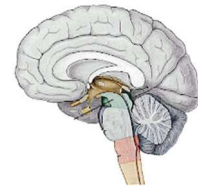


Contents lists available online at:

Jurnal Kesehatan Mesencephalon

Journal homepage:

<https://ejournal.stikeskepanjen-pemkabmalang.ac.id/index.php/mesencephalon>

The Effect of Infrared (IR) and Mirror Exercise on Increasing Muscle Strength and Functional Ability in Bell's Palsy Cases

Nurul Wasilah, Nurul Halimah, Rachma Putri Kasimbara, Sartoyo

Program Studi S1 Fisioterapi Alih Jenjang. Fakultas Ilmu Kesehatan
ITSK RS Dr. Soepraoen Kesda V/Brawijaya

E-mail: E-mail: nurulwashilah28@gmail.com¹, nurul.halimah@itsk-soepraoen.ac.id²,
rachmakasimbara@itsk-soepraoen.ac.id³, sartoyo@itsk-soepraoen.ac.id⁴

ARTICLE INFO**Keywords:**

Infra Red (IR), Mirror Exercise, Bell's Palsy, Muscle Strength, Functional Ability.

Correspondence:

E-mail:
nurulwashilah28@gmail.com

ABSTRACT

Bell's Palsy is an acute, ipsilateral facial nerve (VII) paralysis. Bell's palsy is also caused by swelling and pressure on the nerve in the stylomastoid foramen which causes damage to the facial nerve. Problems that sufferers often experience after realizing facial muscle weakness from a physiotherapy perspective include facial asymmetry, a feeling of stiffness and thickness on the affected side of the face and decreased facial muscles. force on the affected side has the potential for spasm and tissue adhesions, as well as potential irritation to the affected side of the eye. The population of this study consisted of 30 respondents. Special examination for Bell's palsy sufferers using the Ugo Fisch scale and a treatment program using infrared (IR) and mirror exercise methods. This action aims to increase facial muscle strength, reduce muscle spasm, increase functional activity of facial muscles, and increase functional activity. The sample for this research consisted of 20 respondents. From the results of the hypothesis test, a p-value of 0.000 ($\alpha < 0.05$) is obtained as a critical limit, which means that H_0 is rejected and H_a is accepted. So, the results of this therapy show a significant increase in facial muscle strength and functional ability between before and after therapy. Based on these results, the intervention given in the form of infrared (IR) and mirror exercise was effective in increasing muscle strength and functional ability as well as improving the participants' nerves.

INTRODUCTION

The role of physiotherapy in cases of Bell's palsy is to reduce muscle spasms, help increase facial muscle strength and improve the patient's functional ability (Kurniawan, 2017). The prevalence of Bell's Palsy in the world is quite high. Based on research data from El - Tallawy et al (2016), the incidence of bell's palsy in the city of Al - Quseir Egypt is 98.9/100,000 in residents aged 9 years and over. In 2011 to 2015, according to UK hospital statistics from the Health and Social Care Information Centre, hospital diagnoses of Bell's Palsy cases increased between 2011 and 2015 in the UK. The number of Bell's palsy cases in 2011 - 2012 was 13,114, increased in 2012 - 2013 to 13,151 and in 2013 - 2014 was 14,001, then decreased in 2014 - 2015 to 13,463 (Cooper et al, 2017).

In 2014 to 2016, the incidence of Bell's palsy in India was 253 cases of Bell's palsy patients at RA Hospital & Research Center, Warisaliganj (Nawada), India (Shankar et al, 2017). Bell's Palsy can also occur in children. In 2013 to 2015, there were six Bell's palsy patients under one year old who were examined at the Otorhinolaryngology Outpatient Department at East India Hospital (Swain et al, 2017).

Meanwhile in Indonesia, data on the prevalence of Bell's palsy cases is difficult to know. This is because data on the prevalence of bell's palsy cases in Indonesia has not been included in the Indonesian Health Profile and Basic Health Research of the Ministry of Health of the Republic of Indonesia, and the number of studies regarding the prevalence of bell's palsy in Indonesia is still small. Data collected from four hospitals in Indonesia shows that the frequency of Bell's Palsy is 19.55% of all neuropathy cases and is highest at the age of 21 – 30 years. More common in women than men. There is no difference in incidence between hot and cold climates, but some sufferers have a history of excessive exposure to cold air or wind (Hanako, 2010).

Bell's Palsy is a peripheral type of Nerve VII (Facial Nerve) paralysis that occurs acutely without any other neurological abnormalities and the cause is unknown (Abidin et al, 2017). Bell's palsy is caused by swelling and pressure on the nerves in the foramen and stylomastoid causing nerve obstruction/damage (Olivia Maharani, Adam, 2019). Bell's palsy is an acute paralysis of the peripheral facial nerve of unknown cause. Sir Charles Bell (1821) was the first to examine several sufferers with asymmetrical faces, since then all peripheral facial nerve paralysis without a known cause is called Bell's Palsy (Abidin et al, 2017).

Problems that sufferers often experience after realizing facial muscle weakness, from a physiotherapy perspective include disorders that often occur in Bell's palsy, namely facial asymmetry, a feeling of stiffness and thickness on the affected side of the face, decreased facial muscles. force on the affected side, potential for spasm and tissue adhesions as well as potential irritation on the affected side of the eye. Functional Limitation is a functional disorder involving facial muscles, such as closing the eyes (eyes not closed tightly on the side of the lesion), gargling, chewing, eating (food collects on the side of the lesion) and drinking, speech disorders. and depression. As well as restrictions on participation in the form of lack of self-confidence. Infrared (IR) has radiation with wavelengths longer than the red end of the visible spectrum, extending into the microwave region, from 7070 nm to around 12500 nm (Cifu, 2020).

Infrared (IR) is very beneficial because it increases circulation thereby reducing edema pressure. Application of infrared (IR) produces local vasodilation in the irradiated area and because the patient gets better circulation can disperse inflammatory exudates. Infrared (IR) can penetrate up to 5 cm beyond soft tissue and bone and can theoretically reach the facial canal when applied transcutaneously. Infrared (IR) is also safe to apply transcranially. The application of infrared (IR) rays with a level of 250 mW/cm² is not dangerous. This produces negligible heat and no physical damage (Ng & Chu, 2014).

Mirror Exercise is a therapeutic intervention that focuses on moving the undamaged limb. It is a form of mirror image that is used to convey visual stimuli to the brain through observation when an individual carries out a series of movements (Abidin et al., 2017). The physiotherapy measures given for Bell's Palsy in this study were infrared (IR) and mirror exercise. This action aims to increase facial muscle strength, reduce muscle spasm, increase functional activity of facial muscles, and increase functional activity.

METHODS

This research is an experimental study with a one group pretest - posttest method carried out by home visits from September to October 2023. The population of this study consisted of 30 respondents with cases of Bell's palsy. Using a sampling technique in the form of purposive sampling, 20 respondents were obtained, namely 5 men and 15 women. The inclusion criteria taken included respondents who had Bell's palsy within 1 month, then men and women aged 6 years to 50 years and over, and had limited muscle

strength and functional ability. The exclusion criteria included patients with a history of acute injury and balance disorders.

Providing physiotherapy intervention with infrared (IR) modality can increase metabolic processes, dilate blood vessels and repair muscle tissue. Infrared (IR) irradiation is attempted perpendicular to the treatment area at a distance of 30 – 60 cm. Irradiation time is adjusted from 10 minutes according to medical conditions. Meanwhile, providing intervention with the mirror exercise modality is a form of image with a mirror which is used to convey visual stimulation to the brain through observation when the individual carries out a series of movements. For various mirror exercise movements as follows: 1) Eyebrow raising movement, dose 8 – 12 repetitions and practice 2 times a week, 2) Eye opening and closing movement, dose 8 – 12 repetitions and practice 2 times a week, 3) Frowning movement, dose 8 – 12 repetitions and practice 2 times a week, 4) Smiling movements on the lips, the dose is 8 – 12 repetitions and practice 2 times a week, 5) Smiling movements on the lips, the dose is 8 – 12 repetitions and practice 2 times a week.

The measuring tool for this research uses the Ugo Fisch Scale which is used to evaluate the improvement in facial functional abilities of Bell's palsy. Data management was carried out using the SPSS 26.00 program with data analysis using the Wilcoxon test. This research has gone through the research ethics committee issued by IIK STRADA with number 3958/KEPK/X/2023.

RESULTS AND DISCUSSION

Respondents in this study were 20 home visit patients with Bell's Palsy between September and October 2023. Respondent characteristics include age and gender. Following are the differences before and after treatment.

Table 1. Age and Gender Characteristics

Characteristics	Frequency	Percentage
Gender		
Man	5	25%
Woman	15	75%
Total	20	100%
Age		
6 – 25		5%
26 – 30		2%
31 – 40		91%
>40		2%
Total		100%

Table 2. Distribution of Increased Muscle Strength and Functional Ability in Bell's Palsy Patients Using Infra Red (IR) Modalities and Mirror Exercise (Wilcoxon Test Results)

	N	Median (minimum-maximum)	Mean \pm SD	P Value
Pretest	20	3,00 (1-4)	2.70 \pm 0,979	0,000
Posttest	20	5,00 (4-5)	4.75 \pm 0,444	

DISCUSSION

From the general data above, around 75% of the respondent population are women, while around 25% are men. Age also has a large influence on the prevalence of Bell's palsy, which is illustrated by the average age of respondents being 6 years and the highest age being 69 years. The global prevalence caused by Bell's palsy reaches 7.6% of all cases of neuromuscular disorders. (Dewi, 2018)

Infrared (IR) light is light that is invisible when seen with a spectroscope, so infrared (IR) radiation will appear in the electromagnetic spectrum with a redlight wavelength. The physiological effects that occur on the body after infrared (IR) irradiation are: increasing body temperature, activating the work of sweat glands, influencing sensory nerves, increasing metabolic processes, relaxing muscle tissue, causing vasodilation of blood vessels (Red, 2017).

From the results above, it can be concluded that the physiological effect of infrared (IR) if it is absorbed into the skin, the skin area being treated produces a biological effect in healing. These physiological effects are activating superficial heat receptors on the skin to change the transmission or conduction of sensory nerves in delivering pain so that it has the effect of reducing pain, the effect of heat also causes widening of blood vessels (vasodilation) and increases blood flow so that oxygen in the area is sufficient, apart from that the effect of providing infrared (IR) provides a feeling of comfort and relaxation so that it can reduce pain in the muscles. experiencing tension (Ansari et al., 2014).

Mirror exercise is a therapeutic intervention that focuses on moving undamaged or injured body parts using a mirror, which aims to provide sensory feedback to encourage learning in the patient's healing process. Mirrors are used to convey visual stimuli to the brain through observing unaffected parts of the body while the individual performs a series of movements (Munawwarah et al, 2021). It can be concluded that the healing mirror exercise uses facial exercises on the side of the lesion (abnormal on the body) in front of the mirror and can prevent muscle atrophy so that it can improve muscle function and speed up the healing process for patients with Bell's palsy and in mirror exercise the role of physiotherapy in cases Bell's palsy is moving the facial muscles with mirror feedback which is used to convey visual stimulation to the brain by observing the part of the body that is experiencing weakness so that the individual is affected and carries out a series of movements (Astuti & Rahman, 2021).

The results showed that infrared (IR) and mirror exercise have significant and effective results. The aim of providing this intervention is based on the results of the research observations above which examined the effect of giving infrared (IR) and mirror exercise on increasing muscle strength and functional ability in cases of Bell's palsy, namely to restore and maintain facial muscle strength, as well as restore facial function which is disturbed by weakness in the face. facial muscles.

Researchers also identified that infrared (IR) and mirror exercise have the effect of reducing pressure on the facial nerve, thereby reducing swelling, providing a muscle relaxation effect and maintaining muscle tone. Thus, giving infrared (IR) and mirror exercises to Bell's palsy patients is considered to have a positive effect on improving muscle strength and functional ability of facial muscles as measured using the Ugo Fisch scale.

CONCLUSIONS AND RECOMMENDATIONS

In research with 20 respondents (100%), it can be concluded that infrared light (IR) and mirror exercise consistently provide an increase in facial muscle strength and functional ability in Bell's palsy

sufferers, based on evaluation results using the UGO Fisch scale parameters where there are variations in improvement.

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