



Phenomenon of Music Therapy Using BmT in Treating Neurological Disorders Patients

Junita Batubara

Universitas HKBP Nommensen, Medan, Indonesia

ABSTRACT

This study aimed to develop music therapy using a BmT device as a 'supplement' media for patients with neurological disorders. there are 2 (two) methods of music therapy in the namely: 1). In active music therapy, the patient is invited to sing, learn to use musical instruments, imitate notes, and even compose short songs. 2). Passive music therapy, this is music therapy that is cheap, easy and effective. The patient has to listen to and experience a certain type of music that is tailored to the problem, where music therapy can reduce pain, relax the body and mind, and adjust other benefits to the content of the music. Researchers have performed music therapy in patients with neurological disorders using passive music therapy methods. This was done by creating a music therapy tool named Box musik Terapi (BmT). The most important aspect in carrying out music therapy with BmT is that the choice of music type must be appropriate for the patient's needs. The method used by researchers to conduct their research was a quasi-experimental method with a non-equivalent design. This method was performed by providing a pre-test and post-test on patients with nervous disorders. The expected benefit of music therapy is that it can realize the function of music therapy through the BmT tool for patients with neurological disorders, so that the target achieved is that patients can overcome their neurological disorders.

Keywords: music therapy, therapy equipment, patients, hospital, medical

ABSTRAK

Studi ini bertujuan untuk mengembangkan terapi musik menggunakan alat BmT sebagai media "suplemen" untuk pasien dengan gangguan neurologis. Terdapat 2 (dua) metode terapi musik, yaitu: 1). Dalam terapi musik aktif, pasien diajak untuk bernyanyi, belajar menggunakan alat musik, meniru not, dan bahkan menciptakan lagu pendek. 2). Terapi musik pasif, ini adalah terapi musik yang murah, mudah, dan efektif. Pasien harus mendengarkan dan mengalami jenis musik tertentu yang disesuaikan dengan masalahnya, di mana terapi musik dapat mengurangi rasa sakit, merelaksasi tubuh dan pikiran, serta menyesuaikan manfaat lainnya dengan isi musik. Peneliti telah melakukan terapi musik pada pasien dengan gangguan neurologis menggunakan metode terapi musik pasif. Ini dilakukan dengan membuat alat terapi musik bernama Box musik Terapi (BmT). Aspek terpenting dalam melakukan terapi musik dengan BmT adalah bahwa pilihan jenis musik harus sesuai dengan kebutuhan pasien. Metode yang digunakan oleh peneliti untuk melakukan penelitian mereka adalah metode eksperimental semu dengan desain non-ekuivalen. Metode ini dilakukan dengan memberikan pre-test dan post-test pada pasien dengan gangguan saraf. Manfaat yang diharapkan dari terapi musik adalah dapat mewujudkan fungsi terapi musik melalui alat BmT untuk pasien dengan gangguan neurologis, sehingga target yang dicapai adalah pasien dapat mengatasi gangguan neurologis mereka.

Kata kunci: terapi musik, alat terapi, pasien, rumah sakit, medis

Corresponding author: Junita Batubara
Universitas HKBP Nommensen, Medan, Indonesia
Email: junitabatubara@uhn.ac.id
DOI: 10.30604/jika.v9i1.2363

INTRODUCTION

One of the causes of nervous disorders in humans is hypertension, which is characterized by high blood pressure. May 17 is celebrated as World Hypertension Day as an effort to raise public awareness of the importance of maintaining blood pressure and risk factors for hypertension effectively and continuously to achieve a longer healthy life. Hypertension or high blood pressure is also called the silent killer because it often occurs without complaints, so sufferers do not know they have hypertension and only find out after complications occur. Based on the above, World Hypertension Day is carried out the theme "Measure Your Blood Pressure Accurately, Control It, Live Longer" which is managed by the World Hypertension League (WHL). Indonesia adopted a global theme with: "Prevent and Control Hypertension Appropriately for a Longer Healthy Life." This theme aimed to increase public awareness to prevent and control hypertension, starting with oneself and the family. The public is also advised to routinely measure blood pressure at least once a month independently or visit a health service facility.

Patients with nervous disorders who experience increased blood pressure must seek measures to control this condition. Looking at the current situation after the Covid 19 pandemic which has been ongoing for almost 3 years, there are still many patients with nervous disorders who experience hypertension at Methodist Hospital in Medan who are experiencing stress, which has resulted in an increase in hypertension. The symptoms of hypertension are often not known by the public. Finally, it shows the need for efforts to make changes in life behavior (Nababan et al., 2023). Many efforts that hypertensive patients can make to control blood pressure can be divided into two parts, namely through treatment and without treatment. Efforts without treatment include changes in life behavior consisting of a low-salt, low-fat, alcohol-free diet and increased potassium, fruit, and vegetables, weight management followed by reducing obesity, regular physical exercise, and stress management. Controlling blood pressure through these efforts is a long way to improve blood pressure and even reduce the need for medication. (Park J. et al, 2015). Therefore, effective treatments are required to cure patients with hypertension. One effort to treat patients with hypertension is music therapy. This is proven based on the author's experience with a group of people at the Mutiara Abadi Binjai Foundation in dealing with stress levels in patients affected by drugs. Of course, you will find different problems because the patients you are facing have different cases of illness, but because the goal is the same, namely, how to overcome stress levels, which results in an increase in hypertension (Batubara et al., 2021).

Therefore, further research is needed on the use of Box Musik Terapi (BmT) in patients with nervous disorders at the Adventist Hospital in Medan. Some of the problems that will be addressed in this study are as follows:

1. Testing performance of Music Therapy as an automatic and measurable treatment for patients with neurological disorders.
2. Development of music therapy programs and tools that are integrated with the GSR (Galvanic Skin Resistance) sensor and MPX5050dp which is integrated with the Arduino Promini system which is more practical and effective

The specific objectives of this research are as follows: (1) To obtain a new methodical approach in the treatment of hypertensive patients by carrying out real-time health protocols using innovative classical music therapy devices, (2) To be able to design a music therapy prototype as an alternative treatment solution for hypertensive patients through classical music. The urgency of this research is very important, where a new formula was found for hypertensive patients who are undergoing treatment by utilizing five sensors including monitoring temperature, blood pressure, controlling stress, becoming a solution that can replace manual methods in treating hypertensive patients and support the industrial world in the field of technology health.

According to Eka in Mulyati (2017: 2) said that one non-pharmacological therapy that can be done easily, cheaply and without side effects is music therapy for hypertensive patients. Several approaches in music therapy believe that our body is the source of sound and that the body's organs can be analogous to a set of musical instruments. The human body is actually full of sound. Biological processes carried out by body organs such as the stomach or heart produce various kinds of sounds. Doctors can listen to these sounds using a stethoscope. Without aids we cannot hear these sounds, because sounds that are too irregular are muffled by the cartilage in the inner ear. Furthermore, according to Finasari et al., (2018) The use of music therapy in the world of health has been done a lot before. For example, classical music therapy as an alternative treatment for hypertension patients at RSUD DR. H. Soewondo Kendal.

This research is a quasi-experimental research with a non-equivalent pretest-posttest design with a control group. This design aims to see the possibility of a causal relationship that arises after treatment is given to a variable, then the results of the treatment are compared with the control group, namely the group that was only given a placebo without treatment. This research design uses measurements twice, namely before and after the intervention (Mulyati et al, 2017: 2).

The MPX5050dp pressure sensor is a piezoresistive transducer made from silicon and designed for various applications, especially those using a microcontroller on a chip, working at pressures of 0 kPa to 50 kPa for mmHg units from 0 mmHg to 375 mmHg. This sensor is a monolithic, technologically advanced silicon pressure sensor. This sensor combines advanced micromachining techniques, thin-film metallization, and bipolar semiconductor processing to provide an accurate, high-level analog output signal that is proportional to the applied pressure. Apart from that, it is equipped with signal conditioned, temperature compensated and calibrated chips. This sensor detects air pressure with an output of voltage in Volts. Sensors are designed for various applications, especially those using microcontrollers. The working principle of this sensor is that the air pressure read by the MPX5050dp sensor produces analog data, making it easier to process data in micro (Deza, 2017).

The objectives of the research are:

1. The urgency of this research is very important, where a new formula has been found for patients with nervous disorders who are undergoing treatment by utilizing five sensors including monitoring temperature, blood pressure, controlling stress, becoming a solution that can replace manual methods in treating patients affected by nervous disorders and support the industrial world. in the field of health technology;
2. Obtaining a new method approach in treating patients with neurological disorders by carrying out health protocols in real time using innovative music therapy devices; 3) Being able to design a music therapy prototype as an alternative treatment solution for patients with nervous disorders through self-composed music

Theoretical Framework

A. GSR (Galvanic Skin Resistance) Sensor

GSR is a sensor that can sense and measure the level of conductivity of the skin, which varies depending on the level of skin moisture (moisture) and the salt content found in sweat on the surface of the skin. The interesting thing that is the focus of attention is that basically the sweat glands are influenced by the sympathetic nerves. Thus, changes in a person's emotional level will affect the sweat glands on the surface of the skin to secrete sweat, thus having the final impact on increasing the level of skin conductivity. Thus, this sensor can be used to determine the psychological and physiological levels of humans (Ningrum, 2019). The resistance of the human body is found in almost all body skin. Body skin consists of 2 (two) layers: the outer layer and the inner layer. The outer layer is composed of scale cells (scaly cells) that have a high resistance when dry, clean, and not torn. The inner layer of the skin has a relatively lower resistance, approximately 300 Ω , owing to the presence of body fluids (Zoel, 2016).



Fig. 1. Hand Electrodermal Response Area for Detecting Stress (source: Zoel, 2016)

B. Music Therapy

Altenmuller in Waruwu & Batubara et al. (2023) said several studies have discussed the use of music therapy as a medium for the treatment of certain diseases. For example, in his article Neurologic Music Therapy, Eckart Altenmuller noted that music can restore impaired nervous processes or neural connections by involving and connecting brain regions with each other. BmT was previously used in hypertensive patients at Methodist Hospital Medan in 2021. The music created in the BmT consists of 16 instrumental pieces of music created by the research team to treat patients with neurological disorders at the Adventist Hospital Medan. Box musik Terapi (BmT) is a music therapy tool that has a square shape (box) which is designed to meet the needs of the community. In the BmT, there are components that support the working system of music therapy. These components are: (1) Galvanic Skin Response (GSR) sensor, (2) MPX5050dp sensor, (3) on/off button, (4) music select button, (5) volume, (6) monitor the results of physical therapy, and (7) earphones (Batubara et al., 2023).

RESEARCH METHOD

This research is a quasi-experimental study with a non-equivalent pretest-posttest design and a control group. This design aims to see the possibility of a causal relationship that arises after treatment is given to a variable, then the results of the treatment are compared with the control group, namely the group that was only given a placebo without treatment. This research design uses measurements twice, namely before and after the intervention (Mulyati & Sudirman, 2017: 2). Next, secondary data in the field were searched through various media, such as the Internet, literature books, journals, and articles, to obtain accurate information (Batubara, 2020; Prasetya et al., 2023).

According to Arikunto (2006), "the population is the entire research subject." The definition of a sample according to Arikunto (2006) is "a portion or representative of the population being studied." Regarding the sample size, Arikunto in Batubara and Maniam (2019) stated that if there are fewer than 100 subjects in the population, it is best to take all of them

so that it becomes a population study. The population limitation in this study was patients suffering from nervous disorders who were patients of Dr. Rustam Sipahutar Sp.S.

The MPX5050dp pressure sensor is a piezoresistive transducer made from silicon and designed for various applications, especially those using a microcontroller on a chip, working at pressures of 0 kPa to 50 kPa for mmHg units from 0 mmHg to 375 mmHg. This sensor is a monolithic, technologically advanced silicon pressure sensor. This sensor combines advanced micromachining techniques, thin-film metallization, and bipolar semiconductor processing to provide an accurate high-level analog output signal that is proportional to the applied pressure. Apart from that, it is equipped with signal conditioned, temperature compensated and calibrated chips. This sensor detects air pressure with an output of voltage in Volts. Sensors are designed for various applications, especially those using microcontrollers. The working principle of this sensor is that the air pressure read by the MPX5050dp sensor produces analog data, making it easier to process microdata (Wiradharma, Mukhtar, & Cahyadi, 2022).

Skin conductance is thought to be a function of sweat glands and the skin pore activity. A person's skin conductance can be influenced by various conditions, including gender, blood type, skin, and situation. Sweat gland activity is controlled, in part, by the sympathetic nervous system. If anxiety occurs, there is a rapid increase in skin conductance. The more anxious a person is, the greater their body's resistance value will be (Bakti & Wardati, 2019). What is done after planning and designing the tool is to purchase the components needed to make the tool such as ESP32_D1_Mini, Audio_Jack, Heart Sensor, YX6200-16S MP3 Module, Ads1115idgst, GSR Sensor Connection, Display-Oled-128X64-I2C, LED0805, Battery, USB-MICRO-5P, USB-103F-B-FE headset, red/yellow/green LED, buzzer, switch, and material selection is the most important factor in making a product, where the material determines the accuracy of a product to be made, including detecting body temperature, measuring distance, measuring oxygen levels through fingers, measuring stress levels from sweat analysis, and GPS-based tracking, each of which comprises 12 tests and data calibration.

RESULTS AND DISCUSSION

The Medan Adventist Hospital was founded by Dr. Elisha Liwidjaja/Lie Sek Hong on May 6, 1955. The hospital was initially a small hospital that later became a large hospital. On June 1, 1971, two units were officially opened for classrooms: an operating room and a delivery room. Furthermore, a general medical center and a dental treatment center were added. On November 23 1975, Pastor Robert. H. Pierson from Washington DC USA was pleased to visit the Medan Adventist Hospital and planted an umbrella sari tree in the Medan Adventist Hospital complex. On October 10, 1980, the leadership system of the Medical Director by P. L. Tambunan built several classrooms and a larger surgical room. Class rooms with a capacity of 42 beds. Over the past 40 years, the Medan Adventist Hospital has experienced various challenges, and on June 10, 1998, the development of the Adventist Hospital became larger and more comprehensive, where inpatient rooms were added to nine rooms consisting of VIP and Super VIP. On May 14 2015, the VVIP inpatient room was inaugurated by Pastor J. Kuntaraf and Dr. Kathleen Kuntaraf and then on June 1 2016 a class I inpatient room with a capacity of 20 beds was inaugurated and finally in March 2017 a class II inpatient room with 42 beds was inaugurated (<https://rsadventmedan.com/profil-rsam/>) .

With the increase in these rooms, the hospital carried out renovations by adding a consultation room/doctor practice room. There were 10 doctors' practice rooms/polyclinics. Medical practice at the Adventist Hospital collaborates with the BPJS. Researchers have observed patients with nerve pain. This research also collaborated with a specialist in neurological diseases, namely Dr. Rustam Sipahutar, Sp.S. He is a senior doctor who has worked at the hospital for a long time as a Medan Adventist. The polyclinic conditions at the Adventist Hospital are neatly arranged, where every doctor who will practice is well-scheduled. Dr. Rustam Sipahutar, Sp. S., he always practices every Wednesday from 10.00 WIB to 14.00 WIB, but if there are enough patients then Dr. Rustam Sipahutar Sp.S., open practice until 16.00 WIB. Dr. Rustam Sipahutar, S. S., average patient with BPJS. According to the results of interviews with patients, why do more people choose Dr. Rustam Sipahutar than other doctors is Dr. Rustam Sp.S., is very intense, and patients listen to his patients' complaints and always provide alternative treatment methods other than the routine medication given to patients every month. On an average, patients are domiciled or live around the Kampung Baru-Titi Kuning, Belawan-Marelan, and Amplas areas. The total number of patients Dr. Rustam Sipahutar, Sp.S, every week, with an average of 25 to 50 people. Usually, patients attend every month for health check-ups, monthly check-ups, and prescription medication to continue treatment. Patients present with various types of neurological diseases, including mild to moderate strokes, vertigo, pinched nerves in the hips and spine, numbness in both hands, tremors in the right hand, and Parkinson's disease.

In research conducted on patients of Dr. Rustam Sipahutar, Sp.S is a group of thirty-five patients with neurological diseases, namely patients who use BPJS. Music therapy was performed based on the results of observations from measurements before and after music therapy. This can be observed in the GSR and bpm. Music therapy is carried out using BMT where in BMT there are GSR and BPM as well as 16 types of self-composed instrumental music. The uniqueness of these 16 pieces of instrumental music is the combination of simple melodies with natural sounds, bird sounds, water sounds, wind sounds, and human voice. Music therapy is done in an educational way in which the patient chooses the type of music he will listen to. Observations were made based on the type of neurological disease. In this study, we observed patients who had experienced nerve pain for more than 1 year.



Fig. 2: Advent Hospital (source: <https://rsadventmedan.com/profil-rsam/>)

The operational standards carried out by researchers when observing nurses are as follows:

1. The patient is a patient of Dr. Rustam Sipahutar Sp.S
2. Patients can participate in music therapy after obtaining permission and being examined by Dr. Rustam
3. The patient is interviewed regarding general identity (name, age, nervous disorders experienced/felt by the patient)
4. Patients are given education about the benefits and uses of BMT
5. Patients are given education about 16 pieces of therapeutic music so that patients can choose what music they want to listen to
6. Patients are given time to choose the therapy music they will listen to
7. The patient must sit relaxed so that observations can be made
8. The patient is given time to listen for 3 minutes to 3 minutes. 8 minutes (depending on the time duration of each therapy music)
9. After listening, the researcher will explain the results of observations via BmT to the patient
10. The patient is advised to come back so that a second and third observation can be carried out

Researchers observed patients from Dr. Rustam Sipahutar Sp.S in accordance with the SOP, and the requirements of the nurses studied were 35 people, of which 12 were men and 23 were women.



Fig. 3: Patients were examined with BmT (source: Authors)

Researchers have used Sera's theory for GSR and MPX5050dp, where stress levels can be detected through the skin condition of the fingers or hands. The stress levels studied are in accordance with the opinion of Regina Seran:

Table 1. Theory of GSR (source: Authors)

Patients' condition	GSR (bits)
Normal	0-300
Relax	301-525
Light Stress	526-600
Moderate Stress	601-725
Heavy Stress	726-825
Extremely Stressful	826-1023

The Stress Level (GSR) of patients following observation was in the range 245 – 704 (before therapy treatment). The patients who took part in music therapy included thirty-five people with an age range of 19 – 84 years, and researchers in this case used initials to maintain patient confidentiality. The thirty-five patients are:

Table 2. Identity of patients with neurological disorders following BmT therapy (source: Authors)

No.	Patients' Initial names	Age	Gender (M/F)	Inspection Day/Date
1	NS	62	F	23/08/2023
2	RS	78	M	23/08/2023
3	KP	69	F	23/08/2023
4	SS	62	F	23/08/2023
5	MH	52	M	23/08/2023
6	SSir	70	F	16/08/2023
7	MP	51	M	16/08/2023
8	SM	69	F	16/08/2023
9	J	45	F	16/08/2023
10	LS	68	M	16/08/2023
11	M	59	M	16/08/2023
12	I	55	F	16/08/2023
13	SH	61	F	16/08/2023
14	HS	75	F	16/08/2023
15	RoS	63	F	16/08/2023
16	MR	60	M	16/08/2023
17	SA	40	F	16/08/2023
18	TB	71	F	16/08/2023
19	JT	82	F	16/08/2023
20	HL	60	M	16/08/2023
21	RN	56	F	16/08/2023
22	SG	67	M	16/08/2023
23	CS	64	M	16/08/2023
24	F	47	F	16/08/2023
25	TH	67	F	23/08/2023
26	LN	60	F	23/08/2023
27	RSM	68	F	23/08/2023
28	JN	62	F	16/08/2023
29	RehS	64	F	30/08/2023
30	MA	19	M	30/08/2023
31	DS	46	F	28/08/2023
32	HA	20	M	30/08/2023
33	HB	84	F	30/08/2023
34	EMS	42	F	30/08/2023
35	SP	36	M	30/08/2023

Table 3. The pasien is male, aged between 19 years until 78 years (source: Authors)

NO	Name	Age	Gender	Date
1	MA	19	M	30/08/2023
2	HA	20	M	30/08/2023
3	SP	36	M	30/08/2023
4	MP	51	M	16/08/2023
5	MH	52	M	23/08/2023
6	M	59	M	16/08/2023
7	MR	60	M	16/08/2023
8	HL	60	M	16/08/2023
9	CS	64	M	16/08/2023
10	SG	67	M	16/08/2023
11	LS	68	M	16/08/2023
12	RS	78	M	23/08/2023

A. Male Patients Aged 19 Years to 78 Years

There were 12 male patients who took part in music therapy out of thirty-five patients (34.29%), with ages ranging from 19 to 78 years. One male patient (2.86%) was aged between 71 and 80 years. Furthermore, men aged between 61 and 70 years were 3 people (8.57%). The age of the male patients who experienced nerve pain was between 51 and 60 years of age, and five people (14.29%). There was an average of one male patient aged 30–40 years (2.58%). At young ages between 10 and 20 years there were 2 people (5.71%). The patient suffered from mild to moderate stroke, a pinched nerve around the waist down, and vertigo. In general, patients suffer more from pinched nerves around the waist, lower strokes, and mild-to-moderate strokes.

From the observation results, it can be seen that the initial bpm before music therapy treatment ranged from 41 to 97, with an average of 71.58. Observations were also carried out through initial GSR before music therapy treatment, which ranged from 248 to 634 with an average of 492.67. From these average results, it can be concluded that male patients with an initial BPM before treatment were in the moderate stress to relaxed level category.

Patient MA (19 years old) was the first patient to visit Dr. Rustam Sipahutar, Sp.S, with problems such as pinched nerves and excessive anxiety. The first thing the researcher did with MA was ask about the pinched nerve and his anxiety. MA said that a pinched nerve was felt at the position of the coccyx, and the high level of anxiety was caused by the inappropriate choice of the educational major currently being undertaken. MA are educated about music therapy. Researchers have explained the function of BMT and selection of therapeutic music. After the MA agreed, the MA did an initial examination with an initial bpm of 61 and an initial GSR of 559. Then, the MA chose song number 3 (natural greets), and after finishing listening, the BPM was detected as a result of music therapy 81 and the GSR as a result of music therapy was 504. In this case, the MA felt relaxed after hearing therapy music number 3. The researcher's question was whether the bpm resulting from music therapy increased by 20. The researcher then asked whether the MA felt a strong heartbeat. MA admitted that his heartbeat was faster than usual because he felt a lot of pain in his tail. HA patients (20 years/male) were those who experienced nerve disease in the back, waist, and thighs. HA has a history of vertigo, but during a visit to Dr. Rustam Sipahutar, Sp.S, HA consulted only for pain.

After explaining the education on the use and benefits of music therapy, the HA agreed to carry out music therapy. initial bpm 97 and initial GSR 248 by selecting song number three (natural greets). After listening to therapeutic music, the BMP resulting from music therapy was 89 and the GSR resulting from music therapy was 141.

Judging from the two patients above, their age was categorized as young, and they had experienced a pinched nerve in the tailbone. In addition, the results found that MH patients had stress levels at light stress levels, and after music therapy fell to relaxed levels. Meanwhile, HA experienced a decrease in bpm and GSR, and HA stress conditions decreased to normal levels.

Furthermore, researchers also observed patients with initial SG (67 years/male) and RS (78 years/male). SG and RS received music therapy twice. What the researchers did was educate SG and RS about music therapy through BMT and its uses. After the SG and RS agreed to perform music therapy, then:

1. On 08/16/2023, the researcher carried out music therapy on SG, where the initial bpm was 71 and the initial GSR was 518.
2. SG chose therapy music song number 8 (I'm grateful version 2)
3. The results obtained by the researchers were that the BPM resulting from music therapy was 68 and the GSR resulting from music therapy was 378
4. On 08/30/2023 SG again received a second treatment for music therapy with the same song selection (no.8): initial bpm 78 and initial GSR 237

5. After completing the music therapy treatment, the BPM resulting from music therapy was 71, and the GSR resulting from music therapy was 83.

SG is a regular patient of Dr. Rustam Sipahutar, Sp.S means a patient who is always given medication every month because he has a blockage in the left side of his brain, is slurred speech and has had a mild stroke.

RS (78 years old, male) is also a regular patient of Dr. Rustam Sipahutar, Sp.S, who has a history of tremors (right hand), numbness, and stroke in his left hand. In this patient's condition, the researcher offered music therapy and educated the patient about the benefits of BMT music therapy. RS also underwent two treatments, where

1. On 08/23/2023, researchers carried out music therapy on RS, where the initial BPM was 41 and the initial GSR was 367.
2. RS chooses therapy music song number 11 (Bidadari Song)
3. The results obtained by the researchers were that the BPM resulting from music therapy was 79 and the GSR resulting from music therapy was 540
4. On 08/29/2023, RS again received a second treatment for music therapy with the selection of song number 3: initial bpm 81 and initial GSR 584
5. After completing the music therapy treatment, the BPM resulting from music therapy was 69, and the GSR resulting from music therapy was 305.

Referring from the results of the first and second treatments, the RS had differences in that the RS in the first treatment did not feel the music therapy carried out by the researchers because the song selection was not appropriate. After the second treatment, the RS felt the benefits of music therapy by choosing a different song.

As a result, the two patients aged over 60 years and under 80 years felt the benefits of music therapy. For RS, when he received the second treatment, he stated that the left hand that had had a stroke (could not be moved) at that time could be moved, even with small movements.

From the results of observations made by researchers regarding the relationship between patient age and the BPM resulting from music therapy, it was stated that as age increased, the BPM resulting from music therapy decreased. This can be seen in the following graph:

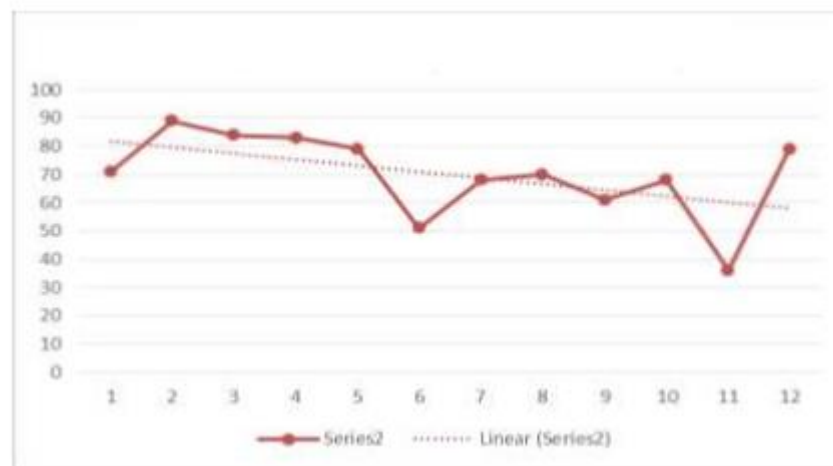


Fig.4: Relationship between age and bpm results of music therapy (source: Authors)

Table 4. The patient is female aged between 40 years until 84 years (source: Authors)

No	Name	Age	Gender	Date
1	SA	40	F	16/08/2023
2	EMS	42	F	30/08/2023
3	J	45	F	16/08/2023
4	DS	46	F	28/08/2023
5	F	47	F	16/08/2023
6	I	55	F	16/08/2023
7	RN	56	F	16/08/2023
8	LN	60	F	23/08/2023
9	SH	61	F	16/08/2023
10	JN	62	F	16/08/2023
11	SS	62	F	23/08/2023

No	Name	Age	Gender	Date
12	NS	62	F	23/08/2023
13	RoS	63	F	16/08/2023
14	RehS	64	F	30/08/2023
15	TH	67	F	23/08/2023
16	RSM	68	F	23/08/2023
17	KP	69	F	23/08/2023
18	SM	69	F	16/08/2023
19	SSir	70	F	16/08/2023
20	TB	71	F	16/08/2023
21	HS	75	F	16/08/2023
22	JT	82	F	16/08/2023
23	HB	84	F	16/08/2023

B. Female Patients Aged 40 Years to 84 Years

Twenty-three female patients who participated in music therapy (65.71%) ranged in age from 40 to 84 years. At the age of 30–40 years, there was one female patient (2.86%). Furthermore, there were 4 people aged between 41 and 50 years (11.43%). Ages 51 to 60 years were 3 people (8.57%), ages 61 years 70 years, 11 people (31.43%), ages 71 years – 80 years, 2 people (5.71%) and ages 81 years to 90 years as and 2 people (5.71%). Patients who experience vertigo are aged 40–68 years, and patients who experience a pinched nerve are aged 55–84 years. The patient with a history of calcification was 68 years of age. The patient had mild to moderate strokes and pinched nerves around the waist and vertigo. In general, patients suffer more from pinched nerves around the waist and lower strokes and mild to moderate strokes.

From the observation results, it can be seen that the initial BPM before music therapy ranged from 39 to 101, with an average of 73. Observations were also carried out via initial GSR before music therapy, which ranged from 245 to 704, with an average of 537.30. From these results, it can be concluded that female patients with initial BPM before treatment were in the light stress to relaxed level category.

Patients SA (40 years/female) and ES (42 years/female) were patients of Dr. Rustam Sipahutar, Sp.S, who experienced acute vertigo. Examinations were carried out on these patients only once because they were permanent. This means that the patients have control every month. SA with ES was educated by researchers regarding BMT by explaining music therapy to reduce acute headaches/vertigo. After the two patients agreed to the first treatment, the researchers observed that SA's initial bpm was 64 and ES was 83. SA's initial GSR status of SA was 449 and ES 401. From the researchers' observations, the BPM from music therapy and the GSR from SA's music therapy were 77 and 404, respectively. choose therapy music number three (natural greets). ES patients with BPM from music therapy 76 and GSR from music therapy 233 by choosing music therapy number 8 (Ku grateful version 2).

Judging from the two patients mentioned above who had acute vertigo, it can be stated that the benefits of BMT are very large for patients where the patient experiences relaxation, and the patient is able to express the music he hears by following the rhythm (shaking his head, tapping his fingers, and toes stomped slowly).

Patient I (55 years old/female) is a patient who has mild vertigo and a pinched nerve. Patient I was also provided education regarding BMT and music therapy. After obtaining consent from the patient, the researcher carried out music therapy where patient I chose therapy music number 4 (Human of the Storm). Researchers carried out an initial detection of the patient's BPM and GSR, where the initial BPM was 53 and the initial GSR was 614. After music therapy was carried out, the BPM resulting from music therapy was found to be 66, and the GSR resulting from music therapy was 486, where the patient's stress level could be categorized as reaching a relaxed level from previously moderate stress. . From the results of the researcher's observations, patient I's BPM results increased, and when interviewed, patient I said that he had just arrived at the hospital on a motorbike.

Next, the researchers observed three women whose ages ranged from 70 years – 84 years; patient HB was 84 years old, patient JT was 82 years old and patient SS was 70 years old. Three patients experienced knee pain, mild stroke, or hearing loss. However, in carrying out music therapy, the researchers felt doubts about the patient because the patient had hearing loss. Then, the researchers made a policy of increasing the sound volume even louder than normal. Thus, three patients were able to hear. Of the three patients, SS received music therapy twice. JT and HB received treatment once. The three patients are regular patients of Dr. Rustam Sipahutar, Sp.S, always gets medicine from BPJS every month

Patients with SS received music therapy on 08/10/2023 and 08/23/2023. In the first treatment, the researchers found that the initial BPM of the SS patient was 69 and the initial GSR was 687. After the SS patient chose music therapy number 8 (I am grateful Version 2), we could see the results of the BPM and GSR, where the BPM resulting from music therapy increased to 79 and GSR. The results of the music therapy decreased to 662. The second treatment was performed again, where the initial BPM was 64 and the initial GSR was 655. After SS chose music therapy number 5 (Dream), the BPM results of music therapy decreased to 62 and the GSR results of music therapy decreased to 528. Judging from the data above shows that SS experienced benefits from music therapy, and also from the results of the interview, SS stated that he felt relaxed and could reduce headaches/vertigo and knee pain.

C. Relationship between song number selection and GSR and bpm

In BMT, there are GSR and bpm, where these components are integrated with songs/instrumental music created by a composer. Songs/instrumental music contains sounds of nature, bird sounds, wind sounds, rain sounds, and melodies with certain pitch areas. The songs/instrumental music contained in the BmT includes 16 compositions.

Table 5. List of Songs/Instrumental Music in BmT (source: Authors)

No	Title of Song	Note
1	After rain comes Sunshine	Instrumental
2	Aktivitas lama	
3	Alam Menyapa	
4	Human of the storm	
5	Impian	
6	In the Morning Shade	
7	Ku bersyukur V1	Vokal
8	Ku bersyukur V2	
9	Renungan	Instrumental
10	Senandung Alam	
11	Senandung Bidadari	
12	The Power of the dream	
13	Suara Alam	
14	Suara Air	
15	Song of the angel	
16	Blessing	

Of all the songs/instrumentals presented by the researchers, patients of Dr. Rustam Sipahutar, Sp.S, at the Medan Adventist Hospital chose song numbers 3, 4, 5, 7, 8, 9, and 11. Of the thirty-five patients who participated in music therapy, songs 8 and 11 were their favorite choices. This can be seen from the percentage of song choices (31.43%), and the second most frequently chosen song was number 3 (14.29 %). Music therapy number 4 was chosen three times (8.57%), numbers 5 and 7 were chosen twice (5.71%), and number 9 was chosen once (2.86%). The average initial GSR of all the patients before music therapy ranged from 245 to 704. The average initial BPM concentration ranged from 39 to 101. After music therapy treatment, the average GSR changed from 141 to 704, and the BPM resulting from music therapy was 36 – 93. Based on the researcher's observations of the patient's stress level before music therapy, the stress level was moderate, and after receiving music therapy, it reached a normal level.

CONCLUSION

Over the past 40 years, the Medan Adventist Hospital has experienced various challenges and on June 10 1998 the development of the Adventist Hospital became larger and more comprehensive, where the inpatient rooms were added to 9 rooms consisting of VIP and Super VIP. On May 14 2015, the VVIP inpatient room was inaugurated by Pastor J. Kuntaraf and Dr. Kathleen Kuntaraf and then on June 1 2016 a class I inpatient room with a capacity of 20 beds was inaugurated and finally in March 2017 a class II inpatient room with 42 beds was inaugurated. With the increase in these rooms, the hospital carried out renovations by adding a consultation room/doctor practice room. There are 10 doctor's practice rooms/polyclinics. The medical practice at Adventist Hospital collaborates with BPJS. The average number of nurses at the Adventist Hospital was $\pm$ 200. There are also nurses who work according to their expertise and are placed in several rooms such as the emergency room (IGD), Intensive Care Unit (ICU), patient inpatient room, and polyclinic.

The operational standard carried out by researchers when observing patients is to educate patients to carry out music therapy. The SOP carried out by researchers is: (1) the patient is a patient of Dr. Rustam Sipahutar Sp.S; (2) patients can participate in music therapy after obtaining permission and being examined by Dr. Rustam; (3) the patient was interviewed regarding general identity (name, age, nervous disorders experienced/perceived by the patient); (4) patients are given education about the benefits and uses of BMT; (5) patients are given education about 16 pieces of therapeutic music so that they can choose what music they want to listen to; (6) patients are given time to choose the therapy music they will listen to; (7) the patient must sit relaxed so that observations can be made; (8) the patient is given time to listen for 3 min to 3 min. Eight minutes (depending on the duration of each therapy music); (9) After listening, the researcher will explain the results of observations via BmT to the patient; (10) Patients are encouraged to return so that the second and third observations can be carried out.

Researchers observed patients from Dr. Rustam Sipahutar Sp.S. In accordance with the SOP and requirements, 35 nurses were studied, of whom 12 were men and 23 were women. There were twelve male patients who took part in music therapy out of thirty-five patients (34.29%) with ages ranging from 19 years to 78 years. At the age of 71 years to 80 years, there was 1 male patient (2.86%). Furthermore, men aged between 61 years and 70 years were 3 people (8.57%). The age of male patients who experienced nerve pain was between 51 years and 60 years of age, 5 people (14.29%). One male patients with an average age of 30–40 years were 1 person (2.58%). At young ages between 10 years and 20 years there were 2 people (5.71%). The patient suffered from mild to moderate strokes, pinched nerves around the waist and vertigo. In general, patients suffer more from pinched nerves around the waist and lower strokes and mild to moderate strokes. Twenty-three female patients who participated in music therapy out of thirty-five patients (65.71%) ranged in age from 40 years to 84 years. At the age of 30 years to 40 years, there was 1 female patient (2.86%). Furthermore, 4 people (11.43 %) were aged between 41 and 50 years. Ages 51 to 60 years were 3 people (8.57%), ages 61 years 70 years were 11 people (31.43%), ages 71 years – 80 years were 2 people (5.71%) and ages 81 years to 90 years as many as 2 people (5.71%). Patients who experience vertigo are aged 40 years to 68 years; Patients who experience a pinched nerve are aged 55 years to 84 years. The patient who has a history of calcification is 68 years old. The patient suffered from mild to moderate strokes, pinched nerves around the waist and vertigo. In general, patients suffer more from pinched nerves around the waist and lower strokes and mild to moderate strokes.

The song/instrumental music titles found on BMT are (1) After rain comes Sunshine; (2) Activities; (3) Nature Greets; (4) Human of the storm (5) Dream; (6) In the Morning Shade; (7) I am grateful V1; (8) I am grateful V2; (9) Reflection; (10) Nature's Hum; (11) Angel's Song; (12) The Power of dreams; (13) Nature Sounds; (14) Sound of Water; (15) Song of the angels; (16) Blessings.

Of all the songs/instrumentals presented by the researchers, patients of Dr. Rustam Sipahutar, Sp.S at the Medan Adventist Hospital chose songs number 3, number 4, number 5, number 7, number 8, number 9 and number 11. Of the thirty-five patients who took part in music therapy, songs number 8 and number 11 were the favorite choices. This can be seen from the percentage of song choices (31.43%), and the second most popular song chosen by patients was number 3 with a percentage of 14.29%. Music therapy number 4 was chosen 3 times (8.57%); number 5 and number 7 were chosen twice (5.71%) and number 9 was chosen once (2.86%). The average initial GSR of all patients before music therapy treatment ranged from 245 – 704. Then the average initial BPM was 39 – 101. After music therapy treatment, the average GSR changed to between 141 – 704 and the BPM resulting from music therapy became 36 – 93. Based on the results of the researcher's observations of the patient's stress level before music therapy, the stress level was moderate stress and after receiving music therapy treatment it reached a normal level.

Based on the observations made by researchers on the patients of Dr. Rustam Sipahutar, Sp.S at the Medan Adventist Hospital, intensive research on patients is needed again, considering that the patient's stress level is moderate. It is necessary to provide music therapy to patients at least twice at the Medan Adventist Hospital on an ongoing basis so that the desired results can achieve minimal relaxation.

Thank You Note

Thank you to Universitas HKBP Nommensen, Medan who has facilitated the costs of this research, as well as thanks to the Medan Adventist Hospital, Dr. Rustam Sipahutar, Sp.S, Mr Dr. Mayer Panjaitan (one of the staff at Adventist Hospital) for providing the time and place to conduct this research well.

Declaration of Conflicting Interests

The authors declared that they did not have a conflict of interest, either individuals or institutions.

Author's Contribution

All authors contributed equally to the drafting of the manuscript, revising the manuscript critically for important intellectual content, conception, and design of the study, acquisition of data, analysis, and/or interpretation of data. All authors approved the final version of the article.

REFERENCES

- A Awallia, D. (2017). *Pengaruh Kecerdasan Emosional Terhadap Penyesuaian Diri Mahasiswa KKN PPM USU 2016 di Kabupaten Karo*. Skripsi. Medan: Fakultas Psikologi Universitas Sumatera Utara.
- Batubara, J. and Maniam, S. (2019) Enhancing Creativity through Musical Drama for Children with Special Needs (Down Syndrome) in Education of Disabled Children. *Music Scholarship*, No.2(2019), 166-177. Available at: <http://dx.doi.org/10.17674/1997-0854.2019.2.166-177>

- Batubara, J. (2020) The Rhythm of Birds: A Programmatic Musical Composition about Living in Tanjung Malim. *Music Scholarship, No.2(2020)*, 116-125. Available at: <http://dx.doi.org/10.33779/2587-6341.2020.2.116-125>
- Batubara, J., Marbun, J., Samosir, H. T., & Galingging, K. (2021). Pemanfaatan Terapi Musik sebagai Pengobatan Alternatif Korban Penyalahgunaan Narkoba di Panti Rehabilitasi Mutiara Abadi Binjai. *Panggung*, 31(4), 467–477. Available at: <https://doi.org/10.26742/panggung.v31i4.1788>
- Batubara, J., Marbun, J., Panggabean, A., Simangunsong, E., & Sembiring, R. A. (2023). Box Musik Terapi (BMT) for Hypertensive Patient in Methodist Hospital Medan: Used MPX5050dp and GSR. *Journal of Coastal Life Medicine*, 11, 858-861.
- Batubara, J., Syarifudin, A., Syathroh, I. L., Herman, H., Yasaviyevna, D. S., & Al-Awawdeh, N. (2023). Challenges of Translating Slang Expressions in American Song Lyrics of the 21st Century into the Arabic Language. *International Journal of Membrane Science and Technology*, 10(2), 131-139. Available at: <https://doi.org/10.15379/ijmst.v10i2.1162>
- Bakti, W. T., & Wardati, N. K. (2019). Alat Deteksi Tingkat Stres Manusia Berbasis Android Berdasarkan Suhu Tubuh, Heart Rate dan Galvanic Skin Response (GSR). *Jurnal Teknik Elektro Dan Komputasi (ELKOM)*, 1(2), 93–98. Available at: <https://doi.org/10.32528/elkom.v1i2.3089>
- DepKes, RI. (2019). Hipertensi Membunuh Diam-Diam, Ketahui Tekanan Darah Anda. Kementerian Kesehatan Republik Indonesia. 22 Mei 2019. Available at: <http://www.depkes.go.id/article/view/18051600004/hipertensi-membunuh-diam-diamketahui-tekanan-darah-anda.html>
- Goleman, D. (2015). *Emotional Intelligence. Buku Edisi 5*. Jakarta: PT. Gramedia Pustaka Utama.
- Grad, I., Mastalerz-Migas, A. & Kiliś-Pstrusińska, K. (2015). Factors associated with knowledge of hypertension among adolescents: implications for preventive education programs in primary care. *BMC Public Health*, 15, 463. Available at: <https://doi.org/10.1186/s12889-015-1773-7>
- Mardonova, M. and Choi, Y. (2018). Review of Wearable Device Technology and Its Applications to the Mining Industry. *Energies*, 11(3):547. Available at: <https://doi.org/10.3390/en11030547>
- Massah O, Farmani F, Karimi R, Karami H, Hoseini F, Farhoudian A. (2015). Group Reality Therapy in Addicts Rehabilitation Process to Reduce Depression, Anxiety and Stress. *Iranian Rehabilitation Journal*, 13 (1) :50-44. Available at: <http://irj.uswr.ac.ir/article-1-464-en.html>
- Mulyati, L., & Sudirman, R. M. (2017). Efektivitas Terapi Musik Degung Sunda Terhadap Penurunan Tekanan Darah Pada Penderita Hipertensi. *Jurnal Ilmu Kesehatan Bhakti Husada: Health Sciences Journal*, 6(2), 27–32. Retrieved from <https://ejournal.stikku.ac.id/index.php/stikku/article/view/48>
- Nababan, Y. M., Batubara, J., Galingging, K. and Sibarani, J. (2023). The Effect of Music Therapy on Stress Level of Hypertension Patients at Methodist Hospital Medan, Indonesia. *Sarcouncil Journal of Arts and Literature, ISSN (online) 2945-364X, Vol-02, Issue-04*. Available at: <https://doi.org/10.5281/zenodo.8206090>.
- Nag, A., & Mukhopadhyay, S. C. (2015). Wearable electronics sensors: Current status and future opportunities. In S. C. Mukhopadhyay (Ed.), *Wearable electronics sensors: for safe and healthy living* (pp. 1-35). (Smart Sensors, Measurement and Instrumentation; Vol. 15). Springer, Springer Nature. Available at: https://doi.org/10.1007/978-3-319-18191-2_1
- Ningrum, W (2019). *Rancang Bangun Alat Pendeteksi Stress pada Manusia Berbasis Mikrokontroler ATmega8535 dengan Menggunakan GSR dan MPX5050dp*. Skripsi. Medan: Universitas Sumatera Utara
- Park, J. B., Kario, K., & Wang, J. G. (2015). Systolic hypertension: an increasing clinical challenge in Asia. *Hypertension research : official journal of the Japanese Society of Hypertension*, 38(4), 227–236. Available at: <https://doi.org/10.1038/hr.2014.169>
- Patil, P. A., Jagyasi, B. G., Raval, J., Warke, N., and Vaidya, P. P. (2015). Design and development of wearable sensor textile for precision agriculture. *7th International Conference on Communication Systems and Networks (COMSNETS)*, 1-6, <https://api.semanticscholar.org/CorpusID:1840538>. Available at: 10.1109/COMSNETS.2015.7098714
- Prasetya, H.B., Batubara, J., Herman, H., Christianto, W.N. (2023). To Fulfil Promises is To Die: A Study of Gatotkaca Falls in Javanese Shadow Puppet Canon. *Information Sciences Letters*. 12(6), pp. 2343–2355. Available at: [doi:10.18576/isl/120611](https://doi.org/10.18576/isl/120611)
- Ragona, F., Granelli, C., Fiandrino, D., Kliazovich, P., and Bouvry, P. (2015). Energy-Efficient Computation Offloading for Wearable Devices and Smartphones in Mobile Cloud Computing. *IEEE Global Communications Conference*. 1(2), 1–6, 978-1-4799-5952-5/15/\$31.00
- Ranasinghe, P., Cooray, D.N., Jayawardena, R. et al. The influence of family history of Hypertension on disease prevalence and associated metabolic risk factors among Sri Lankan adults. *BMC Public Health* 15, 576 (2015). Available at: <https://doi.org/10.1186/s12889-015-1927-7>

- RisKesDas. (2018). Kementrian Kesehatan, Badan Penelitian Dan Pengembangan Kesehatan, Hasil Utama RisKesDas 2018. 14 Mei 2019. Available at: http://www.depkes.go.id/resources/download/info_terkini/hasil_riskesda-2018.pdf
- Salamah, U., Izziyah, A. N., and Raharjo, A. A. (2020). Validasi Pulse oximeter dalam Penentuan Kadar Oksigen dalam Darah. *Jurnal Teori dan Aplikasi Fisika*, 8(2), 135-140. Available at: <http://dx.doi.org/10.23960%2Fjtaf.v8i2.2588>
- Sajiah, T. S. (2017). *Pengaruh Kecerdasan Emosi dan Strategi Koping terhadap Resiliensi Remaja Korban Penyalahgunaan Narkoba di Panti Rehabilitasi*. Skripsi. IPB. Departemen Ilmu Keluarga dan Konsumen Fakultas Ekologi Manusia
- Supriadi, D., Hutabarat, E., & Monica, V. (2015). PENGARUH TERAPI MUSIK TRADISIONAL KECAPI SULING SUNDA TERHADAP TEKANAN DARAH PADA LANSIA DENGAN HIPERTENSI. *Jurnal Skolastik Keperawatan*, 1(2), 29-35. Available at: <https://doi.org/10.35974/jsk.v1i2.80>
- Yulastari, P. R., Betriana, F., and Kartika, I. R. (2019). Terapi Musik Untuk Pasien Hipertensi : A Literatur Review. *REAL in Nursing Journal*, 2(2), 56-65. Available at: <http://dx.doi.org/10.32883/rnj.v2i2.436>
- WHO. (2014). *Global Status Report On Noncommunicable Diseases*. Switzerland: WHO Press; 2014.
- Wiradharma, K. I, Mukhtar, H., & Cahyadi, W. A. (2022). Sensor Galvanic Skin Response (Gsr) Berbasis Arduino Nano Sebagai Pengukur Perubahan Konduktansi Listrik Kulit Dalam Kondisi Tenang Atau Distress. *E-Proceeding of Engineering*, 9(2), 218–225. Retrieved from: <https://openlibrarypublications.telkomuniversity.ac.id/index.php/engineering/article/view/17720>
- Waruwu, H. M. and Batubara, J. (2023). The Effectiveness of BmT Accompanied by Music Therapy for Neurology Patients at Martha Friska Multatuli Hospital. *Gondang: Jurnal Seni dan Budaya*, Vol. 7, No.2 (2023) Page 486-498. ISSN 2599-0594 (print), 2599-0543 (online). Available at: <https://doi.org/10.24114/gondang.v6i2.52964>
- Wright, R. & Keith, L. (2014). Wearable Technology: If the Tech Fits, Wear It. *Journal of Electronic Resources in Medical Libraries*, 11:4, 204-216, available at: 10.1080/15424065.2014.969051
- Zoel, I. (2016). *Pembuatan Alat Bantu Stress Detector Menggunakan Sensor HIR333, GSR, dan DS18B20 Berbasis Mikrokontroler Atmega 8*. Skripsi. Medan: Universitas Sumatera Utara.ssa, A., & Umberger, R. (2022). A concept analysis of family caregivers' uncertainty of patient's illness. *Nurs Forum*.
- Birrell, J., Meares, K., Wilkinson, A., & Freeston, M. (2011). Toward a definition of intolerance of uncertainty: A review of factor analytical studies of the Intolerance of Uncertainty Scale. *Clin Psychol Rev*.
- Brady, N. (2005). Living with Schizophrenia: A Family Perspective. Online J Issues Nurs.
- Dwidiyanti and Tim. (2022). Manual Book: FAMCY (Family Heart Connection Caring System) Patient and Family Companion Application.
- Dwidiyanti, M., & Munif, B. (2022). Happy Spiritual Practical Guide. Semarang.
- Dwidiyanti, M., Fahmi, A., Ningsih, H., Wiguna, R., & Munif, B. (2019). The Art of Islamic Spiritual Mindfulness. Semarang: UNDIP Press.
- Epstein, R. (2021). Facing epistemic and complex uncertainty in serious illness: The role of mindfulness and shared mind. Retrieved from Patient Educ Couns [Internet].: <https://doi.org/10.1016/j.pec.2021.07.030>
- Fitri, A., & Rahmandani, A. (2020). Experiences of Father Involvement in Caring for Children with Schizophrenia: Interpretative Phenomenological Analysis. *J EMPATHY*.
- Lin, L., Yeh, C., & Mishel, M. (2010). Evaluation of a conceptual model based on Mishel's theories of uncertainty in illness in a sample of Taiwanese parents of children with cancer: A cross-sectional questionnaire survey. Retrieved from Int J Nurs Stud [Internet]: <http://dx.doi.org/10.1016/j.ijnurstu.2010.05.009>
- Poegoeh, D., & Hamidah, H. (2016). The Role of Social Support and Emotion Regulation on the Resilience of Families with Schizophrenia. *Insa J Psychology and Health Ment*.
- Center for Data and Information of the Ministry of Health of the Republic of Indonesia. (2019). Mental Health Situation in Indonesia. Jakarta: InfoDATIN.
- Putri, N., Parastan, R., Dyatmika, I., & Lesmana, C. (2020). Coaching Caregiver: Education-Based Telehealth Application. Jimki.
- Reilly, E., Reilly, T., Brown, T., Wierenga, C., & Kaye, W. (2021). Intolerance of Uncertainty and Eating Disorder Symptoms Over the Course of Intensive Treatment. Retrieved from Behav Ther [Internet].: <https://doi.org/10.1016/j.beth.2020.09.002>
- Rettie, H., & Daniels, J. (2021). Supplemental Material for Coping and Tolerance of Uncertainty: Predictors and Mediators of Mental Health During the COVID-19 Pandemic. *Am Psychol*.
- Ria, R. (2016). Description of Socio-Psychological Problems in Families of Schizophrenic Mental Disorders.
- Rosyanti, L., & Hadi, I. (2021). Understanding Burden, Psychosocial Conditions and Family Coping (Caregivers) in Caring for People with Mental Disorders (Family Approach). *Health Information: Research Journal*.

- Smith, M., & Liehr, P. (2018). Understanding Middle Range Theory by Moving Up and Down the Ladder of Abstraction. Middle Range Theory for Nursing, Fourth Edition.
- Suryaningsih, C. (2021). Experiences of Mothers Caring for Adolescent Schizophrenia Post Hospitalization. J Nursing Silampari.
- Yusuf, A. (2013). The Effect of Family Therapy with Spiritual Approach Towards Family'S Health Belief Model in Taking Care of Patients with Schizophrenia. Journal of Nurses.