JOURNAL MIDWIFERY (JM)
Jurnal Jurusan Kebidanan, Poltekkes Kemenkes Gorontalo
P-ISSN (2407-8506), E-ISSN (2808-523X)
http://jurnal.poltekkesgorontalo.ac.id/index.php/JM/index
DOI: http://dx.doi.org/10.52365/jm.v8i1.377

Green Betel Leaf Water with Pure Honey Against Healing Perineum's Wounds Mother Postpartum

Robin Dompas [1], Agnes Montolalu [2], Trifena Gabriely Koloay [3]
[1,2,3] Poltekkes Kemenkes Manado, Jl. R. W. Mongisidi Malalayang II, Manado, Sulawesi Utara, 95263, Indonesia
Email: rob.dmps@gmail.com[1], agnes.montolalu@gmail.com[2], fenagk@gmail.com[3]

Received: February 9th, 2022; Revised: March 14th, 2022; Accepted: March 21th, 2022

ABSTRACT

Many postpartum mothers die from perineal injuries. Perineal infection can occur if the perineal wound is not treated correctly and correctly. This study was conducted to assess the effectiveness of healing wounds perineum postpartum mothers using green betel leaves and pure honey. This type of research is pre-experimental using one pretest group-posttest design. The number of 20 samples is determined by purposive sampling. Intervention is done using betel leaf decoction water to rinse perineal wounds for one week. Water is made from 5 sheets of betel leaves boiled with 1000 millilitres of water for 30 minutes to 600 millilitres. Data collection uses observation sheets filled in before and after the intervention. Analysis of data using the McNemar test obtained the result of the P-value 0.021 with the meaning <0.05. The results showed an effect of giving green betel leaf water and consuming pure honey to heal perineal wounds in postpartum mothers, so it is recommended that postpartum mothers suffering from perineal wounds use a decoction of green betel leaf water to rinse the perineum and consumption. Pure honey because of the benefits and content obtained in green betel leaves and pure honey in healing perineal wounds.

Keywords: Green Betel, Honey, Perineum, Wounds

*Robin Dompas, Poltekkes Kemenkes Manado, Jl. R. W. Mongisidi Malalayang II, Manado, Sulawesi Utara, 95263, Indonesia, *rob.dmps@gmail.com*

INTRODUCTION

Tearing perineum or need of the birth canal is an event that occurs at the time of birth of the baby either using tools or not using tools. The incidence of perineal rupture in maternity mothers worldwide was 2.7 million cases, of which this figure is expected to reach 6.3 million by 2050 (Taukoorah et al., 2018). While in Asia itself, 50% of maternity mothers experience perineum rupture (Suriani et al., 2021). A study from the Bandung research and development center conducted research in several provinces in Indonesia found that one in five maternity mothers who experienced perineal rupture died as much as 20% (Agustini et al., 2021).

In countries in Asia, the incidence *of perineum rupture* is also a considerable problem in society, 50% of the incidence of *perineum rupture* in the world occurs in Asia (Rouse et al., 2019). Prevalence of maternity mothers who experience a *perineal rupture* in Indonesia 52% due to childbirth with a baby birth weight is enough or more (Anugrahwati et al., 2018). The importance of the baby is born the stretching of the perineum so that it is easy to rupture in the perineum (Shimpuku et al., 2021). But on the land, the practice of perineum rupture still occurs even though the baby is not very large, be it spontaneous rupture or intentional rupture (episiotomy)(Kuster et al., 2022). According to clinical training, in 2018, spontaneous rupture of the vagina or perineum can occur when the head and shoulders are born. Tears will increase if the baby is born too quickly and uncontrollably (Astuti, 2021).

Until now, the mother giving birth with rupture perineum wounds still needs to be considered because it can cause dysfunction of the female reproductive organs, as a source of bleeding and the inflow of infection, which leads to death due to bleeding or sepsis (Dey et al., 2018).

According to WHO, maternal mortality from the Inter-Census Population Survey (SUPAS) results in a maternal mortality rate of 305 per 100,000 live births, with postpartum infections being the second leading cause of maternal death in Indonesia after bleeding. Maternal mortality rates known since long ago until now have not changed much. The average maternal mortality rate reached 359 per 100 thousand live births based on this. The average death is far higher than the results, which achieved 228 per 100 thousand and far from the government target contained and based on the results of has dropped to 305 per 100 thousand live births (Dey et al., 2016b). However, the maternal

mortality rate is still high even though there has been a decrease compared to the previous year (Underwood et al., 2022).

Factors that cause postpartum infection can come from the need for a birth canal which is a suitable medium for the development of germs. This is due to low maternal endurance after childbirth, poor care and poor hygiene in need for the birth canal (Din'ni & Meliati, 2021). Inadequate treatment of the perineum results in the condition of the perineum affected by lochea becoming moist. It will significantly support the proliferation of bacteria that cause the onset of infection in the perineum, which can inhibit wounds' healing process (Yang & Florio, 2021). Usually, wounds in this perineal tear will heal varied. Some typically recover, and some experience slowness in healing. This is influenced by several things, including the characteristics of the birth mother, nutritional status, condition of need and treatment (Fatimawali et al., 2021).

Betel leaf is one plant with a therapeutic effect and is a diuretic analgesic that cools, anti germs, antioxidant, anti-inflammatory, antibacterial, antibiotic and antifungal. Betel leaves contain essential oils 4.2%, hydroxyivacikol, chavicol 7.2-16.7%, chavibetol 2.7–6.2%, allypyrokatekol 26.8 –42.5 %, cineol 2.4 – 4.8 %, caryophyllene 3 – 9.8 %, phenyl, estragole, terpinene (Yusriah et al., 2021) diastase, starch sugar, arecoline, eugenol, cineole, 2.2 – 5.6 % carvacrol, cadinene, propane, 1 - 1.3 % tannin, sesquiterpene, and samac. Benefits of betel leaves can prevent and cure various diseases, namely: vaginal discharge, relieve inflammation such as orchitis, arthritis, accelerate the healing of bruises or abrasions (Zaman et al., 2021).

Antibacterial and antiseptic properties are also possessed by honey. Honey is the only food consumed by humans produced by insects. Honey can speed up the healing process of burns due to boiling water or hot oil (Handelzalts et al., 2022). Honey's antibacterial properties also help overcome infections in its needs, and anti-inflammatory can reduce pain and circulation that affect the healing process in stimulating the growth of new tissue to accelerate wound healing and minimize scarring on the skin (Ibrahim, 2021). Honey contains many antioxidant compounds and antibiotics (antibacterial). The content plays a role in strengthening the body's endurance. Antibiotic content can also reduce the incidence of infection in mothers who have just given birth, especially in mothers who give birth by caesarean section (Zhang et al., 2022).

Data from Clinic in 2018 stated that of the 259 spontaneous maternity mothers who experienced rupture perineum, as many as 217 people (83.8%) and those who did not

experience rupture perineum as many as 42 people (16.2%) (Kuster et al., 2022).

Efforts usually made to heal wounds are only made from one of the interventions. In this study, efforts are made by combining wound care by rinsing perineal wounds with green betel leaf boiled water done from the outside and by increasing endurance by consuming pure honey so that it is hoped that the results of this study can shorten the time of wound healing in the mother so that the number of pain in the mother can be lowered. This study aims to determine the effectiveness of using green betel leaf boiled water and the consumption of pure honey to treat perineal wounds during postpartum.

METHOD

This type of research used quasi-experiments with pretest-posttest research design, only one group design. On the subject, pretest first before giving green betel leaf water and pure honey 14 times during the week, when the mother finishes bathing in the morning and evening. Water is made from 5 sheets of betel leaves boiled with 1000 millilitres of water for 30 minutes to 600 millilitres, Then continued with a posttest to determine the effectiveness of providing green betel leaf water and pure love to the healing of perineal wounds in postpartum mothers. The location and time of this study was conducted at Sifra Langowan Clinic

The population in the study were all postpartum mothers at Sifra Langowan Clinic. The sampling technique in this study was using nonprobability sampling techniques with total sampling types. So that the total sample used in this study was 20 respondents.

The sample size formula used is the sample's large formula for the two-mean independent test. Using instruments in the form of *informed consent* sheets is a form of consent between researchers and respondents who will be examined by giving consent sheets. An observation sheet is a direct observation of an object in the ongoing environment covering various activities that focus on studying things using sense.

Data collection is retrieved or obtained from primary and secondary data. The data analysis used is *univariate bivariate* using *mc near* statistical tests. This research has released kepk poltekkes Kemenkes Manado with sorat No.322 / KEPK / VIII / 2019.

RESULT AND DISCUSSION

Result

Based on table 1, it can be seen that of the 20 respondents, primarily aged 20-35

years with 19 respondents (95%), most of the respondents of intervention groups are multigravida, most respondents of intervention groups have high school / vocational education**.** Most of the mothers at Sifra Langowan Maternity Clinic work as a housewife. The study respondents mostly gave birth to babies with birth weight > 3,000 grams amounting to 13 respondents (65%), which can be seen in the table below

Table 1. Distribution of respondents by characteristics of age, parity, education, occupation and birth weight

	f (n= 20)	%
Age		
< 20 years	1	5
20 - 35 years	19	95
Parity		
Primigravida	6	30
Multigravida	14	70
Education		
First Intermediate Sekolah	7	35
Upper Intermediate Sekolah	12	60
College	1	5
Work		
Self-employed	1	5
Housewife	19	95

Source: Primary Data

Based on table 2, it can be seen that out of 20 respondents using *pre-post Crosstabulation* found on (*pre)* before treatment, and there were 16 respondents (80%) who suffered moderate injuries. In comparison, minor injuries were found 4 respondents (20%) who suffered minor injuries and on *(post).* After treatment, 9 respondents (60%) experienced total healing wounds who had previously suffered moderate injuries and three respondents (40%) who experienced full healing wounds who had previously suffered minor injuries. And it can be seen that the *Mc Nemar test,* with a significant number that can be 0.021 is = ($p < 0.05$), means there is a substantial difference in the length of healing of perineal wounds between before treatment and after treatment perineum wounds.

The distribution of respondents by age is highest in the age group of 20-35 years, with a total of 19 respondents (95%) and 1 respondent (5%) aged <20 years. This suggests that most respondents in the age group are not at risk**.** The distribution of respondents by parity is most in the multigravid group, with 14 respondents (70%) and six (30%) primigravida. This indicates that most of the respondents in the multigravida group in question already have children > 1. (Kim et al., 2021)

The distribution of respondents by education is the most in the high school group with a total of 12 respondents (60%), junior high school seven

respondents (35%), and college 1 respondent (5%). This suggests that most respondents have a high school education so that a person's level of education can increase his knowledge and reasoning and better understand the importance of health. (Suriani et al., 2021)

The respondents' occupation distribution is the most in the housewife group with 19 respondents (95%), and self-employed one respondent (5%). This indicates that most of the respondents were in the housewife group. The distribution of respondents by birth weight was highest in the > 3000-gram group with a total of 13 respondents (65%) and ≤3000 grams 7 respondents (35%). This shows that most respondents gave birth to babies with a baby weight born >3000 grams.

Table 2. Analysis of respondents by the state of perineal injuries using *the Mc Nemar test*

		Total	Posttest		p
			(-)	(+)	
Pretest	(-)	16	7	9	0,021
	(+)	4	1	3	
Source: Primary Data		20	8	12	

Discussion

A wound is the disconnection of tissue continuity due to injury or surgery. These wounds can be classified based on anatomical structure, properties, healing process and length of healing. As for the nature of abrasion, contusion, incision (iris), laceration, open, penetration, puncture, sepsis. While wound care is an action to kill microorganisms. (Kim et al., 2021)

Wound healing occurs the organism's response to tissue or organ damage and efforts to restore in conditions of homeostasis so that the physiological stability of tissues or organs in the skin occurs rearrangement of skin tissue characterized by the formation of a functional epithelium that covers the wound. (Suriani et al., 2021)

As a response to damaged tissue, the body has a fantastic ability to replace lost tissue, repair its structure, strength, and sometimes function. Wound healing can also involve the integration of physiological processes. The healing properties of all wounds are the same, with variations depending on the location of the wound, the severity of the wound and the extent of the injury. In addition, wound healing is affected by the ability of cells and tissues to regenerate.

Before giving a decoction of green betel leaf water and pure honey against the healing of perineal wounds in postpartum mothers at the Sifra Langowan maternity clinic in 2019, the results of the test before the provision of green betel leaf water decoction and pure honey, as many as 20 respondents have participated in starting following but after observation on average patients have 100% perineal wounds ranging from mild perineal injuries four respondents (20%) to moderate 16 respondents (80%). (Lagashetty et al., 2019)

After the *posttest,* after being given a decoction of green betel leaf water and pure honey against the healing of perineal wounds in postpartum mothers at Sifra Langowan Maternity Clinic in 2019. (Burgess et al., 2020) The results of the test after the provision of green betel leaf water decoction and pure honey, as many as 20 respondents have participated in starting consuming pure honey and flushing vulva hygiene with a decoction of green betel leaf water and after observation during the administration one week after treatment there were 12 respondents (60%) who experienced a total healing wound in question, namely (4 respondents who suffered minor injuries). (Shimpuku et al., 2021) After the intervention that experienced natural healing, namely three respondents and one respondent still have not recovered completely and 16 respondents who suffered moderate injuries after the intervention that experienced total healing, namely nine respondents and seven respondents still have not recovered completely, so the total number of people who recovered totally from minor and moderate injuries is 12 respondents (60%) & the overall number who have not recovered totally from minor injuries and mild injuries is eight respondents (40%). (Rouse et al., 2019)

Another benefit of betel leaves is to speed up the healing of burns. Oxidative stress that causes wound healing to take longer can be relieved with betel leaves. Not only that, but betel leaves also contain polyphenols that provide infection protection. (Taukoorah et al., 2016)

Betel leaves (Piper betel) contain chavicol that can be used for traditional treatments, including to kill germs, antioxidation, fungicides and antifungals. This study wants to know the function of kavikol, which has antiseptic power in accelerating the healing of perineal wounds in postpartum mothers used during vulva hygiene. (Shimpuku et al., 2021) The research method consists of three stages; the first stage is to extract betel leaves to obtain chavicol with boiling techniques for 10, 15 and 20 minutes with a temperature of 100°C and perform chemical and

characteristic tests. (Suriani et al., 2021) The second stage is implementing chavicol extract for vulva hygiene in gifts mothers against the speed of healing perineum wounds. (Zhang et al., 2022) The study concludes that the highest levels of chavicol are found in the boiling of betel leaf boiled water with a time of 20 minutes and from the results of data retrieval and observation from 19 respondents who obtained data that perineum stitch wounds in gifts mothers healed and dried out on the 3-4th day of postpartum. There were no signs of infection, While the results of interviews with respondents obtained information that respondents stated that pain in perineal stitch wounds also quickly reduced and felt tighter.

In some samples, the unsuccessful interventions were caused by several factors such as general pathophysiological factors, for example, cardiovascular disorders, malnutrition, metabolic and endocrine disorders, decreased resistance to infection and common physiological factors related to age and local adverse conditions at the site of the wound, excessive exudation, dehydration, wound infection, recurrent trauma, decrease in wound temperature, poor blood supply, oedema, local hypoxia, necrotic tissue, extensive tissue peeling, excessive metabolic products, and foreign bodies. (Taukoorah et al., 2016)

The limitations of this study contradict the theory that the inflammatory phase lasts for 1 to 4 days but in this study intervened with a duration of one week or 7 days. In addition, the study also did not use the control group as a comparison.

CONCLUSION

There is an effect of giving a decoction of green betel leaf water and pure honey on the healing of perineal wounds in postpartum mothers**)**. recommended that postpartum mothers suffering from perineal wounds use a decoction of green betel leaf water to rinse the perineum and consumption. Pure honey because of the benefits and content obtained in green betel leaves and pure honey in healing perineal wounds.

ACKNOWLEDGEMENT

The author thanked the Director of Poltekkes Kemenkes Manado, who had to permit to conduct research and the Sifara Langowan Maternity Clinic

REFERENCES

Agustini, R. D., Wahyuni, S., Buheli, K. L., & Suherlin, I. (2021). Determinan Pemberian ASI Eksklusif. *Journal Midwifery Jurusan Kebidanan Politeknik Kesehatan Gorontalo*,

7(1), 44. https://doi.org/10.52365/jm.v7i1.321

Anugrahwati, M., Purwaningsih, T., Rustina, Manggalarini, J. A., Alnavis, N. B., Wulandari, D. N., & Pranowo, H. D. (2016). Extraction of Ethanolic Extract of Red Betel Leaves and Its Cytotoxicity Test on HeLa Cells. *Procedia Engineering*, *148*, 1402–1407. https://doi.org/10.1016/j.proeng.2016.06.569

Astuti, S. C. D. (2021). Sikap Ibu Hamil terhadap Inisiasi Menyusu Dini. *Journal Midwifery Jurusan Kebidanan Politeknik Kesehatan Gorontalo*, *6*(1), 27. https://doi.org/10.52365/jm.v6i1.319

Burgess, A., Clark, S., Dongarwar, D., & Salihu, H. (2020). 5: Hospital maternal mortality rates are falling, overall maternal mortality still rises: Implications for forward movement. *American Journal of Obstetrics and Gynecology*, *222*(1), S5. https://doi.org/10.1016/j.ajog.2019.11.021

Dey, A. K., Sharma, M., & Meshram, M. R. (2016a). An Analysis of Leaf Chlorophyll Measurement Method Using Chlorophyll Meter and Image Processing Technique. *Procedia Computer Science*, *85*(Cms), 286–292. https://doi.org/10.1016/j.procs.2016.05.235

Dey, A. K., Sharma, M., & Meshram, M. R. (2016b). Image Processing Based Leaf Rot Disease, Detection of Betel Vine (Piper BetleL.). *Procedia Computer Science*, *85*(Cms), 748–754. https://doi.org/10.1016/j.procs.2016.05.262

Din'ni, S. K., & Meliati, L. (2021). Teknik Perawatan Tali Pusat terhadap Pelepasan Tali Pusat. *Journal Midwifery Jurusan Kebidanan Politeknik Kesehatan Gorontalo*, *7*(2), 54. https://doi.org/10.52365/jm.v7i2.306

Fatimawali, Maulana, R. R., Windah, A. L. L., Wahongan, I. F., Tumilaar, S. G., Adam, A. A., Kepel, B. J., Bodhi, W., & Tallei, T. E. (2021). Data on the docking of phytoconstituents of betel plant and matcha green tea on SARS-CoV-2. *Data in Brief*, *36*, 107049. https://doi.org/10.1016/j.dib.2021.107049

Handelzalts, J. E., Hairston, I. S., Levy, S., Orkaby, N., Krissi, H., & Peled, Y. (2022). COVID-19 related worry moderates the association between postpartum depression and mother-infant bonding: A longitudinal study. *Journal of Psychiatric Research*, *149*(February), 83–86. https://doi.org/10.1016/j.jpsychires.2022.02.039

Ibrahim, F. (2021). Penerapan Pijat Oksitosin dan Marmet untuk Meningkatkan Produksi ASI Ibu Nifas. *Journal Midwifery Jurusan Kebidanan Politeknik Kesehatan Gorontalo*, *6*(2), 73. https://doi.org/10.52365/jm.v6i2.317

Kim, E. T., Lillie, M., Gallis, J., Hembling, J., McEwan, E., Opiyo, T., Acayo, P., & Baumgartner, J. N. (2021). Correlates of early stimulation activities among mothers of children under age two in Siaya County, Kenya: Maternal mental health and other maternal, child, and household factors. *Social Science and Medicine*, *287*(May 2020), 114369. https://doi.org/10.1016/j.socscimed.2021.114369

Kuster, A., Lee, K. A., & Sligar, K.

(2022). Quality Improvement Project to Increase Postpartum Clinic Visits for Publicly Insured Women. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *March*, 1–11. https://doi.org/10.1016/j.jogn.2022.01.002

Kusumanti, E., & Sugiharto, S. (2017). Effect of dietary supplementation of binahong leaf meal, betel nut meal or their combination on serum albumin and globulin, fecal endoparasites and bacterial counts in milk of Saanen goats suffering from subclinical mastitis. *Agriculture and Natural Resources*, *51*(5), 415–419. https://doi.org/10.1016/j.anres.2017.11.005

Lagashetty, A., Ganiger, S. K., & Shashidhar. (2019). Synthesis, characterization and antibacterial study of Ag–Au Bi-metallic nanocomposite by bioreduction using piper betle leaf extract. *Heliyon*, *5*(12), e02794. https://doi.org/10.1016/j.heliyon.2019.e02794

Rouse, C. E., Eckert, L. O., Muñoz, F. M., Stringer, J. S. A., Kochhar, S., Bartlett, L., Sanicas, M., Dudley, D. J., Harper, D. M., Bittaye, M., Meller, L., Jehan, F., Maltezou, H. C., Šubelj, M., Bardaji, A., Kachikis, A., Beigi, R., & Gravett, M. G. (2019). Postpartum endometritis and infection following incomplete or complete abortion: Case definition & guidelines for data collection, analysis, and presentation of maternal immunization safety data. *Vaccine*, *37*(52), 7585–7595. https://doi.org/10.1016/j.vaccine.2019.09.101

Shimpuku, Y., Iida, M., Hirose, N., Tada, K., Tsuji, T., Kubota, A., Senba, Y., Nagamori, K., & Horiuchi, S. (2021). Prenatal education program decreases postpartum depression and increases maternal confidence: A longitudinal quasi-experimental study in urban Japan. *Women and Birth*, *August*. https://doi.org/10.1016/j.wombi.2021.11.004

Suriani, Sebayang, A., Mirsam, H., Pakki, S., Azrai, M., & Muis, A. (2021). Control of Fusarium verticillioides on corn with a combination of Bacillus subtilis TM3 formulation and botanical pesticides. *Saudi Journal of Biological Sciences*, *28*(12), 7000–7005. https://doi.org/10.1016/j.sjbs.2021.07.083

Taukoorah, U., Lall, N., & Mahomoodally, F. (2016). Piper betle L. (betel quid) shows bacteriostatic, additive, and synergistic antimicrobial action when combined with conventional antibiotics. *South African Journal of Botany*, *105*, 133–140. https://doi.org/10.1016/j.sajb.2016.01.006

Underwood, J. P., Clark, J. H., Cardoso, F. C., Chandler, P. T., & Drackley, J. K. (2022). Production, metabolism, and follicular dynamics in multiparous dairy cows fed diets providing different amounts of metabolizable protein prepartum and postpartum. *Journal of Dairy Science*, *2001*. https://doi.org/10.3168/jds.2021-20996

Yang, J., & Florio, A. Di. (2021). W23. the Postpartum Psychosis International Consortium: Results From Genotype-Phenotype Analyses. *European Neuropsychopharmacology*, *51*, e157–e158. https://doi.org/10.1016/j.euroneuro.2021.08.112

Yusriah, L., Sapuan, S. M., Zainudin, E. S., & Mariatti, M. (2012). Exploring

the Potential of Betel Nut Husk Fiber as Reinforcement in Polymer Composites: Effect of Fiber Maturity. *Procedia Chemistry*, *4*, 87–94. https://doi.org/10.1016/j.proche.2012.06.013

Zaman, S., Nahar, Q., Mamun, A. al, Ahmed, R., & Bari, M. L. (2021). Use of non-chlorine sanitizer in eliminating bacterial and fungal pathogens from betel leaves - A field level study. *Journal of Agriculture and Food Research*, *6*, 100198. https://doi.org/10.1016/j.jafr.2021.100198

Zhang, K., Siziba, L. P., Suo, N. J., Rothenbacher, D., & Genuneit, J. (2022). Breastfeeding duration is positively associated with decreased smoking relapse in the postpartum period. *Midwifery*, *108*, 103289. https://doi.org/10.1016/j.midw.2022.103289

Agustini, R. D., Wahyuni, S., Buheli, K. L., & Suherlin, I. (2021). Determinan Pemberian ASI Eksklusif. *Journal Midwifery Jurusan Kebidanan Politeknik Kesehatan Gorontalo*, *7*(1), 44. https://doi.org/10.52365/jm.v7i1.321

Anugrahwati, M., Purwaningsih, T., Rustina, Manggalarini, J. A., Alnavis, N. B., Wulandari, D. N., & Pranowo, H. D. (2016). Extraction of Ethanolic Extract of Red Betel Leaves and Its Cytotoxicity Test on HeLa Cells. *Procedia Engineering*, *148*, 1402–1407. https://doi.org/10.1016/j.proeng.2016.06.569

Astuti, S. C. D. (2021). Sikap Ibu Hamil terhadap Inisiasi Menyusu Dini. *Journal Midwifery Jurusan Kebidanan Politeknik Kesehatan Gorontalo*, *6*(1), 27. https://doi.org/10.52365/jm.v6i1.319

Burgess, A., Clark, S., Dongarwar, D., & Salihu, H. (2020). 5: Hospital maternal mortality rates are falling, overall maternal mortality still rises: Implications for forward movement. *American Journal of Obstetrics and Gynecology*, *222*(1), S5. https://doi.org/10.1016/j.ajog.2019.11.021

Dey, A. K., Sharma, M., & Meshram, M. R. (2016a). An Analysis of Leaf Chlorophyll Measurement Method Using Chlorophyll Meter and Image Processing Technique. *Procedia Computer Science*, *85*(Cms), 286–292. https://doi.org/10.1016/j.procs.2016.05.235

Dey, A. K., Sharma, M., & Meshram, M. R. (2016b). Image Processing Based Leaf Rot Disease, Detection of Betel Vine (Piper BetleL.). *Procedia Computer Science*, *85*(Cms), 748–754. https://doi.org/10.1016/j.procs.2016.05.262

Din'ni, S. K., & Meliati, L. (2021). Teknik Perawatan Tali Pusat terhadap Pelepasan Tali Pusat. *Journal Midwifery Jurusan Kebidanan Politeknik Kesehatan Gorontalo*, *7*(2), 54. https://doi.org/10.52365/jm.v7i2.306

Fatimawali, Maulana, R. R., Windah, A. L. L., Wahongan, I. F., Tumilaar, S. G., Adam, A. A., Kepel, B. J., Bodhi, W., & Tallei, T. E. (2021). Data on the docking of phytoconstituents of betel plant and matcha green tea on SARS-CoV-2. *Data in Brief*, *36*, 107049. https://doi.org/10.1016/j.dib.2021.107049

Handelzalts, J. E., Hairston, I. S., Levy, S., Orkaby, N., Krissi, H., & Peled, Y. (2022). COVID-19 related worry

moderates the association between postpartum depression and mother-infant bonding: A longitudinal study. *Journal of Psychiatric Research*, *149*(February), 83–86. https://doi.org/10.1016/j.jpsychires.2022.02.039

Ibrahim, F. (2021). Penerapan Pijat Oksitosin dan Marmet untuk Meningkatkan Produksi ASI Ibu Nifas. *Journal Midwifery Jurusan Kebidanan Politeknik Kesehatan Gorontalo*, *6*(2), 73. https://doi.org/10.52365/jm.v6i2.317

Kim, E. T., Lillie, M., Gallis, J., Hembling, J., McEwan, E., Opiyo, T., Acayo, P., & Baumgartner, J. N. (2021). Correlates of early stimulation activities among mothers of children under age two in Siaya County, Kenya: Maternal mental health and other maternal, child, and household factors. *Social Science and Medicine*, *287*(May 2020), 114369. https://doi.org/10.1016/j.socscimed.2021.114369

Kuster, A., Lee, K. A., & Sligar, K. (2022). Quality Improvement Project to Increase Postpartum Clinic Visits for Publicly Insured Women. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *March*, 1–11. https://doi.org/10.1016/j.jogn.2022.01.002

Kusumanti, E., & Sugiharto, S. (2017). Effect of dietary supplementation of binahong leaf meal, betel nut meal or their combination on serum albumin and globulin, fecal endoparasites and bacterial counts in milk of Saanen goats suffering from subclinical mastitis. *Agriculture and Natural Resources*, *51*(5), 415–419. https://doi.org/10.1016/j.anres.2017.11.005

Lagashetty, A., Ganiger, S. K., & Shashidhar. (2019). Synthesis, characterization and antibacterial study of Ag–Au Bi-metallic nanocomposite by bioreduction using piper betle leaf extract. *Heliyon*, *5*(12), e02794. https://doi.org/10.1016/j.heliyon.2019.e02794

Rouse, C. E., Eckert, L. O., Muñoz, F. M., Stringer, J. S. A., Kochhar, S., Bartlett, L., Sanicas, M., Dudley, D. J., Harper, D. M., Bittaye, M., Meller, L., Jehan, F., Maltezou, H. C., Šubelj, M., Bardaji, A., Kachikis, A., Beigi, R., & Gravett, M. G. (2019). Postpartum endometritis and infection following incomplete or complete abortion: Case definition & guidelines for data collection, analysis, and presentation of maternal immunization safety data. *Vaccine*, *37*(52), 7585–7595. https://doi.org/10.1016/j.vaccine.2019.09.101

Shimpuku, Y., Iida, M., Hirose, N., Tada, K., Tsuji, T., Kubota, A., Senba, Y., Nagamori, K., & Horiuchi, S. (2021). Prenatal education program decreases postpartum depression and increases maternal confidence: A longitudinal quasi-experimental study in urban Japan. *Women and Birth*, *August*. https://doi.org/10.1016/j.wombi.2021.11.004

Suriani, Sebayang, A., Mirsam, H., Pakki, S., Azrai, M., & Muis, A. (2021). Control of Fusarium verticillioides on corn with a combination of Bacillus subtilis TM3 formulation and botanical pesticides. *Saudi Journal of Biological Sciences*, *28*(12), 7000–7005. https://doi.org/10.1016/j.sjbs.2021.07.083

Taukoorah, U., Lall, N., & Mahomoodally, F. (2016). Piper betle L. (betel quid) shows bacteriostatic, additive, and

synergistic antimicrobial action when combined with conventional antibiotics. *South African Journal of Botany*, *105*, 133–140. https://doi.org/10.1016/j.sajb.2016.01.006

Underwood, J. P., Clark, J. H., Cardoso, F. C., Chandler, P. T., & Drackley, J. K. (2022). Production, metabolism, and follicular dynamics in multiparous dairy cows fed diets providing different amounts of metabolizable protein prepartum and postpartum. *Journal of Dairy Science*, *2001*. https://doi.org/10.3168/jds.2021-20996

Yang, J., & Florio, A. Di. (2021). W23. the Postpartum Psychosis International Consortium: Results From Genotype-Phenotype Analyses. *European Neuropsychopharmacology*, *51*, e157–e158. https://doi.org/10.1016/j.euroneuro.2021.08.112

Yusriah, L., Sapuan, S. M., Zainudin, E. S., & Mariatti, M. (2012). Exploring the Potential of Betel Nut Husk Fiber as Reinforcement in Polymer Composites: Effect of Fiber Maturity. *Procedia Chemistry*, *4*, 87–94. https://doi.org/10.1016/j.proche.2012.06.013

Zaman, S., Nahar, Q., Mamun, A. al, Ahmed, R., & Bari, M. L. (2021). Use of non-chlorine sanitizer in eliminating bacterial and fungal pathogens from betel leaves - A field level study. *Journal of Agriculture and Food Research*, *6*, 100198. https://doi.org/10.1016/j.jafr.2021.100198

Zhang, K., Siziba, L. P., Suo, N. J., Rothenbacher, D., & Genuneit, J. (2022). Breastfeeding duration is positively associated with decreased smoking relapse in the postpartum period. *Midwifery*, *108*, 103289. https://doi.org/10.1016/j.midw.2022.103289

Ockenhouse, C. F., Hu, W. C., Kester, K. E., Cummings, J. F., Stewart, A., Heppner, D. G., Jedlicka, A. E., Scott, A. L., Wolfe, N. D., Vahey, M. and Burke, D. S. (2018). Common and divergent immune response signalling pathways discovered in peripheral blood mononuclear cell gene expression patterns in presymptomatic and clinically apparent malaria. *Infect Immun*. 74(10). 5561-73.