹, Sari Satya Febriani², Tanjung Ayu Sumekar¹, Muflihatul Muniroh¹, Darmawati Ayu Indraswari¹, Yosef Purwoko¹, Endang Ambarwati¹

¹ Department of Physiology, Faculty of Medicine Diponegoro University, 50275 Semarang, Indonesia

² Department of Medicine, Faculty of Medicine Diponegoro University, 50275 Semarang, Indonesia

ABSTRACT

Introduction: Sleeping disturbance is commonly found in community especially medical students. There are several factors that may cause sleep disturbance including unrelax prior to sleep. Stimulus Autonomous Sensory Meridian Response (ASMR) is known to having a relax sensation. However there is no report yet about ASMR effect on sleep quality. The aim of this study is to determine the effect of ASMR on medical students sleep quality. **Methods:** Thirty subjects from undergraduate students of Medical Faculty Diponegoro University academic year 2017 were collected. Written informed consents were collected before recruitment. They were randomly divided into treatment group was given ASMR stimulation (n=15) and control group was given non ASMR video (n=15). ASMR stimulation was delivered by watching a 20 minutes of ASMR video at the night for 14 consecutive days. The subjects were asked to fill out the Pittsburgh Sleep Quality Index (PSQI) questionnaire at before and after intervention. **Results:** PSQI score in treatment group was significantly reduced after ASMR stimulation (7.0 ± 1.69 vs 3.9 ± 0.9 ; $p=0.001$). PSQI score before and after intervention on control group was not significantly different (6.7 ± 1.45 vs 6.8 ± 1.61 ; $p=0.6$). PSQI score after of treatment group was significantly lower than control group ($p<0.001$). PSQI score category after intervention of subjects in treatment group mostly were "good" (73.3% vs 0.0%; $p<0.01$). **Conclusion:** ASMR stimulation can improve sleep quality in medical students.

Keywords: ASMR, PSQI, Sleep quality

Corresponding Author:

Hardian Hardian, PhD

Email: dokterhardian@gmail.com

Tel: +62(24)76928010

INTRODUCTION

Sleeping is an active process and not just a loss of awake. The overall level of brain activity does not decrease during sleep. During certain stages of sleep, the brain absorbs oxygen more than the normal level when we are awake. The body's need to sleep may come from the periodic needs of the brain to restore reduced energy savings (1). The American Academy of Sleep Medicine (AASM) and the Sleep Research Society (SRS) recommend a good sleep around 7 hours / night regularly to get optimal health (2). Changes in quality, quantity and sleep patterns result in sleep disturbances (3). Sleep disturbances are caused by abnormal conditions in the brain which cause interruptions in sleep patterns (2). Fixed and repetitive sleep disorders can affect a person's health. Undiagnosed and untreated sleep disorders will torment the sufferers and also affect their socioeconomic status. Sleep disorders have various causes, including

those related to medical and psychological conditions. Some sleep disorders are caused by interference with the upper airway while asleep. Other things can also be caused by genetic conditions, age, medication, diet, and environmental factors (4).

Students are demanded by heavy academic pressure and high levels of stress. Heavy demands are deemed to trigger changes in sleep habits and lifestyle of medical students (5). Academic examination pressure is known to compromise the student's sleep quality. Reduced sleep quality during the exam period is mainly predicted by the pressure perceived (6). Poor sleep quality occurs among students, with the most common complaints reported by students about their sleep problems being as follows: difficulty to fall asleep, difficulty of sleeping and waking up in the morning, lack of sleep, fatigue and sleepiness during the day, and sleeping too long during the day (7). There are at least twenty-seven percent of students who experience one sleep disorder. However, between fourteen-point four percent and twenty five percent students experience significant daytime sleepiness, and between thirty-seven-point five percent and fifty-four-point five percent experience significant

daytime fatigue (7). Sleep complaints by students are often associated with poor academic performance, decreased class attendance, increased symptoms of depression, increased symptoms of anxiety, poor general health, and increased traffic accidents (7, 8).

In recent years, there has been a considerable increase of attention to a sensory phenomenon that known as the Autonomous Sensory Meridian Response (ASMR). ASMR is a sensory phenomenon in which individuals experience tingling sensations which occur in scalp, and can radiate to the back of the neck, upper spine and in areas further dependent on the intensity of the area in response to audio and visual stimuli (9, 10). This sensation is accompanied by the feelings of relaxation and comfort and can be used to provide temporary assistance to individuals suffering from sleep disorders, depression, stress and chronic pain. The current study identifies several common stimuli used to achieve ASMR, including whispering, personal attention, sharp voice and slow movements (9, 10).

This study is aim to investigate the benefits of ASMR stimulation can improve sleep quality of medical students. The results of this study can be used as recommendation to institutional education about benefit of ASMR stimulation to overcome student sleeping difficulty.

MATERIALS AND METHODS

Research Subjects

This research was conducted in Diponegoro University Faculty of Medicine (DUFM), Semarang, Indonesia in the period of June 2018. Study subjects were students of DUFM from batch 2017 academic years. Minimal sample size was calculated based on formula of sample size for hypothesis test of difference of mean of two populations. Sample size calculation was based on previous study by Harmat et al (11). Sample size calculation component were $z\alpha=1.96$, $z\beta=0.842$, PSQI score in control group was 6.83 ± 2.093 , PSQI score in treatment group was 5.43. Sample size after 10% drop-out correction yield minimal 15 subjects for each groups. Inclusion criteria were students who registered will take basic medical science module exams, have sleep disturbance based on PSQI questionnaire at previous exam, did not have a history of other diseases that would cause sleep disorders such as the presence of obstructive sleep apnea. Subjects who received medication that can influence sleep quality, refuse to join the study were excluded. Subject who do not complete 14 days of intervention was considered drop-out.

Research Design

This research was a quasy experimental study, study design was two parallel groups pre and post-test design. The research subjects were divided into two groups,

Study groups were treatment group who received ASMR stimulation (n=15) and control group who did not received ASMR stimulation (n=15).

Study variables

Dependent variable was the sleep quality score measured using Pittsburgh Sleep Quality Index (PSQI) questionnaire (12). The PSQI is composed of seven sub scores, each of which can range from 0 to 3. The sub scores were total to obtain global score that can range from 0 to 21. A global score of 5 or more indicates bad sleep quality.

Sleep quality scores were measured two times, first one day before received ASMR stimulation (before) and after 14 days after received ASMR stimulation (after). The subjects were asked to fill out the Pittsburgh Sleep Quality Index (PSQI) questionnaire at before (day -1) and after (14 days + 1) intervention. Re-check of subjects response was conducted at the end of interview to ensure consistency of the answers.

Intervention

In treatment group, ASMR stimulation was given every day for 14 consecutive days. A total 14 ASMR videos were used for this study. The videos were collected from YouTube. The content of the videos was typical ASMR genre and the videos were selected on the basis that they contained multiple ASMR triggers. For example, a spoken video took the form of a role-play such as hair-cut, cooking and so on, and also included triggers of whispering, rubbing, delicate hand movements and close personal attention. Each video have length about 20 minutes. The video have been stored in investigator's private online drive. The link has been concealed and was not distributed until stimulation night. The link of each video was distributed every night at 9 o'clock pm through online chat consecutively for 14 days. The video was played using laptop through ear phone. Videos were played according to subjects preference. Room condition, clothing and bed were set up according to subjects preference. In control group, study subjects were given video non ASMR were collected from YouTube in the same administration manner as experiment group.

All videos ASMR or non ASMR have been uploaded on public domain by YouTuber themselves therefore special permission were not necessary.

During study period, all subjects in both group were not allowed to take medication that may influence sleeping habit, drink coffee or chocolate and performed heavy exercise.

Data Analysis

The difference of sleep quality score before and after treatment were analyzed using Wilcoxon. The difference of sleep quality score between treatment group and control group were analyzed using independent t-test

when data is normally distributed or Mann-Whitney U test when data were not normally distributed. The difference of sex and PSQI score category distribution between study groups were analyzed using χ^2 test. P value <0.05 was considered as significant.

Ethical consideration

Ethical clearance has been obtained from Health Research Ethics Committee Diponegoro University, Indonesia (registration number 233/EC/FK-RSDK/IV/2018). All subjects have been informed about study protocol before signed written informed consent. There were no academic consequence for subjects who refuse to join the study. All expenses related to the study was borne by investigators.

RESULTS

A total 30 students of DUFM who met the research criteria were recruited as study subjects. The mean age of the study subjects was 18.4 ± 0.72 years with the youngest age being 17 years and the oldest age being 20 years. The sex of the research subjects were male (n = 5) and female (n = 25). The characteristics of the study subjects on treatment and control group were described on Table I.

Table I shows that the mean age of the control group was older than the treatment group, however, the difference was not significant ($p=0.8$). The proportions of females subjects in both groups were higher than males, however, the difference was also not significant ($p=0.6$).

Table I : Study subjects' characteristics

| Characteristics | Study Groups | | p |
|----------------------------|------------------|-----------------|------------------|
| | Treatment (n=15) | Control (n=15) | |
| Age (years); mean \pm SD | 18.3 \pm 0.61 | 18.4 \pm 0.83 | 0.8* |
| Sex; n (%) | | | |
| Male | 2 (13.3) | 3 (20) | |
| Female | 13 (86.6) | 12 (80) | 0.6 [§] |

* Mann-Whitney U test

§ χ^2 test

All subjects have no history of sleep disturbances or anxiety and history of consuming certain medicines that affect sleep habit. All subjects in treatments group reported have tingling sensation after triggered by ASMR stimulation. No subjects in treatment group have any bad feeling after watching ASMR video.

Table II show PSQI score in treatment group before ASMR stimulation (PSQI before) was 7.0 ± 1.69 , it was higher than control group which was 6.7 ± 1.45 , however, the difference was not significant ($p = 0.6$). The difference of PSQI score before between treatment group and control group was not significant ($p=0.6$).

Table II. PSQI scores on treatment and control groups

| Time of measurement to treatment | Study Groups | | p |
|----------------------------------|------------------|----------------|------------------|
| | Treatment (n=15) | Control (n=15) | |
| | Mean \pm SD | Mean \pm SD | |
| Before | 7.0 \pm 1.69 | 6.7 \pm 1.45 | 0.6 [¥] |
| After | 3.9 \pm 0.91 | 6.8 \pm 1.61 | <0.001* |
| p [§] | 0.001 | 0.6 | - |

¥ Mann-Whitney test

* Unpaired t-test

§ Wilcoxon test

Table II show PSQI score after ASMR stimulation (PSQI after) in treatment group was 3.9 ± 0.91 lower than the control group which was 6.8 ± 1.61 , the difference was significant ($p<0.001$). Table II also shows that in treatment group there was a significant decrease in PSQI score after ASMR stimulation ($p = 0.001$). In contrast, in control group there was a slight increase in the PSQI score, but the increase was not significant ($p=0.6$).

Figure 1 showed the PSQI score in the treatment group had a significant decrease ($p < 0.001$) while in the control group there was an increase but not significant ($p = 0.6$). PSQI score category in treatment groups after ASMR stimulation and control groups were shown in Table III. Table III show at before ASMR stimulation in treatment group and control groups PSQI score category of all subjects were categorized as bad. After ASMR stimulation in treatment group, PSQI score category of most subjects (73,3%) became good. In other hand, PSQI score category in control group all subjects were remain in bad category.

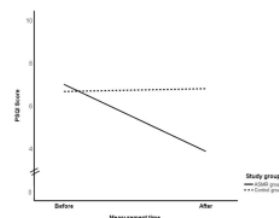


Figure 1: PSQI score in treatment (ASMR) (n=15) and control group (No ASMR) (n=15). Before and after ASMR stimulation in treatment group.

DISCUSSION

The main results of this study was improving sleep quality after ASMR stimulation that indicated by significant reduction of PSQI score after 14 consecutive days ASMR stimulation, significant lower PSQI score after 14 days in treatment group and the proportion of subjects who have "good" sleep quality category was higher significantly in treatment group compare to control group.

Table III : PSQI score categories before and after ASMR stimulation in the treatment and control group

| PSQI score category | Study Groups | | P |
|---------------------|------------------|----------------|---------------------|
| | Treatment (n=15) | Control (n=15) | |
| | n (%) | n (%) | |
| Before | | | |
| - Bad | 15 (100) | 15 (100) | * |
| - Good | 0 (0.0) | 0 (0.0) | |
| After | | | |
| - Bad | 4 (26.7%) | 15 (100%) | <0,001 [§] |
| - Good | 11 (73.3%) | 0 (0.0%) | |

* Statistical tests was not performed because similar number

[§] χ^2 test

ASMR can be defined as a combination of feelings of pleasure and relaxation that was preceded by a specific tingling sensation (13). The tingling sensation and paresthesia often accompanied by a relaxed feeling, therefore ASMR can be used to provide temporary relief to individuals with depression, stress and chronic pain (9, 10, 13).

In this study, there was enhancement in sleep quality scores after ASMR stimulation for 14 days. It has been described watching ASMR video is a monotonous activity that encourages individuals who watch the video to close their eyes, as well as sounds and activities that can recall a person's memory to a beautiful past so as to enhance relaxation and encourage individuals to sleep (14). After watching ASMR videos, there is a tingling sensation generated that is often accompanied by a feeling of relaxation which can reduce physical tension and stop the thinking process, thus inducing a person to fall asleep (9, 15). Similar to previous study, in current study all subjects in treatment group have experience tingling sensation after ASMR stimulation.

This recent study used 14 different videos that were given for 14 days in a row in which the narrator used a prompt to speak to the study subjects. Whispering was a way of speaking that did not cause vibrations of the vocal cords, so that the words create a number of turbulences that were heard when exhaling and can be felt by the subject of the study. When someone whispered or used a combination of gentle whispered and vocalizations to talk to someone, they tend to have a calming effect. Whispering is a technique used to stimulate the brain's pathway through frequencies that can trigger the release of hormones such as dopamine and oxytocin. Since the effects of ASMR is mainly due to neurologic mechanism, the effect of sex hormone can be omitted. Gender preference to voice in the video may be occurred depend on sex of study subjects, however, no previous study available about this phenomena. ASMR can help a person deal with stress, fatigue and insomnia, which can improve a person's sleep quality. In addition to using the whispering method, the narrator also appears

to behave calmly, confidently and attentively so that it creates a deep atmosphere and produces a relaxation effect so as to improve sleep quality (14).

ASMR is associated with certain types of sleep. There are two types of sleep, namely slow-wave sleep or Non Rapid Eye Movement (NREM) and paradoxical sleep or Rapid Eye Movement (REM) (16-18). Brain imaging during REM sleep shows increasing of the activity in areas of high-level visual processing and limbic system (place of emotion), accompanied by a decrease in activity in the prefrontal cortex (place of reason). This pattern of activities is the base of dream characteristics: visual imagery created from within that is an interpretation of the area of complex thinking. Dreams often have a large emotional charge, a chaotic sensation of time, and strange contents taken for granted as reality, with little reflection on all the strange occurrences (1). This study used ASMR stimuli to induce sleep on subjects. ASMR itself can be connected to the area of the brain responsible for the stage of REM sleep. REM is the stage where the dream process occurs. At the REM stage, the individual can forget bad things in the real world, but if an individual experience a very painful event in the real world the process in REM stage can be disrupted to the point where it can induce a person to have better sleep quality (14).

In addition to the direct effects on REM, ASMR also causes relaxation in the muscles of the body. Relaxation of the body muscles can reduce the activity of the prefrontal cortex which is the center of the motor part. It also causes an increase in parasympathetic nerve activity and a decrease in sympathetic nerve activity which is then followed by a decrease in blood pressure and pulse pressure (19). Relaxation can also reduce anxiety and mood disorders where it can indirectly affect a person's sleep quality (20). Relaxation can also reduce tension physical and stop the thinking process so that it induces a person to fall asleep (9, 15).

ASMR may have benefit in education, especially to eliminate anxiety during exam period. Previous study has reported students with exam anxiety can be calm down after watching ASMR video (21). Further study is necessary to determine the effect of ASMR on students cognitive function.

CONCLUSION

This study concluded that ASMR stimulation for 14 days improve sleep quality that indicated by significant reduction of PSQI score after 14 consecutive days ASMR stimulation, significant lower PSQI score after 14 days in treatment group and the proportion of subjects who have "good" sleep quality category was higher significantly in treatment group compare to control group. This results indicates that ASMR stimulation can be potentially used for people who are having sleep problem.

ACKNOWLEDGEMENT

The authors would like to thank Faculty of Medicine Diponegoro University for supporting and facilitating this study.

REFERENCES

1. Sherwood L. Human Physiology: From Cells to Systems. Boston: Cengage Learning; 2015.
2. Watson NF. Recommended Amount of Sleep for a Healthy Adult: A Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society. *Sleep*. 2015;38(6):843-4.
3. Kumar VM. Sleep and sleep disorders. *The Indian journal of chest diseases & allied sciences*. 2008 Jan-Mar;50(1):129-35. PubMed PMID: 18610697. Epub 2008/07/10. eng.
4. Yokoyama E, Kaneita Y, Saito Y, Uchiyama M, Matsuzaki Y, Tamaki T, et al. Comprehensive meta-analysis of excess mortality in depression in the general community versus patients with specific illnesses. *Sleep*. 2014;5(8):453-62.
5. Cameron A, Brick DLS, Tonya MP. Association Between Sleep Hygiene and Sleep Quality in Medical Students. 2013. p. 113-21.
6. Zunhammer M, Eichhammer P, Busch V. Sleep Quality during Exam Stress: The Role of Alcohol, Caffeine and Nicotine. *PLoS One*. 2014;9(10):e109490.
7. Thomas S, editor A survey of sleep disorders in college students: a study of prevalence and outcomes 2014.
8. Gaultney JF. The prevalence of sleep disorders in college students: Impact on academic performance. *J Am Coll Health*. 2010;59(2):91-7.
9. Barratt EL, Spence C, Davis NJ. Sensory determinants of the autonomous sensory meridian response (ASMR): understanding the triggers. *PeerJ*. 2017;5:e3846.
10. Fredborg B, Clark J, Smith SD. An examination of personality traits associated with Autonomous Sensory Meridian Response (ASMR). *Front Psychol*. 2017;8:247.
11. Harmat L, Takács J, Bódizs R. Music improves sleep quality in students. *Journal of advanced nursing*. 2008 May;62(3):327-35. PubMed PMID: 18426457. Epub 2008/04/23. eng.
12. Smith MT, Wegener ST. Measures of sleep: The Insomnia Severity Index, Medical Outcomes Study (MOS) Sleep Scale, Pittsburgh Sleep Diary (PSD), and Pittsburgh Sleep Quality Index (PSQI). *Arthritis & Rheumatism*. 2003;49(S5):S184-S96.
13. Barratt EL, Davis NJ. Autonomous Sensory Meridian Response (ASMR): a flow-like mental state. *PeerJ*. 2015;3:e851.
14. Young J, Blansert I. ASMR. New York: DK Publishing; 2015.
15. InformedHealth.org [Internet]. Cologne: Institute for Quality and Efficiency in Health Care. Insomnia: Relaxation techniques and sleeping habits. 2008 Aug 18 [Updated 2017 Mar 9]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK279320/>.
16. Carley DW, Farabi SS. Physiology of sleep. *Diabetes Spectrum*. 2016;29(1):5-9.
17. Hall JE. Guyton and Hall Textbook of Medical Physiology. 13th Ed. Philadelphia: Elsevier Health Sciences; 2010.
18. Phillips B, Gelula R. Sleep-Wake Cycle: Its Physiology and Impact on Health. National Sleep Foundation. 2006:1-19.
19. Park SA, Song C, Oh YA, Miyazaki Y, Son KC. Comparison of Physiological and Psychological Relaxation Using Measurements of Heart Rate Variability, Prefrontal Cortex Activity, and Subjective Indexes after Completing Tasks with and without Foliage Plants. *International journal of environmental research and public health*. 2017;14(9):1087.
20. Rambod M, Pourali-Mohammadi N, Pasyar N, Rafii F, Sharif F. The effect of Benson's relaxation technique on the quality of sleep of Iranian hemodialysis patients: A randomized trial. *Complement Ther Med*. 2013;21(6):577-84.
21. Fran A. The Benefits of ASMR in Education. *IOSR-JRME* 2016;6(5) Ver. II:113-18.

Hardian-Artikel-C4

ORIGINALITY REPORT

15%

SIMILARITY INDEX

8%

INTERNET SOURCES

8%

PUBLICATIONS

8%

STUDENT PAPERS

PRIMARY SOURCES

| | | |
|---|--|----|
| 1 | Submitted to Texas A&M International University Student Paper | 3% |
| 2 | e-space.mmu.ac.uk Internet Source | 1% |
| 3 | www.ncbi.nlm.nih.gov Internet Source | 1% |
| 4 | Submitted to Blackburn College, Lancashire Student Paper | 1% |
| 5 | Submitted to University of Greenwich Student Paper | 1% |
| 6 | www.tandfonline.com Internet Source | 1% |
| 7 | Submitted to University of West London Student Paper | 1% |
| 8 | library.ndsu.edu Internet Source | 1% |
| 9 | idoc.pub Internet Source | 1% |

-
- 11 Komang Juwita Endrawati, Ni Kadek Mulyantari, Sianny Herawati, Anak Agung Wiradewi Lestari et al. "The Correlation of CD4+ T-Lymphocyte Count and Chemokine Ligand 13 Levels in Human Immunodeficiency Virus Patients Receiving Anti-retrovirus Therapy in Sanglah Central General Hospital", Open Access Macedonian Journal of Medical Sciences, 2022
Publication

-
- 12 Mengjie Liu, Qiang Zhou. "A Preliminary Compilation of a Digital Video Library on Triggering Autonomous Sensory Meridian Response (ASMR): A Trial Among 807 Chinese College Students", Frontiers in Psychology, 2019
Publication

-
- 13 jos.unsoed.ac.id
Internet Source

-
- 14 pure.uva.nl
Internet Source

-
- 15 Jin Li, Kaina Zhou, Xiaomei Li, Miao Liu, Shaonong Dang, Duolao Wang, Xia Xin. "Mediator Effect of Sleep Hygiene Practices on Relationships Between Sleep Quality and

Other Sleep-Related Factors in Chinese Mainland University Students", Behavioral Sleep Medicine, 2014

Publication

16

Nipin kalal, Ashok Kumar, Nimarta Rana, Nikhil kothari. "Quality of sleep and Factors Associated with Sleep Pattern Disturbance among Patients in Critical Care Units: Mixed Method study", Research Square Platform LLC, 2022

Publication

<1 %

17

Seyed-Hosein Abtahi-Eivary, Ali Tajpoor, Ali Firoozi, Shahrzad Mehrzad, Mohammad Hosein Beheshti. "Evaluating the Effects of Noise Pollution on the Levels of Blood Cortisol, Testosterone, and Thyroid in Male Wistar Rats", Health Scope, 2021

Publication

<1 %

18

www.frontiersin.org

Internet Source

<1 %

19

Haya Ibrahim Ali Abu Maloh, Kim Lam Soh, Seng Choi Chong, Siti Irma Fadhilah Ismail et al. "The Effectiveness of Benson's Relaxation Technique on Pain and Perceived Stress Among Patients Undergoing Hemodialysis: A Double-Blind, Cluster-Randomized, Active Control Clinical Trial", Clinical Nursing Research, 2022

<1 %

20

Ryota Shimokura. "Sound Quality Factors Inducing the Autonomous Sensory Meridian Response", Audiology Research, 2022

Publication

<1 %

21

worldwidescience.org

Internet Source

<1 %

22

G. A. Nnaji, J. I. Ikechebelu. "An evaluation of the use of reported febrile illness in predicting malaria in pregnancy", Journal of Obstetrics and Gynaecology, 2009

Publication

<1 %

23

www.researchgate.net

Internet Source

<1 %

24

Suradi Efendi, Al Ihksan Agus, Sri Syatriani, Haeril Amir et al. "The Effect of Benson Relaxation on Quality of Sleep of Cancer Patients", Open Access Macedonian Journal of Medical Sciences, 2022

Publication

<1 %

25

Sima Hashemipour, Fatemeh Lalooha, Khadijeh Elmizadeh. "Association of Sleep Quality and Duration With Preterm Birth: The Qazvin Maternal and Neonatal Metabolic Study (QMNMS)", Journal of Inflammatory Diseases, 2022

Publication

<1 %

Exclude quotes On

Exclude matches Off

Exclude bibliography On

Hardian-Artikel-C4

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5