A Systematic Assessment of Digital apps for Quality Content on Health and Nutritional Aspects of Infants

ABSTRACT

Internet websites and parenting apps have become popular resources for guiding parents on their children's health and nutrition. Parents frequently turn to the internet for information, support, and guidance, mainly relying on search engines and social media to find answers to their parenting questions. Parenting apps, in particular, are gaining popularity as they offer convenient information on child health and nutrition. First-time parents often feel anxious and uncertain about their new responsibilities. Parenting apps provide them with the knowledge and support needed to build their confidence in caring for their baby. Infant parenting apps are an invaluable resource for young parents in India, offering convenient access to information, support, and tools that help them navigate the challenges of raising their first baby with greater ease and confidence. The primary objective of this study was to systematically analyze infant parenting apps for the information they provide about infant health and nutrition. To analyze various infant parenting apps, 40 apps available for free download on the Google Play Store were downloaded and installed on an Android phone. Each app was used and individually assessed by the researcher for its content and quality based on various criteria using a self-structured schedule. The majority of the apps lacked relevant information about infant health and nutrition. The information provided was insufficient and not easily understandable for parents of infants. Additionally, the information was available only in English. The findings of this unique analysis highlight that the information provided in the available apps is insufficient and lacks credibility. These apps do not cater to the needs of Indian parents. There is a strong need for an app for Indian parenting conditions.

Keyword: Internet websites, Indian parents, Infants, Parenting apps, Knowledge, Health aspects and Nutritional aspects

INTRODUCTION

Parenting means providing on-going care and support a child needs to survive and thrive. Such on-going care and support includes making sure that the child has protection from physical danger, adequate nutrition and health care, responsive and loving interactions

with significant, consistent people (UNICEF, 2012). Parenting is at its greatest level of intensity during infancy and toddlerhood. In the first few years of life, children depend entirely on their caregivers, who determine most of the children's experiences. In the first few months of life, parenting focuses on the provision of basic care, ideally from a warm and responsive caregiver. The extent and quality of knowledge of parents is often considered vital for improving children's development and health.

Parenting knowledge includes parents' understanding of normative child development, developmental processes, abilities and accomplishments of children as they grow; and parents' awareness of practices and strategies for maintaining and promoting children's health and coping effectively with children's illness.

Research studies indicated that mothers of infants have significant knowledge gaps. The research findings revealed knowledge gaps among parents and caregivers, with a significant proportion having partial or inadequate knowledge of common childhood illnesses and home remedies. Educational level emerged as a significant factor influencing knowledge and attitudes, with higher educational attainment associated with higher odds of adequate knowledge and positive attitudes (Chaudhari *et al*. 2023). Majority of rural women had medium level of knowledge on selected health and nutritional practices hence efforts should be made to increase the knowledge level of rural women on health and nutritional practices in rural areas (Khatri *et al*. 2022). Children whose mothers regularly engage in quality interaction with them tend to exhibit a high mental development index at 2 years of age (MacLean et al. 2014). There is no doubt that the quality of parenting that children receive during the first year has life-long consequences on emotional, social, and cognitive development (Bornstein et al. 2012).

Earlier we had joint families where elders helped the young parents in child-rearing. They also used to teach parenting side by side by giving practical tips while actively participating in the rearing of the infants. But as we have shifted from joint to nuclear families, the traditional parenting supports and services are typically inaccessible. The spontaneous teaching-learning process is also absent, therefore, parents do not have enough knowledge about the common health and nutritional aspect of infants.

It is also a reality that present generation has much more faith in internet than knowledge of their elders. Thus, the parenting has become much more challenging for today's young parents. The Internet has become a popular medium for consumers seeking health-related information. The proportion of the population regularly accessing the Internet

is large and growing. As per data provided by TRAI, 2023 overall internet penetration in the country is 61.62% with 850.95 million internet subscribers.

Increasingly, parents are turning to the Internet for information regarding infant health related problems like cold and cough remedies, teeth problem, child stomach problem, food allergy, skin problem, child weight loss, child immunity and child yoga. These parents appreciate the convenience and speed of information delivered by the internet and social media and find comfort in the anonymity (Bartlett *et al.*, 2017). The proliferation of web-based health information sources is reflected by the growing literature for health care professionals discussing and advising the use of new technology (Aungst *et al*. 2014). Studies have shown that parents and pregnant women trusted hospital, government, and university websites as accurate, regulated, useful, and current sources of pregnancy and parenting information (Chaudhry, 2018).

Kuo *et al*. (2012) developed A New born Baby Care Support App and found that mothers are willing to pay for this kind of new mobile services that is going to be very typical and popular in future mobile health services. This new type of mobile app for assisting new-born baby care, as well as other mobile applications in healthcare deserves close attention and could be put into market for promotion. Parenting application indicated that parents were excited about the app concept and its specific features. This showed that parents work will become easier in an organized manner and they will get the answers to various parenting issues quickly. Also, the excitement revealed that parents will become more enthusiastic with the idea of using app to make sure that their parenting actions are giving the best possible results (as reflected from the post testing feedback) Sharma *et al*. (2017).

Taki *et al*. (2015) assessed the quality, comprehensibility, suitability, and readability of websites and apps on infant feeding by usage of a developed tool. They found that the majority of the websites and apps were rated poor quality.

The apps provided insufficient information and lacks credibility (Richardson *et al*. 2018). There are a lot of foreign parenting apps available that are meant for western parents who have a different climate, environment, genetic makeup, social conditions, physical facilities, etc. (Virani *et al*. 2019). These apps are of poor quality and are in English language only. These apps do not cater to the needs of Indian parents. There is a strong need for an app for Indian parenting conditions.

METHODOLOGY

Sample selection

To conduct a comprehensive analysis of infant parenting apps, a digital sample of 40 apps was selected for the study. These apps were chosen based on their availability for free download on the Google Play Store. The selection process involved several detailed steps to ensure a representative and diverse sample:

Search Criteria:

- Keywords related to infant parenting, such as infant health, infant nutrition were used to search the Google Play Store.

Inclusion Criteria:

- Only apps that were free to download were considered to ensure accessibility for all users.
- Apps specifically targeting parents of infants, providing information on infant health, nutrition, development, and general parenting tips, were included.

Exclusion Criteria:

- Paid apps or those requiring in-app purchases for essential features were excluded
- Apps that were not specifically focused on infant care or those targeting older children were not considered.
- Apps with very low ratings or insufficient user reviews were excluded to ensure a baseline level of quality.

App Download and Installation:

- The identified apps meeting the inclusion criteria were downloaded and installed on an Android phone.
- Each app was individually accessed to confirm its relevance to the study's objectives and to verify the initial impression based on the app description and user reviews.

Data analysis

Each app was used and individually assessed by the researcher for its content and quality on the various criteria by using self-structured schedule. The collected data were classified and tabulated to draw meaningful inferences as per the objectives of the study. For interpretation of results, following descriptive statistics were used: Frequency and percentage.

RESULT

Table 1: Availability of information on infant health

N=40

Health Aspects	Yes		No	
	F	%	F	%

Cold and cough remedies	09	22.5	31	77.5
Teeth problem	07	17.5	33	82.5
Child stomach problem	11	27.5	29	72.5
Food allergy	07	17.5	33	82.5
Skin problem	13	32.5	27	67.5
Child weight loss	12	30.0	28	70.0
Child immunity	11	27.5	29	72.5
Child yoga	04	10.0	36	90.0
Dadi home remedies	06	15.0	34	85.0
Reminds the pills	10	25.5	30	75.5
Vaccination tracker	15	37.5	25	62.5
Health Care Professionals	11	27.5	29	72.5
Daily doctor advice	11	27.5	29	72.5

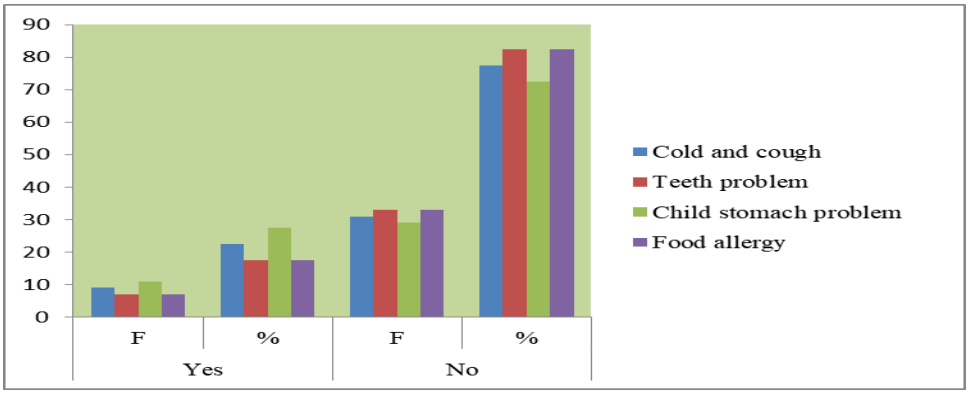

Fig.1 Health Aspects (Case 1)

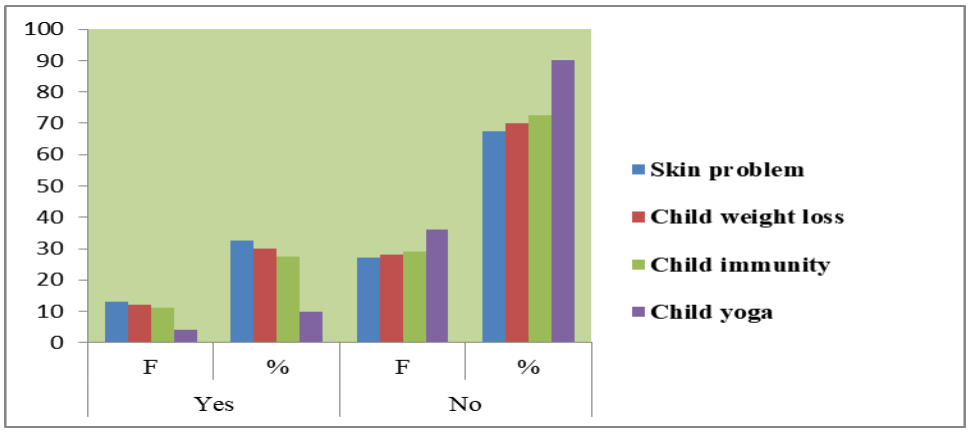

Fig.2 Health Aspects (Case 2)

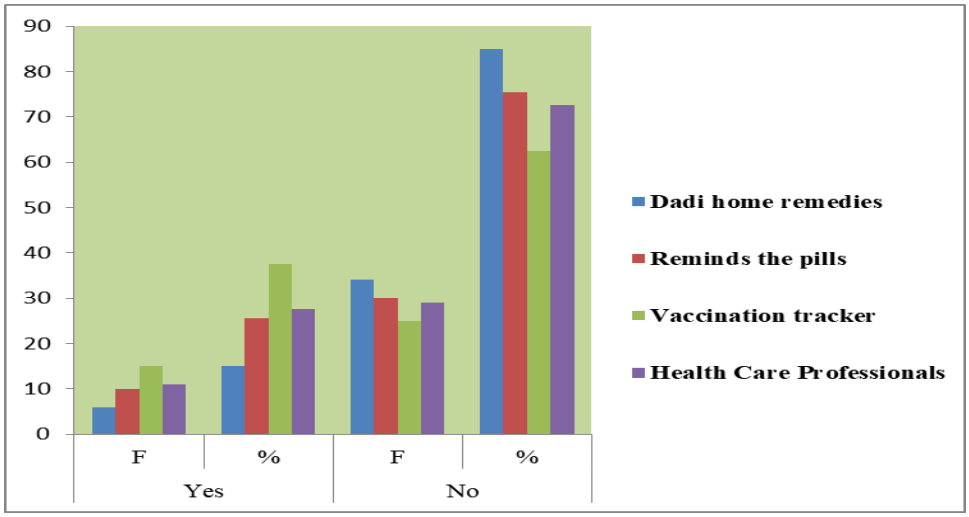

Fig.3 Health Aspects (Case 3)

Results of information regarding infant health have been depicted in Table 1. According to above results, most of the apps lacked information on the health aspects such as teeth problem (82.5%), food allergy (82.5%), child yoga (90.0%) and dadi home remedies (85.0%) while remaining of the apps provided such information. Three -fourth of the apps did not provide information on the aspects such as cold and cough remedies (77.5%), child stomach problem (72.5%), skin problem (67.5%), child weight loss (70.0%), child immunity (72.5%), reminds the pills (75.5%), vaccination tracker (62.5%), health Care professionals (72.5%) and daily doctor advice (72.5%). It is clearly visible that a small number of apps provided information on all of the health aspects.

Table 2: Availability of information on infant nutrition

N=40

Nutritional Aspects	**Yes**		**No**	
	F	**%**	**F**	**%**
Breastfeeding	32	80.0	08	20.0
Colostrum	08	20.0	32	80.0
Bottle feeding	19	47.5	21	52.5
Weaning	11	27.5	29	72.5
Nutrition information	23	57.5	17	42.5
Healthy food tips	19	47.5	21	52.5
Child diet plan	05	12.5	35	87.5
Recipe ideas	08	20.0	32	80.0

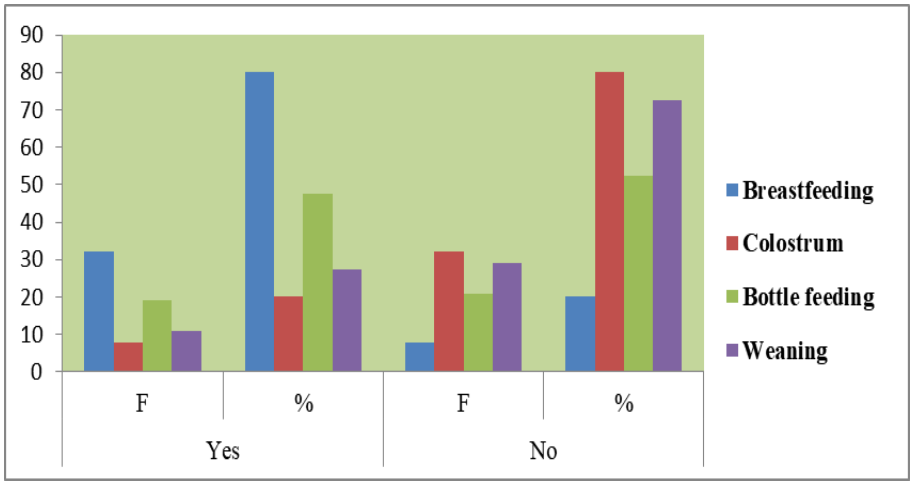

Fig.4 Nutritional Aspects (Case 1)

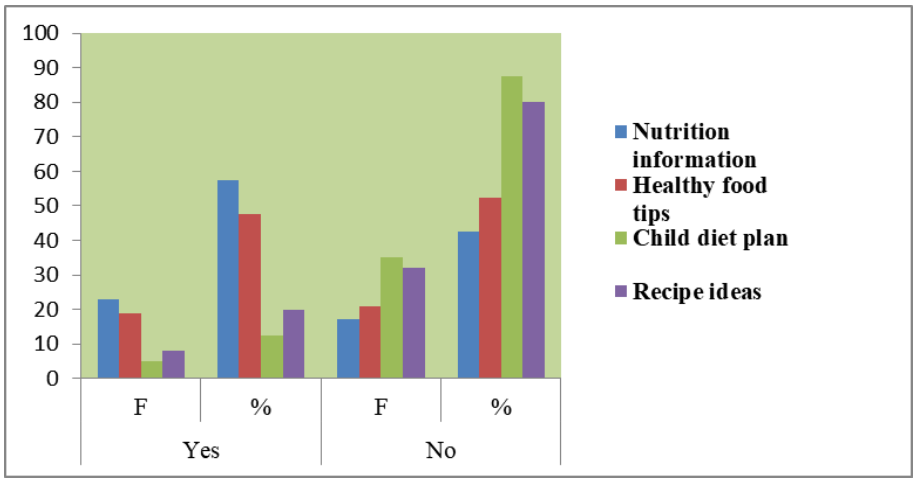

Fig.5 Nutritional Aspects (Case 2)

Results of information regarding infant nutrition have been portrayed in Table 2. As results illustrate that majority of the apps provided information on nutrition aspect of breastfeeding (80.0%) but at the same time they did not provide information on nutrition aspects such as child diet plan (87.5%), colostrum (80.0%), recipe ideas (80.0%), and weaning (72.5%), only few of the apps provided such information. Around half of the apps provided information on nutrition information (42.5%) and healthy food tips (52.5%) bottle feeding (52.5%) while rest of the apps did not provide information on these aspects.

DISCUSSION

A. Infant health

In present study it observed that majority of apps focused on infant health and nutrition has revealed a notable gap in the coverage of crucial health-related aspects. A majority of the apps evaluated in this study were found to provide insufficient information on key topics such as cold and cough remedies, teeth problems, child stomach problems, food

allergies, skin problems, child weight loss, child immunity, child yoga, dadi home remedies, pill reminders, vaccination tracking, access to healthcare professionals, daily doctor advice. This observation suggests that many current apps are not meeting the comprehensive informational needs of their intended users, primarily parents and caregivers seeking reliable guidance on infant health management. This finding aligns with previous research by Samanta *et al.* (2021), which identified a strong demand among mothers for information on essential health aspects including cold and cough remedies, teething, skin problems, vaccination schedules, and common digestive issues such as diarrhea, constipation, and gas. Moreover, insights from other researchers highlight persistent knowledge gaps among mothers concerning various health aspects affecting infants. Another studies by Elbur *et al*. (2015), Purani *et al*. (2015), and Srinivasa et *al*. (2018) underscored similar gaps in knowledge regarding skin care, teething issues, and other common health concerns. Ramawat and Goswami (2018) studied immunization, which was one of the most significant aspect of infant health care, found that lack of awareness 67 resulted in incomplete vaccination of infants.

B. Infant Nutrition

Evaluation of infant nutritional aspects revealed a significant disparity between the information provided and the informational needs expressed by mothers. While many apps offered some content on breastfeeding, it was often insufficient, particularly concerning crucial aspects such as colostrum, bottle feeding, nutrition information, healthy food tips, child diet plans, recipe ideas, and the weaning process. These findings highlight a clear discrepancy between the available digital resources and the comprehensive nutritional guidance desired by mothers. In previous research by Samanta *et al*. (2021), indicated that Indian mothers expressed a strong preference for information on breastfeeding and colostrum, emphasizing a cultural inclination against bottle feeding. Majority of the mothers said that information on various aspects of infant nutrition (i.e. colostrum, breastfeeding and weaning) except bottle feeding is very much needed. It can be inferred that Indian mothers do not want to bottle feed their children and hence, they were not interested in getting information on this aspect. However, they have some idea (but not sufficient knowledge) about the importance of the colostrum and breastfeeding and accordingly they seek knowledge on these aspects. These results are in line with findings of the other research studies which indicates that majority of mothers had some knowledge about health benefits of colostrum (Sohail *et al*., 2017 and Hussein *et al*., 2013) but breastfeeding knowledge was suboptimal among the rural

North Indian mothers (Berisha *et al*. (2017) found that mothers have good knowledge of complementary feeding while they did not have good practices regarding time for starting complementary feeding.

CONCLUSION

The findings of this unique analysis highlight that parenting apps has lack of relevant information for parents of infants regarding various aspects such as teeth problem, food allergy, child yoga, dadi home remedies, cold and cough remedies, child stomach problem, skin problem, child weight loss, child immunity, reminds the pills, vaccination tracker, health care professionals, and daily doctor advice, breastfeeding, child diet plan, colostrum, recipe ideas, weaning, nutrition information, healthy food tips, bottle feeding. The available apps provided insufficient information to parents for their infant health and nutrition. These apps also have lack of credibility. Additionally, the information was available only in English. These apps do not cater to the needs of Indian parents. The present research also indicated that there was a strong demand among Indian mothers for comprehensive information on infant health and nutritional aspects there is a strong need for an app for Indian parenting conditions.

Recommendations

- There is a strong need for an app for Indian parenting conditions.
- The Infant parenting app should provide information in multiple languages to make them useful for larger number of population.
- Infant parenting apps should provide credible information only and the source of information should be clearly mentioned. Infant parenting apps should be affiliated to some government institute.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of manuscripts. This explanation will include the name, version,

model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

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