PHYSIOTHERAPY MANAGEMENT IN CASES OF BRACHIALGIA DUE TO CERVICAL SPONDYLOARTHROSIS

Eka Sihombing[1], Ian Wooton[2], Nur Mazdalifah[3], Sondang Sidabutar[4], Jumadiah Wardati[5]
Faculty of Health Sciences, Universitas Efarina[1,3,4,5]
University of Strathclyde, UK[2]

*Correspondence: eka_sihombing@rocketmail.com, nurmazda92@gmail.com, sondang_sidabutar73@yahoo.com, wardatijuma@gmail.com

Abstract

The purpose of this study was to carry out physiotherapy management in cases of brachialgia due to cervical spondyloarthrosis. This research is a study that examines physiotherapy, the examination process to determine the patient's problems begins with anamnesis, examination, and continues with determining a physiotherapy diagnosis. Anamnesis is divided into two, namely general anamnesis and special anamnesis. The results showed that cervical spondyloarthrosis is a condition of the degenerative process of the intervertebral discs and the connective tissue between the vertebrae. Degeneration causes the disc to begin to thin because its ability to absorb water decreases resulting in a decrease in water content and the matrix in the disc decreases. Spasms of the cervical muscles can also cause pain because ischemia of these muscles compresses the blood vessels so that blood flow will slow down and there is also a decrease in tissue mobility/tolerance to a stretch. All of the above factors will cause a decrease in the range of motion of the cervical joints. In this case brachialgia is caused by cervical spondyloarthrosis which affects C4, C5, C6 which causes excessive pain and tingling along the right arm, so OS requires reassurance in the form of TENS modality with the coplanar method, 2 channels, by-symm flow and using pain and sensory analgesia and US modalities and neck stretching exercises. With the hope that the pain in the shoulder and excessive tingling and tissue adhesions that OS feels are reduced.

Keywords: Physiotherapy, Brachialgia, Cervical Spondyloarthrosis

INTRODUCTION

Spondyloarthrosis is a condition in which degenerative changes occur in the intervertebral joint between the body and disc. Spondyloarthrosis is part of osteoarthritis which can also produce degenerative changes in synovial joints so that they can occur in the apophyseal joints of the spine. Clinically the two degenerative changes occur simultaneously. Cervical spondyloarthrosis is a condition of the degenerative process of the intervertebral discs and the joint connective tissue between the vertebrae. In this case physiotherapy treated a 48 year old female patient complaining of pain in the neck and left shoulder, where there are several possibilities that can cause this complaint, which can be caused by joint pathology, soft tissue and can also occur due to nerve compression. In this patient, the pain is felt to be getting worse when the patient moves his hand, this can be caused by foraminal compression. The patient also explained that he had a history of neck disease (Cervical Spondyloarthrosis).

The pain felt in this patient is described using the Visual Analogue Scale (VAS) with a scale of 7-8 which indicates that this patient belongs to the category of severe pain. And the type of pain in this patient is still included in radicular pain because the patient

complains of radiating pain which is well defined and limited to the dermatome. The radicular pain originates at the site of stimulation and radiates to the affected root innervation area, where this area corresponds to the dermatome area. The possibility of this patient's disease, based on the complaints felt by the patient, is a disturbance in the cervical nerves due to pain that radiates according to the dermatome.

This patient complained of pain in the neck and radiating to the shoulder, there may be abnormalities in the brachial plexus, these abnormalities can be caused by a narrowing of the foramen which causes compression or it can also be caused by a tumor pressing on the nerve. Lesions on the back vertebrae have a different impact. Depending on the level of which segment is affected. One example is brachialgia disorders due to clamping or pressure on the nerves that exit through the cervical spine. This disturbance will have an impact along the transmission of the affected nerve, in this case the affected part is the arm. Symptoms can be felt from the shoulder to the fingers. Brachialgia is a condition that can be caused by pathology of the joints, soft tissue or due to nerve compression. If it is caused by nerve compression, the pain will radiate according to the dermatome. If the affected C2 (between C1 and C2) will usually cause pain in the ear. At a more distal compression, namely at C5, the pain will radiate to the shoulder. At C6, the pain will radiate to the more posterior arm which can involve the little finger.

Physiotherapy is one of the health workers who play a role in the health sector. According to PERMENKES No. 65 of 2015, Physiotherapy is a form of health service aimed at individuals and/or groups to develop, maintain and restore body movement and function throughout the life span by using manual handling, increased movement, equipment (physical, electrotherapeutic and mechanical) function training and communication.

The role of Physiotherapy in this case is to provide modalities in the form of TENS, ULTRA SOUND, and Exercise Therapy (Neck Calliet Exercise) to reduce pain and maintain the patient's functional activity.

LITERATURE REVIEWS

definition

Spondyloarthrosis is a condition in which degenerative changes occur in the intervertebral joint between the body and disc. Spondyloarthrosis is part of osteoarthritis which can also produce degenerative changes in synovial joints so that they can occur in the apophyseal joints of the spine. Clinically the two degenerative changes occur simultaneously. Cervical spondyloarthrosis is a condition of the degenerative process of the intervertebral discs and the joint connective tissue between the vertebrae.

Anatomy and Physiology

a. Neck Anatomy

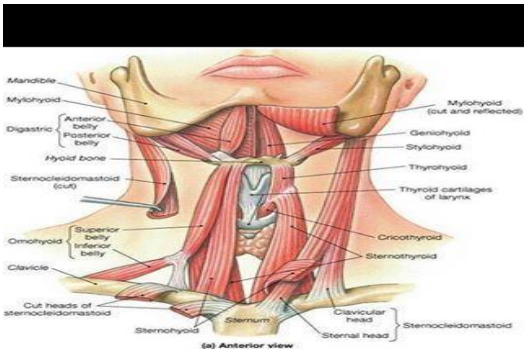

Figure 1. Neck Anatomy

The cervical vertebrae consist of seven vertebrae, have small vertebral bodies and large vertebral cavities. On the taju wing there is a hole where the passage of the nerve is called the foramen transvertalis. The first segment of the cervical vertebrae is called the atlas which allows the head to nod. The second segment is called the odontois process (axis) which allows the head to turn left and right. The seventh segment has a head called the processus promina section. Taju segment rather long. The cervical spine consists of 7 vertebrae and 8 cervical nerves. The main function of the neck is to connect the head to the body. Head stability depends on the 7 cervical vertebrae.

b. Joints on the neck

The relationship between the cervical vertebrae through a fairly complex arrangement of joints. Movement of the neck is possible due to the presence of various joints, the facet joints which are in the posterior play an important role.

1) Atlanto occipitalis (C0 – C1)

   It is an ovoid type of synovial joint formed inferior to the articular face of the concave atlas. The main movement of flexion-extension is known as the yes joint.

2) Atlanto axialis (C1 – C2)

   It is a synovial joint of the swivel type, formed by an arc atlas with dens where the main motion is right-left rotation, so it is known as a no joint.

3) Intervertebral joints (C2 – C7)

   Movement in all directions, with dominant movements such as extension, flexion and lateral

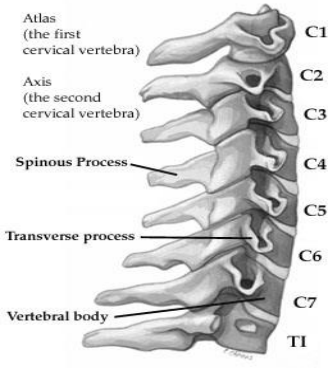

Figure 2. Cervical Vertebrae

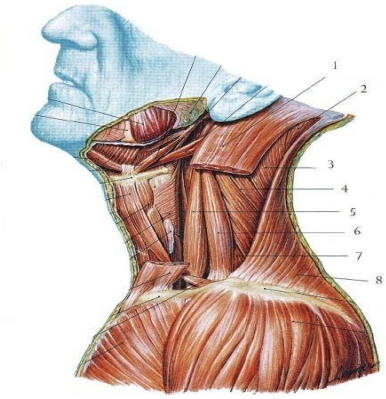

Figure 3. Lateral View Muscles

Caption :

1. m. Sternocleidomastoideus
2. m. Semispinalist
3. m. Splenius Capitis
4. m. Levator Scapulae
5. m. Scaleneus Anterior
6. m. Scaleneus Medius
7. m. Scaleneus Posterior
8. m. Trapezius

c. The muscles in the neck

The muscle spasms in brachialgia include muscle spasms of the Trapezius, Deltoid, Romboideus, and Upper Trapezius.

1) Trapezius muscle

Trapezius muscles are muscles that make up the structure of the human back. Named Trapezius because its shape is similar to a trapezoid shape; the corners are on the neck, two are on both shoulders, and one corner is attached to the T12 spine. A person can feel this muscle working by feeling the back with one hand and holding the muscle between the neck and shoulders.

2) Deltoid muscle

The deltoid muscle is a muscle that forms the round structure of the human shoulder. Named deltoid, because its shape resembles the Greek alphabet Delta (triangle). The origin of the deltoid muscle is composed of three muscle fibers originating from the anterior (clavicular) fibers, media fibers (from the lateral edge and upper surface of the acromion of the scapula), and posterior fibers (from the lower lip of the posterior border of the spine of the scapula).

3) The rhomboid major muscle

The rhomboid major muscle is one of the muscles that make up the upper arm. This muscle originates on the spinous processes of the 2nd to 5th thoracic spine and the

corresponding supraspinatus ligaments. Inserts on the medial edge of the scapula in front of the infraspinata fossa (part of the scapula).

4) Upper trapezius muscle

The trapezius muscles are the muscles that make up the structure of the human back. Named trapezius, because its shape is similar to a trapezium shape. The upper trapezius muscle is part of the trapezius muscle which is located at the very top. The fibers of the upper trapezius extend downward from the os. occipitalis to the seventh cervical vertebra and extends laterally to the acromion. This muscle often experiences tightness and stiffness because of its function as a stabilizer.

d. Arterial circulatory system in the neck

Blood circulation in the neck starts from the aortic arch and then branches in the brachiophalikus trunk to become the common carotid and subclavian then branches to become the subclavian artery then the subclavian branches to become the vertebral artery and axillary artery. From the vertebral artery, blood enters the vertebral artery.

e. Venous circulatory system in the neck

The venous circulatory system is divided into two parts:

1) Supervical vein

This vein is connected to the shoulder area, namely the chapalica vein that originates from the dorsal styloid process radii, runs on the edge of the forearm and after arriving at the upper arm runs outside the fascia brachii which is approximately right at the head of the brevis and long head of the bicep brachi muscle. After arriving at the pectoralis major muscle, it runs in the pectoral deltoid sulcus and then runs and empties into the axillary vein.

2) Providus vein

This providus vein is in the shoulder area following the arteries according to the existing arterial branches.

f. Nerves in the neck

Eight cervical nerves originate from the cervical segment of the spinal cord, 7 cervical nerves exit the spinal cord above the vertebra in question, but the 8th cervical nerve exits the spinal cord below VC7 and above VTh1 as well as the first rib. These nerves provide sensory nerve services to the upper trunk and superior extremities based on a dermatome pattern.

Pathophysiology

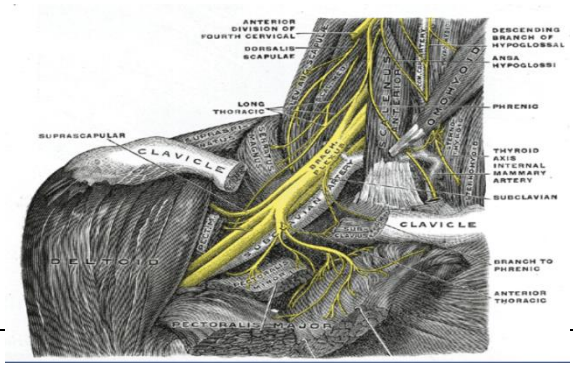

Figure 4. The muscles in the cervical and shoulder

When experiencing degeneration, the disc begins to thin because its ability to absorb water decreases resulting in a decrease in water content and the matrix in the disc decreases. Degeneration that occurs in the disc causes the function of the disc as a shock absorber to disappear, which then osteophytes will appear which causes pressure on the roots, spinal cord and ligaments which in turn causes pain and causes a decrease in tissue mobility/tolerance to a stretch received decreases so that further pressure will occur. received by the facet joints. Degeneration of the facet joints will be followed by the emergence of subchrondal thickening which then occurs osteophytes which can result in narrowing of the intervertebral foramen.

This will cause compression / pressure on the contents of the intervertebral foramen when the movement is extended, resulting in pain which will eventually cause a decrease in tissue mobility / tolerance to a received stretch decreases. In the uncinate joint, which is indeed a false joint that continues to experience constant friction and irritation, osteophytes will also appear which will then compress the spinal canal, causing pain and reducing tissue mobility/tolerance to a stretch. Reduced disc height will be followed by relaxation of the ligaments which results in reduced function and instability. As a result, the nucleus pulposus can move towards the posterior, thus pressing the posterior longitudinal ligament, causing pain and reducing tissue mobility/tolerance to a stretch.

etiologic

In the case of cervical spondyloarthrosis, there are changes in the intervertebral discs, formation of paravertebral osteophytes and facet joints and changes in the posterior arcus laminalis. Osteophytes that form often protrude into the intervertebral foramen and irritate or compress the nerve roots. Cervical extension can increase the intensity of pain. These changes are often seen between C5 and Th1, causing symptoms of stiffness in the lower cervical spine and not infrequently leading to compensatory hypermobility of the upper cervical spine.

Clinical Manifestations

Cervical spondyloarthrosis usually occurs in patients aged 40 years with degenerative features of the discs or joints. Symptoms occur in the neck and upper limbs, are unilateral or bilateral. Symptoms include stiffness in the neck and radiating to the shoulders in the area of the trapezius muscle. There is a feeling of stiffness and pain on movement. Signs and symptoms experienced:

1. Neck pain, the main symptom is usually pain in the back of the neck or the area around it (m. trapezius). The onset of pain occurs slowly although sometimes it appears suddenly. The pain itself is usually chronic and associated with strenuous activity or decreased general condition. Sometimes the pain radiates to the shoulder or upper arm and can also affect the upper cervical region causing occipital pain.

2. Neck stiffness (Stifness) begins in the morning and increases with activity. Neck movement is limited and sometimes accompanied by crepitus and pain.
3. Radicular symptoms depend on the nerve root affected by the spur or irritated by the synovitis of the facets themselves and are usually unilateral. Patients complain of paresthesia numbness and rarely pain. Paresthesia numbness itself depends on which part of the cervical vertebrae has spondylosis, and has different manifestations.
4. Paresthesia (tingling), in general, paresthesia is shown in the fingers. Here the localization is actually very important, because from the localization it can be concluded at what level the nerve structures are stimulated, at the pressure of the C6 root it causes a tingling feeling up to the thumb and forefinger.

METHODS

In providing services to patients, physiotherapy should always start by carrying out an assessment, starting with data assessment (anamnesis, physical examination, specific examinations, etc.) then proceed with the purpose of therapy, physiotherapy management and follow-up and evaluation.

Examination is an important step to find out everything about the patient's condition. From the examinations we carry out, we can establish a diagnosis and set goals as well as physiotherapeutic actions that will be carried out using the right modalities.

To obtain good and correct examination results in patients with Brachialgia et causa Cervical Spondyloarthrosis, the steps that must be carried out in the examination are reading and studying medical data which is the history of the patient's history, physical examination and additional examinations that support the diagnosis.

Data Review

In the assessment of physiotherapy, the examination process to determine the patient's problems begins with anamnesis, examination, and continues with determining a physiotherapy diagnosis. Anamnesis is divided into two, namely general anamnesis and special anamnesis.

1. Special Anamnesis

   Anamnesis is an act of examination that is carried out by holding questions and answers to the patient directly (autoanamnese) or by holding question and answer to the patient's family directly (heteroanamnese) regarding the condition or state of the patient's disease. By doing this anamnesis will be obtained important information for diagnosis.

2. System Anamnesis

Cerebrospinal system	: headache (+)
Cardiovascular system	: hypertension (+), heart disease (-)
Respiration system	: no complaints
Gastrointestinal system	: no complaints
musculoskeletal system	: neck and shoulder pain
Integumentary system	: no complaints

Urogenital system : no complaints

3. Examination of vital signs

Vital sign examination conducted on January 20 2020 obtained data in the form of:

Blood pressure : 130/90mmHg
Pulse : 80 x/minute
Respiration : 20 x/minute
Temperature : 36.2 0
Height : 157 cm
Weight : 50 kgs

RESULTS AND DISCUSSION

Physiotherapy administration method

Physiotherapists select interventions based on the complexity and severity of the problem. The physiotherapist selects, applies or modifies one or more interventional procedures based on the ultimate goals and expected outcomes that have been developed for the patient.

Table 1. Physiotherapy Modalities in Brachialgia Cases

NO	TYPE	METHOD	DOSE	INFORMATION
1	Modality TENS	Analgesia – painful Analgesia – sensory (Co-planar And Counter-planar)	I : Flowbi-symm Phase duration : 260 µs Frequency : 160 Hz Modulation Frequency : 65 Hz D : 15 minutes F : 6 x therapy (3 x a week)	For reduce shoulder pain and reduce flavor tingling onarm.
2	Modality US	Contact direct by means of gels	I : Current Transducer 1MHz *continuous* I : 1.70 w/cm2 D : 6 minutes F : 6 x therapy (3 x a week)	For reduce painful And release the adhesions shoulder tissue.
3	Exercise	***Neck Calliet****(Isometric contraction and stretching Upper*	I : 10 x reps (6 counts) D : 10 minute F : 2 x / day	Reducing muscle spasms, maintaining or increasing neck muscle strength, increase and

		Trapezius		guard LGS,

1. TENS modality

TENS is an electrical stimulation tool, meaning a device that converts electric currents into stimulation for therapy. TENS provides an electric current with an amplitude of up to 50mA with a frequency of 10-250Hz, widely used for pain reduction therapy.

OS position : Face down / Prone Lying Position
Therapist position : To the right of the OS
Governance : Check the tools, prepare the tools, clear the areathe shoulder to be treated. Set bi-symm current, Phase duration : 260 µs, Frequency : 160 Hz, Modulation Frequency : 65 Hz and treatment time : 15 minutes, attach to electrode 1 on posterior right shoulder and pad the other electrode on anterior right shoulder with co-method planar using a 1 channel electrode. Explain to the OS it feels like a needle prick but very smooth. Increase the intensity slowly starting from the smallest to the OS tolerance.

2. US modality

The shape of the ultrasound wave is longitudinal. Ultrasound therapy is a therapy using mechanical vibrations of sound waves with a frequency of more than 20,000 Hz, which is used in physiotherapy is 0.5 MHz-5 MHz with the aim of creating a therapeutic effect.

OS position : Sit relaxed on a bench
Therapist position : Sitting behind the OS
Governance : Check the tools, prepare the tools, clear the areathe shoulder to be treated. Select transducer 1MHz, continuous current, intensity 1.70 µs. Therapy explained to the os that the tool was not hot but a little warm. Put the gel on the transducer, attach the transducer to the right shoulder, move the transducer circularly.

3. Neck Calliet Exercise

OS position : Sit relaxed on a bench
Therapist position : Close to the OS
Governance :

a. OS head erect, eyes straight ahead. Movement of the head forward with a fixed chin height, the therapist's hands hold on the OS temples and fixation on the shoulders. Hold 6 seconds. Return to starting position. Repeat and do 10 times.
b. OS head erect, eyes straight ahead. Movement of the head backwards with a fixed chin height, the therapist holds with optimal resistance in the posterior part of the OS head with fixation on the shoulder hold 6 seconds. Return to starting position, repeat again and do 10 times.
c. OS head erect, eyes straight ahead. Movement of the head to the side with a fixed chin height, the therapist holds with optimal resistance in the lateral / parietal head of the OS with fixation on the shoulder, hold for 6 seconds. Return to starting position, repeat again and do 10 times.

d. OS head erect, eyes straight ahead. Movement of the head looking right and left with a fixed chin height, the therapist holds with optimal resistance to the OS chin with shoulder fixation for 6 seconds. Return to starting position, repeat again and do 10 times.
e. Flexi lateral movement, the same position as the previous exercise. Push/pull head towards right shoulder, hold 6 seconds, rest 6 seconds. Then push/pull your head towards your left shoulder, hold 6 seconds, rest 6 seconds. Repeat 10 times for each shoulder.
f. Rotational movement, the same position as the previous exercise. Rotate head to the right, hold 6 seconds, rest 6 seconds. Then rotate to the left, hold 6 seconds, rest 6 seconds, repeat 10 times for each shoulder.

4. Program For at Home

Programs given to patients to do at home. The program provided must be according to conditions, abilities, cases, and easy to implement. The program provided also includes proper body mechanics so that patients do not experience more severe injuries.

Proper body mechanics (PBM) or proper body mechanics, is the way how we position the body correctly when we are lying down, sitting or standing, and how we move the body properly when we work or do various activities of daily life , including lifting and carrying objects, pushing or pulling objects. PBM is closely related to the state of our back both in a state of not moving (static) and when moving (dynamic). Our back is related to other parts of the body, namely the head, neck, shoulders, chest, abdomen and pelvis. All these body parts form a posture. The beginning of implementing PBM is the awareness to maintain good posture when standing, sitting or lying down.

CLOSING

Cervical spondyloarthrosis is a condition of the degenerative process of the intervertebral discs and the joint connective tissue between the vertebrae. Degeneration causes the disc to begin to thin because its ability to absorb water decreases resulting in a decrease in water content and the matrix in the disc decreases. Degeneration that occurs in the disc causes the function of the disc as a shock absorber to disappear then osteophytes will appear which causes pressure on the roots, spinal cord and ligaments which in turn causes pain and causes decreased mobility.

Spasms of the cervical muscles can also cause pain because ischemia of these muscles compresses the blood vessels so that blood flow will slow down and there is also a decrease in tissue mobility/tolerance to a stretch. All of the above factors will cause a decrease in the range of motion of the cervical joints.

In this case brachialgia is caused by cervical spondyloarthrosis which affects C4, C5, C6 which causes excessive pain and tingling along the right arm, so OS requires reassurance in the form of TENS modality with the coplanar method, 2 channels, by-symm flow and using pain and sensory analgesia and US modalities and neck stretching

exercises. With the hope that the pain in the shoulder and excessive tingling and tissue adhesions that OS feels are reduced.

REFERENCES

Bustani, B., Khaddafi, M. ., & Nur Ilham, R. (2022). REGIONAL FINANCIAL MANAGEMENT SYSTEM OF REGENCY/CITY REGIONAL ORIGINAL INCOME IN ACEH PROVINCE PERIOD YEAR 2016-2020. *International Journal of Educational Review, Law And Social Sciences (IJERLAS)*, *2*(3), 459–468. https://doi.org/10.54443/ijerlas.v2i3.277.

Dunn, Robert. 2011. Brachialgia: Cervical radiculopathy and differential diagnosis.

Falahuddin, F., Fuadi, . F., Munandar, M., Juanda, R. ., & Nur Ilham, R. . (2022). INCREASING BUSINESS SUPPORTING CAPACITY IN MSMES BUSINESS GROUP TEMPE BUNGONG NANGGROE KERUPUK IN SYAMTALIRA ARON DISTRICT, UTARA ACEH REGENCY. *IRPITAGE JOURNAL*, *2*(2), 65–68. https://doi.org/10.54443/irpitage.v2i2.313.

Geovani, I. ., Nurkhotijah, S. ., Kurniawan, H. ., Milanie, F., & Nur Ilham, R. . (2021). JURIDICAL ANALYSIS OF VICTIMS OF THE ECONOMIC EXPLOITATION OF CHILDREN UNDER THE AGE TO REALIZE LEGAL PROTECTION FROM HUMAN RIGHTS ASPECTS: RESEARCH STUDY AT THE OFFICE OF SOCIAL AND COMMUNITY EMPOWERMENT IN BATAM CITY. *International Journal of Educational Review, Law And Social Sciences (IJERLAS)*, *1*(1), 45–52. https://doi.org/10.54443/ijerlas.v1i1.10.

Ilham, Rico Nur. *et all* (2019). Comparative of the Supply Chain and Block Chains to Increase the Country Revenues via Virtual Tax Transactions and Replacing Future of Money. International Journal of Suplly Management.Volume 8 No.5 August 2019.

Ilham, Rico Nur. *et all* (2019). Investigation of the Bitcoin Effects on the Country Revenues via Virtual Tax Transactions for Purchasing Management. International Journal of Suplly Management.Volume 8 No.6 December 2019.

Lasta Irawan, A. ., Briggs, D. ., Muhammad Azami, T. ., & Nurfaliza, N. (2021). THE EFFECT OF POSITION PROMOTION ON EMPLOYEE SATISFACTION WITH COMPENSATION AS INTERVENING VARIABLES: (Case Study on Harvesting Employees of PT. Karya Hevea Indonesia). International Journal of Social Science, Educational, Economics, Agriculture Research, and Technology (IJSET), 1(1), 11–20. https://doi.org/10.54443/ijset.v1i1.2.

Likdanawati, likdanawati, Yanita, Y., Hamdiah, H., Nur Ilham, R., & Sinta, I. (2022). EFFECT OF ORGANIZATIONAL COMMITMENT, WORK MOTIVATION AND LEADERSHIP STYLE ON EMPLOYEE PERFORMANCE OF PT. ACEH DISTRIBUS INDO RAYA. International Journal of Social Science, Educational, Economics, Agriculture Research, and Technology (IJSET), 1(8), 377–382. https://doi.org/10.54443/ijset.v1i8.41.

Mahfud *et all* (2020). Developing a Problem-Based Learning Model through E-Learning for Historical Subjects to Enhance Students Learning Outcomes at SMA Negeri 1

Rogojampi. *IOP Conf. Series: Earth and Environmental Science 485 (2020) 012014* doi:10.1088/1755-1315/485/1/012014.

Mahfud *et all* (2021). PEMANFAATAN TRADISI RESIK LAWON SUKU USING SEBAGAI SUMBER BELAJAR SEJARAH LOKAL PADA SMA DI BANYUWANGI. Media Bina Ilmiah Vol.16 No.3 Oktober 2021. http://ejurnal.binawakya.or.id/index.php/MBI/article/view/1294/pdf.

Mahfud, M., Yudiana, I. K., & Sariyanto, S. (2022). HISTORY OF BANYUWANGI KALIKLATAK PLANTATION AND ITS IMPACT ON SURROUNDING COMMUNITIES. International Journal of Educational Review, Law And Social Sciences (IJERLAS), 3(1), 91–104. https://doi.org/10.54443/ijerlas.v3i1.492.

Majied Sumatrani Saragih, M. ., Hikmah Saragih, U. ., & Nur Ilham, R. . (2021). RELATIONSHIP BETWEEN MOTIVATION AND EXTRINSIC MOTIVATION TO ICREASING ENTREPRENEURSHIP IMPLEMENTATION FROM SPP AL-FALAH GROUP AT BLOK 10 VILLAGE DOLOK MASIHUL. *MORFAI JOURNAL*, *1*(1), 1–12. https://doi.org/10.54443/morfai.v1i1.11.

Nachlas, W. 2010. Brachialgia. A manifestation of various lesions. The journal of bone and joint surgery.

Nur Ilham, R. ., Arliansyah, A., Juanda, R., Multazam, M. ., & Saifanur, A. . (2021). RELATHIONSIP BETWEEN MONEY VELOCITY AND INFLATION TO INCREASING STOCK INVESTMENT RETURN: EFFECTIVE STRATEGIC BY JAKARTA AUTOMATED TRADING SYSTEM NEXT GENERATION (JATS-NG) PLATFORM. *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)*, *1*(1), 87–92. https://doi.org/10.54443/ijebas.v1i1.27.

Nur Ilham, R., Heikal, M. ., Khaddafi, M. ., F, F., Ichsan, I., F, F., Abbas, D. ., Fauzul Hakim Hasibuan, A. ., Munandar, M., & Chalirafi, C. (2021). Survey of Leading Commodities Of Aceh Province As Academic Effort To Join And Build The Country. *IRPITAGE JOURNAL*, *1*(1), 13–18. https://doi.org/10.54443/irpitage.v1i1.19.

Nur Ilham, R., Arliansyah, A., Juanda, R. ., Sinta, I. ., Multazam, M. ., & Syahputri, L. . (2022). APPLICATION OF GOOD CORPORATE GOVERNANCE PRINCIPLES IN IMPROVING BENEFITS OF STATE-OWNED ENTERPRISES (An Emperical Evidence from Indonesian Stock Exchange at Moment of Covid-19). *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)*, *2*(5), 761–772. https://doi.org/10.54443/ijebas.v2i5.410.

Nur Ilham, R., Likdanawati, L., Hamdiah, H., Adnan, A., & Sinta, I. . (2022). COMMUNITY SERVICE ACTIVITIES "SOCIALIZATION AVOID STUDY INVESTMENT" TO THE STUDENT BOND OF SERDANG BEDAGAI. *IRPITAGE JOURNAL*, *2*(2), 61–64. https://doi.org/10.54443/irpitage.v2i2.312.

Price S. A., Wilson L. M, 2006. Patofisiologi Konsep Klinis Proses-Proses Penyakit Volume 2 Edisi 6. Jakarta: EGC.

Putz, R and Pabst, R. Atlas Anatomi Tubuh Manusia SOBOTTA. Jakarta: EGC Penerbit Buku Kedokteran; 2000.

Rahmaniar, R., Subhan, S., Saharuddin, S., Nur Ilham, R. ., & Anwar, K. . (2022). THE INFLUENCE OF ENTREPRENEURSHIP ASPECTS ON THE SUCCESS OF THE CHIPS INDUSTRY IN MATANG GLUMPANG DUA AND PANTON PUMP. International Journal of Social Science, Educational, Economics, Agriculture Research, and Technology (IJSET), 1(7), 337–348. https://doi.org/10.54443/ijset.v1i7.36.

Rico Nur Ilham, Irada Sinta, & Mangasi Sinurat. (2022). THE EFFECT OF TECHNICAL ANALYSIS ON CRYPTOCURRENCY INVESTMENT RETURNS WITH THE 5 (FIVE) HIGHEST MARKET CAPITALIZATIONS IN INDONESIA. *Jurnal Ekonomi*, *11*(02), 1022–1035. Retrieved from http://ejournal.seaninstitute.or.id/index.php/Ekonomi/article/view/481.

Sandi, H. ., Afni Yunita, N. ., Heikal, M. ., Nur Ilham, R. ., & Sinta, I. . (2021). RELATIONSHIP BETWEEN BUDGET PARTICIPATION, JOB CHARACTERISTICS, EMOTIONAL INTELLIGENCE AND WORK MOTIVATION AS MEDIATOR VARIABLES TO STRENGTHENING USER POWER PERFORMANCE: AN EMPERICAL EVIDENCE FROM INDONESIA GOVERNMENT. *MORFAI JOURNAL*, *1*(1), 36–48. https://doi.org/10.54443/morfai.v1i1.14.

Sidharta Priguna. 2009. Neurologi Klinis Dalam Praktek Umum. Jakarta: Dian Rakyat.

Sinta, I., Nur Ilham, R. ., Authar ND, M. ., M. Subhan, & Amru Usman. (2022). UTILIZATION OF DIGITAL MEDIA IN MARKETING GAYO ARABICA COFFEE. IRPITAGE JOURNAL, 2(3), 103–108. https://doi.org/10.54443/irpitage.v2i3.467.

Sinurat, M. ., Heikal, M. ., Simanjuntak, A. ., Siahaan, R. ., & Nur Ilham, R. . (2021). PRODUCT QUALITY ON CONSUMER PURCHASE INTEREST WITH CUSTOMER SATISFACTION AS A VARIABLE INTERVENING IN BLACK ONLINE STORE HIGH CLICK MARKET: Case Study on Customers of the Tebing Tinggi Black Market Online Store. *MORFAI JOURNAL*, *1*(1), 13–21. https://doi.org/10.54443/morfai.v1i1.12.

Sudoyo Aru W., dkk, 2007, Buku Ajar Ilmu Penyakit Dalam Jilid II Edisi IV, Jakarta: FKUI.

Trisnowiyanto, Bambang, 2012 : Instrumen Pemeriksaan Fisioterapi dan Penelitian Kesehatan, Nuha Medika, Yogyakarta.

Wayan Mertha, I. ., & Mahfud, M. (2022). HISTORY LEARNING BASED ON WORDWALL APPLICATIONS TO IMPROVE STUDENT LEARNING RESULTS CLASS X IPS IN MA AS'ADIYAH KETAPANG. International Journal of Educational Review, Law And Social Sciences (IJERLAS), 2(5), 507–612. https://doi.org/10.54443/ijerlas.v2i5.369.

William I, 1994, Brachialgia: a manifestation of varius lession. The Journal of Bone and Joint Surgery. USA.

Yusuf Iis, E., Wahyuddin, W., Thoyib, A., Nur Ilham, R., & Sinta, I. (2022). THE EFFECT OF CAREER DEVELOPMENT AND WORK ENVIRONMENT ON EMPLOYEE PERFORMANCE WITH WORK MOTIVATION AS INTERVENING VARIABLE AT THE OFFICE OF AGRICULTURE AND LIVESTOCK IN ACEH. *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)*, *2*(2), 227–236. https://doi.org/10.54443/ijebas.v2i2.191.