

Research Article

The Impact of Transparent Dressings on Phlebitis Incidence in Pediatric Intra Venous Therapy

Ni Kadek Rai Dwijayanti, Ni Komang Ayu Resiyanthi*, Ni Luh Gede Puspita Yanti, Dewa Putra Arwidiana

Nursing Program, STIKes Wira Medika Bali, Denpasar, Indonesia

Article history:

Submission May 2024

Revised June 2024

Accepted June 2024

*Corresponding author:

E-mail:

resiyanthi@stikeswiramedika.ac.id

ABSTRACT

Introduction: Hospitalization can be a traumatic experience for both children and their parents. During the hospitalization process, procedures such as installing an IV drip can lead to phlebitis infection. To prevent phlebitis, nurses often use transparent dressings when installing a child's IV. The aim of this study was to determine the relationship between the use of transparent dressings and the incidence of phlebitis during pediatric IV drips. **Methods:** This study employed a descriptive correlational research design with a cross-sectional approach. The total sample consisted of 40 individuals selected through accidental sampling. Data collection tools included questionnaires and observation sheets. **Results:** Among the 40 respondents, transparent dressings were used 100% of the time, and the incidence of phlebitis was observed in 2 respondents (5%). The results of the Spearman Rank analysis test showed a p-value of 0.288, indicating no significant relationship between the use of transparent dressings and the incidence of phlebitis in children's IV installations. The Spearman correlation coefficient between the use of transparent dressings and the incidence of phlebitis was 0.172, suggesting a very weak correlation. **Discussion:** Many factors can contribute to the development of phlebitis. While the use of transparent dressings can help nurses observe and detect signs of phlebitis more easily, this study found no significant correlation between their use and the incidence of phlebitis. However, transparent dressings can still be beneficial for early detection and intervention.

Keywords: Bandages, Child, Hospitalization, Incidence, Phlebitis

Introduction

Hospitalization is treatment carried out in a hospital, which can cause stress and trauma, especially in children who have just been

hospitalized. Hospitalization of children can be a traumatic experience for both the child and the parents themselves. Many things can happen during the hospitalization process, such as

How to cite:

Dwijayanti, N. K. R., Resiyanthi, N. K. A., Yanti, N. L. G. P., & Arwidiana, D. P. (2024). The Impact of Transparent Dressings on Phlebitis Incidence in Pediatric Intra Venous Therapy. *Basic and Applied Nursing Research Journal*, 5(1), 39 – 46. doi: 10.11594/banrj.05.01.05

the risk of nosocomial infections or what is currently called Healthcare Associated Infections (HAIs) with a broader meaning because it is not only limited to hospitals but also in other health service facilities [1]. One of the types of HAIs that most often occurs in health care facilities, especially hospitals, is Bloodstream Infection (IAD) because almost all patients treated in hospitals, including pediatric patients, have IV drips installed [2]. One of the risk factors for bloodstream infections can be caused by the installation of venous and arterial cannulas which can cause phlebitis [3]. Phlebitis is a nosocomial infection that appears for at least 3x24 hours and the incidence of phlebitis is an indicator of the minimum quality of hospital service with a standard incidence of $\leq 1.5\%$ [4]. The incidence of phlebitis is a health problem in both countries around the world and Indonesia. Phlebitis is an infectious disease with the highest rate in health services because intravenous therapy is given to patients admitted to hospital, namely more than 60% of patients receive fluid therapy [5]. The prevalence of phlebitis varies in several hospitals. A study in the United States explained that the number of children hospitalized and receiving infusion procedures was around 150 million children [6]. In pediatric patients in hospitals in India, the incidence of phlebitis was found to be 71.25% and the majority had grade 2 phlebitis (46.25%) [7]. The incidence of phlebitis in several developing countries such as the Philippines (10.1%), Taiwan (13.8%), Nigeria (17.5%), Iran (14.2%), Malaysia (12.7%), and Indonesia (9.80%) [8,9].

Phlebitis ranks first in nosocomial infections in Indonesia compared to other infections, namely 588,000 patient visits at Indonesian General Hospitals, there are 930 incidents of phlebitis or approximately 4.8% of people, while out of 18,800 patient visits at special or private hospitals in Indonesia there are 750 or as much as 3.9%, while the incidence of phlebitis in Indonesia in 2021 is 50.11% for general hospitals in Indonesia while for special or private hospitals it is 32.70% [10]. The prevalence of phlebitis in government hospitals in Bali Province in 2019 was $\pm 4.5\%$, while in private hospitals it was around 3.3% [6]. Indonesia

does not yet have data related to the number of infusions installed, but if we observe in hospitals, the majority of children treated in hospitals have IVs installed. Based on this data, the role of medical personnel is very important in preventing phlebitis infections.

Phlebitis becomes a serious problem if not treated immediately. The occurrence of phlebitis in patients can hinder the continuation of intravenous therapy, thereby disrupting the patient's healing process [8]. Things that can cause phlebitis infections include not disinfecting the infusion catheter insertion area, not performing hand hygiene before carrying out the infusion procedure, not using sterile personal protective equipment (PPE), using non-transparent dressings, and using a large catheter to speed up infusion administration [2]. which is often needed, especially in pediatric patients with dehydration and shock often causing phlebitis. Efforts to prevent phlebitis infection that can be made are by changing and rotating tubes, dressings, needle insertion sites, and using aseptic techniques when installing infusions and during the process of administering intravenous therapy [11]. Another effort that can be made to prevent phlebitis is to carry out early detection of phlebitis from the factors that cause phlebitis, one of which is bacterial factors, the need for an intravenous catheter cover which can inhibit the development of microorganisms as one of the causes of phlebitis, namely by using a transparent cover or transparent dressing [12].

Transparent dressings are sterile bandages that come from a semi-permeable polyurethane layer with transparent acylate adhesive that can be used to bandage or cover wounds, remain watertight, and can maintain oxygen circulation so that the skin is maintained [13]. Osti et al. revealed the use of transparent dressings where the use is more comfortable, the patient can move easily, is less irritated, and can be worn for 72 hours without being changed and monitored without removing the dressing [14]. Innovation in optimizing the use of transparent dressings for infusion installations has also been provided in Cempaka Room 3 Prof. Hospital. Dr. IGNG Ngoerah to prevent phlebitis infections due to infusion.

Based on a preliminary survey conducted in Cempaka Room 3 RSUP Prof. Dr. IGNG Ngoerah on July 20, 2023, there were 416 pediatric patients treated from January-March 2023 and almost all patients had IVs installed with an average of 148 pediatric patients installed IVs every month. This figure is a high number and every pediatric patient who has an IV installed has a risk of phlebitis infection. Based on this amount of data, not all patients who have IVs installed use transparent bandages or transparent dressings. Through observations of 25 children who had IVs installed, it was found that 5 patients had IVs installed without transparent dressings, with 2 child patients showing signs of redness and feeling pain when holding the dressings, which indicated that there was a possibility of phlebitis infection. The use of the type of covering at the insertion site is one of the factors that influences the incidence of phlebitis infection [15]. Efforts that have been made by ward nurses to prevent phlebitis are by replacing the infusion catheter every three days, using an infusion spark with a picture on the hand where the infusion is installed to limit the movement of the patient's hand so that the position of the infusion catheter does not shift, and use transparent dressings on the child's infusion. The use of transparent dressings when installing IV fluids in children is a strategy to prevent phlebitis that is being promoted, but these efforts have not yet provided maximum results, resulting in signs of phlebitis infection such as redness, swelling, and pain when the IV dressing is held.

This study aims to determine the relationship between the use of transparent dressings and the incidence of phlebitis during pediatric IV drips.

Material and Methods

Research design

This study was a quantitative research with a descriptive correlational design, which examines the relationship between variables using a cross-sectional approach. Data collection on the use of transparent dressings and the incidence of phlebitis infections was conducted once by observing the use of transparent dressings with an observation sheet.

Study sample

The population in this study comprised all children aged 1 to 3 years who were undergoing inpatient treatment, with an average of 45 toddler patients per month. The sample included toddlers meeting the inclusion criteria: aged 1 to 3 years, receiving intravenous therapy with a transparent dressing, having compos mentis awareness, and good peripheral vein quality. Exclusion criteria were children who did not receive intravenous therapy but had a stopper installed and those with underlying cancer. The sample size, calculated using the Slovin formula, was 40 individuals. The sampling technique used was non-probability sampling with accidental sampling.

Variables

In this study, the independent variable was the use of transparent dressings for infusion, and the dependent variable was the incidence of phlebitis.

Data collection

This research utilized primary and secondary data. Primary data were obtained directly from observations of the use of transparent dressings and the incidence of phlebitis during pediatric infusions. Secondary data were obtained from records such as the number of pediatric patients over the last three months in Cempaka Room 3 at Prof. Dr. IGNG Ngoerah Hospital. Data collection steps included administrative collection and technical procedures. Researchers observed the use of transparent dressings during infusion procedures and the incidence of phlebitis infections in patients with infusions using transparent dressings. Observations of the dependent variable were conducted using a research scale sheet (rating scale).

Instruments

Phlebitis observation was performed using the standardized Visual Infusion Phlebitis (VIP) score, which is a valid, reliable, and clinically feasible tool for early indication of phlebitis and assigning the appropriate score [16]. Observations were carried out three times for

each patient: on the first, second, and third days. Patients were considered to have phlebitis if they exhibited two or more signs such as erythema at the insertion area, pain at the insertion area with erythema, layer formation, hardening along the vein, and/or purulent discharge. The VIP score is considered to indicate phlebitis if the score is ≥ 2 , which is associated with a recommendation for removal of the peripheral intravenous catheter (PIVC).

Data analysis

The study incorporated univariate analysis of variables such as age, sex, nutritional status, hospitalization history, IV size, IV injection, and IV history. Data analysis sought to address the research problem and determine the validity of the research hypothesis by employing the Spearman Rank test to examine the correlation between the utilization of transparent dressings and the occurrence of phlebitis in

intravenous drips administered to children. The Spearman Rank correlation test was conducted to determine the degree of association between the two variables, using the correlation coefficient. This method is necessary for quantifying the proximity of the link between two variables without the need to adhere to the standards of a normal distribution.

Ethical considerations

The Institutional Review Board has granted approval to conduct this research in compliance with ethical standards. We engaged in a discussion with the volunteers regarding the potential disadvantages and benefits of taking part in this study. Furthermore, researchers have demonstrated their readiness to provide informed consent. Prospective participants in this study have the choice to refuse or discontinue their involvement if they do not wish to take part in the inquiry.

Results and Discussion

Characteristics of Research Subjects

Table 1. Frequency Distribution of Characteristics of Toddler

Characteristics	Research Results (n=40)	
	Frequency (f)	Percentage (%)
Age		
1 years old	17	42.5
2 years	13	32.5
3 Years	10	25
Gender		
Male	21	52.5
Women	19	47.5
Nutritional status		
Normal Nutrition	24	60
Malnutrition	11	27.5
Obesity	5	12.5
Hospitalization History		
First time	26	65
More than 1 time	14	35

Based on Table 1, the majority of respondents were 1 year old (42.5%), male (52.5%),

with normal nutrition (60%), and first hospitalization (65%).

Table 2. Distribution of Infusion Characteristics

Characteristics	Research Results (n=40)	
	Frequency (f)	Percentage (%)
Intravenous catheter size		
22 G	1	2.5
24 G	39	97.5
Number of IV injections		
1 time	32	80
2 times	8	20
History of intravenous therapy		
Infusion only	11	27.5
Medication and infusion	18	45
Intravenous drugs only	11	27.5

Based on Table 2, the characteristics of pediatric infusion installations show that the size of the intravenous catheter used in pediatric infusion installations was mostly 24G size (97.5%), one puncture (80%), and receiving drug and infusion therapy (45%).

The majority of respondents who had IVs installed with transparent dressings did not experience phlebitis (95%), while only 2 respondents (5%) who had IVs installed with transparent dressings experienced phlebitis.

Table 3. The Relationship between the Use of Transparent Dressings and the Incidence of Phlebitis in Children's Infusions

Children's Infusion Installation	Phlebitis Occurrence		Spearman Correlation Coefficient	Sig. (2-tailed)
	Phlebitis	No Phlebitis		
Use of Transparent Dressing	2	38	0.172	0.288
Total	2	38		

The Spearman correlation coefficient between the use of transparent dressings and the incidence of phlebitis was 0.172 ($p>0.05$), indicating that the use of transparent dressings does not influence the incidence of phlebitis.

Discussion

The investigation revealed that all children who underwent intravenous (IV) installation used transparent dressings, with 40 individuals (100%) meeting the study's inclusion criteria. These data indicate that transparent dressings are commonly used for infusion installations. The results suggest that transparent dressings adhere well to the infusion site and allow clear visibility of the insertion area.

A study by Hamidjun found that using transparent dressings reduced the occurrence of phlebitis at RSUD Prof. Dr. H. Aloei Saboe in Gorontalo City [17]. This aligns with our research, which showed that all pediatric IV

patients used transparent dressings to help detect signs of phlebitis. Transparent dressings offer comfort, and minimal allergy risk, and can remain in place for 72 hours without replacement. They allow for monitoring of insertion wounds without removing the dressing, facilitating easier phlebitis detection for nurses administering IV therapy to children [18].

Transparent dressings are made of synthetic, hypoallergenic materials that adhere well without causing skin moisture, thanks to a gas exchange mechanism similar to healthy skin. They are elastic, making them suitable for various body areas, and resistant to friction and shear pressures [19]. The dressing should remain dry, secure, and intact; if compromised, it should be replaced promptly. Transparent dressings enable early identification of phlebitis and infiltration [20], consistent with research findings where all IV patients used

transparent dressings, aiding nurses in monitoring for phlebitis.

Research by Novardian [20] suggests that transparent dressings with a skin barrier are effective in preventing infections in infants with IVs at RSUPN Cipto Mangunkusumo Jakarta [21]. This supports the notion that transparent dressings are not the primary cause of phlebitis but rather one of several external factors. Transparent dressings are essential for observing and detecting infection symptoms early during IV installation [22].

The study found that 95% of respondents (38 individuals) did not experience phlebitis, while 5% (2 individuals) did, showing erythema and redness with a severity score of 2 on the second day of observation. Phlebitis is characterized by pain, redness, swelling, heat, and hardness at the puncture site and along the veins [2]. Respondents experienced phlebitis within 2 days of infusion, scoring 2 for severity, and reported pain and redness at the infusion site. Transparent dressings allow nurses to quickly identify and address phlebitis, preventing its progression.

Phlebitis can be caused by various factors, categorized into five types by the Infusion Nurses Society [23]: mechanical, chemical, bacterial, patient-related, and post-infusion. Phlebitis categorizes into four groups: chemical, mechanical, bacterial, and post-infusion [24]. Causes of phlebitis are influenced by patient-specific characteristics such as gender, age, underlying conditions, and nutritional status. This study found that individuals with phlebitis were mostly female, under 3 years old, and had suboptimal nutritional status, aligning with existing theories that females and young children are more prone to phlebitis, especially those with poor nutrition.

Nuryanti et al. found that phlebitis can occur due to various reasons, including the type of IV fluid used [16]. This study's findings align, indicating that different types of IV therapy were administered to participants with phlebitis. Alexander et al. noted that fluids with high osmolality could irritate veins, promoting inflammation and clot formation [15]. Researchers believe that phlebitis development is influenced by the type of IV fluid administered,

necessitating close monitoring for early signs of infection to prevent or detect phlebitis.

According to the research findings, 2 out of 40 respondents (5%) who used transparent dressings experienced phlebitis. The phlebitis score for 31 responders was 0, indicating no phlebitis. On the 3rd day, 7 participants had a phlebitis score of 1, with mild pain around the insertion site. A VIP score of 2 or above indicates phlebitis, influenced by patient-specific risk factors such as gender and age. Studies by Jacinto et al. [3], and Wallis et al. [25] showed that phlebitis is more common in women and children under 3 [26,27]. This study observed that respondents with phlebitis were females aged 2 and 3 years.

The type of IV fluid also contributes to phlebitis, with fluids of extreme pH or high osmolality causing vein irritation and inflammation. This study found that respondent number 10, who had phlebitis, was given meropenem in 0.9% NaCl, and respondent number 34 received KCl and phenobarbital. Both showed signs of phlebitis on the second day with a severity score of 2. Martiasih's research found a significant correlation between IV fluid osmolality and phlebitis in hospitalized patients [19].

The two-tailed analysis showed no significant link between transparent dressings and phlebitis in children's IV drips ($0.288 > 0.05$). This aligns with Warsono's research [20], which found no significant difference in phlebitis incidence between transparent and conventional dressings at Tarakan City General Hospital. Researchers hypothesize that phlebitis in 2 participants was due to the specific IV fluids administered. Phlebitis can result from various factors, including age, gender, nutritional status, medical conditions, IV catheter size, type of IV fluid, and vein condition. Transparent dressings allow for easy phlebitis detection and prompt treatment, preventing infection spread. Further research is needed to analyze factors affecting phlebitis in children using IV drips.

Implications

Clinical relevance suggests prioritizing transparent dressings for IV dressings to mitigate phlebitis risk in high-risk patients.

Transparent dressings are now required in SOPs for pediatric and adult infusions to enhance nosocomial infection management, particularly bloodstream infections. Educating and training health workers, especially nurses, to monitor IV infusions closely, check dressings regularly, and assess phlebitis risk is crucial. Families should also be educated to monitor for phlebitis and notify nurses if symptoms appear. Future studies should explore factors influencing phlebitis during IV fluid installation in children.

Conclusion

The study found that all respondents (100%) used transparent dressings for IV installations, with phlebitis observed in 2 people (5%). Transparent dressings did not show a significant relationship with phlebitis incidence in children (p-value of 0.288), with a very weak correlation.

References

1. Wati, N. M. N., Subyaktien, E., Lestari, T. R., Pendet, D. P., Rachmawati, N., Juanamasta, I. G., & Aunguroch, Y. (2023). Is Infection Prevention and Control Training Can Increase Knowledge and Compliance of Nurses? *JURNAL INFO KESEHATAN*, 21(4), 815–822.
<https://doi.org/10.31965/infokes.Vol21.Is.s4.1355>
2. Guanche-Sicilia, A., Sanchez-Gomez, M. B., Castro-Peraza, M. E., Rodríguez-Gómez, J. Á., Gomez-Salgado, J., & Duarte-Climents, G. (2021). Prevention and treatment of phlebitis secondary to the insertion of a peripheral venous catheter: a scoping review from a nursing perspective. *Healthcare*, 9(5), 611.
3. Jacinto, A. K. de L., Avelar, A. F. M., Wilson, A. M. M. M., & Pedreira, M. da L. G. (2014). Phlebitis associated with peripheral intravenous catheters in children: study of predisposing factors. *Escola Anna Nery*, 18, 220–226.
4. Gallant, P., & Schultz, A. A. (2006). Evaluation of a visual infusion phlebitis scale for determining appropriate discontinuation of peripheral intravenous catheters. *Journal of Infusion Nursing*, 29(6), 338–345.
5. Kemenkes RI. (2021). *Profil Kesehatan Indonesia 2020*.
6. Dinas Kesehatan Provinsi Bali. (2019). *Profil Kesehatan Kesehatan Provinsi Bali 2019*.
7. Triyanto, E., & Upoyo, A. S. (2006). Analisis faktor-faktor yang berpengaruh terhadap kejadian plebitis di rsud purbalingga. *Jurnal Keperawatan Soedirman*, 1(1), 43–52.
8. Gargar, A., Cutamora, J., & Abocejo, F. (2017). Phlebitis, Infiltration, and Localized Site Infection Among Patients With Peripheral Intravenous Catheters. *European Scientific Journal*, 13. <https://doi.org/10.19044/esj.2017.v13n1.8p148>
9. Nito, P. J. B., & Wulandari, D. (2020). Incidence Of Phlebitis Associated With Osmolarity. *NS-UNISM 2019: Proceedings of the First National Seminar Universitas Sari Mulia, NS-UNISM 2019, 23rd November 2019, Banjarmasin, South Kalimantan, Indonesia*, 473.
10. Supriadi, I. R., Haanappel, C. P., Saptawati, L., Widodo, N. H., Sitohang, G., Usman, Y., Anom, I. B., Saraswati, R. D., Heger, M., Doevendans, P. A., Satari, H. I., Voor in 't holt, A. F., & Severin, J. A. (2023). Infection prevention and control in Indonesian hospitals: identification of strengths, gaps, and challenges. *Antimicrobial Resistance & Infection Control*, 12(1), 6. <https://doi.org/10.1186/s13756-023-01211-5>
11. Weinstein, S. M., & Hagle, M. E. (2014). *Plumer's principles and practice of infusion therapy*. Lippincott Williams & Wilkins.
12. Atay, S., & Yilmaz Kurt, F. (2021). Effectiveness of transparent film dressing for peripheral intravenous catheter. *The Journal of Vascular Access*, 22(1), 135–140.
13. Tudoroiu, E.-E., Dinu-Pîrvu, C.-E., Albu Kaya, M. G., Popa, L., Anuța, V., Prisada, R. M., & Ghica, M. V. (2021). An Overview of Cellulose Derivatives-Based Dressings for Wound-Healing Management. *Pharmaceuticals*, 14(12), 1215. <https://doi.org/10.3390/ph14121215>
14. Osti, C., Khadka, M., Wosti, D., Gurung, G., & Zhao, Q. (2019). Knowledge and practice

- towards care and maintenance of peripheral intravenous cannula among nurses in Chitwan Medical College Teaching Hospital, Nepal. *Nursing Open*, 6(3), 1006–1012. <https://doi.org/10.1002/nop2.288>
15. Alexander, M., Corrigan, A., Gorski, L., Hankins, J., & Perucca, R. (2009). *Infusion nursing: An evidence-based approach*. Elsevier Health Sciences.
 16. Nuryanti, E., Cipto, C., & Sutarmi, S. (2021). Pengaruh Intravena Dressing Transparan Dan Kasa Betadin Terhadap Kejadian Flebitis. *Jurnal Studi Keperawatan*, 2(1), 8–12.
 17. Hamidjun, W. (2018). *Pengaruh penggunaan balutan transparant Dressing terhadap kejadian phlebitis di RSUD Prof. Dr. H. Aloe Saboe Kota Gorontalo* [Universitas Negeri Gorontalo]. <https://repository.ung.ac.id/skripsi/show/841416152/pengaruh-penggunaan-balutan-transparant-Dressing-terhadap-kejadian-phlebitis-di-rsud-prof-dr-h-aloei-saboe-kota-gorontalo.html>
 18. Abusafia, B. M., & Boztepe, H. (2017). Evaluation of Peripheral Intravenous Catheter-Induced Local Complications in Pediatrics. *Journal of Clinical Nursing*.
 19. Martiasih, S. (2019). *Studi Komparasi dan Korelasi osmolaritas Cairan Infus Dengan Kejadian flebitis di Ruang Rawat Inap Rumah Sakit Umum Daerah wonosari*. Universitas' Aisyiyah Yogyakarta.
 20. Warsono. (2022). *Efektifitas dressing transparan film terhadap kejadian flebitis di RSUD Kota Tarakan* [Universitas Borneo Tarakan]. https://repository.ubt.ac.id/index.php?p=show_detail&id=13680&keywords=
 21. Novardian, Sulaeman, S., Purwati, N. H., & Sari, W. (2020). *The Effectiveness of Skin Barrier on Medical Adhesive Related Skin Injury in Neonates at Perinatology Dr. Cipto Mangunkusumo Hospital Jakarta*.
 22. Thayer, D. (2012). Skin damage associated with intravenous therapy: common problems and strategies for prevention. *Journal of Infusion Nursing*, 35(6), 390–401.
 23. Society, I. N. (2006). Infusion nursing standards of practice. *Journal of Infusion Nursing: The Official Publication of the Infusion Nurses Society*, 29(1 Suppl), S1–S92.
 24. Urbanetto, J. de S., Peixoto, C. G., & May, T. A. (2016). Incidence of phlebitis associated with the use of peripheral IV catheter and following catheter removal. *Revista Latino-Americana de Enfermagem*, 24. <https://doi.org/10.1590/1518-8345.0604.2746>
 25. Wallis, M. C., McGrail, M., Webster, J., Marsh, N., Gowardman, J., Playford, E. G., & Rickard, C. M. (2014). Risk factors for peripheral intravenous catheter failure: a multivariate analysis of data from a randomized controlled trial. *Infection Control & Hospital Epidemiology*, 35(1), 63–68.
 26. Daud, A., & Mohamad, F. (2021). Patient characteristics related to phlebitis in the east coast of peninsular Malaysia hospital. *Jurnal Keperawatan Indonesia*, 24(1), 25–31.
 27. Mandal, A., & Raghu, K. (2019). Study on incidence of phlebitis following the use of ppherpheral intravenous catheter. *Journal of Family Medicine and Primary Care*, 8(9), 2827. https://doi.org/10.4103/jfmpc.jfmpc_559_19