

Abstract

Breastfeeding is the normal and safest way to nurture an infant, and prolonged exclusive breastfeeding duration to six months will yield the greatest gains in optimum infant development. Despite this knowledge less than 35% of infants world-wide are exclusively breastfed during the first four months of life.

With the advent of the Internet has been the development of many varied e-Health interventions. Using the internet to support breastfeeding is a relatively novel method of health intervention in an area which has traditionally always been face to face. The aim of this paper is to review the literature on the provision of internet based breastfeeding information and support intervention programs.

A systematic literature review of current evidence was conducted using the electronic databases CINAHL (via Ebscohost), MEDLINE, Current Contents, Psychinfo and Web of Knowledge for English-language publications from 2000 to May 2013. Inclusion criteria limited interventions to those delivered to women of childbearing age who accessed the internet to source breastfeeding information and support. Only studies reporting breastfeeding outcomes (e.g. breastfeeding duration) were included.

A total of 1,379 articles with citations and abstracts were identified as potentially relevant after searching the identified databases. One study was eligible for inclusion and reported positive outcomes, however methodological issues limit the interpretation of these results. Numerous study limitations and problems with scientific rigor make it difficult to extend study findings to antenatal and postnatal care.

More rigorous evidence is needed before breastfeeding internet interventions replace traditional methods of support and education for women intending to breastfeed.

Background

As of June 2012, more than 2.4 billion people worldwide used the services of the internet.¹ The terms internet and World Wide Web are often used interchangeably however, the internet and the World Wide Web are different entities of the digital era. The internet establishes a global data communications system between computers whereas the Web is only one of the services of communication available via the internet. Information provision through the World Wide Web (e.g. Internet Explorer, Mozilla Firefox), communication (e.g. email, Skype) and file sharing (e.g. File Server, Webstreaming, Webcam) are the main functions of the internet.²

The internet has no centralised governance and for this reason the Internet has extended organically into most parts of the world. Although Asia has the highest internet usage, the penetration of the internet has been greatest in North America (78.6%) and the Oceania/Australia region (67.6%). On average throughout the world penetration has been 34.3% with the geographic regions of Asia and Africa falling below the median.¹

With this rapid growth in the internet is the search for information that is instant and immediate to our needs, particularly in the area of health. Today more than ever people are going online in search of health information, especially women,³ and the internet is potentially filling an information gap in areas where health services are lacking. An area that is of particular interest to women is that of antenatal health and postnatal care. Research

shows that approximately a third of female internet users between the ages of 18 and 33 have looked online for information about pregnancy and childbirth, compared with 25% of those between 34-45 years old, and just 5% of internet users aged 46 or older. Current parents are also more likely than internet users who do not have children living at home to do this type of research.³

Through the availability of the internet has arisen the delivery of health care through innovations such as 'telehealth', 'telemedicine' or 'e-health' (herein referred to as telehealth) which provide patients with greater access to service providers.⁴ A recent telehealth study trialled real-time videoconferencing breastfeeding support and found no causal association between the videoconferencing and breastfeeding outcomes, despite the positive feedback on the weekly videoconferencing sessions. In addition, both participants and the research team experienced problems with the high-speed Internet service, a range of operating systems not compatible with the videoconferencing setup, firewall block outs and a lack of quality of pictures and sounds which prevented the assessment of breastfeeding.⁵

Breastfeeding is the optimal method of feeding infants and the benefits of breastfeeding are well recognised for both mothers and their babies. There is considerable evidence to support an increase in health benefits with increasing exclusivity of breastfeeding and health authorities world wide recommend exclusive breastfeeding for the first six months of life.^{6,7} However any level of breastfeeding is beneficial to the mother and infant⁷ and translate into both health and economic gains for individuals and communities.

Despite these known health and economic benefits the lack of continued breastfeeding at any

level is problematic. Traditionally mothers actively attend formal antenatal classes in an effort to prepare for the birth of their infant and to learn about breastfeeding from a qualified health professional. However a combination of lay and professional support has been found to be the most effective for the continuation of exclusive breastfeeding.⁸ With the advent of the internet, world wide web and telehealth is it possible that online support is able to play a role in providing complementary lay support to mothers?

When entering the term 'mothers and health' on the search engine Google, approximately 234 million results appear. In Google Scholar this is somewhat more modest with only 2,180,000 results. Googling the terms 'Mothers and breastfeeding' brings up approximately 21.6 million results while 'breastfeeding' alone brings up 26.6 million websites for information (as of March 14, 2013). Navigating this myriad of information can be daunting even for the experienced researcher and it is concerning how mothers manage to steer their way through the information highway and to what extent they search and utilise the internet for infant feeding information online.

In a review of the literature on 'parenthood and the internet' Daneback and Plantin⁹ note that the first article on parenthood and the internet was published in 1997 and in the early years this research area mostly focussed on listing useful websites for parents as well as analysing them regarding quality and accuracy. In 2000 the first article on parents' user patterns was published and research articles from this time onwards began to describe how parents accessed and searched for parent information on the internet. Parents mostly found the World Wide Web to be a positive parenting resource. From 2002 onwards came the advent of research articles investigating the use of online support groups outlined in the literature as

web communities, web chat rooms, and email list serves, where parents interacted with each other and occasionally professionals. Danebeck and Plantin⁹ identify a fourth area which focussed on the use of the internet to provide health related information on various topics to parents. This type of research increased considerably after 2005 and concentrated on researchers reporting pre-test/post-test outcomes from the delivery of internet interventions.

Using the internet to support breastfeeding is a relatively novel method of health intervention in an area which has traditionally always been face to face and sometimes 'hands on'. The use of the internet by women to support their breastfeeding practices is comparatively unknown compared to other general parenting topics.¹⁰

Aim

The primary aim of this review is to assess the effectiveness of any breastfeeding support internet interventions on breastfeeding outcomes.

Methods

A systematic literature review of current evidence was conducted. The review methodology was designed in reference to the Joanna Briggs Institute, Reviewers' Manual.¹¹

Search strategy

Intervention studies were searched using the electronic databases CINAHL (via Ebscohost), MEDLINE, Current Contents, Psycinfo and Web of Knowledge for English-language

publications from 2000 to May 2013. Briefly, the keyword search terms were breastfeeding, lactation, mothers, internet, world wide web, information seeking, computer assisted instruction, electronic communication, blog, social media, health education, education, program, support, support program, program evaluation, indicator, outcome and measure. The search strategy was tailored utilising each databases' controlled vocabulary or subject terms. Where a controlled vocabulary did not have a suitable subject term the search term was entered as a keyword.

Inclusion criteria limited interventions to those delivered to women of childbearing age who accessed the internet to source breastfeeding information and support. Only studies reporting breastfeeding outcomes (e.g. breastfeeding duration) were included.

Abstracts, conference papers and unpublished articles were not included.

Selection of studies

A two-step screening process was employed. In step one, one author scanned the titles and abstracts of studies identified by the search for their eligibility. Full text articles that were identified as eligible or unclear were retrieved. At step two, full text articles were screened by one author for eligibility and included studies were checked by a second author.

Results

A total of 1,379 articles with citations and abstracts were identified as potentially relevant after searching the identified databases. After step one a total of 46 articles were identified as meeting the selection criteria. At the conclusion of step two, 20 articles were discarded as not meeting the selection criteria, 18 were discarded as duplicates, and a total of eight were reviewed. Of these eight articles, one article met the inclusion criteria (see Figure 1.).

Studies that met the selection criteria

Huang and colleagues (2007)¹² conducted a quasi-experimental internet intervention aimed at increasing the breastfeeding knowledge and skills of primigravida women in Taiwan. Sixty five women were allocated to the intervention group which received access to an internet based breastfeeding education program prenatally with historic controls who did not receive the program. Some of the topics included in the program were the composition of human milk, benefits of breastfeeding, breastfeeding problems and solutions, contraindications to breastfeeding, and human milk storage.

Using a pre-test and post-test measure of knowledge and attitudes, a significantly higher post-test score for both knowledge and attitude was recorded in the intervention group, a fortnight after the pre-test was taken, during which time the intervention was completed.

As per the inclusion criteria, this study measured breastfeeding rates as an outcome of the intervention. Indicators measured were exclusive breastfeeding (defined as infants who only received breast milk with no supplemental formula), mixed feeding (breast milk and formula) and exclusive formula feeding at 3-5 days postpartum, two, four and six weeks. The exclusive breastfeeding rate was significantly higher in the intervention group with 48.3%, 45%, 31.7% and 26.7% compared to 38.3%, 20%, 20% and 20% in the control group reported at 3-5 days postpartum, two, four and six weeks, respectively reported in the univariate analysis.

The generalised estimating equations model (GEE) model was used to control for infant birth weight and time trend, and to analyse the independent effect on exclusive and mixed feeding.

There was a significant effect of the intervention on exclusive breastfeeding (OR=1.75, Z=1.97, p=0.048) and on mixed feeding (OR=2.69, Z=2.35, p=0.019).

Despite the clear outcomes identified in this study, a small sample size limited to only one hospital, the reliance on a convenience sample, and a lack of consideration of the factors known to confound breastfeeding practices¹³, make the results difficult to generalize to other populations.¹²

Discussion

Despite retrieving numerous studies in this systematic review which investigated or examined the effect of the internet based interventions on parenting, there is a dearth of studies specifically focussing solely on the area of breastfeeding support and education. Studies that did include a breastfeeding component did not definitively measure breastfeeding outcomes, had a limited sample size taking part in this program component and/or provided limited methodological information required to meet eligibility inclusion criteria for this review.

There is currently an abundance of internet based sources of information for parents regarding infant health and development and the proliferation of information available on the internet to support new parents in their future role has burgeoned since the field of parenthood and the internet was established in 1997.⁹ However, the effectiveness of these resources as a forum for educating breastfeeding women remains unexamined, with the exception of the subject matter. Websites providing general breastfeeding information to parents are plentiful and the content has been found to be mostly accurate when compared to evidence based knowledge.¹⁴

Breastfeeding education is integral to the learning experience of the new parent. The aim of governments and health agencies worldwide is to have mothers exclusively breastfeed for six months postpartum to obtain the recognised health and development benefits.⁷

The use of the internet to support breastfeeding is just one of the numerous strategies currently employed in breastfeeding education. Traditionally instruction has been health provider based (e.g. midwife) however the internet is filling the gaps of client isolation and cuts in health service provision. In her comprehensive review of breastfeeding intervention

delivery methods, Pate demonstrates that internet based interventions may be an appealing option to more costly and time consuming provider based breastfeeding education and support. In addition, the internet has the ability to reach large numbers of people at low expense, particularly people in areas of remote isolation.¹⁵ However in a recent meta-analysis of internet-delivered interventions to increase physical activity levels the authors concluded that despite considerable reference being given to the fact that internet delivered interventions use the internet to reach large populations at low cost, few researchers have evaluated this cost effectiveness. Not dissimilar to our findings, this meta-analysis also reported inherent problems with the revision of studies including; inconsistency in reporting the level of engagement in the intervention, variability in self-reporting of physical activity measures, a lack of available studies that met the inclusion criteria, and the possibility that small studies with negative results are unlikely to be published. Finally, the authors concluded there was a small effect size of internet interventions on physical activity and that the effect size was smaller than face-to-face interventions.¹⁶ Even though the research area of physical activity is considered to be advanced in organisation and approach, it appears that when employing novel methods of delivery such as the internet, it too is plagued with methodological issues.

It is possible that as internet technology advances and the various platforms for internet use expand (e.g. digital tablets, smart phones) the true potential of the internet in delivering fast and effective breastfeeding support is still to be recognised. In the last decade the internet traffic of all international countries has markedly increased. World wide many countries are investing in long term high-speed broadband (HSB) initiatives. The World Economic Forum Global Information Technology Report highlights how the Finnish Government has promised to provide HSB (100MB/s) to every Finnish household by 2015. In addition the report also states that the Australian, US, UK and Brazilian governments are planning to invest on HSB

A\$43billion, US\$9 billion, £850 million, and US\$7.3 billion, respectively, whilst other emerging economies such as India are also setting up their national broadband plans.¹⁷

This systematic review is the first to specifically identify and examine breastfeeding interventions delivered via the internet, and report on recognised breastfeeding indicators. Results from this review clearly demonstrate that internet interventions in this area are limited and those that have been conducted lack the basis of rigorous study design and comprehensive analysis.

It is possible however that future internet breastfeeding support programs are better able to provide real time guidance and advice with the advent of the highly efficient fibre optic network of the HSB, and therefore demonstrate better breastfeeding outcomes. Having a lactation consultant or breastfeeding counsellor on the computer screen of every new mother upon arriving home from hospital could be a potential opportunity to vastly support breastfeeding and improve lactation outcomes. The potential for peer counselling and support will also exponentially increase as information becomes specific to each mother rather than a general website providing general information as demonstrated by Rojjanasrirat et al.⁵ The ability to diagnose breastfeeding difficulties and provide regular monitoring of ongoing progress could prove invaluable particularly when technical difficulties can be overcome. In addition, the HSB will provide quality care to women remotely, potentially increasing breastfeeding outcomes and saving time and travel costs (e.g. to and from regional, rural and remote communities).¹⁸ The development of new communication technologies (e.g. microblogging) and support hardware (e.g. smartphone, digital tablets) provide even further opportunities for personally connecting with breastfeeding women in a socially supportive approach.

However these advantages may bring other challenges to breastfeeding in the form of consistency in information and privacy to the patient. Concerns about personal exposure, particularly in circumstances in which women show their breasts (e.g. attachment) may give rise to the need for the provision of secure videoconferencing.^{19,20} Furthermore, the proposed uptake of telehealth and its corresponding impact may be constrained due to a number of issues related to regulation, policy and practices. For example, currently in Australia if a medical service or intervention cannot be allocated a payment code, and one that is recognised as valid by health regulators, it cannot be billed. Therefore the medical professionals (e.g. midwife or lactation consultant) offering these services will not be reimbursed.²¹ This situation will discourage the adoption of new healthcare services that can be delivered via HSB and it will be necessary for administering governments to develop a system where these consultations can be accounted for.

Inherent in breastfeeding research are the inconsistencies and incongruencies in reporting outcomes due to differences in recording and defining breastfeeding outcomes.²² Accurately measuring breastfeeding indicators is paramount when demonstrating an effect of an intervention specifically aimed at promoting breastfeeding, so too for interventions delivered via the internet. Huang et al.¹² reported on breastfeeding outcomes as per the inclusion criteria for this review, however detail regarding breastfeeding indicators was limited and method of data collection relating to this indicator variable was vague.

An overarching limitation of this review is the lack of eligible studies able to be included in this review. A further limitation is that the only study able to be included lacked a high degree of scientific rigour. It is possible that in time, this emerging area of research will adopt

more scientific precision that will in turn provide greater certainty of the intervention outcomes. Further research in this area is recommended particularly in light of the improvements in internet delivery taking place internationally.

Conclusion

Poor study design, numerous study limitations, and a lack of scientific rigor make it difficult to determine what role the internet can play in breastfeeding support. At this point in time it would be unethical to recommend the internet as the sole source of breastfeeding support and education in the antenatal or postnatal period. However the imminent arrival of the HSB which will provide faster and more reliable access to the internet is an opportunity to further explore the role of the internet in breastfeeding support.

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Conflicts of interest

Nil to report.

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