International Journal of
BioScience and Applications

ISSN : 2619-8363
Volume 1, Number 1, March 2019
https://doi.org/10.22662/IJBSA.2019.1.1.001

Improving Mother's Mosquito Eradication Behavior through A Text-Messaging Based Intervention: *Dengue Chit-Chat* in Bali

Ni Luh Putu Nopriani[1], Made Rini Damayanti S[1], Meril Valentine Manangkot[1] and Indah Mei Rahajeng[1]

[1] School of Nursing, Udayana University, Denpasar, Indonesia

Abstract

Background/Objectives: Mother's Mosquito Eradication (ME) behavior plays important role on ME in Indonesia. Dengue Chit-Chat (DCC) is a text-messaging based intervention that can be used to improve ME. The aim of this study was to analyse the effect of DCC on the mother's ME behavior in Bali. **Methods/Statistical analysis:** This study was a quasi-experimental with pre-test and post-test with control group design and cluster sampling technique. Sixty-seven participants were divided into experimental and control groups. The experimental group was given a three weeks message program that was delivered four times a week. **Findings:** Statistical analyses showed no significant differences in knowledge ($p=0.064$) and container index score ($p=0.051$), but showed significant differences in attitude ($p<0.001$) and practice ($p<0.001$) before and after the intervention**. Improvements/Applications:** Based on these results, we conclude that DCC can be used to increase attitude and practice of ME. However, study with a longer intervention duration may be needed to explore the behavioral effect of text-messaging intervention on ME.

Index Terms

Telehealth, Videoconferencing, Functional Independence, Quality of Life (QoL), Elderly, Philippine

Corresponding author : M.R. Damayanti
damayanti_maderini@unuc.ac.id

• Manuscript received February 5, 2019.
• Revised February 22, 2019 ; Accepted March 25, 2019.
• Date of publication March 31, 2019.

I. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is a common public health concern in Denpasar, Bali, Indonesia. DHF is acute febrile disease caused by infection of dengue virus[1]. DHF incidence in Denpasar increase significantly each year[2]. DHF prevention through Mosquito Eradication (ME) consisting of three activities, namely to drain, to close, to bury or reuse known as PSN 3M Plus in Indonesia is still considered as the most effective and efficient DHF prevention program in Bali[2.3]. However, the knowledge, attitude, and practice of ME in Denpasar remains poor[1]. Denpasar District Health Office[2] showed that 78.8% of population had not yet implement ME appropriately. Improvement of the ME behavior is required to prevent the incidence of DHF.

Health education is a potential strategy to improve ME behavior. Health education targeting the general population about ME has been done through various media, such as poster, sticker, leaflet, video, and social media[4,5]. Due to the ubiquity of the mobile phone in Denpasar, Short Message Service (SMS) has been becoming an ideal modality for delivering health information, especially to improve the ME behavior. Additionally, SMS also becomes the most preferable, neutral, and simple text-messaging feature on all population[6]. Several studies have conducted to analyse the behavioral effect of SMS as a health education media[7-9]. Study conducted by Coleman et al., [7] and Lund et al., 8 showed that SMS was effective in increasing antenatal care (ANC) visit on pregnant women. A local study conducted by Chikmah et al., [9] also found that SMS was more effective in improving mother's parenting behavior in comparison with conventional health education.

Dengue Chit-Chat (DCC) was a text-messaging based intervention designed to improve ME behavior in Denpasar. DCC was sent personally to a participant who is a mother. Mothers contribute dominantly on the household management[10,11]. ME is strongly connected with household management, such as organizing the water-holding containers and cleaning water-holding container, hence mothers' ME behavior plays important role on DHF prevention[12]. This study aimed to analyse the effect of DCC on the mother's ME behavior in Denpasar.

II. MATERIALS AND METHOD

A. Research design, setting, and sampling technique

This was a quasi-experimental study with pre-test and post-test with control group study employing a cluster sampling technique. This study was conducted on April 10th until May 7th 2018 in Padangsambian Klod Village, Denpasar which according to data by Denpasar District Health Office [2] has the highest DHF incidence rate. Cluster sampling technique was applied to choose the location of the subject who participated in this study. Two smallest territorial areas termed as tempek in Padangsambian Klod Village were chosen randomly as the final study locations.

B. Population of the Study

Population of this study was all mothers that lived in the final study locations. Seventy mothers who met the inclusion criteria such as: being willing to participate, able to understand Bahasa, has personal mobile phone, and able to use the mobile phone especially SMS feature were included in this study and assigned into the experimental (n=35) and control group (n=35). The exclusion criteria in this study were has worked or working as jumantik (larva-monitoring staff), has worked or working as a health professional, and diagnosed with mental health or cognitive problem.

C. Study Instruments

Participant's ME behavior was classified into three categories: (1) knowledge, (2) attitude, and (3) practice. (1) Participants' knowledge scores were collected by knowledge questionnaire (knowledge score) that consists of 10 multiple-choice questions about DHF and ME behavior. (2) Attitude questionnaire was used Participant's ME behavior was classified into three categories: (1) knowledge, (2) attitude, and (3) practice. (1) Participants' knowledge scores were collected by knowledge questionnaire (knowledge score) that consists of 10 multiple-choice questions about DHF and ME behavior. (2) Attitude questionnaire was used to measure ME attitude. This questionnaire was consisted of 10 Likert-scale items with five-point response formats (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). Five items were favorable statement, while the other five items were unfavorable statement. (3) Participant's practice scores were measured by two instruments, they were observational sheet (practice score) and container index (CI) Sheet (CI score). The observational sheet contained of 20 statements about appropriate ME practice. CI scores were also measured in this study coupled with the practice

scores. CI can be defined as percentage of water-holding containers infested with larvae[13]. CI score could have indicated participants' ME practice. CI sheet provides a list of information about household containers that probably contain mosquito larvae. The internal consistency of the study instruments have done by Akita [14] during her study, with the coefficient of Cronbach's Alpha for knowledge and attitude questionnaires respectively, 0.872 and 0.872.

D. Instrumentation and Data Collection

DCC was the intervention given to the experimental group in this study. DCC was a text-messaging intervention that consisted of twelve short messages about DHF and ME sent through SMS feature on the mobile phone. DCC also contained of three quizzes aimed to confirm participants' comprehension about the information deliver through the messages.

Participants in experimental group was given DCC during the study. DCC was sent to the participants in experiment group four times a week (on Monday, Wednesday, Friday, and Saturday at 09.00 am) in three weeks. Participants in experimental group also received quizzes once a week (on Sunday at 09.00 am). One participant in the experimental group who answered the quizzes quickly and correctly received a weekly reward. Participants in control group did not receive any intervention during the study, a conventional ME health education was given after administering the post-test. The pre-test in both groups was administered one week before the intervention in experimental group, while the post-test was administered one day after the last quiz sent to the participants in the experimental group.

Statistical analyses was performed using Statistical Package for the Social Science version 18. Paired t-test and Wilcoxon Test were used to analyses the participants' ME behavior in group, while unpaired t-test and Mann-Whitney Test were used to analyse participants' ME behavior between groups

E. Ethical Consideration

Approval from the Ethical Committee of Faculty of Medicine and Sanglah Hospital Udayana University Denpasar have been obtained before conducting the study. Access to the participants was granted by The Comission on National Unity and Politics of Denpasar District and Denpasar District Health Office.

III. RESULTS

There were 67 participants' data on the final statistical analyses. Three participants, one participant from the experimental group and two participants from the control group, were refusing to continue participating on this study. Table 1 shows that there was no significant difference on the participants' demographic characteristics in the experimental and control group. Statistical analyses showed that there were a significant difference on the knowledge, attitude, practice, and CI score on the experimental group after the intervention, but none on the control group (Table 2). Statistical analyses between groups showed that there were no significant difference on the knowledge and CI score, but showed significant difference on attitude and practice (Table 3).

Table 1 PARTICIPANT'S DEMOGRAPHIC CHARACTERISTIC

Variable	Experiment Group	Control Group	p
Age	42.88 (±8,029)*	41.94 (±8,019)*	
20-50	29 (85.3%)	29 (87.9%)	
>50	5 (14.7)	4 (12.1)	0.632**
Education Level			
Not	0 (0%)		
Completed Elementary School		1 (3.0%)	
Elementary School	3 (8.8%)	8 (24.2%)	
Junior High School	3 (8.8%)	7 (21.2%)	0.952***
Senior High School	22 (64.7%)	14 (4.4%)	
University	3 (8.8%)	3 (9.1%)	
Others	3 (8.8%)	0 (0%)	
Occupation			
Housewife	26 (76.5%)	16 (48.5%)	
Entrepreneur	6 (17.6%)	16 (4.5%)	
Employee on Private Company	1 (2.9%)	0 (0%)	0.688****
Others	1 (2.9%)	1 (3%)	
DHF History			
Participant had experienced DHF	5 (14.7%)	2 (6.1%)	
Participant's family had experienced DHF	11 (32.4%)	6 (18.2%)	0.418****
Participant and her family haven't experienced DHF	18 (52.9%)	25 (75.8%)	
ME Information Exposure			
Have been exposed by ME	13 (38.8%)	21 (61.8%)	1.000****

information		
Have not been exposed by ME information	21 (63.6%)	12 (36.4%)

* Mean (SD), ** *T-Test* Independent, *** Kruskal-Wallis Test, **** Fisher Test

Table 2. PRE-TEST AND POST-TEST ME BEHAVIOR'S SCORE ANALYSES ON THE EXPERIMENTAL GROUP

ME's behavior (n=34)	Mean (SD)/Median (Minimum-Maximum)	Score Difference (SD)	CI 95%	p
Knowledge				
Pre-Test	16.50 (14-19)**	1.50 (2,620)	-2.414(-0,586)	0.002
Post-Test	19.00 (14-20)**			
Attitude				
Pre-Test	36.12 (2,556)*	4.07 (2.892)	-4.842 (-2.805)	<0.001
Post-Test	39.94 (2,870)*			
Practice				
Pre-Test	30.00 (22-37)**	8.26 (4.151)	-9.173 (-6,816)	<0.001
Post-Test	38 (33-40)**			
CI Score				
Pre-Test	0.00 (0.00-42,85)**	-5.48 (10.64)	-	0.005
Post-Test	0.00 (0.00-0.00)**			

*Mean (SD), **Median (Minimum/Maximum)

Table 3. PRE-TEST AND POST-TEST ME BEHAVIOR'S SCORE ANALYSES BETWEEN EXPERIMENTAL AND CONTROL GROUP

ME Behavior's Sc Difference	Mean (SD)/Media n (Minimum-Maximum)	p	Mean Difference (CI 95%)
Knowledge	0.00 (-4-6)	0.064	-
Attitude	1.97 (3,41)	<0.001	3.76 (2.37-5.15)
Practice	4.70 (5,19)	<0.001	7.23 (5.41-9.05)
CI	0.00 (-42,85-20)	0.051	-

IV. DISCUSSION

Statistical analyses before and after the DCC intervention showed that there were significant differences on the knowledge, attitude, practice, and CI score in experimental group with p value 0.002, <0.001, <0.001, and 0.005 respectively. The improvement of the knowledge in the experimental group occured because of the DCC was providing weekly information about DHF and ME. The other factors that could contribute to this result were the participants' background education level that was dominantly senior high school and the high incidence of DHF in the neighborhood. High incidence of DHF could drive the participants to consider the need of appropriate ME implementation as a prevention. Additionally, participants' enthusiasm for the quizzes could affect the improvement of their knowledge. Previous study revealed that quiz was effective to motivate and to confirm participants' knowledge level[15].

The participants' attitude in experimental group was also significantly increase after the DCC intervention. Information that sent via DCC can strengthen the attitude of the participants[11]. Information that sent to participant mobile phone can be stored and can be read anytime. Studies showed that the more frequent information obtained, the greater the chance of attitude improvement[6,14]

ME practice was also significantly increase on the experimental group. This might be affected by increasing of the participants' knowledge and attitude. Knowledge and attitude are the strong predisposition in the process of practice formation[16]. The high incidence of DHF in participant neighborhood also influence participants' ME practice to prevent the DHF infection. Statistical analyses of CI score in experimental group was decrease significantly. This result could indicate that the participants were implementing ME during the study period. This result is in line with the study conducted by Lund et al. [8] and Coleman et al. [7] that showed that SMS reminder could increase mothers' antenatal care (ANC) visit significantly.

Statistical analyses between groups in contrast did not show any significant differences on the knowledge (p=0.064) and CI score (p=0,051). Factor that might contribute to this result is the exposure of DHF information from the Public Health Center (PHC) during the study period. During the study, PHC of West Denpasar was performing a health promotion campaign to prevent DHF infection through door-to-door health education and routine larvae check. No significant difference on the CI score could be resulted as the condition of participants' living place that already free from mosquito larvae since the pre-test. This condition affected the CI score on the pre-test and post-test. Routine larvae check from the PHC of West Denpasar also may impact the CI score during this study.

SMS is a text messaging that has largely been applied for disease prevention[15] Studies that involved text-messaging based intervention and analyzed behavioral effects usually taking long period of time. Study by Hingle et al. [17] that conducted to analyse the effect of SMS on skin cancer prevention within 12 weeks of study period showed that there were significance differences on the knowledge and the practice of skin cancer prevention. A twelve-month study by Lim et al. [18] had explored the effect of SMS on sexually-transmitted disease knowledge showed that the teenager knowledge was significantly increase after the intervention. Study by Lund et al. [8] and Coleman et al. [7] that involved mothers also showed

that SMS reminder was effective to increase mothers' ANC visits within six weeks. DCC in this study was sent in three weeks duration. This study duration was relatively short to measure the behavioral change.

V. CONCLUSION

We conclude that SMS could improve the mother's attitude and practice of ME in Denpasar. Further studies are required to explore the behavioral effect of text-messaging based intervention in longer study duration.

REFERENCES

[1] Ministry of Health of Indonesia. Demam Berdarah Dengue (DBD); 2017. Retrieved January 2018 from: www.kemkes.go.id.

[2] Denpasar District Health Office. Laporan Bulanan P2 DBD, Denpasar; 2017.

[3] Denpasar District Health Office. Profil Kesehatan Kota Denpasar Tahun 2016, Denpasar; 2017.

[4] Ilmas THA. (2013). Kesesuaian Media Promosi Kesehatan Penyakit Tropis Demam Berdarah oleh Dinas Kesehatan Surabaya. *Media Commonline, 1(2),*1-14.

[5] Ipa M, Laksono AD. (2014). Potential Analysis of Promoting the Dengue Hemorrhagic Fever Prevention Through Youtube. Buletin Penelitian Sistem Kesehatan,17(1).

[6] Suffoletto B. (2016). Text message behavioral interventions: From here to where?. *Current opinion in psychology. 9,*16-21.

[7] Coleman J, Bohlin KC, Thorson A, Black V, Mechael P, Mangxaba J, Eriksen J. (2017). Effectiveness of an SMS-based maternal mHealth intervention to improve clinical outcomes of HIV-positive pregnant women. *AIDS care. 29(7),*890-897.

[8] Lund S, Nielsen BB, Hemed M, Boas IM, Said A, Said K, Makungu MH, Rasch V. (2014). Mobile phones improve antenatal care attendance in Zanzibar: a cluster randomized controlled trial. *BMC pregnancy and childbirth,14(1),*29.

[9] Chikmah AM, Laksono B, Yuniastuti A. (2016). Efektivitas SMS bunda dibanding ibu balita terhadap peningkatan pengetahuan, sikap, perilaku. *Public Health Perspective Journal,1(1).*

[10] Izah ST, Nurhidayanti T, Syamsianah A. Hubungan pengetahuan ibu dengan perilaku pencegahan demam berdarah dengue di RW XI Kelurahan Sendangmulyo Kecamatan Tembalang. [Manuscript]. Semarang: Universitas Muhammadiyah Semarang; 2013.

[11] Pujiyanti A, Trapsilowati W. (2010). Pengetahuan, Sikap Dan Perilaku ibu Rumah Tangga Dalam Pencegahan Demam Berdarah Dengue Di Kelurahan Kutowinangun, Salatiga. *Jurnal Penyakit Tidak Menular Indonesia,2(2),*102-115.

[12] Ferry Efendi, M.(2009). Keperawatan Kesehatan Komunitas: teori dan praktik dalam keperawatan. Ferry Efendi.

[13] World Health Organisation. Vector Surveillance; 2018. Retrieved from https://www.who.int/denguecontrol/monitoring/vector_surveillance/en/.

[14] Akita, A. (2015). Pengaruh Pelatihan dan Pendampingan melalui SMS Reminder terhadap Perilaku Pengendalian Nyamuk Aedes Aegypty dalam Pencegahan Penyakit Demam Berdarah Dengue di Kecamatan Medan Helvetia Tahun 2015. [Unpublished Paper]. Medan: Universitas Sumatera Utara; 2015.

[15] Déglise, C., Suggs, L. S., & Odermatt, P. (2012). Short message service (SMS) applications for disease prevention in developing countries. *Journal of medical Internet research, 14(1),* e3.

[16] Notoatmodjo S. Ilmu Perilaku Kesehatan. Jakarta: Rineka Cipta; 2010.

[17] Hingle MD, Snyder AL, McKenzie NE, Thomson CA, Logan RA, Ellison EA, Koch SM, Harris RB. (2014). Effects of a short messaging service–based skin cancer prevention campaign in adolescents. *American journal of preventive medicine,47(5),*617-623.

[18] Lim MS, Hocking JS, Aitken CK, Fairley CK, Jordan L, Lewis JA, Hellard ME. (2012). Impact of text and email messaging on the sexual health of young people: a randomised controlled trial. *J Epidemiol Community Health,66(1),*69-74.