Jurnal Keperawatan Global
Vol. 9, No. 1, June 2024
https://doi.org/10.37341/jkg.v9i1.901

Original Research

The Relationship Between Adults, Elderly, and Smoking History With The Incidence Of Adhesive Capsulitis Shoulder

Fika Asdayanti Malik[1], Sri Susanty[2*], Muhammad Rustam[3]

[1,3] Undergraduate Medical Study Program, Faculty of Medicine, Halu Oleo University, Indonesia
[2] Nurse Professional Education Study Program, Faculty of Medicine, Halu Oleo University, Indonesia
[3] Orthopedics and Traumatology, Orthophysio Clinic Kendari, Indonesia

ABSTRACT

Background: *The pathological condition known as Adhesive Capsulitis Shoulder (ACS) is characterised by the excessive production of fibrotic tissue, resulting in the rigidity of the capsule of the glenohumeral joint. These factors encompass age, gender, extended immobilisation of the shoulder region, tobacco use, and more variables. The primary objective of this study is to investigate the correlation between adults, older people, and smoking history in relation to the prevalence of adhesive capsulitis shoulder at the Orthopaedic Poly of Indonesia.*

Methods: *The present investigation employs an observational analytical design, utilising a case-control methodology. The study examined the relationship between two independent variables: age (specifically adults and older people) and smoking history. The dependent variable under investigation was adhesive capsulitis in the shoulder. The purposive selection technique was employed to choose a sample consisting of 94 cases of ACS events and 94 controls who did not experience any ACS events. A statistical test known as the Odds Ratio (OR) was conducted to analyse the data.*

Results: *The test results indicate that age (OR <1; OR = 0.178, 90% CI 0.092–0.346) and smoking history have a significant impact on the incidence of adhesive capsulitis shoulder at the Orthopaedic Poly of Indonesia. Additionally, both variables have a value (OR <1; OR = 0.501, 90% CI 0.294–0.793).*

Conclusion: *The findings of this study indicate a correlation between age (adults and older adults), smoking history, and the occurrence of adhesive capsulitis in the shoulder at Orthopaedic Poly Indonesia.*

ARTICLE HISTORY
Received: March 23th, 2024
Accepted: August 6th, 2024

KEYWORDS
adhesive capsulitis shoulder, adults, age, older adults, smoking history;

CONTACT
Sri Susanty
✉
sri.susanty@uho.ac.id
Nurse Professional Education Study Program, Faculty of Medicine, Halu Oleo University. Green Campus of Bumi Tridharma, Anduonohu, Kec. Kambu, Kendari City, Southeast Sulawesi 93232 Indonesia.

Cite this as: Malik, F. A. ., Susanty, S., & Rustam, M. (2024). The Relationship Between Adults, Elderly, and Smoking History With The Incidence Of Adhesive Capsulitis Shoulder. *JKG (JURNAL KEPERAWATAN GLOBAL)*, *9*(1). Retrieved from https://jurnalkeperawatanglobal.com/index.php/jkg/article/view/901

INTRODUCTION

Movement and its functions are an intrinsic component of human physical capabilities and functional capacities, with which humans are inseparable in daily life.

Human corporeal movement activities may be disrupted by the emergence of multiple complaints. Due to the shoulder region's substantial mobility and limited stability, any disruption to daily activities could be significantly disruptive.

The shoulder provides the greatest range of motion in the body, allowing the arm to lift and rotate in various directions. Problems that often arise from frozen shoulders are pain and limited range of motion of the joint, or LGS, which can reduce a person's functional ability (Apriliyani et al., 2021). Adhesive capelusitis shoulder (ACS), colloquially referred to as immobilised shoulder, is an instance of a shoulder disorder (Suhendro, 2023).

ACS describes the presence of adhesions and swelling (inflammation) in the glenohumeral joint capsule, which causes the capsule to shrink and form scar tissue (fibrosis), resulting in limitations in the shoulder joint's range of motion, both active and passive (Suharti et al., 2018). The prevalence of ACS in Asia reaches 15.6%. This value is consistent with that reported from other studies, ranging from 11% to 15% (Malavolta et al., 2018). In Indonesia alone, almost 5% of the population experiences ACS (Jehaman et al., 2021).

Based on the results of observations of preliminary data for the last five years from medical records at the Bahteramas Regional General Hospital, Southeast Sulawesi Province, patients who experienced ACS were 34.3% (2018), 35.9% (2019), 26.4% (2019), 10.1% (2021), 6.3% (2022), and 24.6% in January to June (2023) (Bahteramas, 2023). Factors that cause ACS are reported from various sources, such as in populations in the 40–60-year age group (Phansopkar, 2022). Apart from that, gender is another trigger factor: this disease attacks 0.33% of women and 0.23% of men per year (Itoi et al., 2016). This is supported by other research by De la Serna et al., (2021) which found that the incidence among women is 1.6–4 times higher than that of men.

Comorbidities, including diabetes, dupuytren's syndrome, thyroid disease (particularly hypothyroidism), nephrolithiasis, cancer, Parkinson's disease, shoulder injuries, heart and neck surgery, chronic regional pain syndrome, and smoking, have been found to significantly contribute to the development of acute coronary syndrome (ACS) (De la Serna et al., 2021). Smoking is a contributing factor to the incidence of ACS. According to a study conducted by Zabrzynski et al., (2020) smoking tobacco has been found to have detrimental effects on muscles, bones, and tendons.

According to a recent study conducted by Caughey et al., (2021) smoking has been found to restrict blood flow in regions that are already experiencing relatively low blood volume. This restriction leads to a reduction in cell proliferation, an increase in the pace of degeneration, and an elevation in cellular inflammation. According to Caughey et al., (2021) these effects have the potential to impede the healing process, resulting in heightened pain levels and diminished functional abilities.

ACS results in various consequences, including pain, restricted joint mobility, reduced muscle strength, impaired functional tasks such as lifting hands during hair combing, rubbing the back during bathing, retrieving items from the back pocket of trousers, picking up or placing items on top, and difficulty in donning and removing clothing. According to Jehaman et al., (2021) the patient's inability to move the shoulder joint can exacerbate their pre-existing condition, leading to mobility abnormalities and impaired daily functioning activities. The researchers express their interest in performing a study titled "The Correlation between Adult Age, Elderly Status, and Smoking History with the Prevalence of Shoulder Adhesive Caplaluis in Orthopaedic Polyclinics in Indonesia," as indicated in the aforementioned description.

MATERIALS AND METHOD

This research is a type of observational analytical research with a case control approach, which is an analytical study of how risk factors are studied using a retrospective approach by analysing two specific groups, namely the group that suffers from the disease or is affected by the consequences and the group that does not suffer from the disease or is not affected by the consequences. This research uses primary data in the form of smoking questionnaire interviews and secondary data in the form of medical records. For primary data at the research location, adhesive capsulitis shoulder patients were asked for their willingness as respondents by filling out an informed consent form.

Furthermore, an interview was conducted to fill out the research questionnaire. For primary data conducted online via WhatsApp social media, researchers shared messages with respondents containing questions contained in the questionnaire. If respondents did not have WhatsApp social media, researchers contacted respondents via short message service (SMS), while secondary patient data was obtained from registration data at the orthopaedic polyclinic and medical records of adhesive capsulitis shoulder patients at Bahteramas Hospital, Southeast Sulawesi Province.

For adhesive capsulitis shoulder patients with a history of smoking, data were taken from patients who came to medical rehabilitation for physiotherapy and patients who came to the orthopaedic polyclinic. We used a questionnaire with an ordinal measurement scale with three categories, namely light smokers (1–10 cigarettes per day), moderate smokers (11–20 cigarettes per day), and heavy smokers (more than 20 cigarettes per day) menurut klasifikasi Bustan, 2007 yang telah di uji validitasnya (Bustan, 2007).

The study was carried out between December 6 and December 18, 2023. In 2023, the entire patient population of the Orthopaedic Polyclinic at Bahteramas Regional Hospital will comprise the subject of this investigation. Patients with adhesive capelusitis served as cases in this investigation, while controls lacked adhesive capelus shoulder. The sampling methodology employed was purposive sampling, in which the sample was selected according to predetermined inclusion and exclusion criteria. As a result, a total of 94 individuals were included in the case sample, whereas the control sample also consisted of 94 individuals.

We used purposive sampling as a sampling technique with certain considerations by using case inclusion criteria (Patients who have been diagnosed with adhesive capsulitis shoulder by an Orthopedic and Traumatology Specialist, ACS patients who come to Medical Rehabilitation, patients who are willing to be research respondents, and are able to communicate actively, have an active telephone number, and complete medical records), control inclusion criteria (patients who are not diagnosed with adhesive capsulitis shoulder by an Orthopedic and Traumatology Specialist, are able to communicate actively, have complete medical records), and exclusion criteria (refusing to be respondents, cannot be contacted, and incomplete medical records).

In data analysis, the frequency with which an exposure or risk factor is observed in cases relative to controls is determined using the Odds Ratio (OR). A bivariate analysis was performed to see the relationship between independent variables and dependent variables. Data were analysed by determining the Odds Ratio (OR) to assess how often there were exposure or risk factors in cases compared to controls. The OR calculation was preceded by cross-tabulation between variables.

In this study, adhesive capelusitis of the shoulder is the dependent variable; age and smoking history are the independent variables. The Health Research Ethics Commission of the Faculty of Medicine XXXX has issued a letter of ethical approval for this study, bearing the number 063/UN29.17.1.3/ETIK/2023.

RESULTS

Table 1 shows the distribution of the characteristics of the age at risk, namely the elderly, numbering 119 respondents, with the case group being 77 respondents (81.9%) and the control group being 42 respondents (44.7%), while the age group not at risk is 69 adults. respondents, with the case group amounting to 17 respondents (18.1%) and the control group amounting to 52 respondents (55.3%).

Table 1. Distribution of Age Characteristics

Age	Case (+)		Control (-)		Total	
	n	%	n	%	n	%
Adults (+)	77	81.9	42	44.7	119	63.3
Older adults (-)	17	18.1	52	55.3	69	36.7
Total	94	100	94	100	188	100

In Table 2, it was found that in the case group, the number of smokers was 58 respondents (61.7%) and the remaining non-smokers were 36 respondents (38.3%), while in the control group, the number of smokers was 42 respondents (44.7%) and the remaining non-smokers were 52 respondents (55.3%). Furthermore, smoking data from cases and controls was reprocessed to classify them as light smokers, moderate smokers, and/or heavy smokers.

Tabel 2. Smoking History (Case)

Case (+)				Control (-)	
n	%			n	%
Not a smoker	36	38.3	Not a smoker	52	55.3
Smoker	58	61.7	Smoker	42	44.7
Total	94	100	Total	94	100

Table 3 shows the distribution of smoker classification characteristics in the case group of 58 smoker respondents. The highest number was found in heavy smokers with >20 cigarettes/day, 29 respondents (50.0%), then moderate smokers with 11-20 cigarettes/day, 15 respondents (25.9%), and light smokers with 1- 10 cigarettes/day amounted to 14 respondents (24.1%) while in the control group there were 42 smoking respondents with the largest number being light smokers with 1-10 cigarettes/day amounting to 25 respondents (59.5%), then moderate smokers. With 11-20 cigarettes/day, 10 respondents (23.8%), and finally heavy smokers with >20 cigarettes/day, 7 respondents (16.7%).

Table 3. Distribution of Smoker Classification Characteristics

Smoker Classification	Case (+)		Control (-)		Total	
	n	%	n	%	n	%
Light Smoker	14	24.1	25	59.5	39	39.0
Moderate Smoker	15	25.9	10	23.8	25	25.0

Smoker Classification	Case (+)		Control (-)		Total	
	n	%	n	%	n	%
Severe Smoker	29	50.0	7	16.7	36	36.0
Total	58	100	42	100	100	100

Table 4. The Influence of Age on the Incidence of Adhesive Caplaluis Shoulder in the Orthopedic Polyclinic of Bahteramas Regional Hospital

Age	Case (+)		Control (-)		OR	90% CI
	n	%	n	%		
Adults (+)	77	81.9	42	44.7	0.178	(0.092 – 0.346)
Older adults (-)	17	18.1	52	55.3		
Total	**94**	**100**	**94**	**100**		

Table 4, the results of calculating the Odds Ratio at the 90% CI level, obtained an OR of 0.178 {90% CI (0.092–0.346), indicating that someone in old age has a 0.17 times greater risk of suffering from adhesive capelusitis of the shoulder than someone who is older (≤ 40 years). Interpretation of the results obtained by OR <1 means that the independent variable is a protective variable (the chance of ACS as a risk factor for the elderly is low). The interpretation of the lower limit (LL) and upper limit (UL) obtained is less than one, which means that the OR value obtained has a meaningful influence so that Ha is accepted or there is a relationship between age and the incidence of adhesive shoulder capelusitis at the Orthopaedic Polyclinic, Bahteramas Regional Hospital, Southeast Sulawesi Province.

The results of the Odds Ratio calculation at the 90% CI level obtained an OR of 0.501{90% CI (0.294–0.793)} indicating that a smoker has a 0.50 times greater risk of suffering from adhesive capelusitis than a non-smoker. Interpretation of the results obtained by OR <1 means that the independent variable is a protective variable (the chance of ACS as a risk factor for smoking history is low). The interpretation of the lower limit (LL) and upper limit (UL) obtained is less than one, which means that the OR value obtained has a meaningful influence so that Ha is accepted or there is a relationship between smoking history and the incidence of adhesive capelusitis shoulder in the Orthopaedic Polyclinic of Bahteramas Regional Hospital, Southeast Sulawesi Province.

Table 5. The Influence of Smoking History on the Occurrence of Adhesive Caplaluis Shoulder in the Orthopedic Polyclinic at Bahteramas Regional Hospital

Smoking History	Case (+)		Control (-)		OR	90% CI
	n	%	n	%		
Smoker(+)	58	61,7	42	44,6		
Not a smoker (-)	36	38,3	52	55,4	0,501	(0,294 – 0,793)
Total	**94**	**100**	**94**	**100**		

Tabel 6. Smoker classification with the incidence of Adhesive Caplaluis Shoulder at the Orthopedic Polyclinic at Bahteramas Regional Hospital

Smoker Classification	ACS		No ACS		OR	90% CI
	n	%	n	%		
				I		
Light Smoker	14	21,9	25	39,1		
Moderate Smoker	15	23,4	10	15,6	0,373	(0,138 -0,848)
Total	**29**	**45,3**	**35**	**54,7**		
				II		
Light Smoker	14	18,7	25	33,3		
Moderate Smoker	29	38,7	7	9,3	0,135	(0,042 -0,300)
Total	**43**	**57,4**	**32**	**42,6**		

After getting the number of smokers from both the case group and the control group, the researchers carried out the next analysis test, namely the dummy variable test, to determine the effect of the number of cigarettes smoked per day on the incidence of adhesive shoulder capelusitis. Table 6 shows that the proportion of ACS events was higher in moderate smokers, 15 respondents (23.4%), compared to light smokers, 14 respondents (21.9%). The results of calculating the Odds Ratio at the 90% CI level obtained an OR of 0.373 {90% CI (0.138 - 0.848), indicating that moderate smokers have a 0.37 times greater risk of suffering from adhesive capelusitis than light smokers.

In addition, it shows that the proportion of ACS events was higher in heavy smokers, 29 respondents (38.7%), compared to light smokers, 14 respondents (18.7%). The results of calculating the Odds Ratio at the 90% CI level obtained an OR of 0.135 {90% CI (0.042 - 0.300), indicating that heavy smokers have a 0.13 times greater risk of suffering from adhesive capelusitis than light smokers.

DISCUSSION

Influence of Age on the Occurrence of ACS

Based on the results of the univariate analysis, it shows that the distribution of the highest incidence of adhesive capsulitis shoulder in the orthopaedic polyclinic of Bahteramas Hospital, Southeast Sulawesi Province, is in the at-risk age group, namely age >40 years, amounting to 77 cases (81.9%). The highest age group without adhesive capsulitis shoulder in the orthopaedic polyclinic of Bahteramas Hospital, Southeast Sulawesi Province, is the non-risk age group, namely age ≤ 40 years, amounting to 52 cases (55.3%). According to the World Health Organisation (WHO), elderly people are divided into 4 categories: middle age (45–59 years), elderly (60–74 years), old age (75–89 years), and very old age (> 90 years) (Fashihullisan, 2019; Susanty et al., 2022).

Based on the WHO classification of the elderly, ACS patients fall into the middle age and elderly categories. The results of the bivariate analysis of age showed an OR value of 0.178 with a 90% CI of 0.092–0.346, which means that elderly people can experience adhesive capelusitis 0.17 times more than adults. WHO elderly classification: ACS patients fall into the middle-aged and elderly categories. The results of the bivariate analysis of age showed an OR value of 0.178 with a 90% CI of 0.092–0.346, which means that elderly people can experience adhesive capelusitis 0.17 times more than adults.

This research is in line with research conducted by Cao et al., (2022) showing that there is a significant relationship between age at risk, namely >40 years, and adhesive shoulder capelusitis, with a statistical analysis p-value of 0.001 < 0.05. Another study conducted Sintia & Fatimah, (2020) stated that the majority of ACS sufferers were between the ages of 50 and 59 (51.7%). From this research, it can be concluded that advanced age is a risk factor for ACS.

This is in accordance with the theory put forward, namely that there is a decrease in physical ability so that elderly people have the possibility of being inactive for longer periods in the shoulder joint, which can cause ACS (Füzéki & Banzer, 2018). However, this research is different from other research conducted by Aïm et al., (2022) which shows that those aged ≤ 40 years who are not at risk can experience ACS with a statistical analysis p-value of 0.32 > 0.05.

The Influence of Smoking History on the Occurrence of ACS

The results of the analysis test showed that the distribution of smokers was highest in the case group with adhesive capelusitis: 58 respondents (61.7%) compared to the control group, which did not have adhesive capjualis shoulder; only 42 respondents (44.7%), with an OR value of 0.501 {90% CI (0.294–0.793), shows that a smoker has a 0.50 times greater risk of suffering from adhesive capelusitis than a non-smoker. OR <1, which means that smoking history is a protective variable (the chance of occurrence as a risk factor for smoking history is low). Next, an analysis was carried out to classify smokers.

The classification of smokers is divided into three categories: light smokers: 1–10 cigarettes per day; moderate smokers: 11–20 cigarettes per day; and heavy smokers: more than 20 cigarettes per day. The results obtained showed that the largest distribution of case groups was in heavy smokers, amounting to 29 respondents (50.0%), while in the control group, the largest number was in light smokers, amounting to 25 respondents (59.5%). Research that is in line with this research conducted by Deng & Wei (2023), shows that the prevalence of ACS is higher in populations who have ever smoked.

Another study by Cogan et al., (2022) found that tobacco use increased the incidence of ACS with an OR (95% CI) of 1.33 (1.30–1.36), P < 0.001. Research that is not in line is research by Lee et al., (2022) using univariate and multifactorial logistic regression to analyse risk factors in 262 patients with advanced stage ACS, showing that smoking was not related to the incidence of ACS. Another study by Cohen et al., (2020) found that smoking was not a risk factor for ACS.

Researchers have not obtained the same research in classifying the number of cigarettes smoked every day to cause ACS. Therefore, with this research, researchers also aim to analyse the relationship between smoker classification and the incidence of ACS. The results of the classification of smokers from the two dummy variable test tables concluded that the greater the number of cigarettes smoked per day, in this case heavy smokers (>20 cigarettes/day), were considered to have a higher influence on the incidence of adhesive capelusitis in the Orthopaedic Polyclinic at Bahteramas Regional Hospital.

This is thought to occur because the amount of nicotine contained in heavy smokers accumulates more in the body, so mechanical processes such as inflammation, platelet stickiness, and microvascular occlusion have more influence in heavy smokers. In light smokers and moderate smokers, ACS also occurs, but the number of incidents is

less than in heavy smokers because the amount of nicotine they are exposed to is less, so the mechanism for the emergence of ACS is lower. What you also need to know is that each person has a different body response depending on the amount of nicotine. that enters the human body.

Supporting the results of this study, it has been explained in other studies that smoking has been clinically proven to have negative musculoskeletal effects. The nicotine contained in cigarettes is a strong vasoconstrictor and can reduce oxygen delivery to tissues, which is associated with a weakening of the inflammatory healing response (Santiago-Torres et al., 2015), so people with ACS experience a slower healing process. In addition, nicotine also increases platelet stickiness and supports microvascular occlusion, which can cause ACS (Abate et al., 2013).

CONCLUSION

Based on the results of the research that has been carried out, it was concluded that adult age, the elderly, and a history of smoking have a relationship with the incidence of adhesive capelus shoulder at the Orthopaedic Polyclinic at Bahteramas Regional Hospital. Further research is needed with different variables or using different types of approaches, such as cross-sectional or cohort, in order to obtain more accurate causal relationships between independent variables and dependent variables or to develop research using different statistical analysis tests. Apart from that, especially people who have entered the elderly category, they should increase their physical activity, such as doing light exercise regularly and not consuming cigarettes. This can occur if someone aged ≤ 40 years experiences trauma to the shoulder area or after surgery that requires prolonged mobilisation, which can cause ACS. We recommend a quasi-experimental intervention approach in the future, especially in the elderly population with ACS.

REFERENCES

Abate, M., Vanni, D., Pantalone, A., & Salini, V. (2013). Cigarette smoking and musculoskeletal disorders. *Muscles, ligaments and tendons journal*, *3*(2), 63.

Aïm, F., Chevallier, R., Marion, B., Klouche, S., Bastard, C., & Bauer, T. (2022). Psychological risk factors for the occurrence of frozen shoulder after rotator cuff repair. *Orthopaedics & Traumatology: Surgery & Research*, *108*(2), 103212.

Apriliyani, D. C., Lestari, S., S ST, M., Yani, F., ST, S., & Fis, M. (2021). Pengaruh pemberian ultrasound dan joint mobilization terhadap aktivitas fungsional pada frozen shoulder: narrative review.

Bahteramas, RS. (2023). Adhesive Capsulitis Shoulder (ACS). Retrieved December, 22 from https://rsud-bahteramas.go.id/

Bustan, M. N. (2007). Epidemiologi penyakit tidak menular. *Jakarta: Rineka Cipta*, *221*.

Cao, W., Chen, J., Pu, J., Fan, Y., & Cao, Y. (2022). Risk factors for the onset of frozen shoulder in middle-aged and elderly subjects within 1 year of discharge from a

hospitalization that involved intravenous infusion: a prospective cohort study. *Frontiers in Medicine*, *9*, 911532.

Caughey, W. J., Maher, A., Leigh, W. B., Brick, M. J., Young, S. W., Walker, C. G., & Caughey, M. A. (2021). Impact of smoking on pain and function in rotator cuff repair: a prospective 5-year cohort follow-up of 1383 patients. *ANZ Journal of Surgery*, *91*(10), 2153-2158.

Cogan, C. J., Cevallos, N., Freshman, R. D., Lansdown, D., Feeley, B. T., & Zhang, A. L. (2022). Evaluating utilization trends in adhesive capsulitis of the shoulder: a retrospective cohort analysis of a large database. *Orthopaedic journal of sports medicine*, *10*(1), 23259671211069577.

Cohen, C., Tortato, S., Silva, O. B. S., Leal, M. F., Ejnisman, B., & Faloppa, F. (2020). Association between frozen shoulder and thyroid diseases: strengthening the evidences. *Revista Brasileira de Ortopedia*, *55*, 483-489.

De la Serna, D., Navarro-Ledesma, S., Alayón, F., López, E., & Pruimboom, L. (2021). A comprehensive view of frozen shoulder: a mystery syndrome. *Frontiers in Medicine*, *8*, 663703.

Deng, G.-h., & Wei, Y.-k. (2023). The causal relationship between ever smoked and frozen shoulder: A two-sample Mendelian randomization. *Medicine*, *102*(44), e35656.

Fashihullisan, M. (2019). Hubungan Usia Dan Masa Kerja Terhadap Risiko Terjadinya Low Back Pain Myogenic Pada Penambang Pasir Di Kalimujur Kabupaten Lumajang. *Universitas of Muhammadiyah Malang*.

Füzéki, E., & Banzer, W. (2018). Physical activity recommendations for health and beyond in currently inactive populations. *International journal of environmental research and public health*, *15*(5), 1042.

Jehaman, I., Berampu, S., Tantangan, R., Siahaan, T., & Sinuhaji, S. (2021). Manfaat pemberian manual terapi dan codman pendular exercise terhadap aktivitas fungsional pasien frozen shoulder. *Jurnal Pengmas Kestra (JPK)*, *1*(1), 13-18.

Lee, H.-j., Kim, Y.-s., & Kim, B.-s. (2022). Increase in range of motion after intra-articular injection of triamcinolone acetonide for the treatment of frozen shoulder is related to body mass index. *Joint Diseases and Related Surgery*, *33*(3), 496.

Malavolta, E. A., Gracitelli, M. E. C., Pinto, G. d. M. R., Silveira, A. Z. F. d., Assunção, J. H., & Ferreira Neto, A. A. (2018). Asian ethnicity: A risk factor for adhesive capsulitis?. *Revista Brasileira de Ortopedia*, *53*, 602-606.

Phansopkar, P. (2022). A Review on Current Notion in Frozen Shoulder: A Mystery Shoulder. *Cureus*, *14*(9).

Santiago-Torres, J., Flanigan, D. C., Butler, R. B., & Bishop, J. Y. (2015). The effect of smoking on rotator cuff and glenoid labrum surgery: a systematic review. *The American journal of sports medicine*, *43*(3), 745-751.

Sintia, I., & Fatimah, N. (2020). The Correlation of the Limitations of Movement of the Shoulder Joint with the Functional Ability of Frozen Shoulder Patients at the Medical Rehabilitation Institute Dr. Mohammad Hoesin Palembang. *Sriwijaya Journal of Medicine*, *3*(3), 88-96.

Suharti, A., Sunandi, R., & Abdullah, F. (2018). Penatalaksanaan Fisioterapi pada Frozen Shoulder Sinistra Terkait Hiperintensitas Labrum Posterior Superior di Rumah Sakit Pusat Angkatan Darat Gatot Soebroto. *Jurnal Vokasi Indonesia*, *6*(1), 7.

Suhendro, A. P. (2023). Diagnosis dan Tata Laksana Capsulitis Adhesiva. *Cermin Dunia Kedokteran*, *50*(5), 255-258.

Susanty, S., Chung, M.-H., Chiu, H.-Y., Chi, M.-J., Hu, S. H., Kuo, C.-L., & Chuang, Y.-H. (2022). Prevalence of loneliness and associated factors among community-dwelling older adults in Indonesia: a cross-sectional study. *International journal of environmental research and public health*, *19*(8), 4911.

Zabrzynski, J., Gagat, M., Paczesny, L., Grzanka, D., & Huri, G. (2020). Correlation between smoking and neovascularization in biceps tendinopathy: A functional preoperative and immunohistochemical study. *Therapeutic Advances in Chronic Disease*, *11*, 2040622320956418.