NVEO
Natural Volatiles &
Essential Oils

Trial of Dental Health Care Model ("AGITA") towards Increasing Maternal Knowledge and Teeth Brushing Skills of Children

Tri Wiyatini [1,*], Diyah Fatmasari[2], and Wiangke Fajjrin[3]

[1,2,3]Dental and Oral Health Therapist Postgraduate Program, Poltekkes Kemenkes Semarang

Abstract

The prevalence of dental caries in children in Indonesia based on Riskesdas data in 2018 is 36.4% with an age range of 3-4 years suffering from dental and oral health problems. Untreated dental and oral health problems can lead to infection, pain, and tooth loss that affect a child's quality of life. Maintenance of dental and oral hygiene in children from an early age based on good mother's knowledge is an effort to prevent dental caries in children in the future. Technological developments in the health sector are growing rapidly, so the need for the latest educational media by following the development of the industrial revolution 4.0 so that it can achieve the goal of increasing mother's knowledge and children's brushing skills. This study used Research and Development (R&D) and model trials using one group pre-experimental pretest and posttest design. There are 5 stages of research namely 1) information collection, 2) model design, 3) expert validation and revision, 4) product/model trials, 5) product results. The mother and child study subjects was 82 samples, given interventions by applying "AGITA" for 10 days. The "Agita" model contains the stages of mother training, assessment, diagnosis, planning, implementation, and evaluation. Mothers were asked to fill in pre and posttest data, mother's biodata, fill in the assessment stage, fill in the diagnosis stage, approve the planning stage, fill in the implementation stage, and fill in the evaluation stage. The data was tested using intra class correlation and Wilcoxon tests. "AGITA" model validation test obtained an average value of 95.1 is categorized very decent (p=0.016), an increase in mother's knowledge (p=0.001), and an increase in children's tooth brushing skills (p=0.001). The application of the toddler dental health care model ("Agita") is effective for increasing mother's knowledge and child's brushing skills.

Introduction

Dental and oral disease is the most common type of non-communicable disease that affects approximately half of the world's population. As many as 2.4 billion people have dental and oral problems, one of which is caries in permanent teeth and 486 million children suffer from caries in their primary teeth. Untreated primary dental caries was the 10th most common condition globally in 2010. The prevalence of dental caries is increasing due to behavioral factors such as consuming excessive sugar and not maintaining oral hygiene (Nepaul & Mahomed, 2020). The awareness of Indonesian people in maintaining oral and dental hygiene is still low, this is evidenced by the high national prevalence of dental and oral health problems based on Riskesdas in 2018 that 57.6% of Indonesian people have dental and oral health problems as well as the national prevalence of dental caries in children from 2013 to 2018 increased by 26%(Kementerian Kesehatan RI, 2018). The age range of children experiencing dental caries is in the age group of 1-4 years by 10.4% and the age group of 3-4 years by 36.4% (Kementerian Kesehatan RI, 2013, 2018). Dental caries disease in children has a negative impact on the growth and development of children, where children who have dental caries from an early age will tend to have a higher risk of dental caries in the future (Seow, 2018). Despite the poor dental health behavior, consuming added sugar can contribute to increase the risk of dental caries in children (Vos et al., 2017).

Even though most mothers know that consuming excessive added sugar can increase the risk of dental caries, some mothers still give sweet foods such as candy on their daily basis so that 58.2% of children experience dental caries. Dental caries in children begins in the first 2 years and the prevalence of its severity increases until the age of 6 years (Tsang et al., 2019). Strategies to prevent dental caries in children include providing dental and oral health education and implementing dental hygiene care through the role

of mother (Noaman, Khalid, & Fattah, 2019). Mothers represent an important subgroup among the adult population as they are not only responsible for their own dental health but also for the dental health of their children (De Buhr & Tannen, 2020). The previous research showed that the knowledge of mother about dental and oral health can change children's dental and oral hygiene behavior (Noaman et al., 2019).

Previous research has stated that mothers who do not have sufficient knowledge about dental and oral health potentially cause a high prevalence of dental caries in children (Noaman et al., 2019). Behavioural factors are important factors in reducing the prevalence and severity of dental caries in children. Family background plays an important role in implementing dental and oral hygiene practices in children. The family is the first institution for children in providing dental health education, especially mothers who are the main model for behavior development (Sehrawat et al., 2016). Mothers are known to play an important role in dental and oral health for children. Previous research has shown a relationship between maternal and child dental health (Finlayson, Siefert, Ismail, Delva, & Sohn, 2005). Given the important role of mothers in shaping children's dental and oral hygiene behaviour, the researchers carried out an innovative development on a model of dental health care for toddlers, named “Agita”.

The “Agita” model is the latest method and media that has been adapted to the right target so that the implementation and information received are effective and appropriate. The “Agita” model uses communication, information, and education media which consists of 5 stages, namely assessment, diagnosis, planning, implementation, and evaluation following Minister of Health Regulation No. 284 of 2016 concerning the implementation of dental and oral health care in community groups but there are no special regulations for toddlers (Gultom, 2019). Researchers innovate by creating a model of information technology-based dental health care for toddlers (“Agita”) by following the development of the industrial revolution 4.0 that includes the implementation of comprehensive and sustainable dental health care for toddlers carried out for ten days using the theory of behavior change so that it will achieve the goal (Purnama, Santoso, Suwondo, Fatmasari, 2019). The objective of this study was to prove the effectiveness of “AGITA” in improving mother's knowledge and children's brushing skills.

Research Methods

The research design was a quasi-experimental where there was no control group. The research sample amounted to 82 people that were divided into 41 mothers and 41 children. The samples were taken randomly from 3 playgroups (KB), namely KB Melati, KB Kartika Daya, and KB Masyithoh III. The study was carried out for one month in January - February 2021 where the implementation of dental health care for toddlers (“Agita”) in each family planning program was carried out for 10 days.

The instrument used was “AGITA” software which contains the stages of training, assessment, diagnosis, planning, implementation, evaluation and has passed the design process and expert validation. The measuring instrument for mother’s knowledge is 15 multiple choice questionnaires and the measuring instrument for children's teeth brushing skills is a checklist sheet of 30 pieces. Before giving the software intervention, the mothers were given a training on dental and oral health as well as a simulation of the use of the “Agita” software. Besides that the mothers were also as the controller of the operation of the “Agita” software, while the implementation was as follows:

1) the mother filled in the mother's biodata,

2) the mother filled in the pre-test of mother's knowledge and skills in brushing the child's teeth, in the assessment stage,

3) the mother filled in the diagnostic stage in the form of checking the condition of the child's oral cavity,

4) the mother agreed to the plan that has been determined by the dental and oral therapist,

5) mothers filled in the implementation stage by inputting data in the form of photos and time of brushing their children's teeth and watching educational videos and distributing them to children,

6) mother filled in post-test of mother's knowledge and child's brushing skills,

7) mother can find out the overall score on “Agita” software. Not only mothers, children also contribute to the implementation of the “Agita” software, children were asked to watch educational videos that have been provided on the software and children were asked to do tooth brushing activities in the morning after breakfast and before going to bed at night accompanied by the mother. Data on mothers’ knowledge and children's tooth brushing skills before and after the trial using the “AGITA” model were analyzed with the Wilcoxon test statistical test (because the data were not normally distributed).

Research Result

A. Information Collection

From the results of the information collection, it can be concluded that efforts to establish the tooth brushing behaviour of children require targeted and effective educational methods based on the knowledge of the mother in maintaining oral and dental hygiene appropriately and it will establish behaviors that support the tooth brushing skills of children so that the goal can be achieved.

B. Model Design

The data from information collection is used to create the model design. The results of information collection revealed that in order to improve the knowledge of the mother and the tooth brushing skills of children, an appropriate and effective educational method was required, the researchers innovated by creating a model of information technology-based dental health care for toddlers.

C. Expert Validation

Table 1. Expert Validation Statistic Test

Expert Validation					
	N	F (%)	Total	Category	*p-value**
Relevant	3	100	95,1	Very Feasible	0,016
Irrelevant	0	0			

**Interclass correlation coefficient*

The results of expert validity indicate that the p-value = 0.016, which means that the “Agita” information technology-based model is feasible to use in the implementation of dental health care for toddlers.

D. Product/Model Trial

Table 2. Respondent Characteristic Data

No.	Children Characteristic	n	%

1	Gender		
	Male	18	43,9
	Female	23	56,1
2.	Age		
	3 years	15	36,6
	4 years	26	63,4

Table 2 shows that the distribution of the frequency of children based on gender with the highest percentage is 56.1% totalling 23 female children.

Table 3. The Average Value of Mother's Knowledge Before and After the Application of the "Agita" Model

Variable	Statistic				
	Mean	Delta	SD	Min	Max
Mother's knowledge pre-test	6,78	4,93	1,666	4	12
Mother's knowledge post-test	11,71		1,487	9	15

Table 3 shows that the mean value of the knowledge of mother variable before and after the implementation of the "Agita" model improved from 6.78 to 11.71.

Table 4. The Average Value of Children's Brushing Skills Before and After the Application of the "Agita" Model

Variable	Statistic				
	Mean	Delta	SD	Min	Max
Children brushing skills pre-test	16,12	6,1	2,900	11	25
Children brushing skills post-test	22,22		3,054	18	29

Table 3 shows that the average value of the children's tooth brushing skill variable pre- and post-implemented the "Agita" model improved from 16.12 to 22.22. Before proceeding with the next test, the researcher has tested the normality of the data and the result is that the data is not normally distributed, so the next test will be using non-parametric analysis.

Table 5. The results of the paired data test of mother's knowledge before and after the application of the "Agita" model

Variable	Statistic		
	Before	After	*p-value**

Mother's Knowledge			
a. Mean ± SD	6,78±1,666	11,71±1,487	0,001
b. Min-Max	4-12	9-15	

**Willcoxon*

Table 5 shows that there is a significant difference in maternal knowledge between before and after the application of the "Agita" model as evidenced by a significance value of <0.05. The average result shows that the value after the application of the "Agita" model is greater than before the application, so it can be concluded that the application of the "Agita" model is effective in increasing the mother's knowledge.

Table 6. The Results of The Paired Data Test of Children's Tooth Brushing Skills Before and After the Application of the "Agita" Model

Variable	Statistic		
	Before	After	*p-value**
Children's tooth brushing skills			
a. Mean ±SD	16,12±2,900	22,22±3,054	0,001
b. Min-Max	11-25	18-29	

**Willcoxon*

Table 6 shows that there is a significant difference in children's brushing skills between before and after the application of the "Agita" model as evidenced by a significance value of <0.05. The average result shows that the value after the application of the "Agita" model is greater than before the application, so it can be concluded that the application of the "Agita" model is effective in improving children's tooth brushing skills.

E. Product Result

The product is an information system that can be accessed at http://"Agita".online/ and an information technology-based guidebook for toddler dental health care ("Agita") which contains procedures for using information systems. The implementation of the "Agita" model emphasizes the active role of the mother where the mother plays a very essential role in the application of the "Agita" model, such as 1) the mother as a model and deliver the dental health knowledge to children, 2) the mother must understand and be able to demonstrate dental health knowledge to children, 3) the mother as a controller of the operation of the system, 4) the mother as a controller of the formation of children's tooth brushing skills.

Figure 1. Guidebook for toddler dental health care model ("Agita")

F. Discussion

The results of collecting information concluded that efforts to shape the tooth brushing behavior of children needed an educational method based on mother's good knowledge in maintaining oral and dental hygiene. Mothers needed to be given intervention in the form of education on the maintenance of proper dental and oral hygiene with the aim of creating supportive behaviour in children in the form of good and correct brushing skills (Naidu, Nunn, & Irwin, 2015). Previous research has shown that preventive measures against dental caries are focused on changing dental hygiene behaviour (Paglia, 2019). Through daily practice of brushing teeth and supportive dental and oral hygiene maintenance behaviour are strongly influenced by mothers (Snell et al., 2019). The model for maintaining oral and dental hygiene with an emphasis on the active role of the mother is manifested in the toddler dental health care model ("Agita"). The results of the expert validity of the "Agita" model showed that the p-value = 0.016, it can be interpreted that the "Agita" model is feasible to use in the implementation of dental health care for toddlers. The expert validation process is important in model development in order to produce models that are useful in improving the quality of education, in accordance with the results of previous studies that media which can convey information clearly, concisely, concisely, and on target will support the process of shaping children's tooth brushing behaviour (Melo, Fine, Malone, Frencken, & Horn, 2018). A study using the application of a three-dimensional model was also effective in improving children's brushing skills (Wiyatini, Fatmasari, & Shobirun, 2021). Another study applying the online media YouTube with the title of *Mogigu* has also proven effective in improving teeth brushing skills, but in children who are older than elementary school age (Satria, Fatmasari, 2020).

The results of the paired test of mother's knowledge in this sample before being given an intervention in the form of an "Agita" model was 6.78 while after being given an intervention in the form of an "Agita" model it increased to 11.71 with a p-value of 0.001 which means that the application of the "Agita" model is effective in increasing mother's knowledge. This is evidenced that the knowledge of mothers after being given the "Agita" model has increased because there is a special emphasis on health promotion for mothers in the information system (Naidu et al., 2015). The information system in the "Agita" model was equipped with dental and oral health materials along with videos that can be accessed by mothers wherever and whenever they are. Mothers can demonstrate the knowledge they already have for their children. The emphasis on the active role of the mother makes the children more cooperative so that the children can easily receive information from the mother (Hemmat, Ayatollahi, Maleki, & Saghafi, 2017). Mother's knowledge of dental and oral health is very important in the formation of children's teeth brushing skills, in accordance with the results of previous studies that positive behavior of the mother affects the child's behavior (De Buhr & Tannen, 2020). Most of the mothers' ages in this study ranged from

30-39 years which showed that the relatively young age group had consistent traits towards their children at the preschool stage (Naidu et al., 2015).

The results of the paired test for children's teeth brushing skills before being given the “Agita” model intervention was 16.12 while after being given the “Agita” model intervention it increased to 22.22 with a p-value of 0.001 which means that the application of the “Agita” model is effective in improving children's brushing skills. This is evidenced that the children's tooth brushing skills have increased due to the mother's active role in the child's dental health. Children have the nature sense of imitating every behaviour of adults and mothers are role models for children (Finlayson et al., 2019). The improvement of children's brushing skills before applying the model that the children brushed their teeth at the time after taking a shower in the morning and evening while after applying the model, the children brushed their teeth after having a breakfast and before going to bed at night. It is known that there was an increase in the frequency of children's brushing teeth activity, besides that there was also an increase in the brushed surface. Before the application of the model, the children brushed only the front surface and chewed part only, while after the application of the model, they brushed the entire tooth surface which was accompanied by the mother (De Jong-Lenters, L’Hoir, Polak, & Duijster, 2019). This study was more effective than previous studies which stated that changes in children's tooth brushing behaviour would occur after the intervention was given for 21 days (Kesehatan Gigi et al., 2020). The results of this study are in accordance with previous studies which stated that children brushing their teeth repeatedly in the morning and evening can increase their knowledge of teeth brushing skills (Melo et al., 2018). Previous research also supports the result of this study that the activity of brushing children's teeth accompanied by the mother has less chance of dental caries than children who brush their teeth without being accompanied by their mother (Collett et al., 2016).

Conclusion

Based on the results of the study, it can be concluded that the toddler dental health care model (“Agita”) for mothers and children is feasible and its application is effective as an effort to improve the mother's knowledge and children's brushing skills. “Agita” software is recommended as one of the online educational media for Indonesian children under five years and can be applied in the family environment with the active role of the mother as an effort to prevent early dental caries in children.

REFERENCES

Collett, B. R., Huebner, C. E., Seminario, A. L., Wallace, E., Gray, K. E., & Speltz, M. L. (2016). Observed child and parent toothbrushing behaviors and child oral health. International Journal of Paediatric Dentistry, 26(3), 184–192. https://doi.org/10.1111/IPD.12175

De Buhr, E., & Tannen, A. (2020). Parental health literacy and health knowledge, behaviours and outcomes in children: A cross-sectional survey. BMC Public Health, 20(1), 1–9. https://doi.org/10.1186/S12889-020-08881-5/TABLES/9

De Jong-Lenters, M., L’Hoir, M., Polak, E., & Duijster, D. (2019). Promoting parenting strategies to improve tooth brushing in children: Design of a non-randomised cluster-controlled trial. BMC Oral Health, 19(1), 1–12. https://doi.org/10.1186/S12903-019-0902-6/FIGURES/2

Finlayson, T. L., Cabudol, M., Liu, J. X., Garza, J. R., Gansky, S. A., & Ramos-Gomez, F. (2019). A qualitative study of the multi-level influences on oral hygiene practices for young children in an Early Head Start program. BMC Oral Health, 19(1). https://doi.org/10.1186/S12903-019-0857-7

Finlayson, T. L., Siefert, K., Ismail, A. I., Delva, J., & Sohn, W. (2005). Reliability and Validity of Brief Measures of Oral Health-Related Knowledge, Fatalism, and Self-Efficacy in Mothers of African American Children. Pediatric Dentistry, 27(5), 422.

Gultom, E. (2019). Bahan Ajar Keperawatan Gigi: Konsep Dasar Pelayanan Asuhan Kesehatan Gigi dan Mulut I. Badan PPSDM Kesehatan Kemenkes Republik Indonesia.

Hemmat, M., Ayatollahi, H., Maleki, M. R., & Saghafi, F. (2017). Future Research in Health Information Technology: A Review. Perspectives in Health Information Management, 14(Winter).

Kementerian Kesehatan RI. Riset Kesehatan Dasar 2013. , Badan Penelitian dan Pengembangan Kesehatan, Kementerian Kesehatan RI 306 (2013).

Kementerian Kesehatan RI. (2018). Laporan Riskesdas 2018. Laporan Nasional Riskesdas 2018, 53(9).

Fatmasari, D., Jati Dyah Utami, W. (2020). Edukasi dan Pendampingan Selama 21 Hari dengan Mogigu Meningkatkan Perilaku Menggosok Gigi dengan Benar pada Anak dan Orang Tua SD Bulusan Semarang. Jurnal Kesehatan Gigi, 7(1), 29–34. https://doi.org/10.31983/JKG.V7I1.5661

Satria, J., Fatmasari, D., (2020). MEDIA ONLINE "MOGIGU" EFFECTIVE FOR INCREASING KNOWLEDGE ABOUT TOOTHBRUSHING ON ELEMENTARY SCHOOL STUDENTS GROBOGAN REGENCY. Jurnal Riset Kesehatan, 9(2), 127–131. https://doi.org/10.31983/JRK.V9I2.6468

Melo, P., Fine, C., Malone, S., Frencken, J. E., & Horn, V. (2018). The effectiveness of the Brush Day and Night programme in improving children's toothbrushing knowledge and behaviour. International Dental Journal, 68 Suppl 1, 7–16. https://doi.org/10.1111/IDJ.12410

Naidu, R., Nunn, J., & Irwin, J. D. (2015). The effect of motivational interviewing on oral healthcare knowledge, attitudes and behaviour of parents and caregivers of preschool children: an exploratory cluster randomised controlled study. BMC Oral Health, 15(1). https://doi.org/10.1186/S12903-015-0068-9

Nepaul, P., & Mahomed, O. (2020). Influence of Parents' Oral Health Knowledge and Attitudes on Oral Health Practices of Children (5-12 Years) in a Rural School in KwaZulu-Natal, South Africa. Journal of International Society of Preventive & Community Dentistry, 10(5), 605–612. https://doi.org/10.4103/JISPCD.JISPCD_273_20

Noaman, B. R., Khalid, R. F., & Fattah, L. D. (2019). Maternal Dental Health Knowledge and Its Relation to the Dental Caries Experience of Their Children in Mamyzawa Camp of Refugees in Erbil, Iraq. Acta Medica Academica, 48(3), 294–302. https://doi.org/10.5644/AMA2006-124.270

Paglia, L. (2019). Oral prevention starts with the mother. European Journal of Paediatric Dentistry, 20(3), 173–173. https://doi.org/10.23804/EJPD.2019.20.03.01

Purnama, T., Santoso, B., Suwondo, A., Fatmasari, D., & Author, C. (2019). Tedi's behavior change model as an efforts for brushing teeth behavior in preschool children. International Journal of Allied Medical Sciences and Clinical Research, 7(3), 715–721.

Sehrawat, P., Shivlingesh, K. K., Gupta, B., Anand, R., Sharma, A., & Chaudhry, M. (2016). Oral health knowledge, awareness and associated practices of pre-school children's mothers in Greater Noida, India. The Nigerian Postgraduate Medical Journal, 23(3), 152–157. https://doi.org/10.4103/1117-1936.190344

Seow, W. K. (2018). Early Childhood Caries. Pediatric Clinics of North America, 65(5), 941–954. https://doi.org/10.1016/j.pcl.2018.05.004

Snell, A. K., Burgette, J. M., Weyant, R. J., Crout, R. J., McNeil, D. W., Foxman, B., & Marazita, M. L. (2019). Association between a child's caries experience and the mother's perception of her child's oral health status. Journal of the American Dental Association (1939), 150(6), 540–548. https://doi.org/10.1016/J.ADAJ.2019.01.032

Tsang, C., Sokal-Gutierrez, K., Patel, P., Lewis, B., Huang, D., Ronsin, K., … Gurung, S. (2019). Early Childhood Oral Health and Nutrition in Urban and Rural Nepal. International Journal of Environmental Research and Public Health, 16(14). https://doi.org/10.3390/IJERPH16142456

Vos, M. B., Kaar, J. L., Welsh, J. A., Van Horn, L. V., Feig, D. I., Anderson, C. A. M., … Johnson, R. K. (2017). Added Sugars and Cardiovascular Disease Risk in Children: A Scientific Statement From the American Heart Association. Circulation, 135(19), e1017–e1034. https://doi.org/10.1161/CIR.0000000000000439

Wiyatini, T., Fatmasari, D., & Shobirun. (2021). Increasing Teeth Brushing Skills for Mentally Retarded Children with Application of “Educational Media Modification Puzzle” 3D. European Journal of Molecular & Clinical Medicine, 8(3), 2588–2594.