OPTIMIZING MATERNAL AND CHILD HEALTH: ENHANCING PUBLIC AWARENESS OF TORCH INFECTIONS DURING PREGNANCY

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ABSTRACT

TORCH infections (Toxoplasmosis, Rubella, Cytomegalovirus, Herpes simplex) pose significant risks during pregnancy, contributing to congenital abnormalities and adverse neonatal outcomes. In Indonesia, limited public awareness and inadequate preventive practices exacerbate these risks. This community service initiative aimed to enhance knowledge about TORCH infections among reproductive-aged women through a hybrid educational seminar. Conducted in collaboration with Peduli TORCH, the program utilized the "5P Framework" (Pathogen Awareness, Prenatal Screening, Pathogen Management, Postnatal Monitoring, Preventive Practices) to deliver evidence-based strategies. A total of 54 participants (87% female, 61.1% from Jambi Province) attended the seminar, combining in-person and virtual engagement. Pre- and post-tests assessed knowledge improvement, revealing a statistically significant median score increase from 70.0 to 100.0 ($p<0.001$, Wilcoxon test). Participants reported high satisfaction with the seminar's content, interactive format, and accessibility, though logistical refinements were suggested for future iterations. The initiative successfully bridged knowledge gaps, emphasizing the importance of early screening, vaccination, and hygiene practices. By empowering women and leveraging community engagement, this program highlights the potential of targeted educational interventions to reduce TORCH-related morbidity and improve maternal-child health outcomes. Culturally adapted, hybrid approaches demonstrate promise for scalable public health strategies in low-resource settings.

Keywords: *TORCH Infections, maternal and child health, community services, community-based education, preventive practices*

ABSTRAK

Infeksi TORCH (Toksoplasmosis, Rubella, Cytomegalovirus, Herpes simpleks) menimbulkan risiko selama kehamilan yang menyebabkan kelainan kongenital dan dampak buruk pada neonatus. Di Indonesia, rendahnya kesadaran masyarakat dan praktik pencegahan yang kurang optimal memperparah risiko ini. Inisiatif pengabdian masyarakat ini bertujuan meningkatkan pengetahuan tentang infeksi TORCH pada wanita usia reproduksi melalui seminar edukasi hibrida. Kolaborasi dengan Peduli TORCH menggunakan "Kerangka 5P" (Kesadaran Patogen, Skrining Pranatal, Manajemen Patogen, Pemantauan Pascanatal, Praktik Pencegahan) untuk menyampaikan strategi berbasis bukti. Sebanyak 54 peserta (87% perempuan, 61,1% berasal dari Provinsi Jambi) mengikuti seminar secara luring dan daring. Tes pra dan pasca menilai peningkatan pengetahuan, menunjukkan kenaikan skor median signifikan dari 70,0 menjadi 100,0 ($p<0,001$, uji Wilcoxon). Peserta melaporkan kepuasan tinggi terhadap konten, format interaktif, dan aksesibilitas seminar, meski perlu penyempurnaan logistik untuk kegiatan mendatang. Inisiatif ini berhasil menjembatani kesenjangan pengetahuan, menekankan pentingnya skrining dini, vaksinasi, dan praktik higienitas. Dengan memberdayakan perempuan dan melibatkan partisipasi komunitas, program ini menegaskan potensi intervensi edukasi terarah untuk mengurangi morbiditas terkait TORCH dan meningkatkan kesehatan ibu-anak. Pendekatan hibrida yang adaptif secara budaya menjanjikan strategi kesehatan masyarakat yang dapat diskalakan di wilayah terbatas sumber daya.

Kata kunci: *Infeksi TORCH, kesehatan ibu dan anak, pengabdian masyarakat, edukasi masyarakat, praktik pencegahan*

INTRODUCTION

TORCH, an acronym for a group of pathogens capable of crossing the maternal-fetal barrier, is associated with adverse pregnancy outcomes and congenital infections in fetuses. These pathogens include Toxoplasma gondii (TOXG), Rubella virus (RV), Cytomegalovirus (CMV), and Herpes simplex virus (HSV)[1,2]. The global prevalence of TORCH infections varies significantly, influenced by factors such as sanitation standards, hygiene practices, access to healthcare, and vaccination coverage. Approximately 2–3% of congenital abnormalities worldwide are attributed to maternal TORCH infections during pregnancy[3]. According to Disability-Adjusted Life Years (DALYs) estimates, congenital toxoplasmosis caused by TOXG accounts for 1.20 million cases annually[4], while congenital rubella syndrome (CRS) due to RV infection affects nearly 1

million newborns yearly[5]. CRS-related mortality rates range from 5% to 34%, contributing to approximately 5,000–34,000 deaths annually[6,7].

In Indonesia, epidemiological studies have identified key transmission patterns and risk factors for TORCH infections. For instance, exposure to infected cat feces and fur, coupled with the consumption of undercooked meat, elevates the risk of Toxoplasma gondii transmission. Conversely, insufficient rubella vaccination coverage has been linked to higher rubella incidence among pregnant women[8]. Research further highlights the detrimental impacts of TORCH infections on maternal and child health in Indonesia, including increased rates of miscarriage, preterm birth, congenital malformations, and long-term developmental disorders[8].

First-trimester TORCH infections pose the highest risk of severe neonatal complications due to their interference with critical fetal organogenesis[7,9]. Consequently, early screening prior to conception or during the initial stages of pregnancy is essential to mitigate these risks[10,11]. Public awareness initiatives targeting reproductive-aged women particularly those planning pregnancy or with a history of recurrent miscarriage are critical for facilitating timely diagnosis and evidence-based clinical interventions.

To address these challenges, our community engagement team collaborated with *Peduli* TORCH, a nonprofit organization, to conduct a hybrid educational seminar. This initiative aimed to enhance public knowledge, especially among women of reproductive age, through the dissemination of the "5P Framework": 1) Pathogen Awareness: Understanding TORCH infections and their impact on pregnancy outcomes; 2) Prenatal Screening: Guidelines for early TORCH infection detection in pregnant women; 3) Pathogen Management: Clinical strategies to prevent fetal complications in infected mothers; 4) Postnatal Monitoring: Early detection and intervention for infants born to TORCH-positive mothers; 5) Preventive Practices: Evidence-based measures to reduce infection risks, including vaccination and hygiene protocols.

METHODS

This community service program implemented a hybrid seminar conducted on Saturday, 31 August 2024, at the Anatomy Laboratory of the Faculty of Medicine and Health Sciences, Universitas Jambi, with simultaneous online participation via Zoom Meeting, a widely used virtual conferencing platform. The target participants were women of reproductive age who registered through a structured Google Form. The educational program employed a multi-component methodology. The seminar comprised expert-led presentations on TORCH infections and their implications for pregnancy, delivered by two keynote speakers: Dr. Rizka Adi Nugraha Putra, M.Sc, Sp.OG, an obstetrician-gynecologist and lecturer at Universitas Muhammadiyah Purwokerto, who joined virtually to present on “TORCH Infections and Pregnancy Outcomes,” and Isti Anindya, S.Si., M.Sc, founder of *Peduli TORCH* and lecturer at Universitas Indonesia Maju, who delivered an on-site lecture titled “TORCH Infections and Autism Spectrum Disorders.” Pre-test and post-tests, administered via Google Form, were conducted before and after the seminar to assess participants’ knowledge acquisition.

Subsequently, an interactive discussion session facilitated moderated dialogue, allowing participants to share personal experiences and discuss reproductive health challenges related to TORCH infections. Speakers addressed participant questions in real time, fostering collaborative problem-solving. Additionally, educational media were disseminated, including a digital brochure (e-brochure) outlining evidence-based strategies for TORCH infection prevention, such as hygiene practices, vaccination guidelines, and prenatal care recommendations.

Participant feedback and knowledge outcomes were evaluated using a structured Google Form questionnaire capturing demographic data (age, gender, residency), pre- and post-test scores (to quantify knowledge improvement), and qualitative feedback on seminar quality and relevance. Descriptive statistics summarized participant characteristics (e.g., age, residency) as frequencies and percentages, while pre- and post-test scores were analyzed as mean (± standard deviation) and median (range). For inferential analysis, data normality was assessed using the Kolmogorov-Smirnov test. Depending on normality results, paired t-tests (for normally distributed data) or Wilcoxon signed-rank tests (for non-parametric data) were applied to compare pre-test and post-test scores, with a significance threshold of $p < 0.05$. All statistical analyses were performed using SPSS v24 and Microsoft Excel 365. The results were critically reviewed to inform iterative improvements for future seminars.

RESULTS AND DISCUSSION

The Community Service Team from the Department of Medicine at Universitas Jambi, in collaboration with *Peduli* TORCH, organized an initiative titled “Optimizing Maternal and Child Health: Managing TORCH Infections During Pregnancy.” This program aimed to raise public awareness, particularly among women of reproductive age, about the risks of TORCH infections (Toxoplasmosis, Rubella, Cytomegalovirus, and Herpes simplex) and their adverse effects on pregnant women and fetuses. The hybrid seminar was conducted in-person at the Anatomy Laboratory of the Faculty of Medicine and Health Sciences (FKIK), Universitas Jambi, with simultaneous virtual participation via Zoom Meeting.

A total of 54 participants attended the hybrid seminar, comprising 30 attendees (55.5%) in person and 24 participants (44.5%) online. The baseline characteristics of the participants, including gender, age group distribution and residency, are summarized in **Table 1**. As illustrated in the table, the majority of participants were female (87%), with 22% categorized as early reproductive age and 16% as optimal reproductive age. This demographic alignment confirms the program's success in reaching its primary target audience: women in their reproductive years, who are more likely to retain and apply the disseminated knowledge to improve community health outcomes. While male participants and older age groups (late reproductive, middle-aged, and elderly) constituted a smaller proportion, their involvement remains critical, as they may act as intermediaries to relay vital information to spouses, children, grandchildren, or friends. Additionally, participant residency data are presented in **Table 1** highlights that 33 out of 54 participants (61.11%) resided in Jambi Province. The hybrid format enabled broader geographical outreach, attracting attendees from other Indonesian provinces, though non-Jambi residents constituted less than 50% of the total cohort. This limited cross-provincial participation may reflect the short registration window, as promotional posters were released only one week prior to the event.

Table 1. Baseline characteristics of the participants (gender, age group and residency)

Characteristics	Frequency (%) [n=54]
Gender	
Male	7 (13.0%)
Female	47 (87.0%)
Age Group (years old)	
Early reproductive age (15-24)	22 (40.7%)
Optimum reproductive age (25-34)	16 (29.6%)
Late reproductive age (35-44)	7 (13.0%)
Middle-aged reproductive age (45-59)	7 (13.0%)
Elderly reproductive age (60-74)	2 (3.7%)
Residency	
Jambi Province	33 (61.1%)
Non-Jambi Province	21 (38.9%)
- Central Sulawesi	1 (1.9%)
- South Sulawesi	2 (3.7%)
- East Kalimantan	2 (3.7%)
- Central Kalimantan	1 (1.9%)
- East Java	3 (5.6%)
- Central Java	2 (3.7%)
- Special Region of Yogyakarta	1 (1.9%)
- West Java	4 (7.4%)
- Banten	1 (1.9%)
- South Sumatera	2 (3.7%)
- West Sumatera	2 (3.7%)

To evaluate the program's efficacy, participants completed pre-test and post-tests administered via Google Form under supervised conditions to ensure data integrity. These assessments aimed to quantify knowledge retention and assess the intervention's impact on public understanding of TORCH infections[12]. Pre- and post-test results are detailed in **Table 2**.

Table 2. Pre-test and Post-test results

Test Type	Score[1]	P Value[2]
Pre-test	70.0 (40.0 – 100.0)	**<0.001**
Post-test	100.0 (50.0 – 100.0)	

[1]Data are presented in median (range) because the data are not normally distributed according to the Kolmogorov-Smirnov normality test. [2]Wilcoxon test with a significance level of P<0.05.

As shown in Table 2, participants' baseline understanding of TORCH infections, assessed via pretest scores, yielded a median score of 70. Following the hybrid seminar intervention, post-test results revealed a statistically significant improvement, with the median score rising to 100 ($P < 0.001$, Wilcoxon test). This underscores the program's success in enhancing participants' comprehension of critical topics, including the dangers of TORCH infections during pregnancy, the importance of preconception and antenatal screening, and preventive measures such as hygiene practices, avoidance of raw meat consumption, and Rubella immunization.

The effectiveness of this initiative aligns with global evidence highlighting community-based education as a cornerstone strategy for reducing congenital infection risks among women of reproductive age[13,14]. Such interventions are particularly impactful in socio-cultural contexts where health behaviors are shaped by local norms, as tailored educational programs can significantly improve awareness and preventive practices[15,16].

The morbidity burden of TORCH infections further emphasizes the urgency of bridging knowledge gaps through community-level interventions[17,18]. Similar approaches have demonstrated success in mitigating other infectious diseases, suggesting their applicability to TORCH prevention[19,20].

Epidemiological studies report alarmingly high TORCH seroprevalence across diverse regions, reinforcing the need for proactive, community-driven health education[21,22]. Elevated seropositivity rates among pregnant women, as documented in multiple studies, indicate substantial risks of vertical transmission to fetuses[13,23]. Integrating educational campaigns into public health frameworks can facilitate early detection and timely interventions, thereby minimizing adverse perinatal outcomes[17,18]. Culturally adapted messaging, informed by regional epidemiological data, is critical for optimizing risk communication and fostering behavioral change[14,24]. These strategies not only enhance awareness but also drive actionable preventive behaviors, which are pivotal for reducing congenital TORCH incidence[15,25].

Participant satisfaction with the hybrid seminar, detailed in **Figure 1**, reflects overwhelmingly positive feedback. A majority of participants rated the seminar's content as highly relevant and well-aligned with the theme, with speakers praised for their clarity and the interactive sessions for fostering productive discussions. The hybrid format combining in-person and virtual engagement was deemed advantageous, offering flexibility and broader accessibility. However, a minority of participants noted suboptimal timing, suggesting room for logistical refinements in future iterations. Overall, the evaluation underscores the seminar's success in meeting participant expectations while identifying areas for improvement.

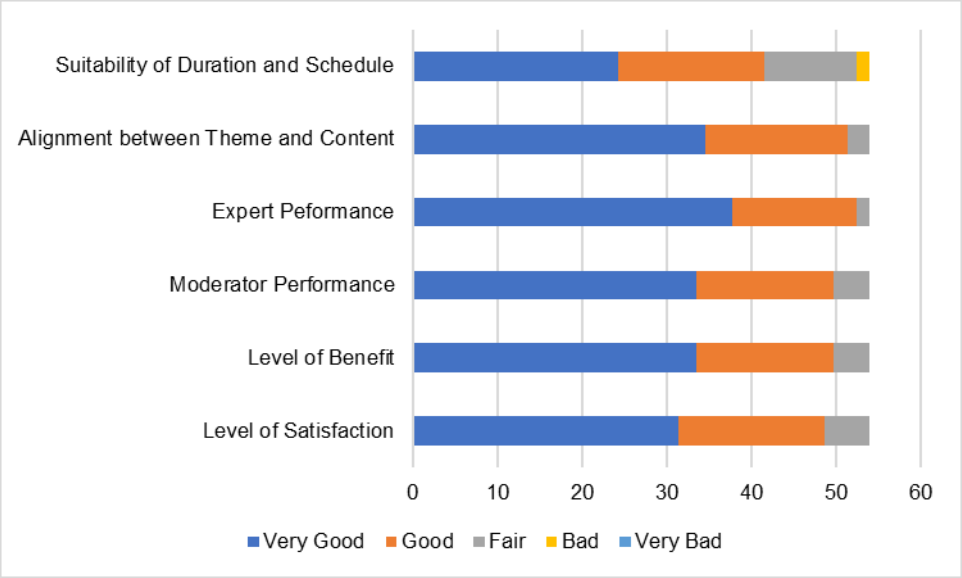

Figure 1. Diagram of Participant Satisfaction Results for the Implementation of Hybrid Seminars

This community service activity holds particular significance given the severe consequences of untreated TORCH infections during pregnancy, including fetal abnormalities and autism spectrum disorders. By equipping reproductive-aged women with actionable knowledge, the program empowers them to adopt healthier lifestyles and mitigate infection risks. Enhanced awareness of TORCH screening and prevention is expected to translate into improved maternal and neonatal health outcomes. Moreover, the inclusion of male and older participants amplifies the intervention's reach, as these individuals can disseminate critical information within their social networks.

The findings resonate with empirical evidence demonstrating that community-based interventions, when culturally adapted and participatory, effectively enhance knowledge and preventive behaviors among high-risk populations[20,26]. Such programs, coupled with routine screening, have been shown to reduce congenital infection rates significantly[13,18]. Evaluations of analogous initiatives in high-burden settings further corroborate their capacity to drive behavioral change and curb disease transmission[19,27]. These successes highlight the indispensable role of sustained community engagement and education in combating TORCH infections[22,25].

CONCLUSION

This community service initiative successfully enhanced public awareness regarding TORCH infections through a hybrid seminar engaging women of reproductive age, alongside male and older participants who can further disseminate knowledge within their communities. The program demonstrably improved participants' understanding of TORCH risks during pregnancy, the critical role of screening, and essential preventive strategies, evidenced by a statistically significant increase in knowledge scores post-intervention. High participant satisfaction with the seminar's content, delivery, and flexible hybrid format underscores the effectiveness of this educational approach in bridging knowledge gaps. By equipping individuals, particularly

women of reproductive age, with actionable information, this activity holds significant potential for promoting healthier behaviors, mitigating infection risks, and ultimately contributing to improved maternal and neonatal health outcomes, reinforcing the value of targeted community engagement in public health.

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