

Factors affecting PTSD symptoms among hospital nurses during the COVID-19 pandemic in Korea

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코로나19 팬데믹 상황 중 병원 간호사의 PTSD 증상에 영향을 미치는 요인

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Abstract This study is to investigate the factors affecting post-traumatic stress disorder (PTSD) symptoms among hospital nurses during the COVID-19 pandemic in Korea. Cross-sectional, descriptive design is used in this study. Data collection was completed through an online self-administered survey from December 2020 to January 2021 among 180 registered nurses dealing with COVID-19 patients at hospitals. This survey includes socio-demographic questions, including a 22-item PTSD questionnaire, a 14-item type D personality questionnaire, a 25-item resilience questionnaire, and a 23-item Social Support Scale questionnaire. 56.1% of the subjects in this study were at risk of PTSD. In the high-risk group for PTSD, resilience and social support were lower than those in the low-risk group for PTSD. But there was no statistically significant difference in both variables (resilience $t=0.21$, $p=.836$, social support $t=1.07$, $p=.287$). However, education (OR = 2.23, $p=.041$) and type D personality (OR = 3.67, $p < .001$) were significant factors for PTSD symptoms. The results of the study can be utilized to recognize PTSD in nurses by identifying factors influencing PTSD during epidemics such as COVID-19, and to apply management systems such as psychological programs to help overcome them.

Key Words : COVID-19, Nurses, Post-Traumatic Stress Disorder, Resilience, Social support

요약 한국의 COVID-19 대유행 기간 동안 병원 간호사의 외상 후 스트레스 장애증상(PTSD)에 영향을 미치는 요인을 조사하기 위함이다. 방법: 횡단적, 서술적 연구설계로 병원에서 COVID-19 환자를 다루는 간호사 180명을 대상으로 2020년 12월부터 2021년 1월까지 온라인 설문 조사를 통해 데이터 수집을 하였다. 이 설문조사는 사회인구학적 질문, 외상 후 스트레스 장애 22항목, D유형 성격 14항목, 회복탄력성 25항목, 사회적 지지 23항목이다. 연구결과: 이 표본(n=180)에서 간호사의 56.1%(n=101)가 PTSD 고위험군에 해당하였다. PTSD 고위험군의 경우 회복탄력성과 사회적 지지 정도가 PTSD 저위험군에 비해 낮았으나 두 변수 모두 통계적으로 유의한 차이는 없었다(회복탄력성 $t=0.207$, $p=.836$, 사회적 지지 $t=1.07$, $p=.287$). PTSD에 영향을 미치는 요인으로는 교육(OR=2.23, $p=.041$)과 D유형 성격(OR=3.67, $p<.001$)으로 확인되었다. 결론: 연구의 결과는 COVID-19와 같은 전염병 동안 PTSD에 영향을 미치는 요인을 확인함으로써 간호사의 PTSD를 확인하고, 이를 극복하기 위한 심리 프로그램 등 관리 체계를 적용하기 위해 활용될 수 있다.

키워드 : 코비드-19, 간호사, 외상후 스트레스장애, 회복탄력성, 사회적지지

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1. Introduction

The Coronavirus Infection Disease(COVID-19) pandemic, which started in 2019, continues through 2022. Due to the rapid spread of COVID-19 and mutated viral variants, people worldwide are experiencing anxiety[1]. High levels of anxiety and stress have even been reported by medical staff who care for individuals infected with COVID-19[2]. When Middle East Respiratory Syndrome(MERS) was prevalent in Korea in 2015, many of the medical MERS patient providers complained of mental stress[3]. Regarding COVID-19 infections, medical staff and nurses who are at greater risk from direct viral exposure through treatment of patients or exposure to colleagues have shown increased anxiety and stress over their personal vulnerability when their peers became infected[3]. The COVID-19 situation can be compared to Severe Acute Respiratory Syndrome (SARS) and MERS in that healthcare workers who are exposed to the virus can develop extreme stress, which can lead to the development of Post-Traumatic Stress Disorder (PTSD). PTSD is a psychiatric disorder that may occur in people who have experienced or witnessed a traumatic event such as a natural disaster, a serious accident, a terrorist act, war/combat, or rape or who have been threatened with death, sexual violence or serious injury[4]. PTSD is more likely to develop following long-term or repeated exposure to one or more traumatic events than brief or minor trauma exposure[5]. PTSD was also reported among medical staff who provided patient care to individuals with Severe acute respiratory syndrome (SARS) or Middle East respiratory syndrome (MERS)[2, 5].

One acute care setting where nurses reported PTSD with associated physical and mental problems, the hospital also reported lower

nursing care quality indicators[6]. PTSD related to work should not be overlooked because it can lead to extreme outcomes such as depression or suicide[7]. A systematic approach would address work life stressors, identify nurses who are experiencing PTSD, and provide a program to help the victims overcome PTSD. This approach could improve nursing work life and ultimately the quality of care they provide.

According to Lazarus and Folkman's theory of stress, stress can either exhibit positive or negative results through a person's coping responses to stressors. Individuals with characteristic factors that help them cope with stress can adapt well to daily life in a positive way[8]. However, individuals with inappropriate coping characteristics might have negative reactions to stressful events[8]. According to this theory, many factors are associated with or influence the coping response and PTSD. These include general characteristics, such as personal personality type, resilience, and social support[8]. According to the study by Cho and Kang in 2017, the type D (Depressed) personality is one of the risk factors influencing PTSD[9]. Type D personality is characterized by both normal and stable personality traits; negative affectivity(NA) is the tendency to experience negative emotions, and social inhibition(SI) is the tendency to inhibit expression of emotions[10]. Individuals with a Type D personality have a decreased quality of life, as well as an increased risk of disease morbidity and mortality[10]. Therefore, the type D personality should not be overlooked for PTSD research. In the study by Xi and colleagues in 2020, it has been reported that resilience and social support have a direct effect on PTSD[11].

Resilience refers to one's internal ability to respond flexibly to a large number of changing

situational demands and achieve successful adaptation[12]. When resilience is low, it has a negative effect on coping in general and coping with stress in particular[12]. According to the results of a study on resilience among nurses, the higher the resilience, the lower the stress and the less burnout [13] they experienced. It was also reported that these nurses experienced greater psychological stability[13].

Social support refers to all positive resources that an individual can obtain through interpersonal relationships, and includes information and material support from superiors, colleagues, subordinates, and other people[14]. Previous study has reported that the higher the social support, the lower the incidence of post-traumatic stress[15].

Further research is necessary to determine the characteristics of nurses providing COVID-19 care and the relationship of the characteristics to stress and coping responses. The research findings will expand the in-depth knowledge of nurses' care of COVID-19 in hospitals and design appropriate prevention and treatment programs. Therefore, our study was guided by the following three research objectives: 1) verify prevalence of PTSD in this sample; 2) identify the nurses' social coping factors such as levels of type D personality, resilience, and social support; and 3) explore the association of stress coping factors with PTSD.

2. Methods

2.1 Research design and Sample Size

This descriptive-correlational quantitative study used survey research design and methods that required a priori calculation of the appropriate sample size. The investigators used the G-power 3.1.3 for logistic regression analysis; the odds ratio was 1.5; and the

significance level was .05 with a power of .80[16]. The minimum sample size was 177.

2.2 Setting and Sample Selection

The target population was a group of nurses who worked in Korean hospitals. One month before the study, the researchers posted a study invitation on the online bulletin boards of five hospital websites (two general hospitals, three university hospitals). The invitation described the purpose of the study and emphasized voluntary participation in the online survey and maintenance of the anonymity of responses. The investigation period was carried out between December 21, 2020 and January 29, 2021. The participants were all Korean registered nurses. All surveys completed by study participants who self-reported a mental illness or were receiving psychiatric medications or treatment were excluded (n=2) from the data analysis. The final sample size was 180.

2.3 Research Instrument

2.3.1 PTSD

The Impact of Event Scale-Revised-Korean (IES-R-K) is a tool that has been used to measure PTSD. In 1979, the Impact of Event Scale(IES) was developed by Horowitz et al. with 15 items to identify invasive and avoidance symptoms among trauma-related psychological response patterns[17]. In 1997, Weiss and Marmar developed a 22-item tool to measure PTSD. The sub-categories of this tool consist of a total of 22 items measuring 8 items related to hyperarousal symptoms, 8 items related to avoidance symptoms, and 6 items related to intrusion symptoms[18]. Eun et al.[19] translated the IES-R into Korean language (IES-R-K), and through reliability and validity analysis, it was divided into 6 items related to hyperarousal, 6

items related to avoidance, 5 items related to intrusion, and 5 items related to sleep problems & numbness. The optimal cutoff score was 24 or 25. The IES-R-K requires self-reports on how often these symptoms have appeared over the past week on a 5-point Likert scale ranging from 0 to 4. The 22-item responses are summed for a possible total of ranging between 0 to 88. The cut-off score for our study is 25. Therefore, a score of 25 or higher is considered positive for PTSD. In study of Eun et al.[19], the Cronbach's alpha for IES-R-K was 0.89. The subcategories' Cronbach's alphas were also as follows: hyperarousal was 0.87, avoidance was 0.70, and intrusion was 0.63. In our study, the Cronbach's alphas were as follows: hyperarousal was 0.89, avoidance was 0.90, intrusion was 0.89, and sleep problem & numbness were 0.78.

2.3.2 Type D personality

The type D Personality Scale-14, developed in 2005 by Denollet[10], was translated into Korean by Lim [20] in 2011(The Korean Type D Scale-14). The instrument consists of 14 items in two subscales: 7 items on negative affectivity (NA) and 7 items on social inhibition (SI). The individual item responses range from 0 (false) to 4 (true) for a 5-point Likert-type scale. The score for each sub-scale ranges from 0 to 28. Subjects can be categorized as Type D when they score 10 or higher on both scales[20]. Cronbach's alphas of the type D Personality Scale-14 were .88 for NA and .86 for SI [19]. In our study, Cronbach's alpha ranged from .89 to .93 respectively.

2.3.3 Resilience

To measure resilience, the investigators selected the Korean Version of the Connor-Davidson Resilience Scale(K-CD-RISC). The Connor-Davidson Resilience Scale(CD-RISC)

developed by Connor and Davidson[21] was adapted into the Korean language by Baek[22]. This 25-item instrument measures five sub-factors. The first factor is having high standards, tenacity, and personal competence(8 items) whereas the second factor indicates handling negative emotions, trusting one's instincts, and strengthening effects of stress(7 items). The third factor then is having a positive attitude to change and secure relationships(5 items). The fourth factor is received control(3 items), and the fifth one is spirituality(2 items). Each of the 25 items has a 5-point Likert-type response scale ranging from 0 (not true at all) to 4 (true nearly all of the time). The possible total scores range from 0-100. Higher score indicates higher resilience. In the study of Connor and Davidson[21], Cronbach's alpha was .87, whereas in our study, Cronbach's alpha was .95.

2.3.4 Social Support

The 25-item Social Support Scale was developed from Korean sample by Park[23]. The items represent 4 types of support factors: informational(6 items), material (5 items), emotional (8 items), and evaluative support(6 items). Each item has a 5-point Likert-type response scale ranging from 1(strongly disagree) to 5 (strongly agree). The possible total scores range from 25-125. Higher scores indicate higher social support. In the study by Park[23], Cronbach's alpha was .93 whereas in our study, Cronbach's alpha was .99.

2.4 Data analysis

The collected data were analyzed using the SPSS/WIN version 27.0 program. The detailed data analysis method is as follows. For demographic characteristics of the research subjects and type D personality frequency, percentage, mean, and standard deviation were

calculated. The difference in resilience and social support according to the PTSD group was calculated through the t-test. A chi-square was performed to confirm the relationships between the subjects' demographic characteristics/type D personality and PTSD. Lastly, logistic regression was performed to identify risk factors for PTSD.

2.5 Ethical considerations

The P University Institutional Review Board application in South Korea, IRB No. 2-1040766-AB-N-01-R-2020-27 was approved. The response was treated as anonymous. It was explained in advance that the survey results will be used only for research purposes. The survey introduction assured the respondents that they could withdraw from the survey at any time without penalty. The information of the study subjects was stored in a research director's laboratory computer along with a security number for data security. Research documents will be kept for three years from the date of study completion or in accordance with the revised regulations or laws. Research data will never be used for purposes other than research and were protected in accordance with the provisions of the relevant laws as personal information.

3. Results

3.1 Demographic characteristics and type D personality

Table 1 shows the demographic characteristics and working experience of the subjects(n=180). The subjects were 96.1% female(n=173) and the mean age was 33.5(SD=7.5) years. Unmarried subjects accounted for 54.4%(n=98), non-religious were 60.6%(n=109). As for the level of education,

subjects with Bachelor of Science in Nursing(BSN) and Associate Degree in Nursing(ADN) accounted for the most subjects at 76.7%(n=138). As for working areas general units for the highest proportion at 50.6%(n=91). Those with less than 10 years of experience as a registered nurse made up the largest proportion at 60.0%(n=108) in our sample. Subjects with D type personality were identified as 41.7%(n=75) in the study.

Table 1. Subjects Demographic and Working Characteristics (N= 180)

| Variables | | M±SD or n (%) |
|----------------------------|-------------------------------------|---------------|
| Gender | Male | 7(3.9) |
| | Female | 173(96.1) |
| Age (yr) | 33.5±7.5 | |
| | <30 | 65(36.1) |
| | ≥30 | 115(63.9) |
| Marital Status | Unmarried | 98(54.4) |
| | Married | 82(45.6) |
| Religion | No | 109(60.6) |
| | Yes | 71(39.4) |
| Education | ADN/ BSN Degree | 138(76.7) |
| | Graduate Degrees | 42(23.3) |
| Working Unit | Special Units(ICU, CCU, SICU, & OR) | 37(20.6) |
| | General Units | 91(50.6) |
| | Outpatient Units | 52(28.8) |
| Working Experience as a RN | 9.2±7.0 | |
| | <10 | 108(60.0) |
| | ≥10 | 72(40.0) |
| Annual Salary (1,000won) | Less than 35,000 | 101(56.1) |
| | Higher than 35,000 | 79(43.9) |
| Type D personality | Yes | 75(41.7) |
| | No | 105(58.3) |

ADN =Associate Degree in Nursing,
 BSN = Bachelor of Science in Nursing,
 CCU=Coronary Care Unit, ICU=Intensive Care Unit,
 OR=Operating Room, RN =Registered Nurse,
 SICU=Surgical Intensive Care Unit

3.2 Resilience, social support, and PTSD

Table 2 shows the associations between subjects' resilience and social support and PTSD. The subjects' scores on PTSD ranged

from 0-73 (27.48 ± 16.03). In our study, the sample was divided into two groups according to the scores of the IES-R-K tool. Of the 180 subjects, 56.1% ($n=101$) had scores of 25 or greater on the IES-R-K which were considered at risk for PTSD. Resilience in the low PTSD risk group ($IES-R-K < 25$) was 84.36 ± 15.39 , and that in the high PTSD risk group ($IES-R-K \geq 25$) was 83.90, indicating that the average of resilience of nurses in the high PTSD risk group was low. However, the difference in resilience between the two groups was not statistically significant ($t=0.21, p=.836$). Social support in the low PTSD risk group was 82.84 ± 18.60 , and the high PTSD risk group was 81.52 ± 18.42 , indicating that high risk subjects also had high social support. The difference of social support between the two groups was not statistically significant ($t=1.07, p=.287$).

Table 2. Resilience and Social Support t Test Between Groups by PTSD (N= 180)

| Instruments | Total (n=180) M±SD | PTSD<25 (n=79) M±SD | PTSD≥25 (n=101) M±SD | t(p) |
|----------------|-----------------------|---------------------------|----------------------------|----------------|
| Resilience | 84.11±14.85 | 84.36±15.39 | 83.90±14.49 | 0.21 (.836) |
| Social Support | 82.84±18.60 | 84.52±18.82 | 81.52±18.42 | 1.07 (.287) |

3.3 Bivariate Analysis of Sample Characteristics and PTSD Risk

Table 3 shows the statistical Chi square test between the subjects' characteristics (i.e., age, marital status, education level, annual salary, working experiences RN and Type D personality) and PTSD status. Education level ($p=.039$) and Type D personality ($p<.001$) were significantly associated with the dichotomized risk for PTSD.

Table 3. Results of the Chi-square Test for Factors by PTSD Scores (N= 180)

| Variable | PTSD Scores | | x 2(p) | |
|----------------------------------|-------------------|---------------|--------------|------------------|
| | <25 | ≥25 | | |
| | n (%) | n (%) | | |
| All RNs | 79 (43.9) | 101 (56.1) | | |
| Age (yr) | <30 | 27 (34.2) | 38 (37.6) | .228 (.375) |
| | ≥30 | 52 (65.8) | 63 (62.4) | |
| Marital status | Unmarried | 39 (49.4) | 59 (58.4) | 1.46 (.145) |
| | Married | 40 (50.6) | 42 (41.6) | |
| Education | ADN /BSN | 66 (83.5) | 72 (71.3) | 3.723 (.039) |
| | Graduate Programs | 13 (16.5) | 29 (28.7) | |
| Annual Salary (1,000won) | < 35,000 | 41 (51.9) | 60 (59.4) | 1.014 (.196) |
| | ≥ 35,000 | 38 (48.1) | 41 (40.6) | |
| Working experience as a RN | <10 | 45 (57.0) | 60 (59.4) | .109 (.429) |
| | ≥10 | 34 (43.0) | 41 (40.6) | |
| Type D personality | Yes | 59 (74.7) | 46 (45.5) | 15.485 (.001) |
| | No | 20 (25.3) | 55 (54.5) | |

Note. Registered Nurse = RN; ADN =Associate Degree in Nursing; BSN = Bachelor of Science in Nursing; PTSD= Post-Traumatic Stress Disorder.

3.4 Predictive Analysis of PTSD from Sample Characteristics

A logistic regression was conducted to verify the significant predictors for PTSD risk. In our study, the degree of education and Type D personality were initially selected and analyzed as reference variables. According to the logistic regression results (See Table 4), education (odds ratio[OR]=2.23, $p=.041$) and Type D personality (OR=3.60, $p<.001$) were statistically significant predictors for PTSD. The explanatory power of the model was 14.3%. Therefore, the results indicate that nurses with undergraduate degrees (i.e., ADN & BSN) were 2.2 times more likely to experience PTSD symptoms than nurses with graduate program degrees. In addition, the nurses with Type D personality were 3.7 times more likely to experience PTSD symptoms than nurses who did not.

Table 4. Summary of Logistic Regression Showing of Predictors for Symptoms of PTSD

| Predictor | 95% CI | Wald | OR | <i>p</i> |
|--------------------------|-----------|-------|------|----------|
| Education | 1.04-4.81 | 14.87 | 2.23 | 0.041 |
| Type D Personality | 1.86-6.69 | 4.19 | 3.67 | <.001 |
| Constant | 0.47 | | 0.29 | 0.018 |
| <i>R</i> ² | .143 | | | |
| Model Chi-square (df =2) | 15.9 | | | |
| <i>p</i> | <.001 | | | |

Note. PTSD: Post-Traumatic Stress Disorder; OR= Odds Ratio; CI = Confidence Interval.

4. Discussion

Our study is a descriptive research study to identify the degree of PTSD in nurses in relation to the COVID-19 outbreak and to identify factors that affect it. The epidemic of infectious disease affects nurses' physical work and fatigue, as well as their psychological stress of caring for dying patients. The nurses can then experience PTSD. Kim and colleagues found that more than 50% of Korean nurses in special units (ICU or OR) experienced PTSD while caring for patients with infectious disease such as MERS in 2015[3]. Many studies with COVID-19 also had similar data. In our study, 56.1% (n=101) of Korean nurses experienced PTSD during the COVID-19 pandemic. Johnson et al. found that 28.9%(n=513) of Norwegian healthcare workers and public service providers had symptoms of PTSD[24]. Hennein et al. also reported that 22.8%(n=249) of healthcare workers experienced PTSD symptoms in the United States[25].

Resilience and social support were mentioned as significant variables to reduce PTSD symptoms[11]. However, in our this study, there was no statistically significant difference between resilience and social and PTSD; additional research to verify the associations between them is still needed. PTSD is also related to depression and suicidal thoughts[26].

However, our study did not include these variables. Therefore, future studies should include them.

PTSD is related to Post-Traumatic Growth(PTG). PTG is a concept that refers to positive changes that occur in an individual after experiencing a traumatic event According to Kim and colleagues' study, resilience and social support were significantly associated with PTG[26]. Therefore, resilience and social support can be critical factors for improving PTG in nursing, which is a high-risk group for PTSD compared to other occupational groups. Along with preventing or reducing PTSD, it is necessary to improve resilience and social support for PTG. Further studies are also needed to better understand the relationships between resilience/social support and PTG.

Our study found significant associations between PTSD and education and type D personality. In other words, it can be predicted that nurses with undergraduate degrees (i.e., ADN & BSN) were 2.2 times more likely to experience PTSD symptoms than nurses with graduate program degrees. In addition the nurses with type D personality can experience PTSD 3.6 times more often than others.

According to the study by Carmassi et al., the incidence of PTSD was higher in individuals with a low academic background[27]. This finding was likely because additional education and training were provided on how to cope with stress that may lead to PTSD or to objectively grasp the situation in more educational process. It appears that in graduate programs, students can receive education and training on stress situations through exchange of opinions with colleagues in various disciplines and discussion on research results.

People with type D personality have been reported to be at a higher risk for

cardiovascular disease. Lazarus and Folkman[8] interpreted these risks as individual personality traits that influence interpretation of stress. Kim and colleagues reported that nurses with type D personality had high empathy fatigue, burnout, and job stress[28]. Nurses with type D personality can be at high risk for PTSD and should receive immediate actions from counseling, applying relaxation therapies, and meditation for PTSD through continuous and intensive observation[29,30] and systematic interventions or programs. Furthermore, the actions will reduce the incidence of PTSD and help healthcare workers to quickly overcome from post-traumatic stress, which can lead to successful PTG.

Our study discovered valuable data describing the PTSD status of Korean nurses during the COVID-19 pandemic. However, there is a limit to generalizability of the study results. Therefore, relevant studies of diverse populations in different regions are still needed.

5. Conclusions

In our study, the significant factors for post-traumatic stress were identified as educational level and type D personality. Post-traumatic stress experienced by nurses in an infectious disease situation such as COVID-19 can cause depression and burnout in individual nurses, which can reduce the overall quality of nursing care. Therefore, it is necessary to provide a way to overcome PTSD through the continuing education of nurses in consideration of factors affecting post-traumatic stress. In addition, efforts should be made to reduce the incidence of PTSD through intensive observation and management of the nurses with a type D personality. Furthermore, a systematic approach is required, such as detecting the occurrence of PTSD at an early stage and

applying an immediate response method. Our study is meaningful in that it identified the factors affecting nurses' PTSD in special circumstances, such as the factors affecting PTSD of nurses in the ongoing COVID-19 situation. The results of our study are suggested to be used as basic data for the development and systematic management of programs to maintain the mental health of nurses and the quality of nursing care for patients in crisis situations that occur repeatedly, such as infectious disease outbreaks like COVID-19, SARS, and MERS.

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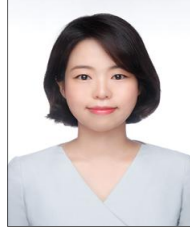
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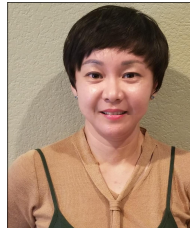


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