

ORIGINAL ARTICLE

Influence of Infant Massage Practice on Breastfeeding Among Mothers In Sarawak

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ABSTRACT

Introduction: Practice of infant massage by mothers has been reported previously to provide benefits such as nurturing touch, warmth and relaxation to infants and a more positive breastfeeding practice due to its stimulant for oxytocin release. This study aimed to determine the influence of infant massage by mothers on their breastfeeding practice in the local context. **Methods:** A quasi-experimental study was conducted among 310 mother-infant pairs who were recruited from five selected health centres within First Division of Sarawak. Intervention group participants (n=155) were taught to do infant-massage during the clinic session and instructed to practice 15 minutes twice daily throughout the two-months intervention period, while the control group (n=155) were not. Breastfeeding practice data were obtained using questionnaire from both groups pre-intervention at infants' age one-month and post-intervention at age three-months. **Results:** Multinomial regression analysis showed that those in the intervention group were two times more likely than the control group for exclusive breastfeeding when compared to mothers who stopped breastfeeding (RR=2.022, 95% CI=1.007, 4.071; p-value=0.048). Similarly, mothers from the intervention group were two and half times more likely than control group for mixed feeding (RR=2.560, 95% CI=1.280, 5.121; p-value=0.008). Those who were housewives were nearly three times more likely than the private workers for exclusive breastfeeding (RR=2.734, 95% CI=1.246, 5.997; p-value=0.012). **Conclusion:** Infant massage influenced breastfeeding practice positively at infants' age three-months, in particular, among mothers who were housewives. Healthcare providers should encourage infant massage practice by mothers as part of the maternal and child healthcare service.

Keywords: Infant massage, Mothers, Breastfeeding practice

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though the teaching of postnatal mothers to practice IM is provided in selected private healthcare settings, this is still not part of the regular government maternal and child health service.

INTRODUCTION

The practice of infant massage (IM) is a long-established natural mothering tradition which has been passed down through the generations in many cultures. However, the sense of touch or tactile sensation related to the practice of infant massage has been neglected and under-valued in the modern, advance-technology era, as highlighted by Adamson (1). It is gaining acceptance in the western countries such as the United States of America and Europe as more findings that support the benefits of the IM practice emerged (1-4). Locally in Malaysia,

IM by mothers provides their infants with nurturing touch, warmth, relaxation, better sleep, relief from discomfort and colic, stimulation and interaction (3-7). The correlation of mothers providing IM and its positive influence on stress, self-esteem and depression were highlighted earlier (8-9). Those who practiced IM to their infants experienced higher level of self-esteem, less stress and depression. The experience of peer support from one another in the context of IM by mothers in group sessions was reported (9, 10). IM practice and its positive influence on breastfeeding (BF) practice are due to the IM strokes which provide the skin-to-skin

contact or touch between mothers and infants (11-13). It provides mothers the related benefits due to its stimulating effect of oxytocin hormones release and the resulting decrease of maternal anxiety and increase in calmness (13-15).

Oxytocin hormones have been reported to be critical in BF physiology because it stimulates the let-down and contraction of myoepithelial cells that transfers milk to the areola for the infant's suckling (16). These hormones are suggested to have mood ameliorating effects, promoting feelings of nurturance and relaxation during BF (16, 17). IM practice also provides mothers with better interpretation of their baby's cues and enhanced infant-maternal attachment. The practice of IM with its resultant benefits can play a role in reducing perceived BF difficulties and contribute towards a more positive BF practice (11).

Breastmilk has been recognised as the best source of nutrition for child's health at the early age. Malaysia as a nation adopts the World Health Organization guideline which recommends exclusive BF for the child's first six months, followed by a combination of nutritious, complementary foods and continued BF for up to two years or beyond (18). There is no doubt about the significant advantages of BF on health, society and family economics.

Numerous efforts have been made to support and promote BF to increase the rate of BF (19). However, BF practice could be influenced by socio-demographic variables, exposure to healthcare support services and existing community's cultural beliefs. The other influencing factors were reported to include BF-friendly environment, health condition of mothers and babies, support and guidance by family members (20-22). It could also be associated with maternal occupation, fatigue, difficulty in juggling between the demands of work and BF, and workplace facilities (23-25). Besides these, non-exclusive BF was also noted to be associated with mothers from the urban areas, deliveries in private hospitals and caesarean section deliveries (26).

Recent study among the Malaysian mothers (27) reported that exclusive BF was positively associated with rural residence, Malay ethnicity, non-working and multiparous mothers, supportive spouses and the practice of rooming-in. Chinese mothers were found to be relatively less in exclusive BF practice among the various ethnic groups. This was perceived to be associated with the confinement helper whom they engaged during their confinement period.

Besides socio-demographic variables and cultural beliefs which may influence BF practice, the neuroendocrine mechanism related to stress reactivity has been implicated to BF failure (16). Study among the mothers

in the United States of America shows that only less than half of them breastfed their infants for as long as they had wanted to. This was due to physiological difficulties and their perceived suckling difficulty or concerns about milk supply (16). Milk insufficiency has been reported as one of the most common reasons indicated by mothers for stopping BF or reduced exclusive BF (28).

In view of the significance of BF to ensure infants' health and the various factors which influence the BF practice, the challenge is for us to consider efforts to support and improve further BF practice by mothers (29).

The practice of IM with its resultant benefits (11) could play a role in reducing perceived BF difficulties, and hopefully contribute towards a more positive outcome of BF among mothers. It augurs well to examine some of the earlier studies which reported about the influence of IM. A study among nulliparous Iranian mother-infant pairs (N=80) reported that the practice of IM by mothers twice a day of fifteen minutes each time for eight-weeks duration had a significant effect on the duration and frequency of BF at infants' one month and two months of age among those in the study group ($P<0.05$) (17).

A Lebanon study using quasi experimental design (N=66) with thirty-two preterm infants who received the massage therapy by their mothers shows no statistical significant difference between the two groups (intervention and control) on the duration of BF at twelve months. It was argued that the other socio-cultural factors could have influenced the duration of BF other than IM alone (23).

Another cited study which involved Chilean mothers-infant pairs from the low-income neighbourhood evaluated the effects of IM on exclusive BF and infant weight gain, between the control group (n=65) and the IM group (n=35). The clinic nurses provided IM instruction to the study group mothers who massaged their infants for ten to fifteen minutes at least once a day, starting when their infants were fifteen days old. Findings showed no statistical difference between the groups on the incidence of exclusive BF at infants' two months or four months of age (30).

The above studies among the non-Malaysian mothers indicate varying results in relation to the influence of IM on BF practice. A study to examine the influence of IM on BF practice among mothers in the local context is warranted. As part of the main research, this study aimed to answer the question "What is the influence of IM practice by mothers on their BF at infants' three months of age within the local context?" Author's note: The main research has also examined the influence of IM on maternal-infant attachment, infant sleep and the qualitative experience of mothers learning and doing IM. Findings of mothers' experience learning and doing IM was reported earlier (10).

MATERIALS AND METHODS

Study design and study setting

A quasi-experimental study approach was used to conduct the study from January 2017 till June 2018. Study involved IM intervention group (n=155) and control group (n=155). It was conducted at the five selected government health clinics which provide maternal and child health services within the First Division of Sarawak. BF-related health education activities as stipulated under the Ministry of Health Malaysia are actively promoted and emphasized to all the antenatal mothers in these health clinics.

Prior visits to these clinics were made to survey on the feasibility of conducting experimental study. Two of the health clinics (i.e. clinics A and B) were selected for recruitment of participants as the study group based on the room space availability and feasibility for the small-group IM teaching sessions. Three other health clinics (i.e. clinics C, D and E) which were relatively more congested were assigned for recruitment of participants as the control group (refer Fig. 1). Different health clinics were designated for the intervention and control groups to minimize the risk of contamination between groups.

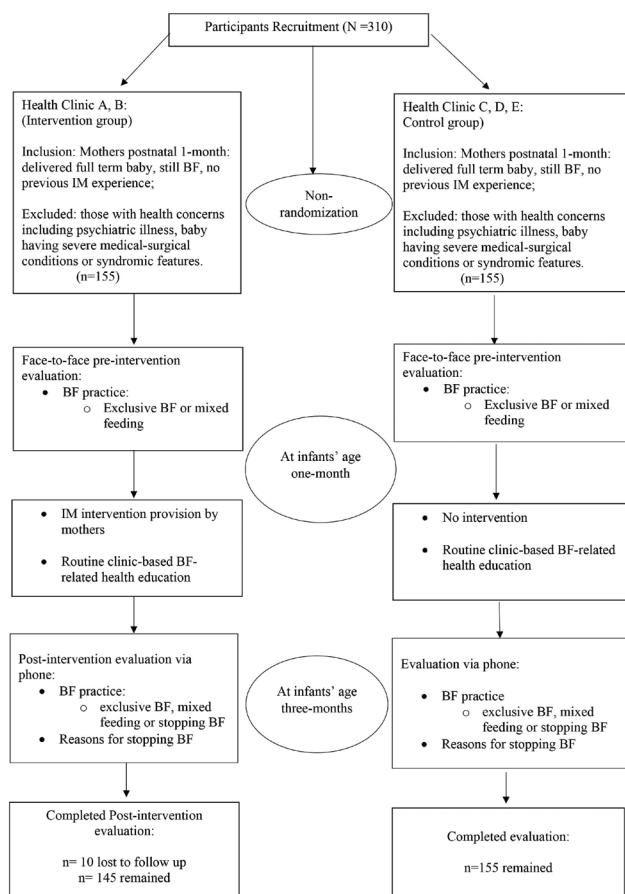


Figure 1: Flow chart of the study showing the allocation of health clinics A - E for the recruitment of participants to the intervention and control groups, inclusion and exclusion criteria, dependent variables, intervention, pre-post intervention assessment, number of participants lost to follow-up and number completed post-intervention assessment.

Study population and sample

The study population were the local postnatal mothers of various ethnicities who attended the postnatal and child health follow up clinic sessions during the data collection period and fulfilled the inclusion criteria. The inclusion criteria were mothers who were at one-month postnatal, given birth to a full term baby, still BF their babies, with no prior experience of doing IM, able to read and understand Bahasa Malaysia, English or Mandarin. However, mothers with health concerns including those with underlying psychiatric illness, or whose babies suffered from severe medical or surgical conditions, with syndromic features were excluded from the study.

Sample size and sampling procedure

Sample size calculation for the study took into account the previous study (11) with mean Maternal Attachment Inventory score of 90.9 and 85.1 for both study and control groups respectively and with standard deviation of 15, 95% confidence interval and 80% power. The calculated sample size was 284. With predicted 20% drop out, the final sample size as calculated was N=310.

Mother-infant pairs who attended the clinics for the postnatal and child health follow-up clinic sessions during the data collection period (from January 2017 till June 2018), fulfilled the inclusion criteria and consented to participate were recruited sequentially, using convenience sampling technique. Those who met the inclusion criteria from the clinics A and B were recruited as the intervention group (n=155), whereas those who met the inclusion criteria from clinics C, D and E were recruited as the control group (n=155) (refer to Fig. 1).

Study variables

The dependent variables were the BF practice (either exclusive BF, mixed feeding or stop BF, and BF duration). In this study, exclusive BF was considered when infants received only breast milk from mother (either directly from the breasts or expressed milk) and no other liquids. Mixed feeding was considered when infants received breast milk and also other liquids including formula milk.

The independent variables were the mothers' socio-demographic characteristics (age, marital status, ethnicities, religions, education levels, occupation, household income, parity) and IM intervention provided by mothers who had been given the IM instructions.

Study Instrument

This study used a survey questionnaire which was developed with reference to previously published resources (31-33) and the expert input of one lactation consultant. Section One (19 question items) consists of questions on mothers' background socio-demographics, infant and delivery-related details, post-delivery support and health problems. Section Two (7 question items)

comprises of questions on BF practice, whether BF exclusively, mixed feeding or stop BF, BF duration and frequency; other types of feeding given and frequency, and reasons for stopping BF.

Content validity of the questionnaire was established by two senior Family Medicine Specialists and the lactation consultant who reviewed the questionnaire items and agreed that the items were relevant and appropriate to obtain the required data for the study. The clarity of the item sequence, the skip pattern and the exhaustiveness of alternatives were scrutinized accordingly. It was then translated from English to Bahasa Malaysia and Mandarin and back translated, to cater to the participants who did not read English. These were verified by two bilingual experts to check for the accuracy of translation meaning and appropriateness of words used.

Prior to the actual study, the self-administered BF survey questionnaire was pilot-tested among 30 mothers recruited from the selected health clinics to assess the face validity, feasibility and questionnaire items clarity. It showed that the questionnaire could be smoothly completed within 10 minutes and mothers understood the questionnaire items. Samples for the pilot study was excluded from actual study.

The intervention

The intervention involved IM teaching session for participating mothers who would then provide IM to their infants at home. Participants in the intervention group (n=155) who consented to participate were invited to attend the IM teaching session with their infants (including their accompanying spouse or family member) in the designated clinic room. The IM teaching which was conducted in a small group of two to three mother-infant pairs per session was adapted from McClure (3) and was conducted by the principal investigator, a certified IM instructor. Each teaching session which lasted from forty-five minutes to an hour would start with discussion and emphasis on observing baby cues, maintaining eye contacts with their infants, the choice and use of oil for providing gentle IM and prior environment preparation.

The techniques of providing IM strokes over infants' legs, abdomen, chest, arms and back (3) were first demonstrated on a teaching doll while the mothers observed. They then followed and applied the IM strokes on their infants who were awake. Demonstration of IM strokes on teaching doll was repeated till mothers could perform the massage strokes correctly as a return demonstration. If their infant cried during the teaching session, their accompanying spouse or family member would hold or comfort their infant while the mothers continued with the IM practice on another teaching doll provided. They were encouraged to ask questions for clarification if they had any query. A handout of the IM strokes was given to each of the participating mothers

for their reference at home. A bottle of cold-pressed olive oil (sixty ml) was given to each of them for use during the IM to avoid friction to infant' skin. Mothers were instructed to provide IM at home twice a day for fifteen-minutes duration during their infants' awake time, throughout the two-months IM intervention period.

In order to increase the mothers' compliance, the researchers' mobile phone numbers which were contactable by the mothers were provided in the participant information sheet. They were encouraged to call or message one of the researchers if they needed further clarification or assistance. The researchers did not attempt to burden the participating mothers by asking them to do documentation on the frequency of practising IM, with due consideration that they might be too occupied with their childcare task for the documentation. However, each of the participating mothers was contacted by one of the researchers via phone call one week later to monitor their progress and to remind them about the provision of IM for their infants. They were informed that they would receive a phone call from one of the researchers two months later, i.e. at infants' age three-months for a follow-up assessment using the same questionnaires.

Recruitment

Postnatal mothers and their infants at age one-month who came to the health clinics were identified after they had registered at the counter. They were approached by one of the researchers individually and screened for eligibility to participate in the study. Participant information sheets about the study were distributed and explained to the potential participants. They were encouraged to ask any questions they had related to the study. Thereafter, willing participants were requested to sign the written consent form.

Data collection

Baseline data related to background characteristics and pre-intervention BF practice details of participants (at infants' age one-month) from the IM intervention and control groups were assessed using the self-administered survey questionnaire. Participants were followed up by one of the researchers after two months (i.e. at infants' age three-months) via phone calls. The follow-up assessment was to assess the effect of the IM intervention on their BF practice at infants' age three-months as compared to baseline. Among the recruited mother-infant pairs, only 300 mother-infant pairs completed the follow-up assessment at infants' age three-months due to loss to follow up (n=10) from the IM intervention group, hence a response rate of 96.7% (refer Fig. 1).

Data analysis

Data analyses was conducted by using Statistic Package for Social Sciences version 26.0. The descriptive properties of demographic characteristics and dependent variable are reported as frequency and percentages. Chi-square

and regression were used to examine the association between the demographic information and BF practice. This was followed by univariate analysis which was conducted to compare between the intervention and control groups; multivariable multinomial and logistic regression were conducted to determine the association between the independent variable (i.e. intervention vs control groups) and dependent variables (i.e. BF practice) with controlled demographic factors. The level of significance was set at $p < 0.05$. Relative Risk (RR) at 95% confidence interval were calculated as a measurement of association between an independent variable and the dependent variable. Variables were excluded from the final logistic model if they were not associated with exclusive BF. BF practice at infants' age three-months was further re-categorized as 'BF duration of at least three months' (i.e. still exclusively BF or mixed feeding at infants' age three-months) and 'BF duration of less than three months' (i.e. had stopped BF at infants' age three-months).

Ethical approval

Ethical approval was obtained from the Faculty Ethics Committee (UNIMAS/NC-21.02/03-02Jld. 2(21) and the Medical Research Ethics Committee of Ministry of Health Malaysia (NMRR-16-1321-30270 (IIR) prior to commencement of study.

RESULTS

Background demographic characteristics, infant, delivery and baseline BF practice

The mean age of the participants was 29.2 years (SD=5.55). More than half of them were multiparous and had delivered via spontaneous vaginal deliveries (70.6%). 24.5% of them had undergone caesarean section. Generally, there were slightly more male (53.9%) than female (46.1%) infants. The control group (n=155) and IM intervention group (n=155) participants were not significantly different ($p > 0.05$), except for the ethnicities and religions with the IM intervention group (n=155) having slightly more Malays and Muslims. At baseline of study at infants' age one-month, from among the recruited participants (N=310), 61.9% (n=192) indicated to exclusively BF, while 38.1% (n=118) indicated mixed feeding (Table I).

Baseline BF practice at infants' age one-month

For further understanding of the baseline BF practice of participants (N=310) at infants' age one-month, multiple variable linear regression analysis was done. BF practice was found to be significantly related to background characteristics, i.e. religion, education and infants' birth position ($p < 0.05$). Mothers whose child was the 2nd child and beyond was two times more likely than those with first-born child to exclusively BF (OR 2.146, 95% CI 1.244, 3.702, p -value=0.006). Muslim mothers were more likely to exclusively BF as compared

Table I: Background socio-demographics, infant and delivery-related details (N= 310)

Characteristics	(N=310) n(%)	Intervention group (n=155) n(%)	Control group (n=155) n(%)	*p-value
Maternal age (years)	Mean(SD) 29.2(5.55)	Mean(SD) 29.20(5.48)	Mean(SD) 28.88(5.69)	0.182
15-24 yrs	68(22.7)	33(22.8)	35(22.6)	0.977
25-34 yrs	183(61.0)	89(61.4)	94(60.6)	
≥ 35 yrs	49(16.3)	23(15.9)	26(16.8)	
Ethnicities				
Malay	186(60.0)	107(69.0)	79(51.0)	0.005*
Sarawak Bumiputera	78(25.2)	30(19.4)	48(31.0)	
Chinese	46(14.8)	18(11.6)	18(11.6)	
Religions				
Muslims	209(67.4)	115(74.2)	94(60.6)	0.011*
Non-Muslims	101(32.6)	40(25.8)	61(39.4)	
Highest education attained				
≤ Lower secondary	54(17.4)	27(17.4)	27(17.4)	0.267
Upper secondary	131(42.3)	72(46.5)	59(38.1)	
≥ Diploma (University)	125(40.3)	56(36.1)	69(44.5)	
Marital status				
Married	297(95.8)	151(97.4)	146(94.2)	0.166
Single	14(4.2)	4(2.5)	9(5.8)	
Occupation				
Full time housewife	163(52.6)	88(56.8)	75(48.4)	0.334
Government servant	62(20.0)	28(18.1)	34(21.9)	
Private worker	85(27.4)	39(25.2)	46(29.7)	
Household incomes				
≤ RM 1000 (very low income)	71(22.9)	35(22.6)	36(23.2)	0.404
RM 1001-3000 (low income)	132(42.6)	72(46.5)	60(38.7)	
RM 3001-5000 (middle income)	69(22.3)	33(21.3)	36(23.2)	
≥ RM 5000 (high income)	38(12.3)	15(9.7)	23(14.8)	
Infant gender				
Male	167(53.9)	89(53.3)	78(46.7)	0.210
Female	143(46.1)	66(46.2)	77(53.8)	
Birth Position				
1 st child	121(39)	65(41.9)	56(36.1)	0.295
≥ 2 nd child	189(61)	90(58.1)	99(63.9)	
Baby birth weight (kg)	2.98(0.46)	2.95(0.43)	3.02 (0.47)	0.182
Modes of delivery				
Spontaneous vaginal delivery	219(70.6)	107(69.0)	112(72.3)	
Assisted (forceps & vacuum)	15(4.8)	10(6.5)	5(3.2)	
Caesarean section	76(24.5)	38(24.5)	38(24.5)	0.410
Post-delivery care support				
No	109(35.2)	58(37.4)	51(32.9)	
Yes	201(64.8)	97(62.6)	104(67.1)	0.405
Health conditions				
Previous surgery	55	16	39	0.001
Diabetes	36	9	27	0.002
Hypertension	9	n	6	0.285
Hypothyroidism	3	-	3	0.137
Asthma	17	6	11	0.196
BF practice at infants' age one-month				
Exclusive BF	-	116 (74.8)	76 (49)	0.000*
Mixed feeding	-	39 (25.2)	79 (51)	
Total		155(100%)	155 (100%)	

*p-value significant at < 0.05

to non-Muslim mothers (OR 2.346, 95% CI 1.416, 3.885, p-value=0.001). Mothers who had completed their education till the upper secondary level only was less likely to exclusively BF, compared to mothers with diploma level and above (OR 0.508, 95% CI 0.293, 0.880, p-value=0.016).

BF practice and difference between groups at infants' age three-months

After the two-months IM intervention period, follow-up assessment to assess participants' BF practice was conducted. Table II indicates a significant difference in the BF practice between the IM group (n=145) and control group (n=155) at infants' age three-months (p-value=0.023). Among those who stopped BF (n=51), a significantly higher percentage from the control group (68.6%, n=35) than the IM group (31.4%, n=16) was noted. However, among those who indicated exclusive BF or mixed feeding, no significant difference between the both groups was observed.

Table II: BF practice at infants' age three-months (N=300)

Groups	Exclusive BF	Mixed feeding	Stop BF	p-value
IM group	62 (49.6%)	67(54.0%)	16(31.4%)	0.023*
Control group	63(50.4%)	57(46.0%)	35(68.6%)	
Total	125(100%)	124(100%)	51(100%)	

Association between IM intervention and BF practice at infants' age three-months

Multinomial regression analysis was conducted to determine the association between the independent variable (i.e. intervention vs control groups) and dependent variable (i.e. BF practice) with controlled demographic variables. Selected variables that were initially included in the preliminary model were excluded from the final model if they were found to be insignificant. For example, religion was initially found to be significant when the univariate analysis was done. However, it was not included in the final model of the

multinomial regression as it was insignificant. The final model which included the IM intervention, age and occupation of mothers, in which the model was fit, with the Pearson Goodness of fit at 0.842, were able to explain 70% of the variations in the dependent variable (Nagelkerke = 0.7).

Based on the analysis (refer to Table III), mothers in the IM intervention group were two times more likely than the control group to exclusively BF when compared to mothers who stopped BF (RR=2.022, 95% CI=1.007, 4.071; p-value=0.048). Similarly, mothers from the IM group were two and a half times more likely than the control group to choose mixed BF compared to mothers who totally stopped BF (RR=2.560, 95% CI=0.280, 5.121; p-value=0.008). In addition, it was observed that mothers who were housewives were nearly three times more likely than mothers who were private workers to exclusively BF than to stop BF (RR=2.734, 95% CI=1.246, 5.997; p-value=0.012).

Further analysis using repeated measure ANOVA was done to compare the influence of IM intervention and mothers' occupations (i.e. fulltime housewives, government servants and private workers) on BF practice. There was a significance for fulltime housewives, F(1, 157) =5.69, p-value=0.018, but not for the government servants, F(1, 59)=1.08, p-value=0.303 and private workers, F(1, 78)=0.338, p-value=0.563. Fulltime housewives who attended IM intervention (13.1%) were less likely to stop BF at infants' age three-months as compared to those in the control group (16.0%).

BF duration and difference between groups at infants' age three-months

BF practice at infants' age three-months was further re-categorized as 'BF duration of at least three months' (i.e. still exclusively BF or mixed feeding at infants' age three-months) and 'BF duration of less than three months' (i.e.

Table III: Multivariable multinomial regression: IM intervention and BF practice (N=300)

BF practice pattern	Std. Error	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
					Lower Bound	Upper Bound
Exclusive BF	Intercept	.374	1	.951		
	Age	0.031	1	0.966	0.999	0.939 1.062
	[IM intervention]	.356	1	.048	2.022	1.007 4.061
	[Control]	.	0	.	.	.
	[Housewife]	.401	1	.012	2.734	1.246 5.997
	[Government Servant]	.504	1	.084	2.301	.890 6.422
	[Private worker]	.	0	.	.	.
Mixed feeding	Intercept	.340	1	.582		
	Age	0.031	1	0.762	1.010	0.949 1.074
	[IM intervention]	.354	1	.008	2.560	1.280 5.121
	[Control]	.	0	.	.	.
	[Housewife]	.384	1	.725	1.145	.539 2.430
	[Government Servant]	.484	1	.454	1.436	.556 3.706
	[Private worker]	.	0	.	.	.

a. The reference category is: stop breastfeeding completely.

b. This parameter is set to zero because it is redundant.

had stopped BF at infants' age three-months). There was a significant difference in term of BF duration between the IM intervention and control groups ($p=0.006$) (Table IV). Further linear regression analysis was conducted to examine the correlation of the linear combination of the background variables in accounting for variance in the 'BF duration at least three months' vs 'BF duration less than three months'. With all the variables included in the analysis, a significant model has explained 13.4% of the variance, $F(15, 174)=1.79$, $p\text{-value}=0.039$. Only mothers' occupations ($t=2.68$, $p\text{-value}=0.008$) was the significant predictor for the 'BF duration at least three months'.

Table IV: Duration of BF at infants' age three-months (N=300)

Groups	BF duration at least 3 months	BF duration < 3 months	Total	p-value
IM group	129(89.0%)	16(11%)	145(100%)	0.006*
Control group	120(77.4%)	35(22.6%)	155(100%)	
Total	249(83%)	51(17%)		

* Pearson chi-square *p-value significant at <0.05

Reasons for stopping BF

Refer to Table II earlier, out of all the participants (N=300), 51 mothers indicated to have 'stopped BF' at infants' age three-months (i.e. 16 from IM group; 35 from control group). Among those who stopped BF, various reasons for stopping BF were indicated. Common given reasons were 'milk insufficiency' and 'resume work'. Another given reason was unwillingness of child to suckle. Each of these reasons was indicated by more of the mothers from the control than the IM group ($p<0.005$) (Table V).

Table V: Reasons for stopping BF

	n(%)	p-value
a) Milk insufficiency		
IM group	16 (31%)	0.000*
Control	35 (69%)	
Total	51 (100%)	
(b) Resume Work		
IM group	2(10.5%)	0.000*
Control	17(89.5%)	
Total	19 (100%)	
(c) Unwillingness of child to suckle		
IM group	1(11.1%)	0.000*
Control	8(88.9%)	
Total	9(100%)	

Pearson Chi Square *p-value significant at <0.05

DISCUSSION

The objective of this study was to determine the influence of IM intervention by mothers on their BF practice at infants' age three-months within the local context.

The baseline BF practice at infants' age one-month

(N=310) was found to be significantly associated with the maternal religion, education and their infants' birth position ($p<0.05$). Those with 2nd child onwards, those who were Muslims and those with higher education level were noted to be more likely to exclusively BF at their infants' age one-month. Findings of baseline BF practice at early postnatal period concurs with previous studies which reported the multi-factorial influence on BF practice including the ethnicity, religion, or multi-parities (20-27). It is to be highlighted that occupation status of mothers was not a factor influencing BF practice at infants' age one-month. Locally, postnatal mothers employed as either as private workers or government servants would be given the minimal two-months mandatory maternity leave by their employers (34).

After the two-months duration of IM intervention by mothers (i.e. at infants' age three-months), BF practice was found to be significantly different between IM intervention ($n=145$) and control groups ($n=155$), with significantly more mothers in the control group than the IM intervention group who stopped BF ($p=0.023$).

Further analysis using multinomial regression indicates that those in the IM intervention group were two times more likely than the control group to exclusively BF when compared to mothers who stopped BF ($RR=2.022$, $95\% CI=1.007, 4.071$; $p\text{-value}=0.048$). Positive findings as reported in this study concur with the previous IM-related study among the Iranian mother-infant pairs (17).

It is noteworthy to find that nearly half (54%, $n=67$) of the IM group, and 46% ($n=57$) from the control group chose to continue with mixed feeding. The mother-infant pairs would still obtain some benefits from mixed feeding, although they were not exclusively BF. Mothers might choose mixed feeding for a variety of reasons, including health conditions, postnatal depression, a need for flexibility, return to paid work, nipple problems or personal choice (35). Mothers from the IM group were noted to be two-and-a half times more likely than the control group to choose mixed BF compared to mothers who stopped BF ($RR=2.560$, $95\% CI=1.280, 5.121$; $p\text{-value}=0.008$).

BF practice was found to be significantly influenced by occupation status, where mothers who were housewives were nearly three times more likely than mothers employed as private workers to exclusively BF than to stop BF ($RR=2.734$, $95\% CI=1.246, 5.997$; $p\text{-value}=0.012$). Work-related demand and fatigue due to mothers' occupation status were reported among the constraints or determinants of BF practice (24-27). In this study, when infants were at age three-months, most mothers who were employed, especially the private workers, would have returned to work, since their paid-maternity leave was over. It is not surprising then that even with the IM intervention, only mothers who were fulltime housewives were found more likely to BF

exclusively.

BF duration of at least three months (i.e. still exclusive BF or mixed feeding) were found to be significantly different between the IM intervention and control groups ($p=0.006$). From the linear regression analysis, a significant model has explained 13.4% of the variance, $F(15, 174)=1.79$, $p=0.039$. Mother's occupations ($t=2.68$, $p=0.008$) was the significant predictor for BF duration of at least three months.

As highlighted earlier on, teaching postnatal mothers IM and encouraging them to practice IM could provide them the added benefits due to its stimulant for oxytocin release, decreased maternal anxiety and increased in calmness (13-15). Oxytocin hormones have been reported to be critical in BF physiology because it stimulates the let-down and the contraction of myoepithelial cells that transfers milk to the areola for the suckling infant (16). These hormones are suggested to have mood ameliorating effects, promoting feelings of nurturance and relaxation during BF (16-17). Positive experience of mothers learning and practising IM with their infants have been reported by mothers. These include the experience of mothers and infants being more relaxed, better mother-infant attachment and gaining support of husband, attributed to learning and practising IM by mothers (10). Thus, IM practice by mothers could potentially play a role contributing towards a more positive BF practice (11).

It is noteworthy that among the reasons indicated by mothers who stopped BF, common given reasons from both groups were milk insufficiency, 'resume work' and 'unwillingness of child to suckle'. For these reasons as indicated, significantly more were mothers from the control than the IM groups ($p<0.05$).

Reasons of milk insufficiency and resume work as given concur with the earlier reports about constraints and perceptions of exclusive BF among mothers within and outside of Malaysia (24-28). The decision of mothers to stop BF once they go back to work could be due to the fatigue or time constraint having to juggle with BF and work. It augurs well for health professionals in the maternal and child health service to assess and understand further any mothers with issues of milk insufficiency as their reason for stopping BF. They may need further professional assistance and support.

As discussed earlier, the practice IM could potentially provide mothers the added benefits due to its stimulant for oxytocin release, decreased maternal anxiety and increased in calmness (13-15) and better milk flow for the suckling infant (16). In considering mothers' given reason for stopping BF such as 'unwillingness of child to suckle', IM practice could be helpful to influence infants' suckling during BF practice.

There are few limitations in the current study that need to be highlighted. Some of the mothers might not be compliant to practise IM intervention at home due to personal circumstance. Though clear IM teaching with demonstration and returned-demonstration were conducted during the clinic teaching sessions (with take-home visual aids given), there was the possibility that some mothers might not follow the IM strokes correctly. As the follow-up assessment on BF practice at infants' age three-months was conducted via phone calls, information bias was possible. Furthermore, due to non-randomization and convenient sampling, potential sampling bias is to be acknowledged.

Future study related to IM intervention could be considered with randomization of participants to the study and control groups, and to explore further with inclusion of measurements of maternal stress, infant behaviour and growth.

CONCLUSION

IM intervention by postnatal mothers did influence BF practice (BF exclusively or mixed feeding) positively at infants' age three-months with statistical significance. When considering the influence of IM intervention on BF practice, occupation status of mothers as a confounder has to be taken into consideration. Among the postnatal mothers who practiced IM, those who were fulltime housewives were found more likely to continue BF (exclusively or mixed feeding) than those employed in the private sector. The decision of mothers to stop BF once they resume work at infants' age three-months could be due to the fatigue or time constraint having to juggle with BF and work.

In view that milk insufficiency was one of the reasons indicated by mothers for stopping BF, it augurs well for healthcare providers in the maternal and child health service to assess and support postnatal mothers promptly, in order to manage their milk insufficiency concern and early mixed feeding-related issues appropriately. Further, with due consideration of the study findings of IM intervention and its positive influence on BF practice, healthcare providers should consider to teach and encourage IM practice by mothers as part of the future maternal and child health service.

ACKNOWLEDGEMENTS

We would like to thank the Director General of Health Malaysia for his permission to publish this article. We would also like to thank the Sarawak State Health Director for the approval to access the clinics to recruit study participants; staff from the health clinics and the Family Medicine Department, UNIMAS for facilitating the access to participants. We would also like to thank Dr Emily Hii for her contribution at the initial stage of

the study. Our thanks and acknowledgements to all the mothers as participants. This work is supported by the Universiti Malaysia Sarawak' Special Grant F05/SpSTG/1362/16/4.

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