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Web-Based Tris (The Oral Intervention of Parenting Caries) Model as an Effort to Prevent Dental Caries in Pregnant Women in Southeast Aceh Regency

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Abstract:

- ***Background:***

The prevalence of dental caries among pregnant women in Indonesia reaches 82.8%, caused by hormonal changes, nausea and vomiting, decreased brushing habits, and changes in salivary pH and acidity. This condition has the potential to cause pregnancy complications such as low birth weight (LBW), pre-eclampsia, miscarriage, and stunting. Effective and efficient educational media is needed, one of which is through web-based technology. Purpose: To produce a Web-Based Tris Model as a suitable and effective educational media in improving the behavior of pregnant women in preventing dental caries and reducing OHIS scores. To produce a Web-Based Tris Model as a suitable and effective educational media in improving the behavior of pregnant women in preventing dental caries and reducing OHIS scores.

- ***Method:***

Type of R&D Research, Quasy experiment method Pre-Posttest group design pretest-posttest group design. Subjects consisted of 60 pregnant women divided into two groups: 30 intervention group and 30 control group. The variables studied included knowledge, attitudes, actions, and OHIS scores. using the Mann Whiteny and Wicoxon tests.

- ***Results:***

The Web-based Tris model was declared feasible to use with expert validation results of 90%. The effectiveness test showed a significant increase in knowledge 22.85 to 29.15 (p=0.008), attitude 70.20 to 85.60; (p=0.030), action 68.10 to 85.50 (p=0.001), and a decrease in OHIS score 3.40 to 1.90 (p=0.000).

- ***Conclusion:***

The Web-based Tris model is feasible and effective in improving behavior and reducing OHIS scores as an effort to prevent dental caries in pregnant women. Method

Keywords: *Pregnant Women, Caries, Health Behavior, OHIS, Educational Media, Web-Based Tris Model.*

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I. INTRODUCTION

This introduction discusses the problem of oral health, especially caries, which is a global challenge with a major socioeconomic impact. According to the WHO 2022 report, approximately 3.7 billion people experience oral problems.[1]

The prevalence of caries in Indonesia is quite high, reaching 82.8%.[2] Pregnant women are vulnerable to caries with a high prevalence, which can have an impact on maternal and child health, including the risk of premature birth, low birth weight, and stunting.[3]

World Oral Health Day 2024, "A Happy Mouth is A Happy Body", reflects the goal of the National Action Plan for Dental and Oral Health 2022-2030 to reduce caries prevalence by 25% by 2023.[4] Oral health improvement needs to be considered at every age according to the life cycle to achieve optimal health. Dental health service efforts include promotive, preventive.[5]

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Factors that influence the utilization of dental health services include socio-demographic status, education, attitudes, income, dental health conditions, age, gender, availability of dentists, as well as social, environmental, and psychological factors.[6] Digital information technology, such as web-based audiovisual media and print, is expected to improve the behavior of pregnant women in the prevention of dental caries. The use of web applications for 21 days, by reading educational materials and assessing the risk of dental caries, can help increase understanding and awareness.[7]

The dental health of pregnant women is important because it can affect the dental development of children. many pregnant women lack knowledge about dental care, which is exacerbated by hormonal changes during pregnancy. because, educational efforts through media such as web applications are expected to be effective in increasing the knowledge and behavior of pregnant women in maintaining oral health.[8] Dental caries is a multifactorial disease caused by dental biofilm, influenced by diet, biological, behavioral, psychosocial, and environmental factors, which results in mineral loss in the hard tissues of the teeth. This process can lead to the formation of carious lesions..[9]

The web is an internet-based digital media used to access and disseminate information online, a digital educational tool used to deliver information interactively via the internet.10 The web is an online platform that provides various information and services through the internet network.[11]

The web-based Tris (The Oral Intervention of Parenting Caries) model is proposed as an innovative solution to prevent caries in pregnant women, with an interactive educational approach through videos, slides, and toothbrush reminders. This study uses the R&D method to develop and test the effectiveness of web applications as an effort to prevent dental caries in pregnant women about dental health.[12]

II. RESEARCH METHODS

This research is a type of research and development (R&D) that aims to create and test a Web-Based Tris Model as a learning medium to prevent dental caries in pregnant women in Southeast Aceh District. 13 The development process of this model consists of five main stages, namely: (1) collecting information, (2) designing the model, (3) validating with experts, (4) conducting product trials, and (5) evaluating the results.[14] The trial used a quasi-experimental method with a pretest-posttest control group design.[15]

There were two groups, namely the intervention group that used the Web-Based Tris Model and thecontrol group that received conventional counseling.[16] The study took place for 21 days at UPTD Puskesmas Kota Kutacane and UPTD Puskesmas Deleng Pokhkisen from March to April 2025.[17]

The study population was 60 pregnant women in the first trimester who met certain criteria, with total sampling technique.[18]

Each group consisted of 30 people. The tools used included a knowledge questionnaire (10 questions, Guttman scale),7 an attitude questionnaire (10 questions, Likert scale), an action observation sheet (15 indicators), and an oral hygiene score check using OHIS.[19]

Primary data were collected through interviews, observations, and tests (before and after), while secondary data were obtained from the literature.20 Data analysis was carried out quantitatively and qualitatively using the techniques of editing, scoring, coding, filling tables, and entering data with the helmet. ogin sistem, kuesioner, materi edukasi, video animasi, monitoring sikat gigi, dan fitur konsultasi.

This model integrates health promotion through an Internet of Things (IoT) based platform, in line with the development of industry 4.0. Initial analysis showed low knowledge and behavior of dental caries prevention among pregnant women. Therefore, this model serves as a promotive and preventive media with interesting and accessible content.

➢ . *Uji Pantas Coba Model*

- *Validasi Ahli*

Four experts from the fields of IT, dental health, media, and behavior provided assessments of this model.

The validation results showed that the model is feasible to be tested with a p value of 0.410 (ICC), which indicates that the assessment between experts has relevance and consistency.[22]

- *Field Test*

The test was conducted on 60 pregnant women, divided into two groups: 30 people as the intervention group (Kutacane City Health Center) and 30 people as the control group (Deleng Pokhkisen Health Center).[8]

➢ *Results showed:*

- There were significant improvements in the knowledge, attitudes, and actions of pregnant women in the intervention group after education using a web-based model.
- The OHI-S index decreased more in the intervention group, indicating a significant improvement in oral hygiene.[23]
- The Web-based Tris model proved to be valid and effective in improving pregnant women's behavior related to dental caries prevention. This media can be an innovation in promotive-preventive efforts in maternal health services, especially in areas with limited access to direct education. Data

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III. RESULTS

➢ *Test validation*

Table 1 Expert Validation Results

Validation					
NAME	**N**	**Mark**	**F(%)**	**Average**	**p-value***
An,S.Kom., M.Kom	20	93	46,5		
Dr.drg.Ro	20	90	45,5	90%	0,410
Pu,.SKM, M,Kes	20	90	45,5		
De,SKM MPH	20	91	46,5		

*Intraclass Correlation Coefficient ICC)

Based on Table 1 shows that the assessment results from validators are known, the results show that the p-value is 0.410, which means that the Web-Based Tris Model is relevant and feasible as an effort to prevent caries in pregnant women.

Table 2 Frequency Distribution of Respondents' Characteristics Based on Education and Gestational Age in Intervention and Control Groups

	Intervention		**Control**	
Caracteristik				
	F	**%**	**F**	**%**
Education				
Elementary School	5	16,6	4	13,3
Middle School	10	33.3	11	36,6
High School	10	33.3	10	33,3
Bachelor's/Master's Degree	5	16,6	5	16,6
Total	30	100	30	100
Age				
Pregnancy	6	20	5	16,6
1 Month Pregnant	12	40	14	46,6
2 Months Pregnant	12	40	11	36,6
3 Months Pregnant	30	100 %	30	100 %%

*levenestatistic

Based on Table 2, the characteristics of respondents in the intervention and control groups were almost balanced, with most having junior and senior high school education, and gestational age in the 2nd and 3rd months.

Bivariate analysis was used to test for differences between two variables. Model testing began with a normality test, followed by paired and unpaired tests of effe

Table 3 Normality Test of Pregnant Women Data in Intervention and Control Groups

Variable	**p-value***	
	Intervention	**Control**
PreTest Knowledge	0.080	0.297
PostTest Knowledge	0.000	0.000
PreTest Atttutide	0,000	0,047
PostTest Atttutide	0,000	0.000
PreTest Action Or Behavior	0.002	0.002
PostTest Action Or Behavior	0.000	0.004
PreTest OHI-S	0.867	0.908
PostTest OHI-S	0.928	0.479

*Shapiro-Wilk

Based on Table 3, the results of the normality test show that the pre-post knowledge, pre-post attitude, pre-post practice, and pre-post OHIS data are normally distributed, as the p-values are greater than 0.05. If any data are not normally distributed, a non-parametric test is used — the Wilcoxon test for paired samples and the Mann-Whitney test for unpaired samples. Sure! Here's the translation of your phrase into English:

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Table 4 Effectiveness Test of Pregnant Mothers' Knowledge in the Intervention Group and Control Group

Variable	Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Δ (Mean ± SD)	P-value
Knowledge	Intervention	22,85 ± 4,80	29,15 ± 0,90	6,30 ± 4,00	0,008*
	Control	22,85 ± 4,80	26,65 ± 2,92	3,80 ± 3,50	0,000*
		0,881**	0,008**	2,50±1,25	

*Wilcoson
**Mann-Whitey test

Pregnant women's knowledge increased in both groups. The intervention group improved from 22.85 to 29.15, while the control group increased from 22.85 to 26.65. The Wilcoxon test showed a significant difference (p = 0.000). After the intervention, the intervention group showed a more significant improvement compared to the control group (p = 0.008), indicating the success of the educational intervention.

Table 5 Effectiveness Test of Pregnant Mothers' Attutide in the Intervention Group and Control Group

Variable	Group	Pretest (Mean± SD)	Posttest (Mean± SD)	Δ (Mean ± SD)	*P-value*
Atttutide	Intervention	70,20± 6,50	85,60 ± 4,00	15,40± 5,20	0, 0,030*
	Control	70,25± 6,40	80,10 ± 5,50	9,85 ± 5,80	0, 0,000*
		0,958**	0,030**	5.55±0,30	

Wilcoson
**Mann-Whitey test

After the intervention, there was a significant improvement in the attitudes of pregnant women in both groups. The intervention group experienced an increase in mean score from 70.20 ± 6.50 to 85.60 ± 4.00 (a difference of 15.40 ± 5.20), while the control group improved from 70.25 ± 6.40 to 80.10 ± 5.50 (a difference of 9.85 ± 5.80). The Wilcoxon test showed that the improvement was statistically significant within each group (p =0.000).

Before the intervention, there was no significant difference between the two groups (p = 0.958). However, after the intervention, the Mann-Whitney test revealed a significant difference (p = 0.030), indicating that the web-based Tris Model was more effective in improving the attitudes of pregnant women compared to the control group. Thus, the intervention based on the Tris Model proved effective in enhancing the attitudes of pregnant women in the UPTD Puskesmas Kota Kutacane area.

Table 6 Effectiveness Test of Pregnant Mothers' Action or behavior in the Intervention Group and Control Group

Variable	Group	Pretest (Mean± SD)	Posttest (Mean ± SD)	Δ (Mean ± SD)	*P-value*
Action Or Behavior	Intervention	68,10 ± 6,80	82,50 ± 4,50	14,40 ± 5,60	0,001*
	Control	69,00 ± 7,00	75,20 ± 5,50	6,20 ± 6,00	0,000*
		0,365**	0,001**	8.20±0.40	

*Wilcoson
**Mann-Whitey test

The web-based Tris Model significantly improved the action scores of pregnant women in the intervention group (Δ = 14.40 ± 5.60; p = 0.001), compared to the control group, whose improvement was not significant (Δ = 6.20 ± 6.00; p = 0.365). The between-group comparison test showed a p-value of 0.000, indicating that the web-based Tris Model is more effective than the flipchart media.

Tabel 7 Effectiveness Test of Pregnant Mothers' OHIS in the Intervention Group and Control Group

Variable	Group	Pretest (Mean± SD)	Posttest (Mean± SD)	Δ (Mean ± SD)	*P-value*
OHIS	Intervention	3,40 ± 0,70	1,90 ± 0,60	1,50 ± 0,50	0,000*
	Kontrol	3,45 ± 0,75	2,60 ± 0,65	0,85 ± 0,55	0,000*
		0,000**	0,000**	0.65±0.034	

Wilcoson
**Mann-Whitey Pre-test

The OHI-S scores of pregnant women significantly decreased in the intervention group (from 3.40 to 1.90) compared to the control group (from 3.45 to 2.60). Both the Wilcoxon and Mann-Whitney tests showed significant results (p = 0.000), indicating that the web-based Tris Model is more effective in improving the oral hygiene of pregnant women.

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➢ *Web-Based Tris Model*

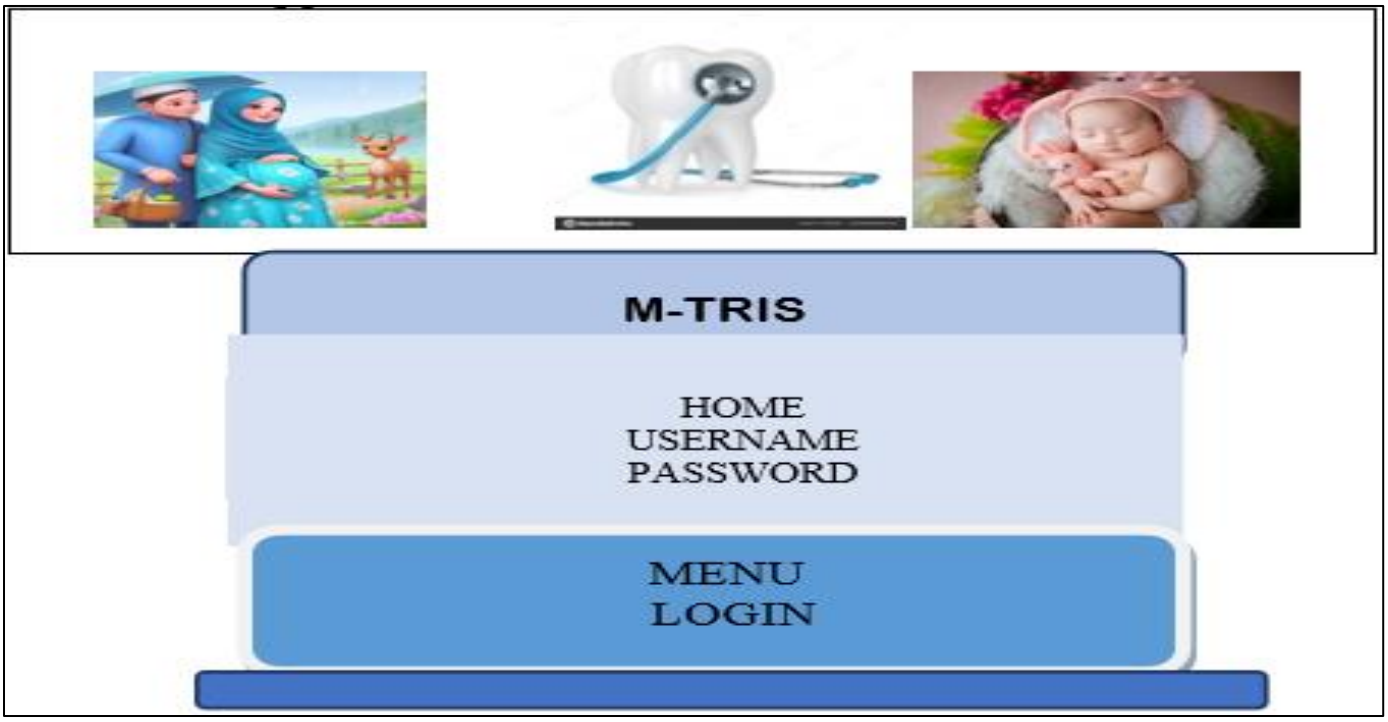

Fig 1 Menu Appearance

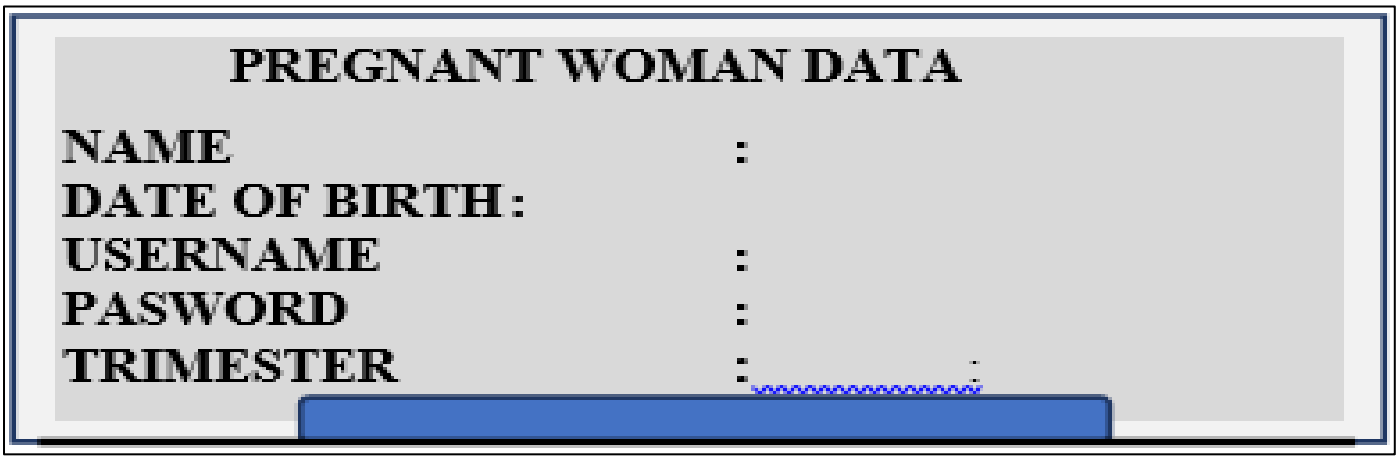

Fig 2 Pregnancy Data Display

➢ *Tampilan Data Dashboard*

- Pretest and Posttest
- Education
- g. Consultation
- Animated video
- h. Logout
- 3D educational video
- QR Code
- Toothbrushing monitoring

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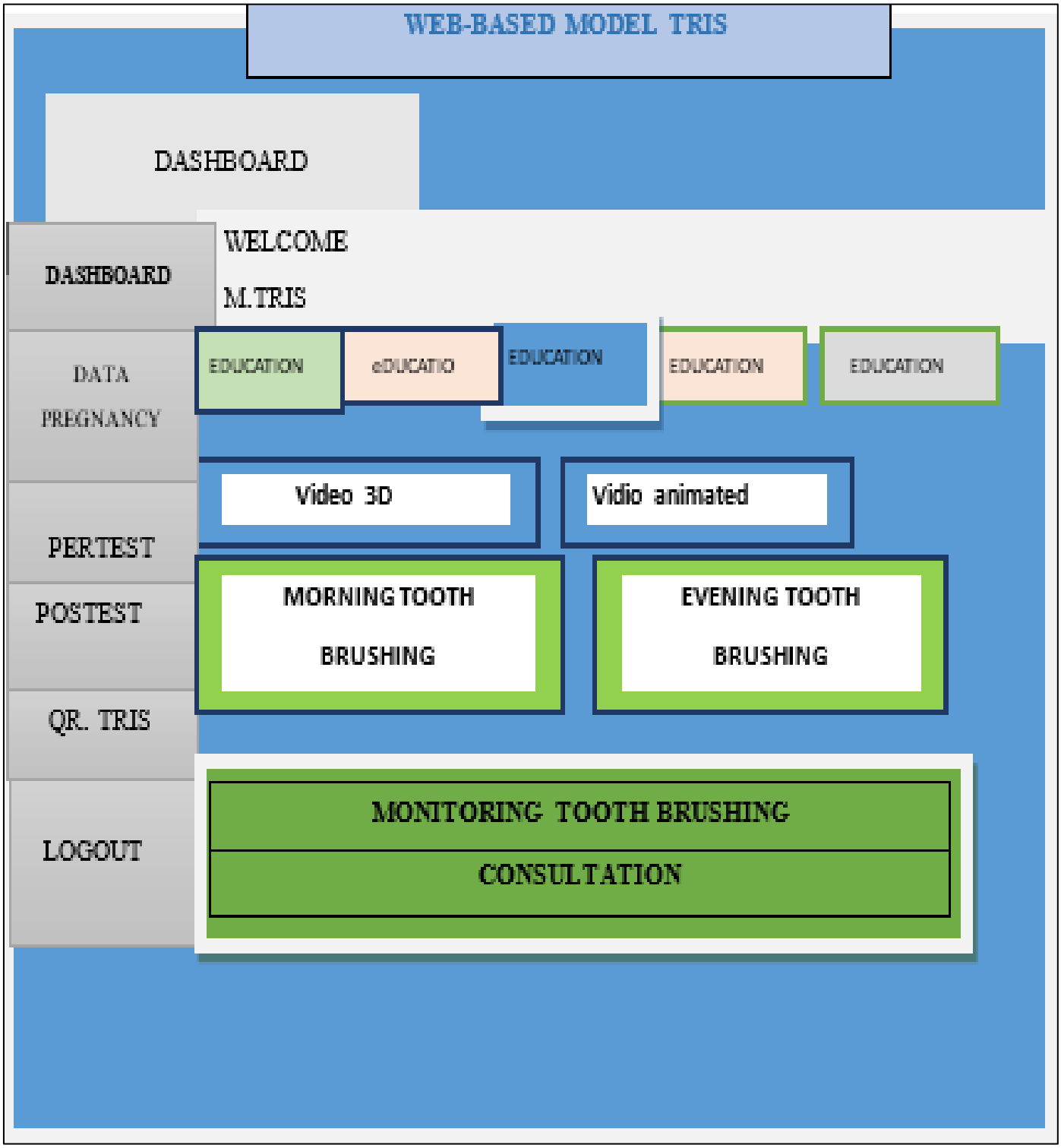

Fig 3 Gambar Web-Based TRIS Model

IV. DISCUSSION

A web-based educational intervention was developed to improve knowledge, attitudes, tooth brushing practices, and oral hygiene (OHI-S) as a caries prevention measure in pregnant women.[24] The results showed that this web-based educational intervention was significantly effective for all studied variables. Validation by four experts demonstrated that this model was highly feasible, with an average validity value of 90% and an ICC test of p=0.410, indicating inter-expert agreement on the feasibility of the Tris Model.[25]

There was a significant increase in knowledge of pregnant women in both the intervention and control groups, but the intervention group showed a significantly higher increase (p=0.008). This strengthens the role of technology-based interactive education in strengthening participants' understanding.[26]

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Regarding attitudes, the intervention also demonstrated a significant positive impact (p=0.030).[27] Education through visual and easily accessible digital media was deemed more effective in shaping positive attitudes of pregnant women towards the importance of maintaining oral *hygiene.28*The Tris Model is also effective in improving toothbrushing skills (p = 0.001).[29] This skill enhancement is supported by an interactive approach and the use of visual media, which aligns with the Health Belief Model of behavior change.[30]The OHI-S index significantly decreased in the intervention group (p = 0.000), indicating an improvement in oral hygiene status.[31] This difference demonstrates the effectiveness of the intervention in creating a positive impact on physical cleanliness, although it is also influenced by external factors.[32] This study has limitations, such as a short intervention duration, small sample size, and lack of long-term evaluation.[33] Nevertheless, these findings suggest that the web-based Tris Model is a promising educational approach to be implemented in health promotion programs for pregnant women, especially in the digital era.[34]

V. CONCLUSION

Based on the results of this study, it can be concluded that: The web-based Tris Model is proven feasible and effective as an educational medium for preventing dental caries in pregnant women in the working area of Puskesmas, Southeast Aceh Regency, with a validation test result of 90% (feasible category). This model demonstrates effectiveness in:

- Increasing knowledge, from a score of 22.85 to 29.15 (p = 0.008).
- Changing attitudes, from a score of 70.20 to 85.60 (p = 0.030).
- Improving preventive actions, from a score of 68.10 to 85.50 (p = 0.001).
- Reducing oral hygiene scores, from 3.40 to 1.90 (p = 0.000).

Overall, this model shows a positive impact on improving preventive behaviors against dental caries in pregnant women. The Tris model was also effective in improving tooth brushing (p=0.001).[29 This] skill improvement was supported by an interactive approach and the use of visual media, which is in accordance with the theory of behavior change (Health Belief Model).[30]

REFERENCES

[1]. World Health Organization. Global oral health status report: towards universal health coverage for oral health by 2030. Geneva: WHO; 2022 \[cited 2025 Aug 4 available from:[https://www.who.int/publications/i/item/9789240061485](https://www.who.int/publications/i/item/9789240061485.

[2]. Kementerian Kesehatan Republik Indonesia. Survei Kesehatan Indonesia (SKI) 2023. Jakarta: Badan Kebijakan Pembangunan Kesehatan; 2023.

[3]. Putri RM, Supriatin S. Hubungan kesehatan gigi dan mulut ibu hamil dengan kejadian karies gigi pada anak usia dini. Jurnal Kesehatan Gigi. 2020;7(2):85–91.

[4]. World Dental Federation. FDI Vision 2030: Delivering Optimal Oral Health for All. Geneva: FDI; 2022 \[cited2025Aug4].Availablefrom: https://www.fdiworlddental.org

[5]. Kementerian Kesehatan Republik Indonesia. Riset Kesehatan Dasar (Riskesdas) 2018. Jakarta: Badan Penelitian dan Pengembangan Kesehatan; 2018.

[6]. Darmayanti L, Astuti IA. Pengaruh kesehatan gigi dan mulut ibu hamil terhadap berat badan lahir rendah dan kelahiran prematur. Jurnal Kesehatan Masyarakat. 2019

[7]. DP, Handayani D. Perubahan hormonal pada kehamilan dan kaitannya dengan kesehatan gigi dan mulut. Majalah Kedokteran Gigi Indonesia. 2021;7(3):120–6.

[8]. Dewi TR, Nugraheni WA. Faktor sosial dan psikologis dalam pemanfaatan pelayanan kesehatan gigi oleh ibu hamil. Jurnal Promosi Kesehatan Indonesia. 2022;17(1):15–22.

[9]. Handayani RA, Maulidya F. Perilaku menyikat gigi ibu hamil dan implikasinya terhadap kesehatan gigi anak. Jurnal Ilmu Kesehatan Anak. 2021;2(2):44–50.

[10]. Nugroho AY, Lestari P. Pengembangan media edukasi digital 14(1):33–40.

[11]. Sari untuk promosi kesehatan gigi pada ibu hamil. Jurnal Teknologi Pendidikan. 2020;22(1):60–72.

[12]. Rahmawati D, Fitriani D. Model edukasi interaktif berbasis audiovisual untuk pencegahan karies gigi. Jurnal Inovasi Kesehatan Masyarakat. 2023;6(1):25–34.

[13]. Borg WR, Gall MD. Educational research: an introduction. 4th ed. New York: Longman; 1983.

[14]. Sugiyono. Metode Penelitian dan Pengembangan (R\&D). Bandung: Alfabeta; 2017.

[15]. Notoatmodjo S. Metodologi Penelitian Kesehatan Jakarta: Rineka Cipta; 2014.

[16]. Arikunto S. Prosedur Penelitian: Suatu Pendekatan Praktik (Revisi). Jakarta: Rineka Cipta; 2013.

[17]. Widoyoko EP. Teknik Penyusunan Instrumen Penelitian Yogyakarta: Pustaka Pelajar; 2012.

[18]. Anwar S. Reliabilitas dan Validitas. Yogyakarta: Pustaka Pelajar; 2012.

[19]. Field A. Discovering statistics using IBM SPSS Statistics. 4th ed. London: SAGE Publications; 2013.

[20]. Creswell JW. Research design: qualitative, quantitative, and mixed methods approaches. 4th ed. Thousand Oaks, CA: SAGE Publications; 2014.

[21]. World Medical Association. WMA Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects \[Internet]. 2013 \[cited 2025 Aug 4]. Availablefrom: [https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human subjects/](https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/)

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25aug279

[22]. Kementerian Kesehatan Republik Indonesia. Peraturan Menteri Kesehatan RI No. 9 Tahun 2020 tentang Etika Penelitian dan Pengembangan Kesehatan. Jakarta: Kemenkes RI; 2020.
[23]. Setyosari P. Metode Penelitian Pendidikan dan Pengembangan. Jakarta: Prenada Media; 2015.
[24]. Tukman BW, Harper BE. Conducting educational research. 6th ed. Lanham, MD: Rowman & Littlefield Publishers; 2012.
[25]. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the Health Belief Model. Health Educ Q. 1988;15(2):175–83.
[26]. Brame CJ. Effective Educational Videos: Principles and Guidelines for Use in Teaching \[Internet]. Vanderbilt University Center for Teaching; 2015 \[cited 2025 Aug 4]. Availablefrom:https://cft.vanderbilt.edu.
[27]. Cook DA, Levinson AJ, Garside S, Dupras DM, Erwin PJ, Montori VM. Internet-based learning in the health professions: a meta-analysis. JAMA. 2008;300(10):1181– 6.doi:10.1001/jama.300.10.1181.
[28]. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Q. 1989;13(3):319–40.
[29]. Ghozali I. Aplikasi Analisis Multivariate dengan Program IBM SPSS 25. Semarang: Badan Penerbit Universitas Diponegoro; 2018.
[30]. Trisnawati H, Susanto H. Model TRIS: Inovasi Edukasi Digital Berbasis Web untuk Pencegahan Karies pada Ibu Hamil. Banda Aceh: Laporan Penelitian R\&D; 2023.
[31]. Mulyani NS, Sari D. Pengaruh media edukasi digital terhadap peningkatan pengetahuan ibu hamil. Jurnal Promkes. 2021;9(2):122–30. Prasetyo Y, Fitriani F. Efektivitas video edukasi kesehatan terhadap perubahan sikap ibu hamil. Jurnal Pendidikan Kesehatan Reproduksi. 2022;4(1):44–51.
[32]. Champion VL, Skinner CS. The Health Belief Model. In: Glanz K, Rimer BK, Viswanath K, editors. Health Behavior and Health Education: Theory, Research, and Practice. 4th ed. San Francisco: Jossey-Bass; 2008. p. 45–65
[33]. Greene JC, Vermillion JR. The Simplified Oral Hygiene Index. J Am Dent Assoc. 1964;68(1):7–13.
[34]. Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO Global Oral Health Programme. Community Dent Oral Epidemiol. 2003;31(Suppl 1):3–23.