

Practical Analysis Diagnosis And Treatment Of Nervous Diseases

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ABSTRACT

The nervous system is a network in the body that has various important functions for the body, while several body functions are controlled by the nervous system, including brain growth and development, sensation or perception, emotions, breathing and heart rate. The human nervous system is divided into two major parts, namely, the central nervous system and the peripheral nervous system. Many neurological diseases can become progressive, impairing respiratory function. Disorders due to neurological disease can affect the respiratory center, inspiratory / expiratory muscles, and upper respiratory tract muscles. Although neurological diseases have many causes and different clinical courses, in most cases respiratory complications are a major cause of morbidity and mortality. Often the first symptoms, respiratory disorders only in the form of sleep disturbances, and nocturnal desaturation. Examination of respiratory function by spirometry showed a restrictive picture with a fairly good total lung capacity. Management with a combination of assisted inspiration and expiration, accompanied by management of oral secretions, breathing exercises, and medical therapy. Good management can prolong survival, improve quality of life, improve cognitive function, reduce the incidence of pneumonia and hospitalization. The presence of an expert reveals information in the form of uncertain statements such as possible, most likely and almost certainly, to help and facilitate the public in diagnosing neurological diseases. Expert systems can help for disease diagnosis, where this system is to reconstruct the expertise and reasoning abilities of an expert.

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1. Introduction

The central nervous system (CNS) is the body's system that receives and processes all information from all parts of the body. It consists of the brain, spinal cord and neurons. It can be said to be the most important system for the body. Nerves are tubular tissue and are useful for transmitting signals from the brain to the body and vice versa. The structure of the nervous system is divided anatomically which consists of the central nervous system (brain and spinal cord) and peripheral nerves (cranial and spinal nerves) and physiologically, the autonomic nerves and somatic nerves. which is the center of integration and control of all body activities. The Peripheral Nervous System is the cranial nerves and spinal nerves which are the lines of communication between the central nervous system and the body. In addition, nerves are tubular tissue and are useful for transmitting signals from the brain to the body and vice versa. The nervous system also plays a role in every activity carried out by humans, for example, the process of breathing, pumping the heart rate, and storing memories. The influence on the nervous system that is often not realized by most humans is a change in environmental conditions that stimulate it (Budiman & Rismawan, 2016).

Most ordinary people pay very little attention to health, especially neurological health, even though neurological diseases can attack anyone regardless of age, there are even neurological diseases that are brought from birth or are often called congenital diseases. Most people lack knowledge about the symptoms of central nervous disease, resulting in delayed treatment of

patients. In addition, people are reluctant to have their nervous health checked because the fees are quite expensive and specialists are still rare, especially in some rural areas. In the end they know that the illness has reached a serious illness or climax.

Indeed, neurological disease is a disease that attacks the nervous system in humans, this disease consists of various kinds of diseases that have similar symptoms between one disease and another. For example, such as Bell Palsy and Stroke, the two diseases have almost similar symptoms, therefore sufferers often feel confused about the initial symptoms that arise and it is difficult to distinguish the symptoms they are experiencing. The lack of knowledge tends to make the sufferer feel panicked, afraid and unable to calm down, and does not know what efforts should be made to take early treatment if he has a nervous breakdown (Dewanto, 2009).

Nervous diseases also often interfere with the body's nervous system, including the brain and bone marrow (central nervous system), as well as the nerves that connect the central nervous system to the body's organs (peripheral nervous system). Disruption of the nervous system can cause changes in some body functions, such as difficulty moving, breathing, speaking, memory problems, and impaired function of internal organs, such as the heart and lungs. Disorders or disorders of the nervous system in humans can have very critical effects. Disruption of the nervous system in the human body, is fatal to health. If it is so, humans will not be able to carry out their normal life routines. Usually, the initial symptoms of a neurological disease attacking the human nerves are characterized by certain symptoms that appear on a recurring scale.

One of the problems in the medical world that is often encountered is the imbalance between patients and doctors. In addition, most people are not trained in medicine or the world of medicine so that if they experience symptoms of the disease they are suffering from, they may not necessarily be able to understand the ways to overcome them or the solution. It is very unfortunate if the symptoms that can actually be treated early become more serious diseases because they are late in handling. The alternative that can be done to get better diagnostic results in the treatment of neurological diseases is through laboratory tests, but this method is relatively expensive and takes a long time to find out the results, besides that not all regions in Indonesia have diagnostic laboratories with adequate facilities. Therefore, in order to reduce misdiagnosis and to make it easier for the community or sufferers to know early on the disease they are suffering from so that it is not too late to get treatment because a doctor or expert has limited time, a system is built that can help solve the problem in the form of an expert system for neurological diseases. (Felix & Santoso, 2022).

An expert system is a software package or computer program package intended as a provider of advice and aids in solving problems in certain areas of specialization such as science, engineering, mathematics, medicine, education and so on. The application of an expert system for early diagnosis of neurological diseases that was built can be applied to support problem solving activities, namely helping doctors in reducing the number of people with neurological diseases in Indonesia in general. So based on the description of the background explanation above, the researcher is interested in researching and describing practical analysis of the diagnosis and management of neurological diseases.

There are several previous studies which the researcher then used as reference material in the process of making this research. Adi Sucipto conducted research on expert systems for diagnosing neurological diseases in 2018 which discussed the development of an expert system for diagnosing neurological diseases. The method used is forward chaining, with 15 symptoms studied, namely, Encephalitis, Meningitis, Stroke, Migraine, Trigeminal Neuralgia, Temporal Arteritis, Vertigo, Tuberculosis Spondylitis, Cluster Headache and Post-Trouma Headache. Of the total 13 disease data, three of them are more or less similar to the disease data in the current research being conducted by researchers, namely Stroke, Migraine, and Vertigo. While the weakness in this previous study was only in the form of a design and had not yet reached the implementation stage, so it cannot be concluded whether the design concepts contained in the study were appropriate and really feasible to use (Leleury et al., 2016).

Further research was carried out by Novhirtamely Kahar in 2017 regarding an expert system for diagnosing central nervous system diseases in android-based humans using the forward chaining method. There were five types of neurological diseases studied, namely, Stroke, Migraine, Parkinson's, Epilepsy, Meningitis, Bell's palsy, Hydrocephalus, Foliomyeletis, Alzheimer's, and ALS (Amythropic Lateral Sclerossis). Of the nine types of disease, four of them have similarities with the disease data studied in the current study, namely Stroke, Migraine, Epilepsy, Bell's Palsy. The

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weakness in this previous research is that there is no page that can display the results of the disease diagnosis process carried out so that the system has not been able to display information about detailed disease explanations or recommendations for disease handling efforts from the diagnosis process that has been carried out.

The latest research was carried out by Felix, Leo Willyanto Santoso in 2019, who also examined the expert system for diagnosing central nervous diseases using the forward chaining method. There are ten types of diseases studied, namely, Epilepsy, Meningitis, Bell's Palsy, Parkinson's, Hydrocephalus, Poliomyelitis, Alzheimer's, Stroke, ALS (Amythropic Lateral Sclerossis), Migraine and there are 64 symptoms. Three out of ten diseases have similarities with the disease data being studied, namely, Epilepsy, Bell's Palsy, Stroke and Migraine. The weakness of this study lies in the process of inputting symptoms that exist just before making a diagnosis of the disease. When inputting symptoms, all existing symptoms are displayed and not divided into several groupings of symptoms so that this can be said to be less efficient, because all the existing symptoms are 64 symptoms (Lembangan et al., 2021).

Nervous disease can be experienced by anyone without exception, in many cases it is often experienced by someone who is elderly, but it is possible if neurological disease attacks adolescents and children, therefore treatment efforts are needed so that the disease does not get worse. and can be handled as soon as possible. However, the similarity of symptoms of neurological diseases often makes a sufferer feel confused about the type of disease he is experiencing. So from these problems, to avoid confusion about the symptoms and types of disease experienced by a patient in order to make early efforts in handling neurological diseases, which is then followed by medical treatment, an expert system is needed that is able to take a history of neurological diseases based on the physical symptoms felt. by the patient.

2. Method

The research method applied in this research is the development of the waterfall method. The waterfall method is a systematic and sequential information system development model. The Problem and Needs Analysis stage is the beginning of system design. At this stage the actual problem point will be determined and what elements are needed for problem solving to create an expert system that can diagnose ischemic nerve disorders accurately. The System Design stage is this stage which is divided into several indicators or elements, namely knowing the problems experienced at the time of diagnosis of the neurological disease process as well as at the same time providing the right solution to solve the problems that are often complained of by people with neurological diseases in general. Therefore, it is necessary to test an appropriate method for diagnosing neurological diseases correctly. The data needed include the types of neurological diseases along with their symptoms and solutions in dealing with neurological diseases (Djiu et al, 2019).

3. Results and Discussion

3.1 Respiratory Disorders in Nervous Disease

TABLE 1
NERVOUS DISEASE DATA, EXPLANATIONS AND HANDLING EFFORTS

Disease Code	Disease Name	Explanation	Handling Effort
PO1	Stroke	Stroke is a disorder in the blood vessels due to the blood supply to the brain being cut off due to blockage or rupture of blood vessels resulting in cell death in some areas of the brain.	Stroke occurs due to several factors, including hypertension, age, diabetes, cholesterol, smoking, heart disease, use of hormonal family planning programs such as injections, implants and pills. To carry out treatment efforts is to reduce controllable risk factors such as quitting smoking, treating diabetes, diligently exercising, reducing weight and maintaining blood pressure to avoid cholesterol, changing family planning programs in a safer way.
PO2	Epilepsi	Seizures or nerve disturbances in the brain without any provocation due to precipitating factors such	Epilepsy occurs due to several factors, including heredity, trouma factors in the head and precipitating factors such as fatigue, lack of sleep, psychological stress, alcohol consumption. To

		as drinking, high sugar levels and excessive activity resulting in various reactions such as momentary stupor, nausea, tingling, and repeated seizures.	carry out treatment efforts, it can only be done on head trauma factors and precipitating factors. Meanwhile, heredity cannot be prevented. The head trauma factor can be prevented by being careful when carrying out activities so as not to fall. and precipitating factors can be prevented by avoiding alcohol consumption, doing activities that are not stressful, getting enough rest, not staying up late at night
PO3	Headache	Feelings of pain or pain that cause discomfort and attack the skull area starting from the forehead towards the top, back of the head and facial area. Headaches are generally grouped based on the cause, namely headaches of unknown cause and headaches whose causes are influenced by other diseases	Efforts to handle it are increasing exercise, adequate rest, healthy lifestyle, avoiding thinking too much that causes stress, reducing trigger factors such as eating cheese and chocolate for patients who are very sensitive to these foods, reducing consumption of foods/drinks that contain caffeine because it can also cause stressed.
PO4	Vertigo BPVP (Benign Paroxysmal Positional Vertigo)	Dizziness is a very specific feeling so that people who suffer from vertigo feel the surrounding environment such as moving and spinning which is triggered by sudden changes in head position and causes abnormalities in the ears.	So far, bppv vertigo cannot be prevented, but early efforts are being made to prevent bppv vertigo from getting worse, try taking herbal medicines, if you feel dizzy and the environment seems to be moving and spinning, try to do balance exercises such as sitting, standing exercise, walking exercise be careful and immediately do a quick treatment by consulting a neurologist at the nearest hospital
PO5	Back Pain HMP (Hernia Nucleosus Purposus)	Is back pain due to being felt in the lower back area, which can be felt between the angles of the lower ribs and the folds of the lower buttocks, namely in the lumbar or lumbosacral area which is often accompanied by radiating pain to the legs and feet.	Handling efforts do not fall, do not lift a load that is too heavy, because if that happens it will worsen the situation and condition of the lower back so that the disease will get worse.

Some neurological diseases, such as Parkinson's disease, stroke, and multiple sclerosis can cause pulmonary complications. Pulmonary disorders usually appear in the late stages of neuromuscular disease, whereas respiratory disorders may appear at the onset of some neurological diseases; sleep disturbances, and nocturnal desaturation. Shortness of breath during physical activity (exertional dyspnea) which is the initial symptom in most respiratory disorders is often not found in neurological diseases, because neurological disorders inhibit patient mobility. Although quite a number of neurological diseases cause respiratory disorders, the management principle is the same (Marcos & Kusumastuti, 2016).

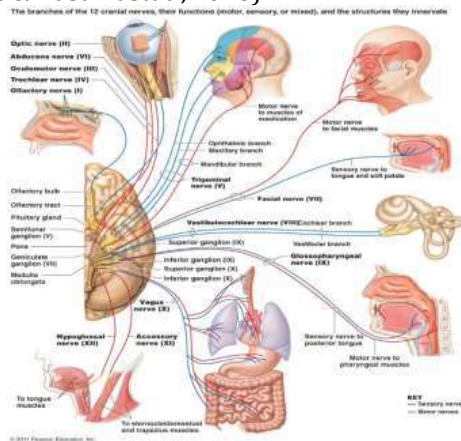


Figure 1. The nervous system in humans

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TABLE 2
DATA ON SYMPTOMS OF HUMAN NERVOUS DISEASE

No	Symptom Code	Symptom
1	G01	Seizures
2	G02	Daydream
3	G03	Fall for no reason
4	G04	Eyelids blinking unnaturally
5	G05	Headache
6	G06	Throw up
7	G07	Blurred Vision
8	G08	Back pain
9	G09	Respiratory disorders
10	G10	Diarrhea

TABLE 3
HUMAN NEUROLOGICAL DISEASE DATA

No	Disease Code	Disease Name
1	P01	Epilepsy
2	P02	Meningitis
3	P03	Bells Palsy
4	P04	Parkinson
5	P05	Hidrocefalus
6	P06	Poliomielitis
7	P07	Alzheimer
8	P09	Stroke
9	P09	ALS
10	P10	Migrain

3.2 The Role of the Nervous System in Breathing Control

Breathing has a regular rhythm, the rhythm of breathing is produced from the respiratory center located in the pons and medulla oblongata (pneumotaxic center). Most nerve cell nuclei located in the medulla oblongata have axons that travel to the spinal cord, synapsing with interneurons or motor neurons located in the cervical, thoracic and lumbar regions. Spinal nerve cell nuclei that receive input from the medulla oblongata form peripheral nerves, exit the spinal cord, innervate the inspiratory and expiratory muscles (Indra, 2016).

Inspiratory muscle contraction will cause negative pressure, causing the flow of air from outside into the lungs. Depth and frequency of breathing is very important because these components of breathing will help maintain homeostasis of oxygen, carbon dioxide and H⁺ ions in arterial blood. Receptors that play a role in detecting changes in lung volume, arterial oxygen levels, carbon dioxide, H⁺ ions will provide feedback to the respiratory center in the medulla oblongata, which in turn will affect the frequency and depth of breathing (Pratama, 2018).

Temperature and pain also affect breathing through a different center, the reticular formation, which provides feedback to the respiratory center in the medulla oblongata. The degree of consciousness (conscious or asleep) and emotions, also affect breathing. In addition, breathing is also under voluntary control of the cerebral cortex, for example when speaking or holding your breath. The voluntary airway does not pass through the respiratory control center in the medulla oblongata with periods of apnea. This breathing pattern is often found in stroke patients, but does not have a specific anatomical correlation k.2. One study reported that CPB occurred in approximately 53% of stroke patients. In addition to causing impaired central respiratory control, acute hemiplegia in stroke is associated with the risk of death from lung infection.

The possibility of pulmonary infection is high in aspiration and hypoventilation patients. Contraction of the diaphragmatic muscle on the side that is paralyzed by a stroke is reduced in voluntary breathing, but has no effect on involuntary breathing. Pulmonary embolism has also been reported to occur in 9% of stroke cases. Central neurogenic hyperventilation, first described by Plum and Swanson in 1959, is hyperpnea that occurs during wakefulness and sleep due to disturbances in the pons. Cluster breathing is hyperventilation alternating with rapid apnea caused by disturbances in the mesencephalon. Ataxic breathing is breathing that has an irregular rhythm and amplitude due to disturbances in the medulla oblongata. Disorders of the lower medulla oblongata make breathing unaffected by chemical responses, but voluntary control is intact (Ondine's curse). If not treated with ventilator support at night, it can cause sudden death.

TABLE 4

CLINICAL COURSE AND RESPIRATORY DISORDERS IN SEVERAL NEUROLOGICAL DISEASES		
Neurological diseases and their locations	Clinical Journey	Prevalence of respiratory disorders and prognosis
Central nervous system Sklerosis multipel	Repeat	Impaired lung function 63%, respiratory failure or infection fatal 5%
Penyakit Parkinson	Progresif lambat	Pneumonia causes 20% of deaths, probably due to upper airway muscle weakness and coughing the weak
Medula Spinalis Trauma	Permanent	High lesions (C1-C3) usually require ventilation long term mechanic
Motor Neuron Sindrom Postpolio	Progress is very slow	Respiratory disorders only in those who have respiratory muscle paralysis during initial infection
Amyotrophic Lateral Sclerosis Saraf Motorik	Progresif	Almost all deaths are due to complications respiration
Sindrom Guillain-Barre	Slow reversible	respiratory failure 28%
Neuromuscular Junction Miastenia Gravis	Reversibel	Aspiration pneumonia causes myasthenic crisis with 6% mortality
Botulisme	Slow reversible	8% mortality due to respiratory failure; respiratory disorders can exceed 1 year if survive
Otot Duchene muscular dystrophy	Progresif	Cause of death is respiratory failure
Polimiositis/ dermatomiositis	Variabel	Normal lung test, diaphragm dysfunction

3.3 Management

Rest is absolutely necessary, if the infection is severe enough to require treatment in the isolation room. Respiratory function should be strictly controlled, endotracheal tube or tracheostomy is required if respiratory distress occurs. Fluid and electrolyte balance requires special handling. Other complications that need to be monitored are the presence of seizures, hyperpyrexia, brain edema, and malnutrition. Antibiotics must be given appropriately and quickly according to the bacteria causing it. Initial empirical antibiotics (empirical antimicrobial) can be given without waiting for the results of cerebrospinal fluid culture. After the culture results prove the presence of specific microorganisms, then specific antibiotic therapy (specific antimicrobial) is given. Ventilatory support and monitoring of inspiratory function usually consist of positive pressure ventilation through a nasal mask or face mask. This method can prolong survival, improve quality of life, improve cognitive function, reduce the incidence of pneumonia and hospitalization (Puspaningrum et al., 2016).

3.4 Indications for the use of positive pressure ventilation in patients with neurological diseases

Forced vital capacity <50% of predictive value of nocturnal desaturation 88% for 5 minutes (during patient sleep). Maximal inspiratory pressure < 60 cm H₂O Awake partial pressure CO₂ (arterial) 45mmHg in usual inspired oxygen fraction contraindicated, upper airway obstruction, Assisted peak cough flows < 2.7 L/sec with failure to clear secretions. There is no suitable mask and cannot tolerate intervention in rapidly progressive and potentially reversible disease, for example in myasthenia gravis and Guillain-Barre syndrome, early detection of respiratory muscle weakness and respiratory failure requires close monitoring of vital capacity and maximal static inspiratory pressure (Simanjuntak & Ruindungan, 2020).

Observations should be made in the intensive care unit (ICU), if the vital capacity is less than 10-15 mL/kg intubation is recommended. Maximum inspiratory pressure when 30 cm H₂O is sufficient for spontaneous breathing, but if the value is 20 cm H₂O indicates the body is unable to maintain a normal partial pressure of CO₂ (PaCO₂). Pulmonary function tests should be performed every 2 hours for patients with myasthenia gravis, and every 4-6 hours for patients with Guillain-Barre syndrome. Invasive ventilation should be considered in patients who fail, or cannot tolerate,

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or have contraindications to non-invasive methods. Permanent invasive ventilation with tracheostomy needs to consider the caregiver's attitude, diagnosis, and prognosis of the underlying disease. The use of a device to assist with the clearance of secretions in combination with an inspiratory device significantly reduces hospitalizations due to respiratory complications and prolongs survival. Expiratory assistance is in the form of a suction device, as well as manual or assisted cough techniques.

The human nervous system has a complex structure with many different and interrelated functions. The nervous system consists of two kinds, namely the central nervous system (consisting of all nerve cells, brain and spinal cord) and the peripheral nervous system (consisting of all neurons that connect the central nervous system with glands, muscles and sensory receptors). The peripheral nervous system is also divided into two, namely the somatic system and the autonomic system. The Central Nervous System (CNS) has a function to coordinate all activities of the human body. In coordinating all activities of the human body, the CNS is assisted by the peripheral nervous system which is the liaison of impulses from the central nervous system to the effector organ cells. Like other parts of the body, the nervous system can be attacked by diseases that affect its function (Sucipto et al., 2019).

a. Expiratory Function Assist

The use of a device to assist with the clearance of secretions in combination with an inspiratory device significantly reduces hospitalizations due to respiratory complications and prolongs survival. Expiratory assistance is in the form of a suction device, as well as manual or assisted cough techniques.

b. Oral Secretion Management

Additional problems for patients with bulbar symptoms are excessive saliva production, drooling saliva, and inability to excrete secretions. Drugs that can be used are anticholinergic groups such as benzotropine mesilate, amitriptyline, and transdermal scopolamine. Surgical intervention is sometimes required in slowly progressive neurological disease to reduce or divert saliva. N-acetylcysteine given by inhalation can thin thick mucus and is combined with bronchodilators to prevent bronchial spasm (Lesnussa et al., 2017).

c. Respiratory Muscle Exercises

Inspiratory muscle training will improve maximum inspiratory pressure and endurance of muscle work. Expiratory muscle training, for example with pectoralis muscle exercises will improve cough and expiratory muscle function, and reduce residual volume in patients with tetraparesis. In a study of patients with multiple sclerosis, expiratory muscle training with a resistive device improved expiratory muscle strength and coughing up to 3 months post-exercise (HIDAYATI, 2015).

d. Medical Therapy

Theophylline has a good effect on increasing the contractility of the diaphragm. In ALS patients, theophylline has the effect of increasing negative inspiratory pressure and vital capacity. In cervical spinal cord injury (animal studies), theophylline has a beneficial effect on phrenic nerve and diaphragmatic activation. However, because theophylline has a narrow therapeutic window, care must be taken to avoid toxic effects. To avoid worsening hypercapnia, oxygen supplementation may have to be limited to patients already on assisted ventilation, or to patients in whom the possibility of hypoventilation has been ruled out.

4. Conclusion

The nervous system functions to regulate every action the human body performs by sending signals to each other from other body parts. For example, nerves work to tell the heart to beat or tell the lungs to breathe without you knowing it. The nervous system itself consists of the brain, spinal cord, sensory organs, and all nerves that are interconnected with organs in the body. The central nervous system functions to receive information from all areas of the body. Then, the system will coordinate all the information to produce the body's response. Organs included in the central nervous system include the brain, spinal cord, and neurons. The central and peripheral nervous systems have an important role in respiratory control in humans, some neurological diseases can

become progressive so that they interfere with respiratory function, for example, symptoms of sleep disorders or orthopnea require further pulmonary function tests to detect respiratory disorders. Spirometry examination in neurological diseases shows a restrictive picture in the form of a decreased forced vital capacity with a fairly good total lung capacity until the disease reaches an advanced stage. Management can be in the form of noninvasive positive-pressure ventilation through nasal masks, suction devices, assisted cough, amitriptyline, inhaled N-acetylcysteine, inhaled bronchodilators, respiratory muscle exercises, and theophylline therapy in certain cases.

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