INTERNATIONAL JOURNAL OF

MIDWIFERY AND HEALTH SCIENCES

- Midwifery
- Nursing
- Public Health

https://ijmhs.id

E-ISSN: 2987-209X
International Journal of Midwifery and Health Sciences
Vol. 3, Issue 2 (2025), July

The Effect of Abdominal Lifting Technique on Postpartum Pain at St. Carolus Summarecon Hospital

Alin Adelina[1 *], Rukmaini[2], Putri Azzahro[3]

Midwifery Study Program, Faculty of Health Sciences, Universitas Nasional, alinadelina@email.com

Alin Adelina, Midwifery Study Program, Faculty of Health Sciences, Universitas Nasional, Indonesia; alinadelina@email.com +62 81311099460

Submission date: 4-6-2025; Date of received: 10-7-2025

Abstract

Background: Postpartum pain is a common discomfort experienced by mothers after childbirth. Abdominal lifting, a non-pharmacological intervention, has been proposed to alleviate such pain. Purpose: To examine the effect of abdominal lifting technique on postpartum pain in postpartum mothers at St. Carolus Summarecon Hospital. Methods: This study used a quasi-experimental pretest-posttest design with one group. Fifteen postpartum mothers were selected using purposive sampling. The Numeric Rating Scale (NRS) was used to measure pain intensity. Data were analyzed using the Paired Sample T-Test. Results: The mean pain score before the intervention was 7.20, and after the intervention was 2.67, with a significant mean difference of 4.53 (p-value = 0.000). Conclusion: Abdominal lifting technique is effective in reducing postpartum pain.

Keywords: abdominal lifting, postpartum, pain, non-pharmacological, intervention

Introduction

Postpartum pain is a physiological response resulting from uterine involution, perineal trauma, or surgical interventions during childbirth. This pain can interfere with a mother's physical recovery, bonding with the newborn, and initiation of breastfeeding. Effective pain management during the postpartum period is therefore essential to support maternal well-being.

Globally, maternal health remains a critical concern. According to the World Health Organization (2020), approximately 295,000 women die each year due to complications during pregnancy and childbirth. Although mortality is the most severe outcome, morbidity—including unmanaged postpartum pain—also significantly impacts maternal health outcomes. In Indonesia, the maternal mortality ratio remains

high, and postpartum discomfort is widely reported but often under-addressed.

Non-pharmacological interventions are increasingly recommended for pain relief due to their accessibility, minimal side effects, and cultural acceptability. One such technique is abdominal lifting, a manual method involving gentle, rhythmic strokes along the abdominal area. Previous studies have indicated that this technique can stimulate endorphin release and reduce muscle tension, contributing to lower pain intensity.

Despite its potential benefits, empirical evidence on the use of abdominal lifting specifically for postpartum pain remains limited. This study aims to investigate the effectiveness of abdominal lifting technique in reducing postpartum pain among mothers who delivered at St. Carolus Summarecon Hospital.

Method

Method should be structured as follows:

1. **Research Design**

   This research used a quasi-experimental design with a pretest-posttest one-group approach.

2. **Setting and Samples**

   The study was conducted at a hospital in Tangerang, Indonesia, in January 2025. Fifteen postpartum mothers were selected using purposive sampling. Inclusion criteria included postpartum mothers willing to participate and complete both

pretest and posttest assessments. Exclusion criteria included medical emergencies or ERACS delivery.

3. **Intervention**

   The intervention involved abdominal lifting performed daily for 7 days. Each session lasted approximately 20 minutes.

4. **Measurement and Data Collection**

   Pain intensity was measured using the Numeric Rating Scale (NRS), a validated and reliable tool ranging from 0 (no pain) to 10 (worst pain). Data collection was done by the researcher using observation sheets.

5. **Data Analysis**

   Data were analyzed using the Paired Sample T-Test with SPSS to determine the significance of the difference in pain scores before and after the intervention.

Results

Table 1. Mean Pain Scores Before and After Intervention

Group	Mean	SD	Min	Max
Pretest	7.20	1.01	6	8
Posttest	2.67	0.97	2	4

The Paired Sample T-Test showed a significant difference in pain scores before and after the intervention ($p = 0.000$).

Discussion

This study provides evidence supporting the effectiveness of abdominal lifting in reducing postpartum pain. The significant decrease in pain scores—from an average of 7.20 to 2.67—demonstrates the intervention's potential as a complementary therapy in postpartum care.

The results align with previous research by Malawat (2020) and Liana (2021), both of which reported significant pain reduction through abdominal lifting. The mechanism behind this effect is likely related to stimulation of the nervous system, leading to the release of endorphins and improved muscle relaxation.

These findings suggest that abdominal lifting is a simple, non-invasive technique that can be taught to healthcare providers or even family members for use in home care. The comfort and simplicity of the technique may increase patient compliance and satisfaction.

Despite its promise, the study is limited by the small sample size and short duration. Larger-scale studies are needed to confirm these findings and explore long-term outcomes and broader applicability.

Limitation

The main limitation of this study was the small sample size and the short intervention period. Additionally, the adherence of participants to the daily intervention schedule was not always optimal.

Conclusion

Abdominal lifting technique significantly reduces postpartum pain among postpartum mothers. It serves as an effective, low-cost, and non-pharmacological intervention that can enhance maternal comfort and recovery. The integration of this technique into routine postpartum care is recommended, particularly in settings where access to pharmacological pain relief is limited. Future research should consider larger sample sizes, longer observation periods, and comparisons with other pain management techniques to further validate the effectiveness of abdominal lifting.

Ethical Considerations

The study received ethical approval from the Health Research Ethics Committee of Universitas Nasional. All participants provided written informed consent.

Acknowledgment

The author thanks Universitas Nasional, research advisors, and all mothers who participated in the study.

Conflict of Interest

The author declares no conflict of interest.

Author contribution

Alin Adelina was responsible for the conception, data collection, analysis, and manuscript preparation.

References

1. Malawat R. The Effectiveness of Abdominal Lifting on Labor Pain. J Midwifery. 2020;4(1):15–21.
2. Liana R. Abdominal Lifting and Labor Pain Intensity. J Matern Health. 2021;3(2):88–94.
3. WHO. Maternal Mortality. World Health Organization; 2020.
4. Setyani R. Non-pharmacological Pain Management in Labor. J Nurs Sci. 2022;10(1):23–30.
5. Erickson E. Massage Therapy and Endorphin Release. J Clin Nurs. 2023;7(3):55–60.

E-ISSN: 2987-209X
International Journal of Midwifery and Health Sciences
Vol. 3, Issue 2 (2025), July

Case management: Continuous Midwifery Care for Mrs. S. At Independent Midwife Practice Place/ TPMB (Tempat Praktek Mandiri Bidan) Ida Nopiah Salipah, S.Keb., Bdn Padurenan Mustika Jaya Bekasi

Iis Sugiyono[1*], Lisa Trina Arlym[2], Ida Nopiah Salipah[3], Rukmaini[4]

[1,2,4] Midwifery Professional Education Study Program, Faculty of Health Science, Universitas Nasional, Indonesia

[3]Independent Midwife Practice Place/ TPMB (Tempat Praktek Mandiri Bidan) Ida Nopiah Salipah, S.Keb., Bdn Padurenan Mustika Jaya Bekasi, Indonesia

** Corresponding Author: Iis Sugiyono, Universitas Nasional;iissugiyono88@gmail.com*

Submission date: 26-6-2025; Date of receipt: 12-7-2025

Abstract

This care uses Continuity Of Care (COC) for Mrs. S since the third trimester of pregnancy, postpartum, and the neonate, with the implementation of complementary care. The results obtained by Mrs. S during pregnancy went well, but at the beginning of the visit, she experienced discomfort in the form of frequent urination and vaginal discharge, so she was given Kegel exercise care and cleaning with boiled betel leaf water. The third visit, Mrs. S experienced Braxton Hix contractions, so she was given relaxation techniques care. The delivery took place spontaneously vaginally on April 17, 2025. In the active phase I Mrs. S was restless because she felt pain, so she was given education on relaxation techniques, rebozo shake apple the tree, and massage. The duration of labor was 4 hours and 48 minutes. Postpartum monitoring was carried out until the 42nd day, and the involution process went well. The first day of breastfeeding was not smooth, so oxytocin massage was carried out and taught. During the neonatal period, the baby's condition was crying loudly, active muscle tone, reddish skin color, male gender, BB: 2990 grams, PB: 48 cm with Apgar Score 8/9, IMD had been carried out for 1 hour, given vitamin K prophylaxis, eye ointment, HB0 immunization, and in KN1–KN 4, Mrs. S's baby did not experience any complaints. It can be concluded that Mrs. S's pregnancy, labor, postpartum, and neonatal period were normal, no complications were found, and complementary care had been given according to the mother's needs.

Keywords: Continuity Of Care, Complementary Care, Case Management

Introduction

The Maternal Mortality Rate (MMR) based on the 2020 population census was 189 per 100,000 live births, which almost reached the target of the 2024 National Medium-Term Development Plan of 183 per 100,000 live births. Efforts to reduce MMR are carried out during pregnancy, childbirth, and postpartum. (Central Statistics Agency, 2024) One of the eight agendas of the 2025-2045 National Long-Term Development Plan (RPJPN) to achieve the vision of Golden Indonesia 2045 is to realize social transformation by improving the quality of human life throughout the life cycle and creating a healthier, smarter, more prosperous, superior, and competitive society. For this reason, there are three missions to be achieved, namely: health for all, equitable quality education, and adaptive social protection. The determination of these three missions is due to Indonesia's opportunity to experience a demographic bonus, where the productive age population (15-65 years) is large and can be the engine of national development. Therefore, investment is needed in the younger generation to reach their full potential so that they are qualified, productive, and able to compete and contribute to the economy and build the nation. (Law of the Republic of Indonesia No. 59, 2024)

Through the 2020-2025 RPJMN Agenda, where the Ministry of Health is transforming the maternal and infant health service system with a community approach such as preparing mothers who are fit to get pregnant; detecting pregnancy complications as early as possible in health services, childbirth in Health Facilities and Services for babies born (Ministry of Health, 2021). To implement the 2020-2025 National Medium-Term Development Plan Agenda, Continuity of Care (COC) care is carried out. Continuity of Care (COC) care is continuous care from the preconception period, pregnancy, childbirth, postpartum to family planning (KB) as an effort to optimize the detection of high maternal and neonatal risks, which can help accelerate efforts to reduce MMR and IMR. In reality, there are still deliveries that experience complications resulting in maternal and infant deaths (Juliana Munthe, 2019).

Success in providing comprehensive midwifery care in Indonesia in 2020, where the maternal mortality rate was 203/100,000 births. In midwifery care, the author provides comprehensive and continuous care during the pregnancy process until the postpartum process ends. Continuity of Care is one of the efforts of the midwife profession to improve midwifery services in the community. Midwifery students are

trained independently to be able to help women from pregnancy to the end of the postpartum period and can apply complementary concepts based on the background that has been presented above, so the author is interested in compiling a final scientific paper for midwives entitled "Continuous care for Mrs. S. at TPMB Ida Nopiah Salipah, S.Keb., Bdn. Padurenan Mustika Jaya Bekasi".

Method

Patient data is collected using anamnesis and physical examination methods. After that, care planning is made based on the results of the patient's anamnesis and physical examination.

Data Collection Results

To the mother (Mrs. S)

1. Diagnosis Mrs. S

Mrs. S, 33 years old, G5P3A1, 35 weeks gestation > 5 days with mild anemia. Basis for mother's diagnosis: The mother admitted that this was her fifth pregnancy, a history of one previous miscarriage, HPHT date 1-8-2024, HPL 8-5-2025, HB 10gr/dL, TFU examination, Mc Donald 32 cm.

Single fetus alive intrauterine, head presentation, mother and fetus are in good condition. Basis: The mother felt her fetus move, and on Leopold 3 examination, the head was palpable, DJJ 142x/minute, regular.

2. Actual Problems None
3. Care needs are Education to overcome anemia, frequent urination, vaginal discharge, and pain in the waist.

To the Baby

1. Diagnosis

Full-Term Neonates According to Gestational Period

Basic: gestational age at delivery 37 weeks, birth weight 2990 grams

2. Actual Problems None
3. Care needs are Newborn Care Education

Midwifery care

Table 1: Midwifery care stages from pregnancy to postpartum

Stages of midwifery care	Problems/ Complaints	Interventions carried out	Rationalization of Interventions
Pregnancy	Problems found during the first visit were frequent urination, up to 10 times a day.	Teaching mothers Kegel exercises	Pregnant women who do Kegel exercises regularly for 5-10 minutes in a sitting position on the bed with the position between their legs stretched can help prevent and overcome frequent urination. Based on research conducted (Ziya et al., 2021), Kegel exercises can reduce and overcome complaints of frequent urination in pregnant women in the third trimester. (Ziya, 2021)
	Pain in the back	Providing care regarding the causes of back pain and its treatment with relaxation techniques	1. Back pain is mostly caused by changes in posture during pregnancy and the center of gravity shifts forward due to an enlarged abdomen, varicose veins, heredity, prolonged standing, and age, plus hormonal factors (progesterone) and pelvic floor congestion. This back pain will have an impact on the pregnancy, such as causing difficulty walking. if not treated immediately, it can have long-term consequences, namely increasing postpartum back pain and being more difficult to treat or cure. Other complications of back pain are worsening mobility, which can inhibit activities such as driving vehicles, caring for children, and affect the mother's work, insomnia, which causes fatigue and irritability. The impact is so great that the problem of back pain must be addressed (Lilis, 2019). 2. According to Suksesty, relaxation techniques are effective in relieving pain in the third trimester and have benefits for sports or physical exercise that function to prepare for childbirth because the exercise techniques emphasize the flexibility of the birth canal muscles, breathing techniques, relaxation, and peace of mind of the mother during the labor process (Suksesty, 2021) 3. Ummah (2012) found that body mechanics are related to the incidence of back pain in pregnancy. Good body mechanics will reduce the incidence of back pain. It can also stabilize muscle tone and posture, maintain body weight, overcome stress, increase relaxation, and improve blood circulation to muscles and other organs of the body. The results of this study are in line with research conducted by Dewi (2017), which states that most pregnant women in the third trimester have good body movements and do not feel lower back pain.
Labor	During the labor process, the mother feels labor pain,	Providing complementary birth ball care with the rebozo shake apple tree technique, with movements that can reduce pain and speed up labor.	1. Birth ball is a physical therapy ball that helps mothers in the first stage of labor to achieve a position that helps progress in labor. A physical therapy ball that helps progress in labor and can be used in various positions. One of the movements is sitting on the ball and rocking back and forth to create a comfortable feeling and help progress in labor by using gravity while increasing the release of endorphins because the elasticity and curvature of the ball stimulate receptors in the pelvis that are responsible for secreting endorphins (Kurniawati, 2017). 2. One factor that can affect pain is attention. Increased

			attention is associated with increased pain, and vice versa. Distraction is associated with a decrease in a person's response to pain. By focusing the client's attention and concentration on other stimuli, their awareness of pain decreases. When a mother in labor applies the use of a birth ball, her attention to pain will be diverted by physical activity, by doing patterned movements that make her feel comfortable and relaxed, and can build the mother's confidence to cope with the pain she feels. In this way, the pain felt by the mother can be reduced (Fadmiyanor et al., 2017). 3. In the research of Mardiana and Suksesty, there are 2 types of rebozo techniques used, namely shifting and shaking the apple tree. Rebozo shifting is useful for helping the ligament muscles in the uterus, while the apple tree is more for the pelvic muscle ligaments. If the mother's ligament muscles are tense and the birthing position is not good, the uterus will be in a tilted position so that the baby has difficulty descending into the pelvis. So the rebozo technique helps mothers in the process. (Mardianah & Suksesty, 2021)
	Irregular cramps accompanied by pain	Relaxation and rebozo techniques	1. Diversion techniques or pain management are one of the non-pharmacological actions that are very necessary for medical personnel to help reduce pain or pain that occurs during the labor process, especially in the first stage of labor. Many techniques can be done to reduce pain, one of which is by applying deep breathing relaxation techniques, or Deep Breathing, by regulating breathing patterns in such a way that it will reduce the pain caused by cervical dilation during the labor process. (Widiyanto, 2021) 2. According to Rukmala, reducing pain by deep breathing relaxation techniques is caused when someone does deep breathing relaxation to control the pain they feel, the body will increase the parasympathetic nerve component in a stimulating manner, so this causes a decrease in cortisol and adrenaline hormone levels in the body which affects a person's stress levels so that it can increase concentration and make clients (Rukmala, 2016)
		Massage Therapy	To reduce pain during labor, one of the techniques can use non-pharmacological techniques. Massage/Touch is a non-pharmacological method without using drugs, safer, simpler, and does not cause adverse effects, and refers to maternal care (Judha, 2012). Back massage during labor can function as an epidural analgesic. The effectiveness of Back Massage in reducing labor pain can reduce pain and stress, and can provide comfort to the mother in labor. This action does not cause side effects on the mother and baby. This back massage can be done by health workers, the patient's family, or the patient herself. Back massage stimulates receptors that make the mother in labor more comfortable because muscle relaxation occurs (Hariyanti, 2014)
Postpartum	Low breast milk production	Oxytocin Massage	Oxytocin massage stimulates the production of oxytocin by the posterior pituitary gland (neurohypophysis). Oxytocin enters the circulatory system and causes

			contraction of special cells (myoepithelial cells) that surround the mammary alveoli and lactiferous ducts. Oxytocin massage is one solution to overcome insufficient breast milk. Oxytocin massage is a massage along the spine (vertebrae) to the fifth-sixth costae bone and is an effort to stimulate the hormones prolactin and oxytocin after giving birth (Biancuzzo, 2003)
	On the first visit, the mother experienced problems with her breast milk not flowing smoothly.	Communication, Information, and Education on Nutrition and Oxytocin Massage	1. Breastfeeding is expected to be able to realize the target of Sustainable Development Goals (SDGs) 3, target 2, namely by 2030, ending infant and toddler mortality to 12 per 1,000 live births. Barriers to exclusive breastfeeding include insufficient breast milk supply (32%), nipple problems (28%), swollen breasts (25%), the influence of formula milk advertisements (6%), and working mothers (5%), as well as the influence of others, especially family members (4%). Therefore, support for breastfeeding from families, communities, and health workers is needed to produce a healthy and quality generation (Jahriani, 2019). 2. According to Hemranani (2020), oxytocin massage is one way to stimulate the release of oxytocin from the posterior pituitary gland. The frequency of oxytocin massage can also affect breast milk production. Oxytocin massage is more effective if done twice a day, namely every morning and evening. This release of breast milk occurs because the smooth muscle cells around the alveoli contract, squeezing the breast milk out. The cause of the muscles contracting is a hormone called oxytocin. By providing education about oxytocin massage, it is hoped that it can be practiced so that breast milk production becomes smooth.

Conclusion

1. Pregnancy Midwifery Care

MRS. S G5P3A1 Age 35 weeks 5 days underwent 10 pregnancy midwifery care visits, namely 3 times TM I, 3 times TM II, and 3 times TM III. During pregnancy, MRS. S received good pregnancy midwifery care and made regular visits with the 10T standard. The results of the pregnancy examination found that MRS. S had complaints of back pain, vaginal discharge and frequent urination. The mother was then given complementary care with relaxation techniques aimed at reducing pain and body mechanics in MRS. S's back. The vaginal discharge experienced for approximately a week until using boiled betel leaves and wearing cotton underwear.

2. Childbirth Midwifery Care

The first stage of MRS. S's labor lasted for 4 hours and 30 minutes; the second stage lasted 13 minutes, the third stage 5 minutes, and the fourth stage 2 hours. Delivery

assistance for MRS. S was carried out following Normal Delivery Care (APN). The results of observations during labor showed that Mrs. S experienced labor pain, so complementary birthing ball care with rebozo shake apple the tree was applied, which aimed to reduce pain and speed up Mrs. S's labor.

3. Postpartum Midwifery Care

During the postpartum period, Mrs. S had postpartum visits up to 6 weeks postpartum. The frequency of postpartum visits made by the mother was postpartum visit I at 6 hours postpartum, postpartum visit II at 6 days postpartum, visit III at 14 days postpartum, and visit IV at 30 days postpartum. During the postpartum period, Mrs. S had problems with the flow of breast milk, and complementary management was carried out, namely Oxytocin Massage, and the problem was resolved well.

4. Newborn Midwifery Care

Newborn Midwifery Care (BBL) took place normally, and there were no problems. Mrs. S's baby received 4 neonatal visits, namely neonatal visit I at 6 hours after birth, neonatal visit II at 5 days after birth, neonatal visit III at 19 days, and visit IV at 28 days after birth for immunization. No problems were found.

Acknowledgment

Dr. Bdn. Lisa Trina Arlym, SST., M. Keb. as a supervising lecturer from the institution in the process of making KIAB, Ida Nopiah Salipah, S. Keb., Bdn. as a supervising lecturer in the field in making my KIAB, Client Mrs. S. and family who are willing to be my COC clients and Mrs. S's husband who has provided moral and material support so that I can carry out KIAB.

Conflict of Interest

There is no conflict of interest

References

1. Anggraini, F. D., Zuwariyah, N., Nisa', F., Masruroh, N., Munjidah, A., R, L. K., & Maharani, U. (2022). Buku Ajar Asuhan Kebidanan Persalinan Dan Bayi Baru Lahir. Surabaya: Unusa Press
2. Astuti, D. P., & Sulastri, E., 2019. Peningkatan Pengetahuan Kehamilan, Persalinan Dan Nifas Yang Sehat Melalui Kelas Ibu Hamil Increasing

Knowledge Of Pregnancy, Labor And Postpartum The 9 th University Research Colloqium 2019. Universitas Muhammadiyah Purworejo. 7– 10

3. Badan Pusat Statistik. (2024). Cerita Data Statistik Untuk Indonesia. Edisi 2024.01. Jakarta: Badan Pusat Statistik.
4. Biancuzzo M. (2003). Breastfeeding The Newborn: Clinical Strategies For Nurses. St Louis: Mosby
5. Carolin, B. T., Suprihatin, Indirasari, & Novelia, S. (2021). Pemberian Sari Kacang Hijau Untuk Meningkatkan Kadar Hemoglobin Pada Siswi Anemia. Jurnal for Quality in Women's Health, 4(1). https://doi.org/10.30994/jqwh.v4i1.111
6. Cholifah, S., Rinata, E. (2022). Buku Ajar Kehamilan. Sidoarjo: UMSIDA Press.
7. Dartiwen, Nurhayati, N. (2019). Asuhan Kebidanan pada Kehamilan. Yogyakarta: CV ANDI
8. Dewi H.K. (2017). Hubungan Mekanika Tubuh (Body Mekanik) dengan Nyeri Punggung pada Ibu Hamil Trimester III di Wilayah Kerja Puskesmas Kambangan Lebaksiu Kabupaten Tegal. Pros Semin Nas Kebidanan dan Call Pap.
9. Dewi, S. S. S., Nasution, I., Napitupulu, M. (2020). Pengaruh Prenatal Yoga terhadap Ketidaknyamanan pada Ibu Hamil Trimester III di Puskesmas Pargarutan. Jurrnal Kesehatan Ilmiah Indonesia, 5(2), 47–53.
10. Diana, Sulis dkk. (2019). Buku Ajar Asuhan Kebidanan Persalinan dan Bayi Baru Lahir. Surakarta: CV Oase Group.
11. Effendi, N., Sarkiah, Mahardika, Z. P., Putri, S. Z., Hasmar, W., Faridah, Marmi, & Firdaus, I. (2024). Sehat Itu Asik" Kajian Kesehatan Dalamm Berbagai Aspek. NEM
12. Fadmiyanor, I., Rahmi, J., & Ayu, M. P. (2017). Pengaruh pemberian metode birth ball terhadap intensitas nyeri persalinan kala 1 fase aktif di BPM Siti Julaeha. Jurnal Ibu Dan Anak, 5(2), 102–109
13. Farhan, Kamila. Dhani D. R. 2021. Anemia ibu hamil dan efeknya ke bayi. J. Muhammadiyah. Vol 2 no. 1. DOI: 10.24853/myjm.2.1.27-33
14. Fatimah., Nuryaningsih. (2017). Buku Ajaran Asuhan Kebidanan Kehamilan. Jakarta: Fakultas Kedokteran dan Kesehatan Universitas Muhammadiyah.

15. Fatmawati, N. (2023). Asuhan Neonatus, Bayi, Balita dan Anak Prasekolah. Jawa Tengah: Eureka Media Aksara
16. Gultom, L., Hutabarat, J. (2020). Asuhan Kebidanan Kehamilan. Sidoarjo: Zifatama Jawara.
17. Hariati, Alim A, Thamrin AI. Kejadian Anemia Pada Ibu Hamil (Studi Analitik di Puskesmas Pertiwi Kota Makassar Provinsi Sulawesi Selatan). J Ilm Kesehat. 2019;1(1):8–17.
18. Hariyanti., Intan, P. (2014). Pijat Punggung Teknik Effluarage Terhadap Intensitas Nyeri Persalinan pada Inpartu Kala I Fase Aktif di BPM Ny"I" Desa Kepuhpandak Kuterejo Mojokerto. Poltekes majapahit.
19. JNPK-KR. 2017. Asuhan Kebidanan Normal. Jakarta: JNPK-KR
20. Judha, Mohammad. (2012). Teori Pengukuran Nyeri dan Nyeri Persalinan. Yogyakarta : Nuha Medika.
21. Kemenkes RI. (2023). Profil Kesehatan Indonesia. Jakarta: Kementerian Kesehatan
22. Kementerian Kesehatan Republik Indonersia. (2020). Pedoman Pelayanan Antenatal, Persalinan, Nifas dan Bayi. Jakarta: Kementerian Kesehatan RI.
23. Khan, F. M., Gul, T., Naqvi, S. F., Obaid, S., & Shahid, M. H. (2021). Frequency Of Stress Urinary Incontinence In Pregnant Females. 215–219.
24. Kurniawati, A., Dasuki, D., Kartini, F. (2017). Efektivitas Latihan Birth Ball terhadap Penurunan Nyeri Persalinan Kala I Fase Aktif pada Primigravida. JNKI: Vol. 5, No. 1, 1-10
25. Manalu, A. B., Siagian, N. A., Yanti, M. D., Yessy, P. A., Barus, D. T., & Purba, T. J. (2020). Pengaruh Pemberian Relaksasi Autogenik Terhadap Tingkat Kecemasan Ibu Primigravida Di Bpm Kurnia Kecamatan Deli Tua Kabupaten Deli Serdang. 5(1), 6–13
26. Manuaba, I. 2014. Ilmu Kebidanan, Penyakit Kandungan dan KB. 2 ed. Jakarta: EGC.
27. Manuaba, I. 2018. Ilmu Kebidanan Penyakit Kandungan dan Keluarga Berencana. Jakarta: ECG.
28. Mardiana, A. E., & Suksesty, C. E. (2021). Pengaruh Teknik Rebozo Terhadap Lama Kala I Dalam Persalinan Pervaginam. Kesehatan, 5. No 1.

29. Megasari. (2019). Asuhan Kebidanan Pada Trimester III Dengan Ketidaknyamanan Sering Buang Air Kecil. Jurnal Komunikasi Kesehatan, 10(1), 29–37. Http://E-Jornal.Akbid-Purworejo.Ac.Id.
30. Mumtaz, S., & Akram, B. (2020). Management Of Anxiety Among Pregnant Women with Serious Medical Conditions: A Multicentre Study. JPMA. The Journal of The Pakistan Medical Association, 70(11), 1966–1969. https://Doi.Org/10.5455/JPMA.47636
31. Munawwarah, Maritalia, D., & Nuraina. (2023). Asuhan Kebidanan Komprehensif Pada Ibu S Di Praktik Mandiri Bidan Muaddah. Jurnal Ilmiah Kesehatan Ibu dan Anak.3(1), 27–35. Universitas Almuslim
32. Munthe J, Adethia K, Damanik LPU, Simbolon ML. (2020). Buku Ajar Asuhan Kebidanan Berkesinambungan (Continuity of Care). Jakarta: Trans Info Media
33. Nurachman, E., Putri, R. A., Hendriani, D., Ratnawati, & Syukur, N. A. (2023). Pengurangan Status Gizi Ibu Hamil dengan Anemia melalui Es Krim Daun Kelor. NEM.
34. Nurhayati, Eka. (2019). Patologi dan Fisiologi Persalinan. Yogyakarta: PT. Pustaka Baru.
35. Prawirohardjo, S (2020). Ilmu Kebidanan. Jakarta: Yayasan Bina Pustaka Sarwono Prawirohardjo.
36. Putri, I., & Mutiah, C. (2022). Hubungan Pemakaian Kontrasepsi Suntik Depomedroxy Progesterone Acetate (DMPA) Dengan Peningkatan Berat Badan Pada Ibu. Malahayati Nursing Journal, 4(4), 853–860. https://doi.org/10.33024/mnj.v4i4.6095
37. Rahandayani, D. S., Pitriawati, D., Bherty, C. P., Febiola, S., Kebidanan, S., Tinggi, S., Kesehatan, I., Jombang, P., Bidan, P. P., Tinggi, S., Kesehatan, I., & Jombang, P. (2022). Literature Review : Efektifitas Konsumsi Kurma Untuk. Jurnal Ilmiah Ilmu Kebidanan Dan Kesehatan, 13(1),44–48.
38. Raidanti, D. (2021). Pengaruh KB suntik 3 bulan Depo Progestron Acetate (DMPA) terhadap kenaikan berat badan di puskesmas Tanah Abang Jakarta Tahun 2019. Maternal & Neonatal Health Journal, 2(1), 15–22. https://journal.neolectura.com/index.php/mnhj
39. Rukmala & Sarwinanti. (2016). Pengaruh Teknik Relaksasi Nafas Dalam dan

Aromaterapi Melati terhadap Tingkat Dismenore pada Mahasiswi Fisioterapi Semester II di Universitas 'Aisyiyah Yogyakarta.

40. Saifuddin, A. (2019). Panduan Praktis Pelayanan Kesehatan Maternal dan Neonatal. Jakarta: EGC
41. Sumarah. (2019). Perawatan pada Ibu Bersalin: Asuhan Kebidanan Pada Ibu Bersalin. Yogyakarta: Fitramaya
42. Suryani, I. S., Nurakillah, H.,Maharani, A., Kencana, U. B., Kusuma, U., Surakarta, H., Surakarta, K., & Tengah, J. (2024). Efektivitas daun kelor dalam meningkatkan kadar hemoglobin pada remaja putri. 7(1), 69–74.
43. Umam, E. R., Sulistyono, A., & Yunitasari, E. (2020). The Effect of A Combination Of Autogenic And Benson Relaxation On Sleep Quality Among Pregnant Women With Hypertension. 3(4), 501–506
44. Ummah F. (2013). Nyeri Punggung pada Ibu Hamil ditinjau dari Body Mekanik dan Paritas di Desa Ketanen Kecamatan Panceng Kabupaten Gresik. 2012;3(13).
45. UU RI NO.59 Tahun 2024 Tentang Rencana Pembangunan Jangka Panjang Nasional Tahun 2025-2045.
46. Varney, & Hellen. (2019). Buku Saku Bidan. Jakarta: EGC.
47. Widiyanto, A., et al. (2021). Literatur Review : Efektivitas Teknik Relaksasi Nafas Dalam (Deep Breathing Relax) Pada Ibu Bersalin Kala I. Journal of Health Research, Vol 4 No 2. (138 - 146).
48. Yulizawati, & Sinta, L. El. (2019). Buku Ajar Asuhan Kebidanan pada Persalinan. Yogyakarta: K-Media
49. Ziya, H., & Putri Damayanti, I. (2021). Senam Kegel Sebagai Upaya Mengurangi Keluhan Sering BAK Di Trimester III Kehamilan. Jurnal Kebidanan Terkini (Current Midwifery Journal), 1(2), 119– 125.
50. Zulhairini, Y, dkk. (2016). Indeks Massa Tubuh Awal Kehamilan Ibu Sebagai Indikator yang Paling Beperan terhadap Kenaikan Berat Badan Ibu Selama Hamil. Bandung Medical Journal. Vol. 48, No.3

E-ISSN: 2987-209X
International Journal of Midwifery and Health Sciences
Vol. 3, Issue 2 (2025), July

Relationship Between HbA1c Levels and Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Hospital

Demitra Rona[1], Arniat Christiani Telambanua[2] *

[1,2]Applied Bachelor Study Program, Medical Laboratory Technology, Syedza Saintika University

**Applied Bachelor's Study Program, Medical Laboratory Technology*

Syedza Saintika University, Indonesia, christianiarniat@gmail.com

Submission date: 20-6-2025; Date of receipt: 10-7-2025

Abstract

Type II Diabetes Mellitus is a chronic metabolic disorder characterized by increased blood sugar due to decreased insulin secretion by pancreatic beta cells and/or impaired insulin function. The purpose of this study was to determine the relationship between HbA1c levels and the Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus patients at Dr. Rasidin Padang Regional General Hospital. This type of research employs quantitative methods and a descriptive design and was conducted in January 2024. The population was all type II diabetes mellitus patients at Dr. Rasidin Padang Regional General Hospital, totaling 55 patients, while the sampling used the total sampling technique. Data were analyzed univariately and bivariately using the Chi-square test. The results of the study showed that 40% had prediabetes HbA1c levels, and 50.9% had abnormal erythrocyte sedimentation rates (ESR). There was a relationship between HbA1c levels and erythrocyte sedimentation rates (ESR) ($p = 0.015$) in type II diabetes mellitus patients at Dr. Rasidin Padang Regional General Hospital. Based on the results, it can be concluded that there is a relationship between HbA1c levels and the erythrocyte sedimentation rate (ESR) in type II diabetes mellitus patients at Dr. Rasidin Padang Regional Hospital. Suggestions: All healthcare workers are expected to provide information about the relationship between HbA1c levels and the erythrocyte sedimentation rate (ESR) in patients with type 2 diabetes mellitus. Health workers should conduct HbA1c examinations more routinely in type II diabetes mellitus patients with tuberculosis

Keywords: Type II Diabetes Mellitus, HbA1c Levels, ESR.

Introduction

Type II diabetes mellitus is a chronic metabolic disorder characterized by elevated blood sugar levels due to decreased insulin secretion by pancreatic beta cells and/or impaired insulin function. Insulin is a hormone that regulates blood sugar balance (Restyana, 2021).

According to Billous & Donelly (2015), the signs and symptoms of type II diabetes mellitus include: Usually a hidden onset of fatigue, thirst, polyuria, and nocturia. No ketoacidosis is found. Usually overweight or obese; often, no recent weight loss is apparent. Frequent infections, such as those in the urine, skin, and chest. Symptoms may be mild and/or ignored by the patient, often indicating other signs of metabolic syndrome, such as hypertension. C-peptide chains can be detected. Common complaints in type II diabetes sufferers include: polyuria, polydipsia, polyphagia, weight loss, weakness, tingling, itching, decreased vision, sores, and vaginal discharge.

According to a 2019 survey conducted by the WHO (World Health Organization), more than 347 million people worldwide suffer from diabetes mellitus. Currently, diabetes mellitus is the seventh leading cause of death globally and is expected to increase by two-thirds between 2008 and 2030. The incidence of diabetes mellitus in Indonesia has reached 9.1 million, placing Indonesia in the top 5 countries with the highest number of diabetes mellitus sufferers after Bangladesh, Bhutan, China, and India. This number is predicted to increase to 21.3 million by 2030. The prevalence of diabetes mellitus in Indonesia, based on diagnoses by healthcare professionals, is 0.7%, while the prevalence of diabetes mellitus is 1.1%. This data indicates that the prevalence of diabetes mellitus diagnosed by healthcare professionals reaches 63.3%, higher than the prevalence of asthma and heart disease (WHO, 2019).

Southeast Asia ranks third with a prevalence of 11.3%. Indonesia ranks 7th among the 10 countries with the highest number of diabetes sufferers, with 10.7 million cases. East Java has the fifth highest number of diabetes sufferers, with a percentage of 2.6% in 2018, rising from 2.1% in 2022. The number of diabetes sufferers in Malang City in 2020 was 21,697 (Ministry of Health of the Republic of Indonesia, 2022).

According to the West Sumatra Provincial Health Profile, the prevalence of diabetes in 2020 was 1.1%, rising to 2.1% in 2021. According to data recorded by the Padang City Health Office, there were 1,200 cases of diabetes in 2020, an increase of 1,290 cases in 2021 (30%) compared to the previous figure (Padang City Health Office, 2021).

One laboratory test to support diabetes mellitus is the erythrocyte sedimentation rate (ESR) or BSR (Erythrocyte Sedimentation Rate). This test determines the rate at which red blood cells settle in unclotted blood (blood containing an anticoagulant) in a vertical tube over one hour. The faster the red blood cells settle, the higher the erythrocyte sedimentation rate. Red blood cells will settle to the bottom of the tube, while plasma will float on the surface. This rate of red blood cell sedimentation is called the ESR.

HbA1c is a stable glucose molecule bound to the N-terminal group of the HbA chain, forming a post-translational modification that combines with a free amino group on the N-terminal valine residue of the hemoglobin β chain. The resulting Schiff base is unstable and, through an irreversible rearrangement, forms a stable ketoamine. Glycation can occur on specific lysine residues of the α and β chains of hemoglobin, resulting in measurable total glycohemoglobin, or total glycated hemoglobin, known as HbA1c. Hemoglobin glycation is not catalyzed by enzymes, but rather through a chemical reaction resulting from exposure to circulating glucose in red blood cells. The rate of HbA1c synthesis is a function of the concentration of glucose bound to red blood

cells during exposure. HbA1c concentration depends on blood glucose concentration and red blood cell age; several studies have shown a relationship between HbA1c concentration and average blood glucose levels (Sri Rahayu, 2021).

HbA1c can also be used to monitor the effects of diet, exercise, and drug therapy. This is in line with findings from the American Diabetes Association (ADA, 2019) that each decrease in HbA1c reduces the incidence of diabetes mellitus-related deaths by 21%. The diagnostic criteria for diabetes based on HbA1c is 6.5%, while the recommended therapeutic goal is less than 7%. Poor HbA1c levels reflect poor patient compliance with diabetes therapy, which can include dietary adjustments, physical exercise, and medication.

Research conducted by Nita Ermawati (2022) on 25 diabetes mellitus patients treated at Daha Husada Hospital in Kediri City showed a strong correlation between HbA1c levels and erythrocyte sedimentation rate.

Method

This type of research is quantitative research with descriptive methods and observational design. Retrospective research is research conducted with the main goal of creating an objective picture or description of a condition by looking back (Notoatmodjo 20018). In this study, the researcher observed or described the results of research on the relationship between HbA1c levels and the Erythrocyte Sedimentation Rate (ESR) in patients with Type II Diabetes Mellitus at Dr. Rasidin Padang Regional Hospital. The population in this study was 55 Type II Diabetes Mellitus sufferers, data collected over the last 3 months from the Dr. Rasidin Padang Regional Hospital polyclinic, and diagnosed by a doctor. The sample in this study was calculated using the total sampling technique, namely, the total population was sampled based on certain criteria.

For the HbA1c Rapid Quantitative Test examination, the sandwich immunodetection

method is used. To examine the erythrocyte sedimentation rate, use the Westergren method. Then, Univariate And Bivariate Variable Analysis Was Performed After Data Processing.

Results

Frequency Distribution of Patient Characteristics

Table1
Distribution of Patient Characteristics

Patient Characteristics	f (%)	%
Gender		
Male	34	61.8
Female	21	38.2
Age		
40-50 Years	4	7.3
51-60 Years	27	49.1
>61 Year	24	43.6
Amount	**55**	**100**

Based on Table 1, it can be seen that of the 55 patients, 34 patients (61.8%) were mostly male, and 27 patients (49.1%) were aged 51-60 years in type II diabetes mellitus patients at Dr. Rasidin Padang Regional Hospital.

Univariate Analysis

Frequency Distribution of HbA1c Levels in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional Hospital

Table 2 Frequency Distribution of HbA1c Levels in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional Hospital

HbA1c Levels	f (%)	%
Diabetes	20	36.4
Prediabetes	22	40.0
Normal	13	23.6
Amount	55	100

Based on Table 2, it can be seen that of the 55 patients, 22 patients (40%) had prediabetes HbA1c levels in type II diabetes mellitus patients at Dr. Rasidin Padang Regional Hospital.

Frequency Distribution of Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional Hospital

Table 3 Frequency Distribution of Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional Hospital

Erythrocyte Sedimentation Rate (ESR)	f	%
Abnormal	28	50.9
Normal	27	49.1
Amount	55	100

Based on Table 3, it can be seen that of the 55 patients, 28 patients (50.9%) had an abnormal erythrocyte sedimentation rate (ESR) in type II diabetes mellitus patients at Dr. Rasidin Padang Regional Hospital.

Bivariate Analysis

The Relationship between HbA1c Levels and Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional Hospital

Table 4 Relationship between HbA1c Levels and Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional Hospital

HbA1c Levels	Erythrocyte Sedimentation Rate (ESR)						P- Value
	Abnormal		Normal		Amount		
	f	%	f	%	f	%	
Diabetes	14	70.0	6	30.0	20	100	**0,015**
Prediabetes	6	27.3	16	72.7	22	100	
Normal	8	61.5	5	38.5	13	100	
Amount	28	50.9	27	49.1	55	100	

Table 4 shows that patients with abnormal erythrocyte sedimentation rates (ESR) were more common in patients with diabetes (14 patients (70%), compared to patients with prediabetes (6 patients (27.3%) with HbA1c levels) and patients with normal HbA1c levels (8 patients (61.5%) in type II diabetes mellitus patients at Dr. Rasidin Padang Regional Hospital.

Based on the Chi-square test results, a p-value of 0.015 ($p<0.05$) was obtained. It can be concluded that there is a relationship between HbA1c levels and erythrocyte sedimentation rates (ESR) in type II diabetes mellitus patients at Dr. Rasidin Padang Regional Hospital.

Discussion

Univariate Analysis

Frequency Distribution of HbA1c Levels in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional Hospital

Based on the research results, it can be seen that of the 55 patients, 22 (40%) had prediabetic HbA1c levels in patients with type II diabetes mellitus at Dr. Rasidin Padang Regional Hospital.

These results align with research conducted by Aminah (2022) entitled "The Relationship Between HbA1c Levels and Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus Patients at Jombang Regional Hospital." The results showed that many patients had diabetic HbA1c levels, at 65.8% at Jombang Regional Hospital.

Hemoglobin A1c is a stable glucose bound to the N-terminal group of the HbA0 chain, forming a post-translational modification where the glucose combines with the free amino group on the N-terminal valine residue of the hemoglobin β chain. The resulting Schiff base is unstable and, through an irreversible rearrangement, forms a stable ketoamine. Glycation can occur on specific lysine residues of the α and β chains of hemoglobin, resulting in measurable total glycohemoglobin, or total glycated hemoglobin, known as HbA1c. Hemoglobin glycation is not catalyzed by enzymes, but rather through a chemical reaction resulting from exposure to circulating glucose in the bloodstream in erythrocytes. The rate of HbA1c synthesis is a function of the concentration of glucose bound to erythrocytes during exposure. HbA1c concentration depends on blood glucose concentration and erythrocyte age; several studies have shown a relationship between HbA1c concentration and average blood glucose levels (Rahayu, 2017).

The researchers assumed that the results showed that many patients had prediabetes HbA1c levels, a metabolic disease characterized by hyperglycemia that occurs due to abnormalities in insulin secretion, insulin action, or both. Diabetes mellitus (DM) is a major public health problem, as its prevalence increases year after year. If left untreated, diabetes can lead to poor blood sugar control, leading to hyperglycemia, or elevated blood sugar levels above normal. Type II diabetes is a group of diabetes characterized by insulin resistance and relative insulin deficiency. Symptoms of type II diabetes often go unnoticed for a long time and are only detected when

complications develop.

Distribution of Erythrocyte Sedimentation Rate (ESR) Frequency in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional

Based on the research results, it can be seen that out of 55 patients, 28 (50.9%) had an abnormal erythrocyte sedimentation rate (ESR) in type II diabetes mellitus patients at Dr. Rasidin Padang Regional Hospital.

These results are supported by a study conducted by Stevani (2019) entitled "The Relationship between HbA1c Levels and Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus Patients at Labuang Baji Regional Hospital, Makassar City." The results showed that many patients had an abnormal erythrocyte sedimentation rate (ESR), namely 69.7% of patients with type II diabetes mellitus at Labuang Baji Regional Hospital, Makassar City.

Erythrocyte Sedimentation Rate is the sedimentation rate of erythrocytes from a blood sample examined in a specific instrument, expressed in mm/hour (Kiswari, 2016). The first phase is also called the aggregation phase because during this phase, erythrocytes begin to aggregate, resulting in very slow sedimentation. In the second phase, erythrocyte sedimentation occurs rapidly. After aggregation (adhering to one another), the ratio of volume to surface area decreases, resulting in faster sedimentation. Rouleaux formation (stacking) also occurs during this phase. In the third phase, the erythrocyte sedimentation rate begins to decrease as the erythrocyte sedimentation rate solidifies (Kiswari, 2016).

Researchers believe that many studies have shown that the patient's erythrocyte sedimentation rate (ESR) is abnormal because prolonged hyperglycemia due to poor glycemic control causes toxic effects on cells (glucose toxicity). This effect ultimately leads to the formation of reactive oxygen species (ROS) and increased production of free fatty acids (FFA) in the liver. The increased ROS and FFA in patients with type 2 diabetes disrupt the thyroid hormone deiodinase process, which can lead to thyroid dysfunction. A high ESR is caused by chronic and acute infections and acute inflammation in the body, fibrinogen globulin, and many other triggers. A high ESR provides a nonspecific response to tissue damage and is an indicator of disease.

Bivariate Analysis

The Relationship between HbA1c Levels and Erythrocyte Sedimentation Rate (ESR) in Type II Diabetes Mellitus Patients at Dr. Rasidin Padang Regional Hospital

The normality Based on the research results, it can be seen that patients with abnormal erythrocyte sedimentation rates (ESR) were more common in patients with diabetes (14 patients (70%), compared to patients with prediabetes (6 patients (27.3%) and patients with normal HbA1c levels (8 patients (61.5%) of type II diabetes mellitus patients at Dr. Rasidin Padang Regional Hospital). Based on the results of the Chi-square test, a p-value of 0.015 ($p<0.05$) was obtained, thus it can be concluded that there is a relationship between HbA1c levels and erythrocyte sedimentation rates (ESR) in patients with type II diabetes mellitus at Dr. Rasidin Padang Regional Hospital.

These research results are supported by research conducted by Adlanta (2022) entitled "The Relationship between HbA1c Levels and Erythrocyte Sedimentation Rates (ESR) at Dr. Pirngadi Medan Regional Hospital." The research results showed a correlation between HbA1c levels and the erythrocyte sedimentation rate (ESR) with a p-value of 0.012 ($p<0.05$) at Dr. Pirngadi Regional General Hospital, Medan.

Erythrocyte sedimentation rate (ESR) is the rate at which erythrocytes settle from a blood sample tested in a specific instrument, expressed in mm/hour (Kiswari, 2016). The first phase, also called the aggregation phase, occurs because during this phase, erythrocytes begin to aggregate, resulting in very slow sedimentation. In the second phase, erythrocyte sedimentation occurs rapidly because after aggregation (adhering to one another), the ratio between their volume and surface area decreases, resulting in faster sedimentation. Rouleaux formation (stacking) also occurs during this phase. In the third phase, the erythrocyte sedimentation rate begins to decrease as the erythrocyte sedimentation rate (ESR) solidifies (Kiswari, 2016).

The researchers hypothesize that the results indicate a relationship between HbA1c levels and the erythrocyte sedimentation rate (ESR) in type II diabetes mellitus patients. This is due to the chronic disease, characterized by hyperglycemia and triggering chronic inflammation. There is an increase in the number of neutrophils in patients with diabetes mellitus experiencing inflammation. In acute inflammation, neutrophils are activated first due to their higher concentration in the blood compared to

mononuclear cells. The transition from neutrophil to lymphocyte activation is also accompanied by apoptosis and phagocytosis of neutrophils, as excessively high neutrophil counts are toxic to surrounding tissues and induce inflammation. The erythrocyte sedimentation rate (ESR) in type II diabetes mellitus (DM) patients is influenced by many factors, the most important of which is chronic inflammation in body tissues, resulting in high blood glucose levels because the body cannot adequately release or utilize insulin. Insulin is a hormone produced by the pancreas that facilitates or controls blood glucose levels by regulating its production and storage. Therefore, inflammation in the body results in a high erythrocyte sedimentation rate (ESR).

Conclusion

Based on the results of data processing and analysis, the following conclusions can be drawn:

1. 40% of patients with type II diabetes mellitus at Dr. Rasidin Padang Regional General Hospital had prediabetic HbA1c levels.
2. 50.9% of patients with type II diabetes mellitus at Dr. Rasidin Padang Regional General Hospital had abnormal erythrocyte sedimentation rates (ESR).
3. There is a relationship between HbA1c levels and erythrocyte sedimentation rates (ESR) in patients with type II diabetes mellitus at Dr. Rasidin Padang Regional General Hospital.

References

1. Aliviameita, A., Puspitasari, P. and Purwanti, Y. (2021) ‘Korelasi Profil Darah Dengan CRP Serum pada Pasien Diabetes Mellitus dengan Ulkus Diabetikum’, the Journal of Muhammadiyah Medical Laboratory Technologist, 4(1), p. 40. Available at: https://doi.org/10.30651/jmlt.v4i1.7242.
2. Aroma,H.,TA Larasati,Reni ,Z.,2013. Hubungan Diet Serat Tinggi dengan Kadar HbA1c Pasien Diabetes Melitus Tipe 2 di RSUD DR.H Diabetes Abdul Moeleok Lampung .Tesis. Fakultas Kedokteran Universitas Lampung .
3. Airin,Q.,I Wayan,PSY.,A.A.Wiradewi ,L.2013. Gambaran Hasil Pemeriksaan Kadar HbA1c Pada Penderita Diabetes Melitus di Laboratorium RSU Surya Husadha Tahun 2013.Tesis. Fakultas Kedokteran Universitas Udayana.

4. Anggeria, E. (2021) Perawatan Diri Pada Pasien Pada Pasien Diabetes Melitus.
5. Bikramjit, P., Raveender, N. and Sudipta, P. (2017) 'The importance of HbA1C and erythrocyte sedimentation rate as prognostic factors in predicting the outcome of diabetic foot ulcer disease', international journal of Advance in Medicine, 4(1), pp. 137–142.
6. Ermawati, N. et al. (2023) 'Hubungan Kadar HbA1c dengan Nilai Laju Endap Darah Pada Penderita Diabetes Melitus Di RSU Daha Husada Kota Kediri', Jurnal Sintesis: Penelitian Sains, Terapan dan Analisisnya, 3(2), pp. 67–74. Available at: https://doi.org/10.56399/jst.v3i2.30.
7. Fickri, D.Z. (2019) 'Journal of Pharmaceutical Care Anwar Medika Artikel Penelitian', Journal of Pharmaceutical Care Anwar Medika, 1(1), pp. 16–24.
8. Fitriani nasution, andilala, ambali azwar siregar (2021) 'Faktor Risiko Kejadian Diabetes Mellitus (Risk Factors For The Event Of Diabetes Mellitus)', ilmu kesehatan medan, 9(2), pp. 94–102.
9. Hartini, Supri. Hubungan HbA1c Terhadap Kadar Glukosa Darah Pada Penderita Diabetes Mellitus di RSUD Abdul Wahab Syahranis Samarinda Tahun 2016. Jurnal Husada Mahakam Volume IV No.3 (Nov 2016) : halaman 171-180.
10. Hal, V.N. and Marbun, V.E. (2021) 'Faktor-Faktor Yang Mempengaruhi Terhadap Kepatuhan Terapi Pada Penderita Diabetes Melitus Tipe 2 di Poli DM RSU Cut Meutia Kabupaten Aceh Utara Tahun 2020 Marbun Viktor E : Faktor-Faktor Yang Mempengaruhi Terhadap Kepatuhan Terapi Pada Penderita Diabetes', BEST Journal (Biology Education, Sains and Technology), 4(2), pp. 64–70. IDF (2019).
11. Kementrian Kesehatan RI, 2014. Pusat Data dan Informasi.Jakarta Selatan
12. Rahmawati, C., Aini and Ramadanti (2019) 'Pengaruh Dosis Antikoagulan EDTA 10% Dan Natrium Sitrat 3,8% Pada Pemeriksaan Laju Endap Darah', Penelitian dan Kajian Ilmiah Kesehatan, 5(1), pp. 79–85. Available at: www.lppm-mfh.com.
13. RSUD Banjarnegara. 2021. Peran Pemeriksaan HbA1c Dalam Penetentuan Dan Pemantauan Penyakit Diabetes (https://rsud.banjarnegarakab.go.id/?p=1748 diakses tanggal 08 Juni 2023).
14. Sarihati, I.G.A.D., Karimah, H.N. and Habibah, N. (2019) 'Gambaaran Kadar HbA1C Pada Pasien Diabetes Melitus Tipe 2 DI RSUD Wangyana', Meditory : The Journal of Medical Laboratory, 6(2), pp. 88–98. Available at:

https://doi.org/10.33992/m.v6i2.442.

15. Susilo, A.S. et al. (2020) 'Korelasi Nilai HbA1c dengan Kadar Kolesterol Total pada Pasien Diabetes Mellitus Tipe 2 Pendahuluan', Jurnal Ilmiah Kesehatan, 9, pp. 640–645.
16. Sartika, Fera, Nurul Hestiani. Kadar HbA1c Pada Pasien Wanita Penderita Diabetes Mellitus Di RSUD dr. DORIS SYLVANUS Palangka Raya. Borneo Journal Of Medical Laboratory Technology Volume 2 No.1 (Okt 2019) : ISSN 2622-6111.
17. Sihombing, Jenny Ria, Eka Margareta. Analisa Kabar HbA1c Pada Penderita Diabetes Mellitus Tipe 2 di RSU Martha Friska Multatuli Meda.
18. Sri Rahayu,P.,Harsinem,S.2014. Peranan Pemeriksaan Hemoglobin A1c pada Pengelolaan Diabetes Melitus. Sub bagian Endoktrin Metabolik Diabetes Bagian Ilmu Penyakit Dalam. Fakultas Kedokteran universitas Hasanudin,Makasar.
19. Soegondo,S.2007. Penatalaksanaan Diabetes Terpadu. Fakultas kedokteran Univrsitas Indonesia.Jakarta.
20. Perkeni, 2021. Pedoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Di Indonesia 2021. ISBN : 978-60-53035-5-5 (Juli 2021) : PB PERKENI.
21. Putri, Y.T. and Nusadewiarti, A. (2020) 'Management of Type 2 Diabetes Melitus Patient with Diabetic Neuropathy and Retinopathy Through The Family Medicine Approach', Medula, 9(4), pp. 631–638.
22. Tandra,H. 2008. Panduan Lengkap Mengenal dan Mengatasi Diabetes dengan cepat dan mudah. Gramedia Pustaka utama,Jakarta
23. Wulandari, Julik. 2019. Perbedaan Hasil Pemeriksaan Glukosa Dara Menggunakan Alat POCT dengan Fotometer (Karya Tulis Ilmiah). Prodi Analis Kesehatan : Poltekkes Kemenkes Kupang.
24. WHO and International Diabetes Federation. 2009. Definition and Diagnosis of Diabetes Mellitus and Intermediate Hyperglycemia. Atlas Diabetes.
25. Hardjoeno,H. 2003. Interprestasi Hasil Tes Laboratorium Diagnostik. Jakarta: EGC

E-ISSN: 2987-209X
International Journal of Midwifery and Health Sciences
Vol. 3, Issue 2 (2025), July

Effect Of Red Amber (Amaranthus Tricolor L.) Extract on Soil-Transmitted Helminth Worm Egg Morphology as a Substitute for 2% Eosin

Arniat Christiani Telambanua [1*], Sri Handayani [2]

[1,2]Applied Bachelor Study Program, Medical Laboratory Technology, Syedza Saintika University

**Applied Bachelor's Study Program, Medical Laboratory Technology*

Syedza Saintika University, Indonesia, christianiarniat@gmail.com

Submission date: 20-6-2025; Date of receipt: 10-7-2025

Abstract

The prevalence of worm disease in Indonesia is around 45-65%. The cause of worm infections that are still common in Indonesia is intestinal nematodes. The intestinal nematode group inhabits the digestive tract and is classified within the Soil-Transmitted Helminths group. This group requires contact with warm and moist soil to reach an infective form. Clinically important soil-transmitted helminth species that infect humans are Ascaris Lumbricoides (roundworm), Trichuris Trichiura (whipworm), Anylostoma Duodenale, and Necator Americanus. This study aimed to determine the effect of red spinach extract (Amaranthus tricolor L.) on the morphology of soil-transmitted helminth eggs as a substitute for 2% Eosin. The research method used was experimental research, and the design used was Statistical Group Comparison. The results of this study are that red spinach extract (Amaranthus tricolor L.) can be used as an alternative coloring in the microscopic examination of soil-transmitted helminth worm eggs. A concentration of 1:1 shows the optimal concentration that can color Soil Transmitted Helminth worm eggs.

Keywords: Red Spinach Extract, Soil-Transmitted Helmints

Introduction

Worm infestation is one of the most common infections worldwide. According to the World Health Organization (WHO), in 2023, approximately 1.5 billion people, or 24% of the world's population, were infected with worms. In Southeast Asia, soil-

transmitted helminth infections reached 500 million people, and 11 countries were categorized as endemic, including Indonesia. Indonesia ranks second in Southeast Asia for the need for worm treatment in children, with a percentage of 15%, after India, which is the priority, with a percentage of 61%. Worm infestation remains a significant public health issue, especially in Indonesia. The prevalence of worm infestation in Indonesia is still high, at around 45-65%. Poor sanitation in tropical and subtropical regions can reach 80% due to poor sanitation. Indonesia, with its tropical climate and high humidity, allows worm eggs and larvae to thrive (Rahmayanti, 2024). Pekanbaru City is one of the cities where cases of worm infestation are still prevalent. In 2012, data from the Pekanbaru City Health Office recorded 2,285 cases of worm infestation from 20 community health centers (Kartini, 2016).

The most common cause of worm infections in Indonesia is intestinal nematodes. This group of intestinal nematodes lives in the digestive tract and belongs to the soil-transmitted helminth group. This group requires contact with warm, moist soil to reach its infective form. Clinically important soil-transmitted helminth species that infect humans include Ascaris lumbricoides (roundworm), Trichuris trichiura (whipworm), Ancylostoma duodenale, and Necator americanus (Arisandi, 2024).

Examination is essential to identify worm infections, both on live worms and on smears. The worms are examined depending on the type of parasite. Intestinal worms or protozoa are examined through feces (Rusmanto, 2012). The native method using 2% eosin reagent is the simplest method for examining intestinal nematode eggs. This reagent has an acidic composition and is orange-red (Hurbelubun, 2011).

The native method using 2% eosin requires a large amount of reagent and is quite expensive; therefore, alternative dyes are needed to visualize the morphology of

intestinal nematode eggs. Several plants can be used as alternative natural dyes, including red spinach (Amaranthus tricolor L.). The pigment found in red spinach is anthocyanin, which gives plants and fruits their purplish-red color (Juliastuti et al., 2021).

Based on research by Ningsih, Salnus, and Novriani (2023), hibiscus flower extract (Hibiscus rosa-sinesis L.) can be used as an alternative dye in the examination of soil-transmitted helminth eggs, but it is not as good as eosin dye because it can only differentiate worm eggs from feces and does not absorb into the worm egg cells.

Based on this background, the authors are very interested in knowing whether red spinach extract (Amaranthus tricolor L.) can be an alternative dye for the examination of soil-transmitted helminth eggs, replacing 2% eosin.

Method

The type of research used is Experimental research, where this research will see the clarity of the shape and color of worm eggs in preparations using red spinach extract (Amaranthus tricolor L.) as an alternative dye in the examination of Transmitted Helminth worm eggs with concentration variations of 1:1, 1:2, 1:3, 1:4, 1:5, and 2% eosin as a control. This research uses a Static Group Comparison design, namely, a group is given a certain treatment, then the effect of the results of each variation in staining time is observed. The population in this study was all fecal samples positive for soil-transmitted helminth eggs. The samples used in this study were fecal samples positive for soil-transmitted helminths in specimens at the Thamrin Pekanbaru Clinical Laboratory. The results of staining Soil Transmitted Helminths eggs using red spinach extract (Amaranthus tricolor L.) were compared with the results of staining Soil Transmitted Helminths eggs using 2% Eosin as a control.

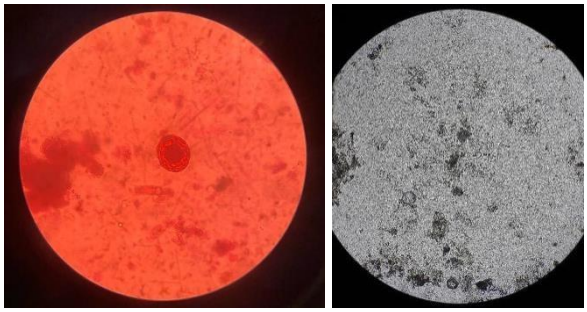
The data processing for this study refers to the effectiveness research criteria. The results of this study were scored 1, 2, and 3, with the following criteria referring to research (Oktari and Mutamir, 2017):

1. A score of 1 is given if the field of view lacks contrast, the worm eggs do not absorb color, and the parts of the worm eggs are not clearly visible.
2. A score of 2 is given if the field of view lacks contrast, the worm eggs do not absorb color, and the parts of the worm eggs are not clearly visible.
3. A score of 3 is given if the field of view has contrast, the worm eggs absorb color, and the parts of the worm eggs are clearly visible.

Results

In a study on optimizing red spinach (Amaranthus tricolor L.) extract, fecal samples positive for Soil-Transmitted Helminths (STH) eggs were used. The red spinach extract was then diluted with distilled water at 1:1, 1:2, 1:3, 1:4, and 1:5 dilutions. The dilutions were then observed using a microscope at 10x to 40x magnification. The following comparisons were made by observing the color of the worm eggs in the results of staining with 2% Eosin, without staining, and red spinach extract concentrations of 1:1, 1:2, 1:3, 1:4, and 1:5. The results of the study for each treatment are shown in the following figure:

Figure 1: Staining using eosin and without eosin



A B

A = Staining with Eosin.

B = Without Staining.

Figure 2: Coloring with Red Spinach Extract Concentration 1:1

Figure 3: Coloring with Red Spinach Extract at a Concentration of 1:2

Figure 4: Coloring with Red Spinach Extract Concentration 1:3

Figure 5: Coloring with Red Spinach Extract Concentration 1:4

Figure 6: Coloring with Red Spinach Extract Concentration 1:5

Based on Figure 1, when compared with Figures 2 to 6, which are stained with spinach extract, it is found that Figure 2, which is stained with 1:1 red spinach extract, gives almost the same results as Figure 1A, which is stained with 2% Eosin. The quality of staining using 1:1 red spinach extract and 2% Eosin provides a bright background color, a clear egg shape, and can be distinguished from feces. This is different from worm eggs without being stained, which can be seen in Figure 1B and cannot be distinguished from feces.

Discussion

Optimization of Red Spinach Extract

This study used fecal samples positive for Soil-Transmitted Helminths (STH) as test samples. This study examined whether there were significant differences between alternative staining methods using red spinach extract at concentrations of 1:1, 1:2, 1:3, 1:4, and 1:5 compared to 2% Eosin staining as a control for the test samples.

After the study, the results of the comparisons of red spinach extract at concentrations of 1:1, 1:2, 1:3, 1:4, and 1:5 were included in the effectiveness research criteria. The test results were given scores of 1, 2, and 3, based on the research conducted by Oktari and Mutamir (2017).

The results of the 1:1 comparison of red spinach extract were given a score of 2 because the visual field lacked contrast, the helminth eggs did not absorb the color, and the egg parts were not clearly visible. Meanwhile, the results of a 1:2 to 1:5 ratio were given a score of 1 because the visual field lacked contrast, the worm eggs did not absorb the dye, and the worm egg parts were not clearly visible.

Staining using red spinach extract at a 1:1 concentration showed quite good results when observed microscopically; the background of the visual field lacked contrast, the worm eggs did not absorb the dye, and the egg parts were not clearly visible. Furthermore, microscopically, the color of the eggs and feces was clear and distinguishable.

Anthocyanins belong to the flavonoid group. The pigment colors produced by anthocyanins are red, orange, blue, and violet. Red spinach is one of the plants that produces red anthocyanins (Saati et al., 2019). This is supported by research conducted by Charolin Pebrianti, RB. Ainurrasyid and Sri Lestari Purnamaningsih (2015) stated

that red spinach produces anthocyanin levels of 6350 ppm in the leaves and 2480 ppm in the stems. Therefore, red spinach can be used as an alternative to eosin due to its high anthocyanin content.

Plant dyes or pigments are extracted using solvents that match the polarity of the substance to be extracted. Extraction of flavonoid compounds is recommended under acidic conditions because the acid denatures plant cell membranes, then dissolves the anthocyanin pigments so they can be released from the cells, and prevents flavonoid oxidation. Anthocyanin pigment content in plants is influenced by several factors, especially sunlight (intensity), air temperature, and pH. Anthocyanins are stable at pH 3-5 and temperatures of 50°C, and during storage at 4°C (Eppang et al., 2020).

One study using plant extracts as dyes was conducted by Fasya Fatarani Nadhira, Mamat Rahmat, Yuliansyah Sundara Mulia, and Zuri Rismiarti (2023). They used teak wood extract as an alternative to eosin in the examination of soil-transmitted helminth eggs. They found that teak wood extract was effective as an alternative dye to 2% eosin in the examination of soil-transmitted helminth eggs. This is due to teak wood being a plant containing anthocyanins.

This study concluded that red amaranth (Amaranthus tricolor L.) can be used as an alternative dye for soil-transmitted helminth eggs. The results of this study are also supported by research conducted in 2022 by Lina Yunda Artanti, Hendra Budi Sungkawa, Herlinda Djohan, Ari Nuswantoro and Riska Alfianita, which stated that the juice of red spinach stems can be used as an alternative dye for Soil Transmitted Helminth eggs, which at a concentration of 1: 1 produces a contrasting color close to Eosin.

Conclusion

Based on the results of research conducted on the effectiveness of red spinach extract (Amaranthus tricolor L.) as an alternative stain for microscopic examination of soil-transmitted helminth eggs, it can be concluded that:

1. Red spinach extract (Amaranthus tricolor L.) can be used as an alternative stain for microscopic examination of soil-transmitted helminth eggs, but not as an eosin stain because it only differentiates helminth eggs from feces and does not penetrate the helminth egg cells.

2. A 1:1 concentration indicates the optimal concentration for staining soil-transmitted helminth eggs.
3. Staining with red spinach extract allows for visualization of the morphology of soil-transmitted helminth eggs.

References

1. Abdurrahman, S., Nur Intan, W. O., dan Amraeni, Y. 2023. Pemanfaatan Limbah Kulit Bawang Merah (Allium cepa) Sebagai Alternatif Pengganti Eosin 2% Pada Pemeriksaan Telur cacing Soil Transmitted Helminths. Jurnal MediLab Mandala Waluya,VII(2):182-194.
2. Aman, A.T. & Mulyaningsih, B (Eds). 2021. Sistem Gastrointestinal, Hepatobiliar, Pankreas. Gadjah Mada University Press: Yogyakarta.
3. Arisandi, D. 2024. Parasitologi. PT Media Pustaka Indo: Jawa Tengah.
4. Gandahusada, S. W., Pribadi dan D. I. Herry. 2010. Parasitologi Kedokteran.Fakultas Kedokteran UI: Jakarta.
5. Harbelubun, A. E., Kesulija, E. M., dan Rahawarin, Y. Y. 2011. Tumbuhan Pewarna Alami Dan Pemanfaatannya Secara Tradisional oleh Suku Marori Men-Gey Di Taman Nasional Wasur Kabupaten Merauke. Biodiversitas,VI(4):281-284.
6. Ideham, B. & Pusarawati, S. 2012. Helmintologi Kedokteran. Airlangga University Press: Surabaya.
7. Juliastuti, H. & Yuslianti, E.R (Eds). 2021. Sayur Dan Buah Berwarna Merah, Antioksidan Penangkal Radikal Bebas. CV Budi Utama: Yogyakarta.
8. Kartini, S. 2016. Kejadian Kecacingan Pada Siswa Sekolah Dasar Negeri Kecamatan Rumbai Pesisir Pekanbaru. Jurnal Kesehatan Komunitas,III(2):53-59.
9. Nadhira, F.F., Rahmat, M., Mulia, Y.S., & Rismiarti, Z. 2023. Ekstrak Daun Jati Sebagai Alternatif Pengganti Eosin Dalam Pemeriksaan Telur Cacing Golongan Soil Transmitted Helminth. Jurnal Kesehatan Siliwangi,IV(1):165- 171.
10. Ningsih, R., Salnus, S., dan Novriani, A. H. 2023. Uji Efektifitas Penggunaan Sari Bunga Kembang Sepatu (Hibiscus Rosa Sinensis-L) Sebagai Alternatif Pengganti Eosin 2% Pada Pemeriksaan Telur Cacing Soil Transmitted Helminths. Jurnal Farmasi, Kesehatan Dan sains (FASKES), I(3):150-157.
11. Rahmayanti. 2024. Akibat Soil Transmitted Helmints (STH). NEM: Jawa Tengah.

12. Regina, M.P., Halleyantoro, R. & Bakri, S. 2018. Perbandingan Pemeriksaan Tinja Antara Metode Sedimentasi Biasa Dan Metode Sediemntasi Formol- Ether Dalam Mendeteksi Soil Transmitted Helmint. Junal Kedokteran Diponegoro,VII(2):527-537.
13. Rusmanto, D. dan Mukono, J. 2012. Hubungan Personal Higyene Siswa Sekolah Dasar Dengan Kejadian Kecacingan. The Indonesian Journal of Public Health,8:105-111
14. Sardjono, T.W. 2020. Helmintologi Kedokteran Dan Veteriner. UB Press: Malang.
15. Sulaeman, Amtaran, N.P.Y., Mulia, Y.S., & Wahyuni, Y. 2023. Pemanfataan Sari Buah Binahong (Anredera cordifolia Ten.) Sebagai Pewarna Pada Pemeriksaan Telur Cacing Soil Transmitted Helminth Pengganti Eosin 2%. Jurnal Kesehatan Siliwangi,IV(1):381-389.
16. Wahyuni, D. 2019. Buku Ajar Dasar Biomedik Lanjutan. CV Budi Utama: Yogyakarta.
17. Widodo. 2013. Parasitologi Kedokteran. D-Medika: Yogyakarta. Widyarati, A. 2023. Penyakit Menular. Bumi Aksara: Jakarta Timur