

# Factors Influencing Severity and Impact of Symptoms in Patients with Upper Respiratory Tract Infection at Community Hospitals and Health-Promoting Hospitals

Jirarurut Pohplook, M.N.S.\*, Wimolrat Puwarawuttipanit, Ph.D.\*\*\*, Sarunya Koositamongkol, Ph.D.\*\*\*, Yong Rongrungruang, M.D.\*\*\*

\*Master of Nursing Science Program in Adult and Gerontological Nursing, \*\*Department of Medical Nursing, Faculty of Nursing, Mahidol University,

\*\*\*Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

## ABSTRACT

**Objective:** This study aimed to examine the factors that influence the severity and impact of symptoms in patients with an Upper Respiratory Tract Infection (URTI).

**Materials and Methods:** This study is a correlational predictive research. The sample size included 127 patients with URTI accessing care at community hospital and 5 health-promoting hospitals from February to June in 2020. Data were collected by using a questionnaire on demographic data, a questionnaire on health literacy, a questionnaire on self-care behavior in patients with URTI, the Nutrition Alert Form (NAF), the Pittsburgh Sleep Quality Index (PSQI), and the Wisconsin Upper Respiratory Symptom Survey-21 (WURSS-21). Subsequently, the data were analyzed using descriptive statistics and multiple regression analysis.

**Results:** The sample had a mean age of 45.30 years in which 73.2% were females; the average score of severity and impact of symptoms was minimal (Mean = 52.75 ± 22.85). The results from the multiple regression analysis indicated that all variables were able to co-predict the severity and impact of symptoms in patients with URTI as 25.9% ( $R^2 = .259$ ,  $F = 10.676$ ,  $p < .05$ ). Sleep quality and health literacy were the most statistically significant in predicting the severity and impact of symptoms in this sample group ( $\beta = .393$  and  $-.221$  respectively,  $p < .05$ ).

**Conclusion:** The findings suggested that nurses should encourage their patients to be aware of the importance of sleep, promoting a good sleep method and health literacy in order to make better decisions in their daily health.

**Keywords:** Upper respiratory tract infection; health literacy; nutritional status; sleep quality; severity and impact of symptoms (Siriraj Med J 2021; 73: 510-517)

## INTRODUCTION

Upper Respiratory Tract Infection (URTI), an acute infectious disease of the respiratory system, continues to be a significant public health issue and is becoming more significant each day. URTIs are mostly caused by viral and bacterial infections. On average, a common

cold occurs two to three times per year in adults and five to seven times per year in young children.<sup>1,2</sup> In addition, URTIs are both frequently encountered and inclined to increase in prevalence in elderly persons, particularly those with chronic illness, thereby leading to severe symptoms and multiple bacterial infections that spread

Corresponding author: Wimolrat Puwarawuttipanit

E-mail: [wimolrat.puw@mahidol.ac.th](mailto:wimolrat.puw@mahidol.ac.th)

Received 18 December 2020 Revised 11 March 2021 Accepted 15 March 2021

ORCID ID: <https://orcid.org/0000-0001-5274-9943>

<http://dx.doi.org/10.33192/Smj.2021.66>

and cause increased inflammation of the respiratory tract and lungs, resulting in respiratory failure and death.<sup>3</sup>

The statistics for the global population in 2017 reported that 17.1 million people had URTI and that the number was higher than 2007 by 11.5%<sup>4</sup>, whereas the mortality rate for URTI is as high as 9,100 people.<sup>5</sup> In the case of Thailand, URTIs are not classified as dangerous and does not require monitoring or pursuance according to the Communicable Diseases Act A.D. 2015. In Thailand, there are no statistical reports for this disease. At Thaimuang Chaipat Hospital, Phang-nga, Statistics of patients with URTI who received outpatient care services reveal that the number of patients is not only continually increasing with 1,901, 2,515 and 2,735 patients in 2017, 2018 and 2019, respectively, but it is also one of the top five diseases that patients sought services for at the hospital (Medical records of Thaimuang Chaipat Hospital, 2020). These statistics are also consistent with the statistics for the world population indicating the increasing numbers of patients. Therefore, URTI is a major problem that requires serious attention.

According to literature reviews, seasonal influenza is significantly correlated with clinical and economic burden and they are a cause of repeated and severe infections in persons with chronic illnesses, particularly in persons who are older than 65 years and pregnant women.<sup>3,6</sup> As a result, there are many factors related to the severity and impact of symptoms of respiratory tract infection (RTI) such as knowledge, sleep duration, exercise, BMI, etc. Furthermore, health literacy, self-care behaviors, nutritional status, and sleep quality may have significance for severity and impact of symptoms. However, to the best of my knowledge, there are no studies on these important factors.

Firstly, Health Literacy (HL) is the ability of an individual to access, understand, appraise, utilize and communicate health information to promote and maintain good health. HL correlates with health outcomes.<sup>7</sup> Furthermore, a poor HL might be an indicator of social inequality by contributing to increased likelihood of poor health, limiting proper health behaviors and practices of individuals.<sup>7,8</sup> British Columbia Health, found that people with URTI need to engage in appropriate self-care because doing so significantly contributes to alleviation of discomfort, reduction of severity and prevention of disease complications.<sup>9</sup> Moreover, malnutrition conditions can cause changes to immune system response and may increase infection risks, thereby increasing RTI risks.<sup>10</sup> Another important factor is sleep quality, for example, if deep sleep is achieved, the body and mind will be prepared for engaging in daily activities with improved

health and improved quality of life. Extensive reduction in sleep and responses to stress can contribute to increased proinflammatory cytokines.<sup>11,12</sup>

As mentioned above, literature review found that most research related to the severity and impact of symptoms of URTI were studies in children and elderly, while there were few studies in adults. In addition, no studies were finding factors that influence the severity and impact of symptoms of URTI, and the same applies to Thailand. The aforementioned factors were studied only among patients with chronic respiratory illness and lower respiratory tract infections. Moreover, the aforementioned factors can contribute to risk of developing.

## MATERIALS AND METHODS

### *Study design and setting*

This correlational predictive research aimed to study the influence of health literacy, self-care behaviors, nutritional status, and sleep quality over the severity and impact of symptoms in patients with URTI at community hospitals and health-promoting hospitals. It was certified for human research ethics by the Institutional Review Board from the Faculty of Nursing, Mahidol University (COA NO.IRB-NS 2019/536.2612) and was conducted in Thaimuang Chaipat Hospital in Phang-nga and networked health-promoting hospitals.

### *Participants*

Patients diagnosed with URTI aged 18 years and older. Samples were both male and female, and sought care services at Thaimuang Chaipat Hospital and networked health-promoting hospitals. The study lasted from February to June 2020. A total of 127 samples was obtained according to the set criteria. The samples must have shown complete perception and cognition while being able to communicate in Thai. The sample size was calculated through power analysis for research using multiple regression statistics with reliability set to  $\alpha = 0.05$  and power of test to 0.80. Because no research with similar characteristics to this research were found, the correlation size was set to medium at  $r = 0.30$ . Then the squared multiple correlation was calculated at  $p^2 = 0.09$  to produce the effect size of 0.098 and the sample size of 127 samples.

### *Research Instrumentation*

The instruments used to collect data in this research consisted of three parts as follows:

**Part 1** Mini-Cognitive Assessment Instrument Thai version was used. It is a cognitive assessment evaluation form for patients 60 years and older that was translated

into Thai by Trongsakul et al. (2014)<sup>13</sup> for assessing the cognitive impairment of elderly persons. A score of 3 or more indicated no cognitive impairments.

**Part 2** The demographic data was used to collect general data about patients covering 15 items, such as education, literacy, chronic illness, number of sicknesses by common cold or cold, medication used before meeting with a physician, influenza vaccination history, channels for receiving information and history of illnesses related to URTI.

**Part 3** The data collection questionnaires consisted of the five following questionnaires:

Set 1 A health literacy questionnaire developed by the researcher based on an instrument by the Health Education Division (2018).<sup>14</sup> This questionnaire contains 36 questions divided into 6 parts covering access to health information and services, understanding, asking of questions, decision-making, health behavior modification, and health recommendations for the individual, family and community. Scores were interpreted according to four levels: insufficient, low, fair, and adequate health literacies. A high overall score indicated adequate health literacy.

Set 2 A self-care behavior questionnaire for patients with URTI modified by the researcher based on a questionnaire by Shangyom et al. (2018).<sup>15</sup> The questionnaire contained 35 questions total covering nonpharmaceutical and pharmaceutical. Total scores were interpreted on four levels: poor, fair, good and very good self-care behaviors. A high overall score indicated very good self-care behaviors.

Set 3 The Nutrition Alert Form developed by Dr. Surat Komindr.<sup>16</sup> The evaluation form was used to evaluate risk of malnutrition and contained 8 items. Answers were multiple-choice, and total scores were interpreted according to 3 levels: no risk, risk of malnutrition and severe malnutrition. A high overall score indicated severe malnutrition.

Set 4 The Pittsburgh Sleep Quality Index that was translated into Thai by Sitasuwan et al. (2014).<sup>17</sup> The form covered self-assessment about sleep quality over the past month. Evaluation covered 2 characteristics, namely, quantitative sleep quality and qualitative sleep quality. A score less than or equal to 5 indicated good sleep quality.

Set 5 The Wisconsin Upper Respiratory Symptom Survey-21 (WURSS-21) developed by Barrett et al. (2004)<sup>18</sup> and translated by the research team contained 2 components, namely, perceived signs and symptoms and impact of symptoms or deficiencies in performing activities of daily living. The form contained 21 sub-

divided questions. Answers were in the form of Likert scales with the total score interpreted according to 4 levels. A high overall score indicated perceived symptoms at a severe level.

### Data analysis

Data were analyzed using SPSS Statistic for Windows to distribute frequencies, percentages, mean values and standard deviations of demographic data, HL, self-care behavior, nutritional status, sleep quality and severity and impact of URTI symptoms. In addition, predictive power over the severity and impact of symptoms in patients with URTI was analyzed by using an enter multiple regression analysis with statistical significance set to .05.

## RESULTS

A total of 127 adults participated in the study, their age range from 18-82 years with a mean age at  $45.30 \pm 14.531$  years. There were nearly 3 times more female samples than male samples (73.2% and 26.8%, respectively). A total of 86.6% of samples held a regular job and worked to earn income and provide family security, while a total of 69.3% of samples completed education on the primary level. Only 3.9% of samples never went to school. A total of 45.7% of samples had more than 1 comorbidity, while 78.7% of samples previously had a common cold or flu. The majority of samples (65.4%) used universal health coverage, and only 3.1% of samples paid out of pocket. Most samples had sufficient income. Furthermore, 59.8% of samples were diagnosed with common cold as shown in (Table 1).

The sample groups's mean includes five different factors, HL, Self-Care Behavior, Nutritional Status, Sleep Quality, and Severity and Impact in Patients with URTI (i) The sample group's mean HL score was fair (Mean =  $133.58 \pm 19.235$ ). Approximately 34.6% of samples had fair HL, and 32.3% had adequate HL, (ii) The sample group's average self-care behavior score was good (Mean =  $125.17 \pm 14.310$ ). Most samples (76.4%) had good self-care behavior. No samples were found to have poor self-care behavior, (iii) The sample group's mean nutritional status score indicated no risk for malnutrition (Mean =  $2.68 \pm 2.360$ ). Only 0.8% of samples had severe malnutrition. (iv) The sample group's mean sleep quality score was good (Mean =  $4.97 \pm 2.606$ ), 33.9% of samples had poor sleep quality, and (v) The sample group's mean severity and impact of URTI symptoms was mild (Mean =  $52.75 \pm 22.852$ ). Nearly half of the samples (44.9%) had mild severity and impact of symptoms. Only a minority of samples had severe symptoms (0.8%).

**TABLE 1.** Patient demographics data (N = 127).

Characteristics	n	Percentage
<b>Gender</b>		
Female	93	73.2
Male	34	26.8
<b>Age (in Years)</b>		
< 20	4	3.1
20 - 29	18	14.2
30 - 39	23	18.1
40 - 49	34	26.8
50 - 59	29	22.8
60 - 69	13	10.2
70 - 79	4	3.1
80 - 89	2	1.6
(mean = 45.30, S.D. = 14.531, min = 18, max = 82)		
<b>Occupation</b>		
Gardener	40	31.5
Employee	34	26.8
Government Officer	15	11.8
Merchant	13	10.2
Unemployed/ Maid/ Butler	11	8.7
Company Employee	8	6.3
Student	6	4.7
<b>Education</b>		
<b>Low Educated</b>		
Not educated	5	3.9
Primary School	41	32.3
<b>Moderate Educated</b>		
Junior High School	20	15.7
Senior High School	27	21.3
<b>High Educated</b>		
High Vocational Certificate/ Vocational Diploma	11	8.7
Bachelor's degree	20	15.7
Graduate	3	2.4
<b>Comorbidity (Answer more than 1 item)</b>		
<b>Respiratory System</b>		
Asthma	10	7.9
COPD	2	1.6
Others	15	11.8
<b>Vascular and Heart System</b>		
Dyslipidemia	23	18.1
Hypertension	22	17.3
Diabetes mellitus	6	4.7
Heart Disease	2	1.6
Stroke	1	0.8
Kidney Disease	1	0.8
Osteoarthritis	0	0
Migraine	6	4.7
Others	6	4.7
<b>In the past 1 year, have you had a cold or the flu?</b>		
Yes	100	78.7
<b>Times</b>		
1 - 3 times	87	68.4
4 - 7 times	11	8.7
More than 7 times	2	1.6
No	27	21.3

**TABLE 1.** Patient demographics data (N = 127). (Continue)

Characteristics	n	Percentage
<b>Used medications before visiting physician (Answer more than 1 item)</b>		
Not taking any medication	22	17.3
Taking medications before visiting physician	105	82.7
Antipyretic	89	70.1
Essential oils	25	19.7
Herbal	17	13.4
Polypharmacy	9	7.1
Vitamin C Supplementation	4	3.1
<b>Flu vaccination history</b>		
Annually	54	42.5
Not to get vaccinated annually	73	57.5
<b>Income sufficiency</b>		
Low income	14	11.0
Lower middle income	47	37.0
Upper middle income	47	37.0
High income	19	15.0

In addition, correlation analysis using the correlation coefficient formula of HL, self-care behavior, nutritional status, sleep quality, and severity and impact of symptoms in patients with URTI found that HL had a negative correlation with the severity and impact of symptoms in patients with URTI ( $r = .271$ ,  $p < .01$ ), while nutritional status and sleep quality had a positive correlation with the severity and impact of symptoms in patients with URTI ( $r_s = .255$ ,  $r_s = .406$ , respectively,  $p < .01$ ). Enter multiple

regression analysis found that all of the independent variables were able to co-predict variance in the severity and impact of symptoms in patients with URTI in the sample by 25.9% with statistical significance at .05 ( $R^2 = .259$ ,  $F = 10.676$ ,  $p < .05$ ). According to the findings, HL and sleep quality can predict the severity and impact of symptoms in this sample group with statistical significance ( $\beta = -.221$  and  $\beta = .393$  respectively,  $p < .05$ ) as shown in (Table 3).

**TABLE 2.** Severity and Impact of Symptoms in Patients with URTI (N = 127).

Severity and Impact of Symptoms Level	n	Percentage
Very mild	37	29.1
Mild	57	44.9
Moderate	32	25.2
Severe	1	.8
(mean = 52.75, S.D. = 22.852, min = 16, max = 117)		

**TABLE 3.** Multiple Regression Correlation Coefficients of Health Literacy, Self-Care Behavior, Nutritional Status, and Sleep Quality for the Severity and Impact of Symptoms in Patients with URTI (N = 127).

Variable	B	Std. Error	B	t	p - value
Constant	59.517	18.578	-	3.204	
Health Literacy	-.263	.102	-.221	-2.589	.011
Self-Care Behavior	.063	.132	.039	.474	.636
Nutritional Status	1.269	.806	.131	1.575	.118
Sleep Quality	3.443	.695	.393	4.954	< .001

$p < .05$

## DISCUSSION

This study found that only 0.8% of samples had severe symptoms and most samples had mild to very mild symptoms. This was consistent with a study conducted by Malathum et al. (2005) who found that most of the samples had mild symptoms. In addition, more than half of the samples with symptoms of a cold or influenza had disruptions to activities in daily living.<sup>19</sup> When compared to a study conducted by Denlinger et al. (2016) who assessed severity of symptoms by using the same WURSS-21 as in this study, mean scores were found to be at 61.3 points.<sup>20</sup> This score was similar to the findings in this study and showed symptom severity at a similarly mild. The reason that the samples in this study had mild symptom might have been due to the fact that most of the sample group (82.7%) used medications before visiting physician and that the medications used the most were antipyretic (70.1%), followed by essential oils (19.7%), the samples symptoms of URTI were alleviated from their actual symptoms. The finding concurs with a study by Ibrahim and Elkady (2016) finding that most elderly patients used medications (97.1%) and that the most used medications were analgesic, antipyretic and aspirin and that most (86.4%) chose medications on their own.<sup>21</sup> Furthermore, Thielmann et al. (2016) found that patients engaged in self-care behaviors by using at least two medicines together (63%), and that only a minority used only one type of medication. The medications used the most were paracetamol or antipyretic (38%), followed by, essential oils (10%).<sup>22</sup> These findings are consistent with the study, which found that headache, bodily aches and fever were the main discomforting symptoms that caused patients to decide to use medications on their own.<sup>23</sup>

According to the study into HL, it was found that most of the sample group (67%) had adequate HL, while 33% of the sample group needed to increase HL. This is because inadequate HL influences data usage, access to care services, self-care in times of sickness and disease prevention and contributes to health problems from a young age and poorer health than persons with adequate HL.<sup>24</sup> In this study, it was found that HL can co-predict the severity and impact of symptoms in patients with URTI with statistical significance ( $\beta = -.221, p < .05$ ). The findings are consistent with a study by Sun et al. (2013) finding that HL and existing knowledge are the top two factors of health behaviors. Thus, HL directly influences health behaviors, and health behaviors positively impact health status.<sup>25</sup> In addition, Bennet et al. (2009) found that 29% of elderly persons had poor health status, that

27% of elderly patients were not vaccinated for influenza and that these findings are correlated with inadequate HL and that HL and health outcomes vary according to ethnicity and education.<sup>26</sup> Thus, it is clear that HL is connected to infection and infection prevention behaviors and that inadequate or limited HL is correlated with disease prevention behaviors. In the same manner, this study found that 10.2% of samples had inadequate HL and that 22.8% of samples had low HL and that most of this group (64.3%) had a low education. When compared to the group with a high education, only 11.8% had low HL. This means that highly educated samples had better HL and made better healthcare decisions. Furthermore, no studies were conducted on HL and symptom severity in patients with URTI. However, a study conducted among patients with chronic respiratory illnesses found inadequate socioeconomic status and HL to be correlated with higher Chronic Obstructive Pulmonary Disease (COPD) severity, hopelessness and lower quality of life. In addition, inadequate HL was correlated with likelihood of a COPD-related hospitalizations and emergency department visits.<sup>27</sup> This was consistent with the findings of this study. Therefore, persons with inadequate HL were at risk of negative health outcomes as well.

Upon studying sleep quality, it was found that sleep quality can co-predict the severity and impact of symptoms in patients with URTI with statistical significance ( $\beta = .393, p < .05$ ). The findings are consistent with literature review, which found that extensive reduction in sleep and stress response contributes to proinflammatory cytokines which leads to chronic inflammation and a compromised immune system.<sup>19</sup> Upon evaluating the sleep duration per night of the sample group, it was found that the mean nightly sleep duration was 7.043 hours (1.484), which is adequate and similar to the findings by Cohen et al. (2009), In the findings of Cohen et al. (2009), the mean sleep duration of samples was 7.45 hours and that samples who slept for less than 7 hours were 2.94 times more likely to contract cold than samples who slept more than 8 hours, while samples whose sleep effectiveness was under 92% were 5.50 times more likely to contract cold than the group with sleep effectiveness more than or equal to 98%. It can be concluded, therefore, that low sleep effectiveness and short sleep duration over several weeks preceding infection are correlated with increased likelihood of contracting cold and a weakened immune system in the presence of illness.<sup>12</sup> Furthermore, a study by Prather et al. (2015) found that shorter sleep duration prior to exposure to viral infection has a correlation with increased sensitivity to cold. When comparing

samples who slept for less than five hours or 5-6 hours with samples who slept more than 7 hours, the samples were found to be more likely to develop cold.<sup>28</sup>

Meanwhile, nutritional status was unable to predict the severity of symptoms and impact in patients with URTI ( $\beta = .131, p > .05$ ). This finding differs from the findings of Tongo and Sy (2017), which found that malnourished elderly persons were at risk of contracting severe community-acquired pneumonia.<sup>29</sup> Thus, the fact that most of the sample group (89%) had no risk of malnutrition might be why the prediction failed. The lack of risk for malnutrition is due to the fact that most samples had a sufficiently socio-economic status with medium to high education levels and sufficient income to cover expenses. Moreover, the southern region's geography has seas on both sides, and fertile soil and water, which enables them to procure nutritious foods more easily.

Although a previous study exists relating to the correlation between self-care and severity of Type 2 diabetes mellitus<sup>30</sup>, its findings differ from the present study, which found that self-care behavior had no correlation with the severity and impact of symptoms in patients with URTI with statistical significance ( $r = -.043, p > .05$ ). It cannot predict the severity and impact of symptoms in patients with URTI ( $\beta = .039, p > .05$ ), possibly due to the fact that most samples were working age individuals who were still able to take care of themselves for the most part (78.7%) who were sick with a common cold or flu in the past year. In addition, the data collection period overlapped with the outbreak of the Coronavirus 2019 pandemic, when news and information about behaviors to lower risk of acute respiratory illness are widely and frequently available in every communications channel, which led patients to have better self-care, and strict measures to counter the pandemic provided indirect control and supervision over the sample group's behaviors.

## RECOMMENDATION

There are two major recommendations on this study including nursing practice and research. Firstly, for the nursing practice, (i) Patients should be encouraged to recognize the importance of sleep and appropriate sleep problem management and (ii) HL should be promoted in patients which should include thinking and social interaction skills for accessing, understanding, appraising and utilizing health information. An adequate HL can help patients make better health decisions in their daily living. Secondly, for nursing research, (i) additional studies should be conducted in patients with URTI in contexts

that are different from this study such as patients who seek services in secondary or tertiary hospitals.

## CONCLUSION

This research revealed that the overall severity and impact of symptoms in most patients with URTI at Thaimuang Chaipat Hospital and health-promoting hospitals were at a mild level, which accounted for 44.9% of participants. Among 5 factors, including HL, self-care behavior, nutritional status and sleep quality, sleep quality and HL are the 2 important factors that influenced severity and impact of symptoms.

## ACKNOWLEDGEMENTS

This research would like to sincerely thank all participants and Thaimuang Chaipat Hospital and health-promoting hospitals. This work was patiently supported by the Chaipattana Foundation.

## REFERENCES

1. Thomas M, Koutsothanasis GA, Bomar PA. Upper respiratory tract infection. Treasure Island: Stat Pearls Publishing LLC; 2020.
2. Turner RB. The common cold. 8th ed. Canada: Elsevier Saunders; 2015.p.748-52.e2
3. Rajaram S, Wiecek W, Lawson R, Blak B, Zhao Y, Hackett J, et al. A retrospective observational analysis of post-pandemic influenza-related outcomes in the United Kingdom, 2010-2014. *Hum Vaccin Immunother* 2018;14:368-77.
4. James SL, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018;392:1789-858.
5. Roth GA, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018;392:1736-88.
6. Duda K. Groups at high risk for dangerous flu complications: Verywell Health; 2020 [cited 2020 Aug 5]. Available from: <https://www.verywellhealth.com/people-at-high-risk-for-flu-complications-770497>.
7. Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G. Complex interventions to improve the health of people with limited literacy: A systematic review. *Patient Educ Couns* 2009;75:340-51.
8. Cutler DM, Lleras-Muney A. Understanding differences in health behaviors by education. *J Health Econ* 2010;29:1-28.
9. British Columbia Health. Self care during an influenza pandemic. *Pandemic Influenza Series* 2006;250:62-69.
10. Moraes AHdA, Aquino JdS, Silva-Maia JKd, Vale SHdL, Maciel BLL, Passos TS. Nutritional status, diet and viral respiratory infections: Perspectives for SARS-CoV-2. *Br J Nutr* 2020;1-12.

11. Besedovsky L, Lange T, Born J. Sleep and immune function. *Pflugers Arch* 2012;463:121-37.
12. Cohen S, Doyle WJ, Alper CM, Janicki-Deverts D, Turner RB. Sleep habits and susceptibility to the common cold. *Arch Intern Med* 2009;169:62-67.
13. Trongsakul S, Lambert R, Clark A, Wongpakaran N, Cross J. Development of the Thai version of Mini-Cog, a brief cognitive screening test. *Geriatr Gerontol Int* 2015;15:594-600.
14. Health Education Division. Health literacy and health behavior among of volunteers and working-age people; 2018 [cited 2019 July 18]. Available from: <http://www.hed.go.th/linkHed/372>
15. Shangyom D, Detprapon M, Malathum P. Self-care behaviors in older persons with upper respiratory tract infection. *Rama Nurs J* 2019;24:345-60.
16. Komindr S, Tangsermwong T, Janepanish P. Simplified malnutrition tool for Thai patients. *Asia Pac J Clin Nutr* 2013;22:516-21.
17. Sitasuwan T, Bussaratid S, Ruttanaumpawan P, Chotinaiwattarakul W. Reliability and validity of the Thai version of the Pittsburgh Sleep Quality Index. *J Med Assoc Thai* 2014;97:S57-S67.
18. Barrett, B. Wisconsin Upper Respiratory Symptom Survey - 21 - Daily Symptom Report; 2004 [cited 2019 July 15]. Available from: <https://www.fammed.wisc.edu/files/webfm-uploads/documents/research/wurss-21.pdf>
19. Malathum P, Palaban S, Hanucharurnkul S, Achananuparp S. Symptom experiences and management strategies in adults with common cold or influenza. *Rama Nurs J* 2548;11:84-99.
20. Denlinger LC, King TS, Cardet JC, Craig T, Holguin F, Jackson DJ, et al. Vitamin D supplementation and the risk of colds in patients with asthma. *Am J Respir Crit Care Med* 2016;193:634-41.
21. Ibrahim HK, Elkady HM. Self-care practices of common cold and influenza among the elderly in alexandria, egypt. *IJSR* 2016; 5:881-7.
22. Thielmann A, Gerasimovska-Kitanovska B, Buczkowski K, Koskela TH, Mevsim V, Czachowski S, et al. Self-care for common colds by primary care patients: A European multicenter survey on the prevalence and patterns of practices-The COCO study. *Ecarn* 2016;1-9.
23. Goldberg DS, McGee SJ. Pain as a global public health priority. *BMC Public Health* 2011;11:770-4.
24. Kutner M, Greenburg E, Jin Y, Paulsen C. The Health Literacy of America's Adults: Results from the 2003 National Assessment of Adult Literacy. Washington, DC: National Center for Education Statistics; 2006.
25. Sun X, Shi Y, Zeng Q, Wang Y, Du W, Wei N, et al. Determinants of health literacy and health behavior regarding infectious respiratory diseases: A pathway model. *BMC Public Health* 2013;13:1-8.
26. Bennett IM, Chen J, Soroui JS, White S. The contribution of health literacy to disparities in self-rated health status and preventive health behaviors in older adults. *Ann Fam Med* 2009; 7:204-11.
27. Omachi TA, Sarkar U, Yelin EH, Blanc PD, Katz PP. Lower health literacy is associated with poorer health status and outcomes in chronic obstructive pulmonary disease. *J Gen Intern Med* 2013;28:74-81.
28. Prather AA, Janicki-Deverts D, Hall MH, Cohen S. Behaviorally assessed sleep and susceptibility to the common cold. *Sleep* 2015;38:1353-9.
29. Tongo M, Sy R. The Relation of Nutritional Assessment and Pneumonia Severity Index among Elderly Patients with Community Acquired Pneumonia Admitted at Cardinal Santos Medical Center. *J Nutr Diet Suppl* 2017;1:1-7.
30. Gatlin PK, Insel KC. Severity of type 2 diabetes, cognitive function, and self-care. *Biological Research for Nursing* 2015;17:540-8.