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ORIGINAL PAPER

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THE DIFFERENCE BETWEEN MU SUPPRESSION AND NURSES' EMPATHY WITH THE DIFFERENCE OF THREE YEARS OF WORK EXPERIENCE

Kamran Azma¹, Nasser Goodarzi², Ehsan Tavakolian², Farhad Yadegarian³

¹Department of Physical Medicine and Rehabilitation, Clinical Biomechanical and Rehabilitation Engineering Research Center, AJA University of Medical Sciences, Tehran, Iran

²Department of Psychiatry, AJA University of Medical Sciences, Tehran, Iran

³Researcher, Family Medicine Practitioner, Tehran, Iran

Corresponding author: Ehsan Tavakolian , Department of Psychiatry, AJA University of Medical Sciences, Tehran, Iran.
Tel: +989138853025. E-mail: Tavakolianehsan64@gamil.com.

ABSTRACT

Background: Nurse's empathy is one of the major parameters to improve the quality of provided health care known for the patient and it has a significant effect on reducing physical and psychological symptoms in patients. However, it has shown that over time and by increasing the background of nurses, their empathy is reducing. However, there is no research to investigate the Mu Suppression that is an indicator of the performance of mirror neurons that is a basis of empathy sense in the brain. So, the aim of this study is to investigate the difference between reported empathy and Mu suppression among nurses with three years of work background. **Methods:** So, a total of 39 male nurse were chosen by available sampling that 15 of them has about 3 years working experience more than other's 15 people, Data collection tool was empathy questionnaire of Jefferson's health professionals. Mirror neurons' activation was investigated by Mu suppression. So, EEG was recorded in three situations including: 1) watching a video of a motionless hand, 2) watching a video of a hand that is opening and closing and 3) moving their own hand. **Results:** The results of MANOVA analysis indicated that although Mu suppression among nurses with more background is less, but this difference is not significant. Also, there is no significant difference between the reported empathy scores by nurses among two groups **Conclusions:** These results indicate that three years of work experience don't have an effect on empathy reduction.

Key word: Nurse, patient, physical and psychological.

1. INTRODUCTION

Providing appropriate nursing service requires nurses to have nursing art, in addition to required knowledge. The meaning of nursing art is the nurse's skill to reduce patient's discomfort. One of the underlying factors of nursing art is empathy and it is the "ability to put yourself on someone place" (1-3).

Among medical staffs, the purpose of empathy is to understand discomfort and experience and patient's view and transfer this understanding to patient to reduce his/her pain. Research evidences also supports this hypothesis that empathy of treatment staffs increases the effect of treatment to improve the physical symptoms such as decreasing blood pressure and psychological symptoms, such as reducing anxiety and depression symptoms and increasing patient's satisfaction and improving follow-up (4-8).

The researchers also have showed that empathy of

treatment staffs can reduce diagnostic errors. It is because patients can report their symptoms and concern, easier. Researches also have shown that they give high importance to empathy, support and providing information by treatment staffs. Hence, in some countries such as America, Canada and Switzerland, one of the education goals of universities is empathy training to medical team (7, 9-13).

Due to the importance of empathy among treatment team, many investigations have been conducted in the field of related factors to increasing or reducing empathy of this population. Some of these researches have been done on physicians. And it indicated that among early years, empathy increases in the early years while during intern period and communicating with patients, the empathy will be reduces. Also, the studies have shown that resident's empathy will be reduced by communicating with patients after a while (14, 15).

The Notable point in these researches is that all of them were used by the empathy expressed by the person. But, none of them investigate the empathy variations on physiological level. The foundation of empathy neurological was discovered on a special type of monkey in the study of Rizzolatti et al. during monkey investigation, they found that a branch of neurons are active during practice and watching the practice by others. In fact, these neurons are lead to representing other's actions in the mind (16-20).

Today, different imaging studies show similar neurons in the pre-motor part of human brain. Also, it is well recognized that mirror neurons are essential not only to represent the motion but also for other vital functions such as language, empathy, imitation and theory of mind (20-22). One of the common methods to study the activities of mirror neurons is to record the brain's electrical activity (EEG). In this way, we investigated the created changes at the Mu range (frequency range of 8 to 13 Hz) (20, 23).

Neuronal activity in the sensorimotor cortex on baseline, synchrony causes to create Mu rhythm with maximum power. When a person performs an action or sees a person during doing an action, the activity of these neurons will be asynchrony, and reduces the amplitude of Mu rhythm. In this case, Mu rhythm suppression is occurred. Many studies prove the reliability of using Mu suppression as an index from the performance of mirror neurons. Especially when the person performed or observed the action of shaking hands, as it was noted, empathy in medical team especially among nurses is particularly important (24-26).

However, research shows that empathy reported by treatment team reduced over time. But, based on our information, there is no research to investigate the changes over Mu suppression during the time. So, present study aims to investigate this issue that is there a significant difference between nurses with work experience difference about 3 years in Mu suppression.

2. MATERIALS AND METHODS

After approving the pattern in Army University of Medical Sciences, a sample of 45 male nurses was considered for research. Among them, only 30 peoples were willing to participate in the EEG recording. Measures of nurse's entrance included: being male, having age between 20 and 50, don't having psychiatric and neurological disorders.

2.1. Tools

Jefferson Empathy questionnaire for health professionals: to measure the empathy in this research, Jefferson scale of empathy-health professionals was used in which empathy is a cognitive attribute and it is the factor of understanding experiences and patient's view and transferring this understanding to patient. This scale can be used to determine empathy in a specific group and we can use therapy group in this field. This scale consists of 20 questions and respondents should answer to questions in a 7 grade Likert spectrum (1=strongly disagree to 7= strongly agree). Scores on this scale are from 20 to 140 that lower scores show that how a person be treated, by an empathy method. Researches show that this scale is valid and reliable (25-29).

2.2. Procedure

EEG was recorded in three modes: 1) moving own hand: respondents keep their right hand and their fingers and thumb were direct and they close and open their hand with a frequency of 1 Hz. Respondents keep their hand in an appropriate distance of visual square, watching the video of moving hand: respondents see the video of closing and opening the right hand of experimenter. Hand movements in the video were similar to way that respondents close and open their hands. The distance of monitor screen from the respondent's view was 1 meter. 3) watching the video of moving a statistic hand: this video was quite similar to previous video. But there is a difference that the hand in the film was constant and don't have any movement. This situation should be considered as the base case. Each of the above three conditions lasted for 80 seconds. In fact, respondents first see the video without hand movement, then they see the video of opening and closing experimenter's hand and finally they closed and opened their own hand.

2.3. How to record and analyze EEG

Electrode was done based on international 10/20 standards. According to this issue than in previous studies, obtained information from electrodes corresponding to sensorimotor cortex (C4, C3 and Cz) showed Mu wave suppression so, it was an indicator of mirror neuron's performance and also, these electrode's information were analyzed. Also, according to shown studies, only the mode of observing other's movement has a correlation with empathy, so, only corresponding data to Mu relative power were compared at the mode of observing the hand movement's video. Sampling frequency was considered to 500 Hz.

Two amounts were calculated as the size of Mu suppression. First amount was the logarithm of power ratio when person close and open his/her hand. Basic mode was observing the video of unmoved hand. The second value was the logarithm of power ratio by observing hand movement to basic mode. R2014a MATLAB software was used to calculate Mu power in each of the electrodes and SPSS software was used to data analysis.

3. RESULTS

Demographic variables and nurse's scores in empathy test of health professionals have been professionals presented in Table 1. As this table shows, the average age of nurses with high work experience is 28.6 years and for nurses with low work experience is 24.87 years. Also, the work experience of two groups is 6.33 and 3.06 years, respectively. Also, the scores of nurses with low experience are considered in empathy test of Jefferson health experienced and nurses. Table 2 shows the related information to Mu relative power in the modes of hand movement by person and observing the video of hand movement in two groups of nurses with low experience and higher experience. As this table shows in the mode of video observing of hand movement, Mu power average among nurses with higher experience (-0.47) is more than nurses with lower experience (-0.57). This issue indicates that Mu suppression for nurse with low experience have happened a little more.

MANOVA test was used to investigate the difference between two groups among Mu suppression variables and

	Nurses with low experience (standard deviation)	Nurses with high experience (Standard Deviation)
age	24.87(1.2)	28.6(1.50)
Background	3.06 (0.77)	6.33(1.4)
Marital status single	7 (46.66%)	0
Married	8 (53.33%)	15
Jefferson professional's empathy	94.86(9.44)	96.4(9.92)

Table 1. Demographic characteristics and empathy scores of nurses reported empathy variables. The results of this test showed that there is no significant difference of Mu suppression between two groups ($F(2,27)=0.971, P=0.3$). Also, among reported empathy scores, there was no difference between nurses with lower and higher experience ($F(2, 27)=0.188, P=0.6$).

4. DISCUSSION

There are many studies that are emphasized on the importance of nurse's empathy to improve treatment result and patient satisfaction. However, empathy reduction among treatment groups due to seeing patients and in other term,

ence and higher experience. Although, it was expected by increasing work experience and patient's exposure causes to empathy reduction but this was not observed.

The first reason is that perhaps the reported empathy by nurses is not precise to show themselves as good and responsible nurses. Another reason is that although by increasing work experience, the empathy will be reduced but some researchers have shown that people who are over the age of 27 have more empathy than peoples who are 21 years old. In this study, more nurses with higher experience were 27 years old and nurses with lower experience were 21 years old. Therefore, one variable is associated with empathy reduction, while second variable is associated with increased empathy.

Therefore, it is possible that these two variables neutralize each other's effects. Another reason for lack of difference between Mu suppression and empathy among nurses with low experience and higher experience can be due to uncontrolled situation to have or have not children. Among treatment staffs, having children has a significant correlation with higher empathy. Also, as stated above, nurses with higher experience were older and all were married. So, the probability for them to have child is more than nurse with

Electrode Nurses	Hand movement case				Hand observing case			
	C3	Cz	C4	The average of electrodes	C3	Cz	C4	Average
Low experience	-0.77 (0.32)	-0.57 (0.26)	-0.75 (0.41)	-0.70 (0.30)	-0.61 (0.42)	-0.39 (0.21)	-0.65 (0.30)	-0.55 (0.25)
High experience	-0.73 (0.46)	-0.61 (0.26)	-0.63 (0.19)	-0.66 (0.21)	-0.49 (0.27)	-0.37 (0.20)	-0.54 (0.26)	-0.47 (0.20)

Table 2. The logarithm of Mu power in C3, Cz and C4 electrodes for two groups

patient's exposure have many concerns. However, there is no precise information about empathy reduction. So, the present study investigated the difference between Mu suppression as an index of mirror neurons activity and empathy among nurses with three years of experience.

The results showed that Mu suppression during observing other's movement among novice nurses is a little more than experienced nurses. This means that the activity of mirror neurons among novice nurses is more than experienced nurses. In other words, we can say that the sensitivity of mirror neurons is reduced than other's activity during nursing years. But, according to the results of MANOVA analysis, it was showed that this difference is not significant and we cannot make comment about this issue, certainty. Also, perhaps the lack of significant difference is because the considered experience difference is low. And activity reduction of mirror neurons is remarkable in long-term.

On the other hand, some researchers consider empathy in a patient- nurse relationship as a cognitive structure than emotional structure. While the researches showed that Mu suppression has correlated with personal distress subscale of interpersonal scale, and this subscale measures its emotional part than measuring the cognitive empathy part (28, 29).

So, making comments about reducing or increasing empathy among nurses that includes cognitive aspects should be done with caution by comparing Mu empathy that was associated with emotional dimension of empathy. Results of MANOVA analysis showed that there is no significant relation between reported empathy by nurse with lower experi-

lower experience that all of them were younger and almost half of them were single. So, having kids can counteract patient exposure to some extent (7). Because, probably three years is so low for experience difference of high empathy reduction among nurses and it will be lasted at longer time. Empathy can have a sharp drop among nurses and it can reduce the effect of other moderator variables.

This research has limitations that make difficult its generalization. The first limitation is that due to disaffiliate women nurses, the sample of this research only included male nurses. The second limitation is that selected sample includes only 30 nurses that is a small sample. Other limitations were lack of age control and situation of having children which are two important variables to determine empathy among the nurses of two groups.

CONFLICT OF INTEREST: NONE DECLARED.

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