JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Understanding the effective breast crawl on maternal and newborn benefits and its feasibility: A literature review

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Abstract

The early initiation of breastfeeding is strongly recommended by UNICEF and W.H.O. Evidence has shown that a lower risk of neonatal mortality is associated with early initiation of breastfeeding. The breast crawl serves as the starting point to initiate first hour breast feeding and a continuum of care for mother and newborn that can have long-lasting effects on health and development. It is associated with a variety of stimulation such as sensory, motor, and neuron-endocrine components, all directly or indirectly help the baby to move and facilitate for initiation of breast feeding. There was a great heterogeneity in providing skin to skin contact (SSC) as well as proper breast crawl technique, which makes cross-county comparison difficult. Therefore to improve the SSC practice should include a standardised set of indicators and measurement tools that document SSC starting time and duration of SSC.

Databases such as Medline, PubMed, and Google scholar were searched. The search terms 'Standard Breast Crawl' and 'Breast Crawl' was used and combined with 'initiation of breastfeeding." Total 20 research papers were selected comprised original research: Randomised Control Trial (RCT), prospective studies, observational, cross-sectional studies and descriptive studies. Studies published between 2001 and2020 were included for the review.

This review provides an understanding of effective breast crawl concept and its protective effect on maternal and newborn heath. It also addresses the awareness and feasibility of breast crawl in the labour room by the health care professionals.

Keywords: breast crawl , initiation of breast feeding

Introduction:

The close interactions between mothers and their newborns soon after birth is the single most important behaviors for the survival of the newborn**(Levy & Keller; 2009).**Womb is the "natural habitat" for the unborn foetus, but after birth the functions of the uterus and placenta take over by the mother's body and breasts in providing warmth, nutrition, protection and maternal bonding (Gangal ***et al.,*** **2007).** Hence the transition from the intra-uterine to the extra-uterine environment is made more comfortable by the breast crawl.

The initiation of breastfeeding within half an hour of birth is strongly recommended by UNICEF and W.H.O. Evidence have shown that a lower risk of neonatal mortality is associated with early initiation of breastfeeding **(Lassi *et al.* 2015: (Account, Guidelines and Access, 2018;)(Edmond *et al.*, 2016;)(Berde and Yalcin, 2016;)(Phukan, Ranjan and Dwivedi, 2018**)It is reported that, worldwide only 50% babies are breastfed during their first hour of birth, despite strong evidence of early initiation of breast feeding in reducing neonatal morbidity and mortality **(Edmond *et al.*, 2016: Victora *et al.*, 2016; Khan *et al.*, 2015)**.Worldwide 16% of the newborn deaths could be reduced if all newborns would have been breast fed from the day 1 and 22% of breast feeding would be started within an hour after birth.The breast crawl serves as the starting point to initiate first hour breast feeding and a continuum of care for mother and newborn that can have long-lasting effects on health and development **(Alive & Thrive 2010)**

Breast crawl is the phenomenon, in which a newborn is kept in between mother's chest immediately after the delivery, the baby can move towards the breast and start latching the breast. I**t** is associated with a variety of stimulation such as sensory, motor, and neuron-endocrine components, all directly or indirectly help the baby to move and facilitate for initiation of breast feeding (**Klaus and Kennel., 2010).**Babies completing the 'Breast Crawl' with spontaneous attachment is instinctive and almost a rule with very few requiring assistance. However some newborn is not able to do anything on their own, they need simulation for enhancing breast crawling activity during the highest mood of alertness i.e soon after birth **(Kulkarini., 2010).** Effective breast crawl technique is the best way for stimulating the alertness of the newborn soon after delivery. Breast crawl will be effective if performed in standard method which includes smearing the breast with breast milk for olfactory perception, proper position of infant for proper skin to skin contact, cheek to cheek contact and holy message by mother to infant, all these can be increased breast crawling activity as soon as possible (UNICEF). There was a great heterogeneity in providing skin to skin contact (SSC) as well as proper breast crawl technique, which makes cross-county comparison difficult. Therefore to improve the SSC practice, a standardised set of indicators and measurement tools should be used for providing proper SSC and achieving better maternal and newborn outcome **(Abdulghani, Edvardsson and Amir, 2018).**

This review provides an understanding of effective breast crawl concept and its protective effect on maternal and newborn heath. It also addresses the awareness and feasibility of breast crawl in the labour room by the health care professionals.

Methods

Databases such as Medline, PubMed, and Google scholar were searched. The search terms 'Standard Breast Crawl' and 'Breast Crawl' was used and combined with 'initiation of breastfeeding." Total 20 research papers were selected comprised original research: Randomised Control Trial (RCT), prospective studies, observational, cross-sectional studies and descriptive studies. Studies published between 2001 and2020 were included for the review.

Search articles:

Pre-defined inclusion and exclusion criteria were set for the review criteria including the type of publication, type of participants, study designs, and study outcome

Table no :1

Inclusion /exclusion criteria

Inclusion criteria	normal birth including instrumental assisted birth, healthy pregnancy, full-term newborn infant, and newborn who are thermodynamically stable not requiring any resuscitation
Exclusion criteria	high risk pregnancy, Ceasearn Section, baby needs any resuscitation or transfer to Neonatal Intensive Care Unit (NICU), low APGAR score (<7) and new born with high risk condition.

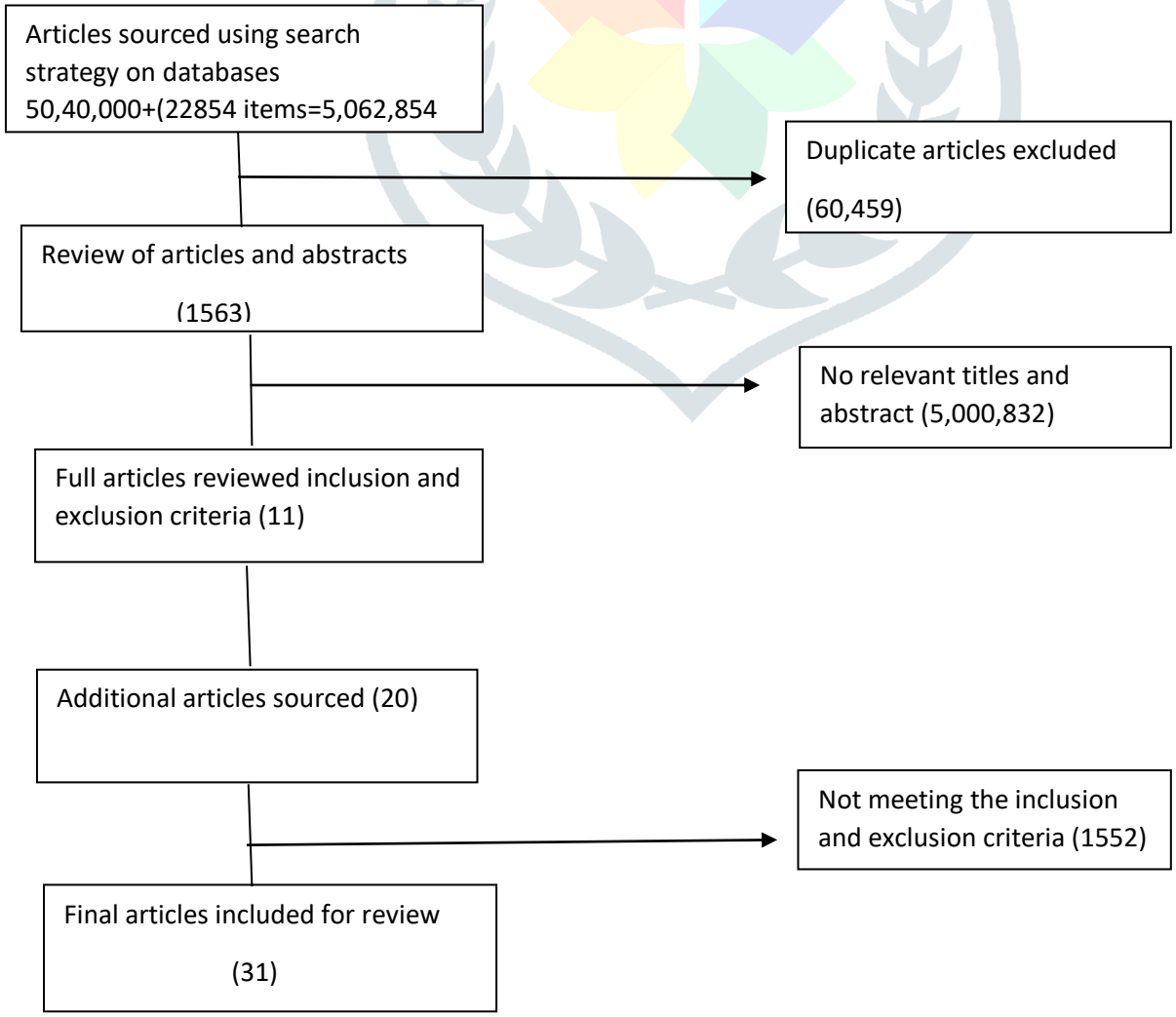

Figure 1: Flow chart of search articles

Discussion

The review intend to focuses on four concepts emerged from the reviews:

- Breast crawl technique vs Standard breast crawl technique
- Breast crawl : super natural power for mother and newborn
- Breast crawl : Awareness and feasibility of breast crawl
- Breast crawl during COVID pandemic

1. Breast crawl technique vs Standard breast crawl technique

The babies are blessed with many instinctive abilities which enable them to perform the breast crawl. Babies have a suckling reflex that enables them to suck and swallow milk. When a baby put on their mother's chest immediately after birth, follow a predictable pattern of pre- feeding behaviour. The movements started within 12 to 44 minutes and had been followed by spontaneous sucking with good attachment at 27 to 71 minutes, there after declined and absent by 2 to 2.30 hours after birth **(World Health Organization 2010)**

Breast odour as the only maternal stimulus elicits crawling towards the odour source. The study indicate breast v/s clean pad indicate the forward movement in the direction of stimulus pad was greatly increased in the response to maternal breast odour**(Varendi and Porter, 2001).**A new concept of smearing of breast milk added in breast crawl, as smearing of breast milk on breast crawl given good result as compared to normal breast crawl (Tripathy, Mo**harana and Prof, 2017)**.Breast crawling is not that baby immediately jumped on abdomen, the infant have some behaviour response after birth and terminated with grasping the nipple ,sucking and then falling asleep. They reported that when birth crying had stopped, the babies showed a short period of relaxation and then successively became alert. It followed nine behavioural phases of birth i.e cry, relaxation, awakening, activity, crawling, resting, familiarization, suckling, and sleeping when skin-to-skin with its mother . Breast crawl starts with 'awakening phase', then an 'active phase' with movements of limbs, rooting activity and looking at the mother's face, a 'crawling phase' with soliciting sounds, a 'familiarization phase' with the licking of the areola, and a 'suckling phase' and last a 'sleeping phase (**Widström *et al.* 2011).** It is recorded a state of wakefulness during the breast crawl , highest alertness recorded within 15 minutes and gradually decreased until 150 minutes after birth, when they fall asleep. This confirms that the newborn's brain is optimally ready to integrate various sensory, olfactory,auditory inputsand other breast crawl components soon after birth. If this vital period of alertness soon after birth will be lost and the newborn will start to sleep, there may be delayed in the breast feeding for several hours. This delay makes the newborn to deprive from the benefits of early initiation. **(Widstrom., et al.,2009) .**This fact was well supported that soon after delivery, when the newborn has cried and started breathing well, breast feeding can be initiated by stimulating the alertness of the newborn **(Kulkarini. 2010).**The world health organization also recommended the best time to start breast feeding is within 20-30 minutes of the newborn's birth, if there are no complications with delivery, it helps to promote bonding and immune protection. Therefore breast crawl technique is the best way for stimulating the alertness of the newborn soon after delivery. It is evidence that

breast crawl will be effective, if it is done with standard operated procedure guidelines which includes smearing the breast with breast milk for olfactory perception, proper position of infant for proper skin to skin contact, cheek to cheek contact and eye to eye contact between mother and infant, all these can be increased breast crawling activity as soon as possible **(Tripathy, Moharana and Prof. 2017)**

A standardized Breast Crawl is associated with a variety of sensory, motor, olfactory and neuron-endocrine inputs which will help the baby to move and facilitate her survival in the new world **(Tripathy, Moharana and Prof 2017).** The smearing of breast milk on breast crawl improves olfactory stimuli, which will have a calming effect on the infant and provide a basis for early individual recognition of the mother.Human neonates have that instinct ability to perform the breast crawl similar to neonates of various animal species who are dependent upon maternal breast odorous. They have born with the instinct ability to locate the nipples by the signals from the mother's ventrum which is known as the "nipple search pheromone". successful nipple attachment and sucking severely disrupts due to absence of these natural attractants, or interfering with neonates' olfactory perception **(Varendi 2018)**. Newborn humans likewise appear to be sensitive to naturally occurring breast odours and may help in eliciting goal directed behaviourof searching the nipple for early suckling of breast**(Winberg, 2005; Polymorphisms and Sweet 1991)**.Other studies given light of temperature comparison between neonate lips and nipple areola complex which may drive the infant directly to nipple. The human female's nipple-areolar complex (NAC) is the point of arrival of a natural progression from birth to breastfeeding, linked to functional, chemical, and biophysical cues that promote the breast crawl soon after birth(Zanardo *et al.*, no date). Further not only the temperature but also the odours of breast promote the breast crawl. Thermal and an olfactory signal help the new born to locate the nipple and latch onto it, leading to the first sucking experience Therefore breast crawl must be is done with standard operated procedure guidelines.

2. Breast crawl: Super natural power for mother and newborn.

Early breast crawl gives positive outcome and act as a super natural power for both mother and newborn. Study found that the early skin to skin contact helps to maintain the newborn's body temperature. It improves metabolic stability; enhance maternal- newborn interaction and earlier establishment of effective suckling and feeding behaviour. All these activities enhance the newborn's sensory, neural development so that these babies cry less, emotionally more stable and are at a lower risk of abandonment **(Gangal *et al.* 2007).**

Breast crawling is the best method to maintain effective skin to skin contact and found to be effective in term of providing warmth, comfort, metabolic adaptation, bonding, helps in uterine contraction, enhances expulsion of the placenta, reduces maternal blood loss and prevents anaemia **(Prajapat, 2019)(Gangal *et al.*, 2007)(Christena, no date)(Sharma, 2017).**Hence these studies had strongly recommended that breast crawling should be allowed for every patient of vaginal delivery until unless contraindicated

The new-born with breast crawl technique had a positive impact in the early postpartum period in terms of early initiation of breastfeeding, made a difference in the early metabolic adaptation of new-born, and promoted the early establishment of lactation and maternal-infant attachment **(Sharma, 2017)**.The newborn who are on breast crawl had high average of latching score and breast feeding rate **(Prajapat, 2019**). Breast crawl is a beneficial practice that promotes immediate initiation of breastfeeding thereby it reduces the immediate newborn weight loss in initial days. It was observed that babies who remained with their mothers immediately after birth were significantly less likely to lose excess weight as compared with those not performed breast crawling and the mean infant weight at 6 months of age was significantly better in the breast crawl group **(Thomas, S., 2018)**. In contrast, no significant difference in breastfeeding rates, the mean weight at discharge and bonding score was observed between breast crawling and non breast crawling groups. However this study reported the maternal perception of breastfeeding and infant activity were significantly better in the breast crawl group. Therefore maternal satisfaction was a measure positive outcome was well reported in other studies that most of the mothers expressed that they were excited, felt sleepy, perceived less pain, and increased bonding with their newborns **(Mulupuru *et al.*, 2019)**.Mother gets more satisfaction during breast crawl and it help to reduce third stage labour complication **(Fernandes, 2017)**. In addition breast crawl not only improved breastfeeding behaviour but also identified lactation failure when compared with non breast crawl women **(Girish *et al.*, 2013).**

Breast crawl is effective in reducing the intensity of pain during episiotomy suturing. It acts as a diversonal therapy when baby on mother abdomen and mother is more concern to baby rather than pain and seems to distract mothers from discomfort during perineal repair **(Fernandes, 2017)**. It was found that there is a significant impact of breast crawl on breast milk production during puerperium who performed breast crawl according to standard procedure **(Murti and Rathomi, 2015)**. It is quite supported with the findings, respondents who were given the breast crawl intervention; the production of breast milk tends to be faster than the group who was not given the intervention. Hence this study recommends to practice breast crawl soon after the baby is born for fully one hour, so that breast milk production is smooth, that giving advantages both for mothers and their babies **(Gupta *et al.*, 2019).**

It is reported that if an infant's lips touched her mother's nipple in the first hour of life and suckles from breast there is an outpouring of nineteen different gastrointestinal hormones in both the mother and the infant. Also early suckling gives tremendous release of oxytocin, hormones of love which facilities in contraction of smooth muscles of breast and uterus, producing milk ejection and separation of placenta and minimizing the blood loss during postpartum period **(Baby Friendly Hospital Initiative, 2010)**.Early suckling is possible through effective breast crawling technique to enjoy all benefits by mother and baby in term of breast feeding practice, helps in uterine contractions, faster the expulsion of the placenta and reduces maternal blood loss and ultimately prevents anaemia **(Colin .H.w. et al., 2010).**It is indeed distressing only 39% of newborn in developing countries are put to the breast within one hour of birth despite notable breast crawl effect has been established during the last decade **(Phukan, D., 2018).** Therefore, effective breast crawl

need to be strictly adhered as an evidence based and cost effective method in establishing early good breast feeding practices for optimal development of the infant.

3. Breast crawl: awareness and feasibility

Breast crawl is novel, easy, readily available and miraculous method to initiate breast feeding in a natural way. It does not require elaborate preparations or instructions and can be performed in all birth settings and units still it is not practiced routinely in all set up **(United Nations Children Emergency Fund, 2010)**.Awareness and feasibility of breast crawl is a main hurdle because there is no clear guidelines and protocol on breast crawling are developed, also it is not routinely practiced in all health care set up also. As literature shows nursing staff working in labour room had inadequate knowledge, uncooperative attitudes towards breast crawling procedure and reluctant to practice this due to work load. Study conducted on feasibility of breast crawling practice identified several roadblocks such as lack of antenatal counselling, lack of awareness and motivation, lack of specific guidelines and instructions, skewed staff-to-patient and bed-to-patient ratio, and lack of privacy **(Gupta *et al.*, 2019).**Hence awareness of health care workers and their family is a crucial feasibility factor of practicing the standard breast crawl procedure soon after delivery. Some study implemented breast crawl pocketbook as a research instrument for routine practice by health care professionals **(Sarita, 2020)** and video-assisted teaching on breast crawl was used in improving the knowledge of staff nurses for practicing breast crawling in their set up **(Jelly and Sharma, 2016).**

The standard breast crawl procedure should be incorporated into the written policy and it should be strictly adhered to as far as possible in all baby-friendly hospitals. Arranging a brief training program for all labour room staff, paediatric residents, interns, obstetric residents, community midwives etc and motivating them for implementing breast crawling as a routine practice in labour unit of their health care set up, increasing the number of working hands by increasing the number of staff nurses and interns and also curtains around each labour room bed for privacy are highly desirable to implement breast crawl as a routine practice. It is also emphasizes incorporating counselling about breastfeeding and breast crawl during antenatal visits as a routine practice is an important factor for successful breast crawling after delivery **(Gupta *et al.*, 2019).**

4. Breast crawl during COVID pandemic

COVID-19 disease caused by the SARS-CoV-2 virus, as a global pandemic declared by the World Health Organisation. The mode of transport of SARS-CoV-2 suggests person-to-person transmission which occurs when in close contact with an infected person. The virus is transferred via respiratory droplets produced when coughing and sneezing **(Lubbe *et al.*, 2020)**

UNICEF warned that Covid-19 containment measures can disrupt life-saving health services such as childbirth care, putting millions of pregnant mothers and their babies at great risk. Based on the current evidence, it seems that the virus is not transmitted via breast milk, breastfed infants have an advantage in receiving additional protection against SARS-CoV-2 **((Lackey *et al.*, 2020),(Zhu *et al.*, 2020)**. As breast crawl is the safest and best transition for mothers and their infants to a new life together, hence it is the best

protective measure available for mother and new born during the time of COVID 19 pandemic for early initiation of breast feeding **(W.H.O breast feeding advice during COVID 2020).** Ensuring breast crawl happens immediately after birth, the infant's micro biome can develop from the mother's flora, which is very beneficial during a pandemic. Mothers and newborn should not be separated, and skin-to-skin contact should not be discontinued, however additional droplet protection should be taken by the mothers by wearing a surgical face mask and maintaining proper hand hygiene when handling and feeding her infant **(Lubbe *et al.*, 2020)**.

Table 2: Summary of included journal

Author	year	Design	Sample /area	Intervention	Study Outcome
Varendi H, Porter RH.	2001	Control trial	22 healthy term newborns Children's Clinic of Clinics of Tartu University, France	Clean pad /breast pad Silk scale tape Breast crawl not provided .baby put on prone position on warming bed	More babies moved towards and reached the breast pad than the clean pad.
Tripathy P, Moharana M	2017	Experimental	60 sample full term newborn 30 in each group IMS & SUM Hospital, Bhubaneswar, India.	Not mentioned properly only highlighted the breast smearing	Smearing of breast milk enough to allowed and guide to neonate toward completing the breast crawl .
Widström AM, Lilja G, Aaltomaa-Michalias P,	2010		Twenty-eight full-term infants in a maternity hospital in Stockholm, Sweden	provided breast crawl without SOP guidelines	Nine behavioural phases birth cry, relaxation, awakening, activity, crawling, resting, familiarization, suckling and sleeping
Prajapat A	2018	Prospective observational		SOP guidelines used for breast crawl.	Breast crawl helps in expulsion of placenta and reduction of blood loss and newborn helps for warmth , comfort , metabolic and quality of attachment.
Christena P	2018	Quasi-	Participants:60	The baby over	Breast crawl

		experimental posttest-only design. probability	postnatal mothers Selected hospital, Trichy	was kept on mother's abdomen without any additional stimulation.	had effective on reduction of blood loss and reduce the third stage of labour time and early initation of breast feeding .+9
Sharma R.	2017	Experimental study	The mothers admitted in labor room, full-term pregnancy (37–42 weeks) with cephalic presentation Kasturba Hospital, New Delhi, India.	Breast crawl without SOP guidelines	Newborn had breast crawl early initiation of breast feeding than the newborn in control and better metabolic development early establishment of lactation and maternal infant attachment present in breast crawl group
Mulupuru S, Siddu A, Murki S, Saikiran D, Reddy A	2019	Randomized control design	200 mother infant	Breast crawl not met the SOP guidelines	Bonding are same in both group at discharge no changes in mean weight of both group but the satisfied breast feeding behaviour of newborn who had breast crawl and after follow up 6 month of age weight of baby are better in breast crawl group
Fernandes V.	2017	Quasi experimental design	40 mother of Muller medical college hospital	Not mentioned clear standard Breast crawl technique.	Breast crawl reduce the intensity as well as behaviour much better in breast crawl mother group
Girish M, Mujawar	2013	A prospective, single blinded,	Mother in labour room	Not mentioned properly the	No breast feeding

N, Gotmare P, Paul N, Punia S, Pandey P.		randomized controlled clinical trial		technique of breast crawl but questionnaire made for check the feasibility	behaviour changes in both group weight decrease in more in control group and breast crawl is not feasible due to heavy work load .
Murti NN, Rathomi AR..	2014	Cross sectional research design	20 Puerperium mothers at RSUD Abdoel Wahab Sjahranie Samarinda ,	Breast crawl with SOP nut not mentioned the SOP and control group without SOP breast crawl	Smooth Breast feeding production in breast crawl with SOP group mothers
Sarita S.	2020	True experimental study with posttest only control	30 midwives participated Poasia Puskesmas, Kendari City, Indonesia.	The pocket book Breast Crawl (IMB) guidelines are used for breast crawling process	Breast milk production smooth in puperium mothers who had breast crawl with pocket book

Conclusion

Breast crawl, keeping mothers and newborns together, and facilitating the process of skin to skin contact is not common practice. There is no proper definition of breast crawl, most commonly it is practiced as skin to skin contact and but study found breast crawling with standard operated procedure with maximum sensory and olfactory stimulation and appropriate duration and time of initiation will have real impact on feeding behaviour of newborn. Also there is a need for awareness among health care workers regarding the standard breast crawl practice and support the initiation of breastfeeding.

Giving birth during the coronavirus pandemic is an added worry and stress for expectant mothers continuing immediate skin-to-skin contact and early and exclusive breastfeeding during the COVID-19 outbreak, as the benefits reduce the potential risks of transmission and illness associated with the disease. To improve

immediate, continuous, and uninterrupted skin to skin contact should include a standardized set of indicators for breast crawl starting time and duration. And also need a standard protocol checklist tool that can assist nurses or midwives when observing the practice would also be helpful. So this review article recommends more studies to be undertaken based on standard breast crawl criteriaand there is also a need to translate the research into practice by implementing standard breast crawl interventions to improve the maternal and newborn outcome.

Acknowledgments

Declaration of interest statement

The authors declare that there is no conflict of interests.

References

1. Abdulghani, N., Edvardsson, K. and Amir, L. H. (2018) 'Worldwide prevalence of mother-infant skinto-skin contact after vaginal birth: A systematic review', PLoS ONE, 13(10), pp. 1–19. doi: 10.1371/journal.pone.0205696.
2. Account, L. M., Guidelines, S. and Access, O. (2018) 'The Lives Saved Tool in 2013 : new capabilities and applications Time to initiation of breastfeeding and neonatal mortality and morbidity : a systematic review', BMC Public Health, 13(3), pp. 1–22.
3. Alive & Thrive (2010) 'Impact of early initiation of exclusive breastfeeding on newborn deaths', Washington, (202), pp. 2–4.
4. Berde, A. S. and Yalcin, S. S. (2016) 'Determinants of early initiation of breastfeeding in Nigeria: A population-based study using the 2013 demograhic and health survey data', BMC Pregnancy and Childbirth. BMC Pregnancy and Childbirth, 16(1), pp. 1–9. doi: 10.1186/s12884-016-0818-y.
5. Christena, P. (2018). A study to evaluate the effectiveness of breast crawl technique on physiological outcome during the third stage of labour and immediate initiation of breastfeeding among postnatal mother at the selected hospital , Trichy, 4(3), pp. 460–465.
6. Edmond, K. et al. (2016) 'Timing of initiation, patterns of breastfeeding, and infant survival: Prospective analysis of pooled data from three randomised trials', The Lancet Global Health. World Health Organization, 4(4), pp. e266–e275. doi: 10.1016/S2214-109X(16)00040-1.
7. Fernandes, V. (2017) 'Effectiveness of breast crawl on the intensity of episiotomy pain and behavioral response among women during episiotomy suturing', Muller Journal of Medical Sciences and Research. Medknow, 8(1), p. 24. doi: 10.4103/0975-9727.199367.
8. Gangal, P. et al. (2007) 'B R E a S T C R Aw L', Unicef.
9. Girish, M. et al. (2013) 'Impact and feasibility of breast crawl in a tertiary care hospital', Journal of Perinatology. Nature Publishing Group, (July 2012), pp. 288–291. doi: 10.1038/jp.2012.109.
10. Gupta A, Prasad B, Khadse S, Valvi C, Kulkarni R, Rajput U, et al.(2019) Feasibility of breast crawl in a tertiary care teaching institute. Indian J Child Health, 6(9):507-511. Doi: 10.32677/IJCH.2019.v06.i09.010.
11. Jelly, P. and Sharma, S. (2016) Teenage Pregnancy: 21st Century's Social Concern, Journal of Nurse Midwifery and Maternal Health. doi: 10.21088/jnmmh.2454.7506.2216.14.

12. Khan, J. et al. (2015) 'Timing of Breastfeeding Initiation and Exclusivity of Breastfeeding During the First Month of Life: Effects on Neonatal Mortality and Morbidity—A Systematic Review and Meta-analysis', Maternal and Child Health Journal, 19(3), pp. 468–479. doi: 10.1007/s10995-014-1526-8.
13. Lackey, K. A. et al. (2020) 'SARS-CoV-2 and human milk: What is the evidence?', Maternal and Child Nutrition, 16(4), pp. 1–26. doi: 10.1111/mcn.13032.
14. Lassi, Z. S. et al. (2015) 'Interventions to Improve Neonatal Health and Later Survival: An Overview of Systematic Reviews', EBioMedicine, 2(8), pp. 985–1000. doi: 10.1016/j.ebiom.2015.05.023.
15. Lubbe, W. et al. (2020) 'Breastfeeding during the COVID-19 pandemic – a literature review for clinical practice'. International Breastfeeding Journal, 3, pp. 1–9.
16. Mulupuru, S. et al. (2019) 'Breast crawl at birth , effect on breastfeeding rate and infant growth in infants delivered at an urban tertiary care public hospital : A randomized controlled trial', 25(April), pp. 236–239. doi: 10.1016/j.jnn.2019.04.008.
17. Murti, N. N. and Rathomi, A. R. (2015) 'Impact of breast crawl to breast milk production on puerperium mothers in rose room of abdoel wahab sjahranie regional public hospital of samarinda in 2014 .', 4(4), pp. 52–57.
18. Phukan, D., Ranjan, M. and Dwivedi, L. K. (2018) 'Impact of timing of breastfeeding initiation on neonatal mortality in India', International Breastfeeding Journal. International Breastfeeding Journal, 13(1), pp. 1–10. doi: 10.1186/s13006-018-0162-0.
19. Polymorphisms, G. and Sweet, O. F. (1991) 'Maternal Diet Alters the Sensory Qualities of Human Milk and Nursling ' s Behavior', (January 2015).
20. Prajapat, A. (2019) 'Prospective Study on Initiation of Breast Feeding by Breast Crawl and its Maternal and Foetal Benefits', 8(5), pp. 2018–2019.
21. Sarita, S. (2020) 'Effectiveness of breast crawl by midwives to increase breast milk production among postpartum mothers', 6(3), pp. 94–98.
22. Sharma, R. (2017) 'Effectiveness of Breast Crawl Technique to Initiate Breast Feeding in Newborn and to Find out Its Impact on Newborn and Maternal Outcome during Early Postpartum Period – An Experimental Study', International Journal of Nursing & Midwifery Research, 04(03), pp. 55–60. doi: 10.24321/2455.9318.201733.
23. Tripathy, P., Moharana, M. and Prof, A. (2017) 'Research Article Effect of Smearing of Breast Milk on Breast Crawl among Newborn Baby', 44(31), pp. 126–129.
24. Thomas, S., Mohanty, N., & Dasila, P. (2018). Effect of breast crawl on initiation of breast feeding. Manipal Journal of Nursing and Health Sciences, 4(2), 1-5.
25. Varendi, H. (2018) 'Does the newborn baby find the nipple by smell ? Does the newboln baby find the nipple by smell ?', 6736(September), pp. 4–6. doi: 10.1016/S0140-6736(94)91645-4.
26. Varendi, H. and Porter, R. H. (2001) 'Breast odour as the only maternal stimulus elicits crawling towards the odour source', Acta Paediatrica, International Journal of Paediatrics, 90(4), pp. 372–375. doi: 10.1111/j.1651-2227.2001.tb00434.x.
27. Victora, C. G. et al. (2016) 'Breastfeeding in the 21st century: Epidemiology, mechanisms, and lifelong

effect', The Lancet. Elsevier Ltd, 387(10017), pp. 475–490. doi: 10.1016/S0140-6736(15)01024-7.

28. Widström, A. M. et al. (2011) 'Newborn behaviour to locate the breast when skin-to-skin: A possible method for enabling early self-regulation', Acta Paediatrica, International Journal of Paediatrics, 100(1), pp. 79–85. doi: 10.1111/j.1651-2227.2010.01983.x.

29. Winberg, J. (2005) 'Mother and newborn baby: Mutual regulation of physiology and behavior - A selective review', Developmental Psychobiology, 47(3), pp. 217–229. doi: 10.1002/dev.20094.
30. Zanardo, V. et al. (no date) 'A temperature gradient may support mother-infant thermal identification'. doi: 10.1111/ijlh.12426.
31. Zhu, H. et al. (2020) 'Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia', Translational Pediatrics, 9(1), pp. 51–60. doi: 10.21037/tp.2020.02.06.