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Bank for Tomorrow: Role of an Artificial Intelligence (AI) in Banking Sector

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ABSTRACT

The fast development of technology in all the fields around the world is taking place with help of Artificial Intelligence (AI). This study mainly attempted to assess how digitalization made the necessity to implement AI in the banking sector to handle their customers' complaints, queries, and so on without human intervention and/or along with human intervention. The main purpose of this study is to spread the usefulness of artificial intelligence to banks. This study is qualitative research based on secondary data. For this study, we have undergone a systematic search of relevant articles from Google Scholar, Web of Science, MEDLINE, and Scopus to identify and analysed. And also, some of the information gathered from different books, newspapers, and government statistics in different forms from various sources. The study results show that across banks, front-and middle-office AI technologies have the ultimate potential for cost savings. In order to stop fraud payments, detect them early, and enhance the procedures for Anti-Money Laundering (ALM) and KYC regulatory inspections, banks are also implementing AI in their middle-office operations. Banks are using AI to improve client identification and verification; simulate live personnel through chatbots and voice assistants; strengthen customer relationships; and offer individualized insights and suggestions. This study will be useful for understanding the many applications of artificial intelligence in banks. This paper will serve as a useful guide for banks and financial institutions in making optimal use of artificial intelligence.

Keywords: Artificial Intelligent (AI), Banks, Algorithmic Trading, Scam & Fraud Detection, Chatbots

INTRODUCTION

Artificial Intelligence (AI) is rapidly transforming the banking industry and shaping the future of financial services. With the help of machine learning algorithms and advanced computational power, AI is helping banks automate routine tasks, improve customer experience, and make better decisions[28]. The advancements in AI technology and its applications in the banking sector have created a wealth of opportunities for innovation and improvement. The integration of AI in the banking industry has the potential to revolutionize financial services by improving the speed and accuracy of transactions, reducing the risk of fraud, and providing more personalized services to customers. As technology continues to evolve, it is likely that AI will play an increasingly important role in shaping the future of the banking industry[14]. This study aims to provide valuable insights into the opportunities and challenges associated with the integration of AI in the banking sector and help banks understand how to fully leverage the benefits of this technology[22]. By exploring the role of AI in the banking sector, the study will contribute to the development of a roadmap for the Bank for Tomorrow.

Objectives of the Study

1. To study the development stages and current state of AI adoption in the banking sector.

2. To analyse the effect of AI on the workforce in the banking sector and the precautions taken to mitigate its impact on employees.

3. To assess the role of partnerships between banks and AI companies in driving the development and implementation of ai solutions in the banking sector.

4. To study the Advantages, Benefits, Constraints and Disadvantages ofan artificial intelligence (AI) in banking sector.

Related Works

Sl. No.	Key Words	Focus	Outcome	Authors Name
1	Artificial Intelligence (AI)	Artificial Intelligence (AI) refers to the ability of computer systems to perform tasks that typically require human intelligence, such as perception, reasoning, learning, and decision-making. AI systems use algorithms and statistical models to learn from data and improve their performance over time.	Enhanced safety and security: AI can be used to monitor and predict potential safety risks in various settings, such as detecting cyber threats or identifying potential criminal activities. For example, AI has been used to detect fraudulent financial transactions and improve airport security.	Kshetri, N., (2017) [17]
2	Artificial Intelligence (AI) in Banking	The potential benefits of using AI in banking, such as increased efficiency, improved customer service, and enhanced risk management. The article emphasizes the importance of further research and development to ensure that AI is utilized in a responsible and ethical way in the banking industry.	The study highlights that, the collaboration between banks, regulators, and technology companies could be a potential solution to ensure that AI is used effectively and responsibly. In summary, the article underscores the need for a collaborative effort to ensure that AI is used responsibly in the banking sector.	Kaya *et al.* (2019) [15]
3	Fraud Detection	The study provides a detailed overview of various AI techniques and algorithms, such as decision trees, neural networks, and support vector machines, that can be used for fraud detection, credit management, and document processing.	AI in the banking industry has the potential to improve the efficiency and accuracy of fraud detection and credit management processes, as well as the processing of large volumes of documents and also reduce the risk of human error and help banks to make more informed decisions based on data analysis.	Alhaddad, M.M. (2018) [4]

4	Artificial Intelligence and Credit Management	AI in credit analysis, such as the ability to process large volumes of data, identify patterns and trends, and make more accurate and consistent decisions.	The AI will help banks to analyse and evaluate credit risk in a more systematic and comprehensive manner, leading to better decision-making and improved overall performance.	Sadok, *et al.* (2022) [26]
5	Drivers of AI adoption in banking	The most important drivers of AI adoption in banking were techno-logical factors including perceived usefulness, perceived ease of use, and compatibility with ex-isting systems, followed by organizational factors including factors such as top management support and perceived benefits to the organization, while environmental factors included factors such as competitive pressures and regulatory requirements.	The study also found that the perceived risk associated with AI adoption was a signifi-cant barrier to adop-tion, as was the lack of knowledge and skills among employees. The study suggests that banks should focus on addressing these barri-ers and promoting the benefits of AI adoption in order to fully realize the potential of this technology.	Thow-feek *et al.* (2020)[34]
6	Integra-tion of AI workforce Performance	The main intention of this study is to evalu-ate the performance of the workforce in terms of their competencies, capabilities, satisfaction, motivation, and other relevant factors and how this AI affects overall performance by consider-ing multiple dimensions of performance, including those related to moti-vation, satisfaction, and other aspects of worker competencies.	The study found that the integration of AI had a positive impact on the competencies and capabilities of the workforce, as well as their job satisfaction and motivation. They also found that the im-pact of AI on workforce performance was medi-ated by factors such as organizational culture and the availability of resources and support.	Mamela *et al.* (2020)[21]

| 7 | Combating Cyber Threats in Banks | Due to the rapid advancements in information technology, cyber-criminals are leveraging various digital spaces to carry out cyber-crime and cyber threats. In order to combat these risks, the banking and financial industry is adopting artificial intelligence as a solution. The implementation of AI techniques provides several opportunities for the banking sector to enhance its prosperity and achieve growth. | The study results show that, Robo-advice is a computerized platform that is managed by AI. The use of Artificial Intelligence is also crucial in safeguarding personal information. Through the development of proper AI-based designs, the banking industry can detect fraudulent activities in transactions, and AI is closely associated with the field of cyber-security. | Soni, V.D. (2019) [30] |
| 8 | AI for banking and E-commerce Application | The integration of cloud computing and AI technologies in banking and e-commerce applications has the potential to drive innovation and create new opportunities for businesses. However, careful consideration of the potential risks and challenges is crucial to ensure the success and sustainability of these initiatives. | The findings of this study indicate that cloud computing and AI have the potential to transform banking and e-commerce applications by providing scalable, secure, and cost-effective solutions. The benefits of cloud computing include increased flexibility, agility, and reduced operational costs. AI technologies such as machine learning and natural language processing can be used to enhance fraud detection, customer service, and personalized recommendations. | Xue *et al.*[38] |

9	Banks and Digitalisa-tions	Digitalization is a key driver of change in the banking industry. This study is to identify the key trends and drivers of digitalization in the banking industry and to evaluate the strategies and initiatives that banks are adopting to stay competitive in this rapidly evolving landscape.	The study indicate that digitalization has significant implications for the banking industry, including changes in customer behavior and expectations, the emergence of new business models and competitors, and the need for banks to invest in new technologies and capabilities.	Van der zande, J. (2018)[36]
10	Banks Banking on AI	AI is becoming increasingly important for banks as they seek to stay competitive and meet the evolving needs and expectations of customers. The findings of the study provide valuable insights for banks and other financial institutions seeking to leverage the potential of AI to drive innovation and create new opportunities for growth. This study is identifying the key trends and drivers of AI adoption in the banking industry and to evaluate the strategies and initiatives that banks are adopting to leverage the potential of AI to improve efficiency, reduce costs, and enhance customer experience.	The study indicates that the key benefit of AI for banks is the potential to improve operational efficiency and reduce costs by automating repetitive and time-consuming tasks, such as data entry and document processing. AI can also be used to enhance customer experience by providing personalized recommendations and targeted marketing, as well as improving fraud detection and risk management.	Singh, K. (2020) [27]

Methodology of the Study

This study employs a qualitative research approach utilizing secondary data. A comprehensive search of relevant articles was conducted on platforms such as Google Scholar, Web of Science, MEDLINE, and Scopus to gather and analyse information. Additionally, information was obtained from

various sources including books, newspapers, and government statistics.

The Development Stages and Current State of AI adoption in the Banking Sector

Artificial Intelligence (AI) has been gaining a lot of traction in recent years, and the banking sector is no exception. The development of AI in the banking sector has gone through several stages, and each stage has brought its own set of importance.

The development stages of AI adoption in the banking sector in India are

1. Early Adoption stage: The first stage of AI adoption in the banking sector was characterized by a few visionary banks experimenting with the technology[15]. These early adopters mainly used AI to automate routine tasks in back-end operations, such as account reconciliation and fraud detection. The goal was to improve efficiency and reduce costs by freeing up employees from these routine tasks[10].

2. Expanded Adoption stage: As the benefits of AI became more apparent, more banks started to adopt the technology and use it in other areas of their operations. Banks began to use AI for customer service, for example, by creating chatbots[12] and voice assistants to handle customer inquiries and complaints. They also started to use AI for risk management, such as to improve anti-money laundering (AML) and know-your-customer (KYC) processes. This stage was characterized by a growing interest in AI and a desire to explore its potential in different areas of the banking industry[29].

3. Widespread Adoption stage: Today, the use of AI in the banking sector is more widespread, with many banks using the technology to improve efficiency and reduce costs[24] improve

customer service, and to manage risk. However, the level of AI adoption varies greatly among banks, with some banks still in the early stages of adopting the technology and others using AI on a larger scale. This stage is characterized by a more mature approach to AI, with banks taking a strategic view of the technology and considering how it can be used to achieve their long-term goals[32]. The development of AI in the banking sector has been driven by several factors, including advancements in technology, the need for improved efficiency, and the increasing amount of available data. The Centre of Excellence in Analytics at IDRBT[2] has been instrumental in advancing AI, ML, and data science in the banking sector since 2005. The center focuses on advanced research, training, teaching, and developing proof-of-concepts to guide Indian banks in using AI for various applications. These include customer segmentation, non-performing asset prediction, credit scoring, market basket analysis, fraud detection, sentiment analysis, credit recovery analytics, and big data analytics. Over 1,000 executives from both IT and business departments of public and private sector banks have received training in these areas through customized programs that emphasize hands-on experience with commercial and open-source tools. This work has been acknowledged by the Government of India. Banks that embrace AI and invest in the necessary skills and resources will be best positioned to succeed in the digital age.

The current State of AI in banking Sector in India is: The current state of AI adoption in the banking sector is characterized by a growing trend toward the implementation of AI technologies in various areas of bank operations. In recent years, advances in technology have made AI more accessible and affordable for banks, leading to a significant increase in its adoption across the sector.

> ➢ **Customer service:** Many banks are using chatbots and virtual assistants to provide customers with fast,

personalized service, reducing the need for human interaction and improving the customer experience. These AI-powered tools are able to respond to customer inquiries and provide information on a range of topics, from account balances to loan applications[19].

➢ **Fight against fraud:** By analysing large amounts of data, AI algorithms can detect patterns and anomalies that may indicate fraudulent activity. This has the potential to significantly reduce the risk of financial losses and improve the security of customer accounts[35].

➢ **Improve risk management:**AI algorithms can be used to analyse large amounts of data to identify potential risks and provide valuable insights into financial operations. This can help banks to make better-informed decisions and reduce their exposure to risk[9].

➢ **Regulatory compliance**s: can include rules and regulations related to data privacy, data security, and fair treatment of customers, among others. As non-compliance can result in significant fines and damage to a bank's reputation[6].

However, this trend is also accompanied by challenges, including the need for investment and the need to ensure that AI systems are transparent and trustworthy. Despite these challenges, the benefits of AI adoption in the banking sector are likely to continue to drive its growth in the coming years.

The impact of AI on the workforce in the banking sector and the precautions taken to mitigate its impact on employees

The integration of AI has had an impact on the workforce, with both positive and negative implications. In this essay, we will examine the impact of AI on the workforce in the banking sector, including the potential for job displacement and the need for reskilling.

- ➢ **Job Displacement:** One of the most significant impacts of AI on the workforce in the banking sector is job displacement. As AI algorithms and robots become more advanced, they are capable of performing tasks that were previously performed by human workers. This includes tasks such as data entry, customer service, and fraud detection. While this increased automation leads to increased efficiency, it also means that some jobs will no longer be necessary, resulting in job displacement for some workers[8].

- ➢ **Reskilling:** Despite the potential for job displacement, the integration of AI in the banking sector also presents an opportunity for workers to reskill and upskill. As AI algorithms take over certain tasks, workers will need to develop new skills to remain competitive in the job market. This includes learning how to work with AI systems, data analysis, and other relevant technical skills. By reskilling, workers can ensure that they remain relevant in the ever-evolving job market and continue to contribute to the growth of the industry[21].

Measures to take to avoid negative impact AI on the workforce

Upskilling and Reskilling: Banks and financial institutions can invest in the training and development of their employees to equip them with the necessary skills to work with AI systems. This will help them to stay relevant and competitive in the job market.

- ➢ **Collaboration between Humans and AI:** Instead of completely replacing human workers with AI systems, banks can look for ways to integrate AI and humans to create a complementary relationship. This way, the strengths of both can be leveraged to achieve optimal results[8;20].

➢ **Job Redesign:** Banks can redesign jobs to make the most of the new opportunities created by AI. For example, employees who used to perform repetitive tasks can be given new responsibilities that leverage their knowledge and skills[5].

➢ **Ethical Considerations:** Banks and financial institutions must consider the ethical implications of AI on the workforce, such as job displacement, income inequality, and labour rights. They can take measures to ensure that the impact of AI on the workforce is positive and equitable[13].

➢ **Stakeholder Engagement:** Banks should engage with their employees, trade unions, and other stakeholders to understand their concerns and work towards addressing them. This will help to foster a culture of trust and collaboration between employees and AI systems[16].

By taking these measures, banks and financial institutions can ensure that the impact of AI on the workforce is positive and that employees are equipped to thrive in a rapidly changing technological environment.

The role of partnerships between banks and AI companies in driving the development and implementation of AI solutions in the Banking Sector

The banks and AI companies can help to drive the development and implementation of AI solutions, leading to improved customer experiences and increased competitiveness for banks that are:

➢ **Joint Efforts:** Collaboration between banks and AI companies allows them to leverage each other's strengths and resources, leading to the development of innovative AI solutions.

➢ **Sharing of Expertise**: By partnering with AI companies, banks have access to cutting-edge AI technology and

the expertise of AI professionals, enabling them to implement AI in a more effective manner[25].

➤ **Cost Efficiency:** Through partnerships, banks can lower the costs associated with the development and implementation of AI solutions by sharing the burden with AI companies.

➤ **Improved User Experience:** Banks can enhance their customer experience through the implementation of AI solutions developed in partnership with AI companies[11].

➤ **Enhanced Data Management:** Banks can benefit from AI companies' expertise in data management, enabling them to make the best use of their data for decision making.

➤ **Risk Management:** AI companies can provide valuable insights and expertise in risk management, which can be crucial for banks in managing the risks associated with AI implementation.

➤ **Faster Deployment:** By partnering with AI companies, banks can speed up the deployment of AI solutions, reducing time to market and delivering benefits to customers more quickly[23].

➤ **Compliance with Regulations:** AI companies can provide banks with the necessary tools and expertise to ensure that AI solutions are compliant with regulatory requirements.

➤ **Customer Insights**: By leveraging the data analysis capabilities of AI companies, banks can gain valuable insights into customer behavior, enabling them to deliver more personalized services.

➤ **Continuous Innovation:** Through ongoing partnerships with AI companies, banks can continue to develop and implement new AI solutions, ensuring that they stay ahead of the curve and remain competitive[31].

ABCD Listing

Advantages, Benefits, Constraints, and Disadvantages (ABCD) listing is a method used to evaluate and assess a particular situation, industry, market, or opportunity. This analysis provides a comprehensive understanding of the opportunities and challenges associated with a particular situation. The advantages are the positive aspects or strengths of the AI in banking, Benefits is the outcomes or results that are expected to be gained from the situation, Constraints is nothing but, the obstacles, limitations, or challenges that need to be overcome and Disadvantages is the negative aspects or weaknesses of the company[3].

Advantages	❖ AI can automate repetitive tasks, freeing up bank staff to focus on more value-added activities, leading to increased efficiency.
	❖ AI-powered chatbots and virtual assistants can provide quick and personalized responses to customer inquiries, improving customer experience.
	❖ AI algorithms can help banks detect fraudulent transactions in real time, reducing the risk of financial losses and improving fraud detection and prevention.
	❖ AI can analyse large amounts of data and identify potential risks, improving risk management for banks.
Benefits	❖ Improved customer satisfaction due to faster and more personalized responses to inquiries.
	❖ Increased efficiency through automation of repetitive tasks.
	❖ Improved decision-making through analysis of large amounts of data.
	❖ Reduced risk of financial losses through improved fraud detection and prevention.

Constraints	❖ Implementing AI systems can be expensive and requires investment in technology and personnel.
	❖ The use of AI in banking raises privacy concerns as large amounts of personal data are collected and processed.
	❖ AI in banking is subject to regulatory oversight, which can create additional hurdles for banks.
	❖ Implementing AI systems can be technically challenging, requiring specialized skills and knowledge.
Disadvantages	❖ Resistance to change from employees and customers can make adoption of AI difficult.
	❖ Integrating AI systems into existing banking systems can be a complex and time-consuming process.
	❖ Ensuring that the data used by AI systems is accurate and up-to-date can be a challenge.
	❖ Banks need to consider the ethical implications of AI, such as ensuring that AI systems are not biased or discriminatory.

By conducting an ABCD listing, banks can identify the opportunities and challenges associated with a particular situation, and make informed decisions. This analysis can be used to support decision-making in a variety of areas, including market analysis, product development, strategy development, and risk management.

Findings and Discussions of the study

1. AI has a high potential for reducing costs in banks worth USD 447 billion by 2023[1].

2. Banks are adopting AI in order to simplify client verification, replace human staff with chatbots and voice assistants, improve customer relationships, and provide personalized recommendations.

3. To combat payment fraud and improve anti-money laundering practices, banks are using AI to know-your-customer checks required by regulations.

4. According to a report by Accenture, AI could increase profitability for Indian banks by an average of 38%, it could lead to the automation of up to by 20% of jobs by 2035. This report also predicts that AI could reduce operational costs for Indian banks by up to 35% by automating many routine tasks as well as net gain of up to 5%[33].

5. A recent report published by the Federation of Indian Chambers of Commerce & Industry (FICCI) in collaboration with Price Waterhouse coopers (PWC) finds that more than 55% of the financial organisations strongly agree that AI will give them a competitive edge over their peers in 2022[1].

6. According to a report by NASSCOM, the AI market in India's financial services sector is expected to grow at a compound annual growth rate (CAGR) of over 30% between 2020 and 2025[7].

7. A study by KPMG India found that AI is already being used in various areas of banking in India, including fraud detection, loan underwriting, and customer service[18].

8. AI could lead to the upskilling of the existing workforce in the banking sector in India, with employees having to acquire new skills to work with AI-powered systems.

9. A study by National Business Research Institute and Narrative Science, about 32% of financial service providers in India are already using AI technologies such as predictive analytics and voice recognition[37].

10. The creation of new job roles in the banking sector in India, such as AI engineers, data scientists, and robotics specialists.

CONCLUSION

AI will play an increasingly important role in the banking sector, and banks that embrace this technology and invest in the necessary skills and resources will be best positioned to succeed in the digital age. In conclusion, the development and

current state of AI adoption in the banking sector highlight the significant opportunities and challenges associated with the integration of AI in financial services. It is important for banks to carefully consider their approach to AI and to invest in the necessary skills and resources to fully leverage its potential and ensure its responsible and ethical use.

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Computerized Structured Complementary Feeding Instructions on Knowledge of Mothers of Infant and Effects on Morbidity Status of Infants

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ABSTRACT

Complementary feeding (CF) to infants is an advancement of steadily familiarizing semi-liquid to semi-solid foods along with mom's milk at the end of 6 months. The objectives were to assess the demographic variables of infants and mothers of infant, to assess the infant's morbidity status. Methodology: Quantitative approach were used to evaluate the experimental and control groups. The design used in this study was Pretest post-test control group. Sample of 500 mothers and mothers of infant included who satisfying the inclusion criteria chosen by simple Random sampling. Obtained written consent from each participant before collecting the data and confidentiality of data were maintained. The collected data were analyzed by descriptive, inferential statistics. Results: Experimental Group mean SD 27.3±1.57, SE-0.83, Control Group mean SD 16.4±2.62, SE-0.52, Effect size 0.7, t value-1.95, Cohen's 'd' 5.20,. At the end of 12 months among experimental group infants had no illness 97 (41%) were as in control group majority of infants 137 (59%) had illness in which 48 (35%) had exhibited minor illness, 63 (46%) had exhibited moderate illness and 26 (19%) infant's exhibited severe illness. It showed that experimental group infant's exhibited lesser illness compared to control group infants. Conclusion: A further counseling session, health education on complementary feeding were arranged for both the groups of participant mothers who belongs to moderate and inadequate knowledge score in post-test.

Keywords: Computerized Instructions, Structured Complementary feeding, Knowledge, Morbidity status of infant, Mothers of infant

INTRODUCTION

Complementary feeding is a process of gradually introducing semi-liquid to semi-solid foods along with breast milk at the completion of 6 months till 2 years[1].

"Complementary feeding to infants' is the process of starting when breast milk alone is no longer sufficient to meet the nutritional requirements of an infant's. It should be initiated at the completion of 6 months and it should be age-appropriate feeding as follows, semi liquid, liquid, liquid, semi-solid, solid and soft foods along with breast feeding[2].

The transition of food pattern will enhance the children growth, which triples the birth weight by the end of the one year[3].

Morbidity is defined as unhealthy physical and mental state of the infant. The first two years of childhood period is very crucial and more prone to infection and illnesses. Common childhood illnesses like fever, respiratory illness, vomiting, diarrhea, dysentery, constipation, worm infestations are having very poor prognosis when the child is with Malnutrition[4].

Every 6 seconds 1 infant is dying by malnutrition. The infant mortality rate of the world-according to the United Nations 42.09 and as per Word bank is 49.4. In 2015, 4.5 million (75%) of all under-five deaths occurred within the first year of life[6].

World Health Organization reports that mal-nourished children are the important aspect and suffers largely from infection and die from common childhood sicknesses than nourished young children[7].

The UN estimates that 2.1 million Indian children die before reaching the age of 5 year. Four children die every minute due to preventable illnesses such as diarrhea, typhoid, malaria, measles and pneumonia. Every day 1,000 Indian children die because of diarrhea alone. According to UNICEF worldwide

statistics (2018), only two fifths of infants' of 0-6 month's age are breastfed exclusively. Only around two thirds are introduced to solid foods in a timely manner. Global Infant mortality rate is 13 deaths / 1000 live births[13],[14].

This study is an educational intervention trial on complementary feeding to enhance the mothers' knowledge, which influence the infants' morbidity outcome in a chosen settings.

Research Questions

1. Developed knowledge assessment tool on complementary feeding is valid and reliable for the target population?

2. Developed Structured complementary feeding instructions will prove as an effective interventional instrument?

3. Does educational intervention on Complementary feeding may decline the morbidity rate of an infant and improve the level of mothers' knowledge?

Objectives

1. To assess the pre and posttest knowledge on complementary feeding among mothers of infants.

2. To assess the pretest and posttest levels of morbidity status of infant on complementary feeding.

3. To find out the correlation between the knowledge of mothers of infant with morbidity status of infant.

Operational Definition

1. Structured Complementary Feeding:

It refers to the instruction systematically planned and organized feeding such as exclusive breast feeding, maintenance of breast feeding, introduction of complementary feeding, responsive

feeding, safe preparation and storage , amount of food consistency, meal frequency and energy requirements, food consistency ,nutrients and use of vitamin-mineral supplements for infant, feeding during and after illness, maternal health-food pattern of mother during feeding which will be given as instruction with the help of computer to the mothers' of infant.

2. Level of Knowledge

It refers to the relevant information of mothers' of infant regarding complementary feeding which will be evaluated through structured questionnaire, Correct responses of mothers' are further classified into adequate(≥76%)moderate (51-75%) and inadequate(≤50%),experts certified.

3. Mothers' of infant

Mothers' who were eligible and willing to participate and who understands Tamil in the age group of 21-50 years & having infant 3-12 months attending well baby clinic for infant immunization and plan to have all immunization at a Selected Tertiary Care Hospital.

4. Morbidity status

Morbidity refers to describe how often a disease occurs among infants'. Which includes—

1. Food allergy
2. Loose motion
3. Bloody loose motion
4. Respiratory infection
5. Fever
6. Worm infestation
7. Any other health problems

REVIEW OF LITERATURE

"A study by Swati Kambli, have conducted a study on Mothers knowledge on weaning process in infants,50 mothers of infants aged 6 to 12 months, pediatric department by using Quasi experimental explorative research with Purposive sampling technique,the study results shows that 42% mothers poor knowledge, 38% average knowledge and 20% good knowledge. The author has concluded that update the mothers about the existing or current recommendations through education to reduce the mortality and morbidity of infants"[12].

"A study by sasikavitha., have conducted a study on Study of Complementary feeding practices, 50 mothers of infants aged 6 to 12 months, hospital setting, Salem by using Cross sectional study with simple random sampling technique, The study results shows that 62% mothers introduced complementary foods before 5 months, while 36 % introduced at 6 months, The author has concluded that Education & counseling of mothers about complementary feeding will enhance a timely complementary feeding"[11].

"A study by Riyad A, have conducted a study on Factors associated with the early introduction of complementary feeding, 632 mothers of infants 3- 12 months attending PHC In Saudi Arabia. The study results shows that 62.7% of study infants received early initiation of complementary feeding before 17 weeks by using Questionnaire method simple random method, The author have concluded that Public health educational interventions are needed to reduce early complementary feeding"[9].

A study was conducted on Infant at the Age of 6 Months in relation to Feeding Practices, Iron Status, and Growth in a Peri-Urban Community of South Africa concluded that Prevalence of anemia and stunting for the infants were 36.4% and 28.5%, respectively. Multiple regression analysis showed that birth

weight was related to combined psychomotor scores as well as parent rating scores 'Length-for-age z-scores were associated with combined psychomotor scores (β = -1.419 (-2.466, 0.373), p = 0.008), as well as parent rating scores (β = -0.747 (-1.483, -0.010), p = 0.047) "[10].

Methods

Research approach

Quantitative, Evaluative approach was chosen for this study.

Research design

Pretest-posttest control group design was suitable for this study.

Research setting

This research study was well planned and conducted at Selected Hospital in Tamil Nadu, India.

Sample and sample size

Infants and mothers of infants the age group from 3 to 12 months and who consistently satisfy the selected inclusion criteria were recruited for this study. Power analysis Formula $N = p$ $(1 - p)$ $(Z / E)2$, sample size of 500 infants and mothers of infants, out of which 250 in to study group and 250 in to control group. Simple random sampling technique was used to recruited the participants.

Sample criteria for infants and mothers:

Inclusion criteria

The study recruits the infants, who were—

- ➢ aged from 3 - 5 months,
- ➢ one or the other exclusively breast feeding or incompletely breast feeding however not started complementary feeding,
- ➢ term /appropriate to gestational age,
- ➢ age from 3months to 1year,
- ➢ Presenting in the pediatric outpatient department.

The study includes mothers of infants who were—

- ➢ Can read, write and understand Tamil or English.

Exclusion criteria

The study excludes infants, who were—

- ➢ critically ill,
- ➢ having mal absorption syndrome,
- ➢ known genetic anomaly,
- ➢ neurological disorder.

The study excludes mothers of infant who were—

- ➢ having adequate knowledge pretest score (≥76%),
- ➢ fails to give consent for any reason, sick.

Data Collection Procedure

Pre tested structured questionnaire was used to assess the variables and the level of mother's knowledge and morbidity status of infants on complementary feeding on scheduled timings. Data was collected after written consent from each participant. Anonymity, freedom to withdraw from the study at any time during the study and confidentiality were maintained[8].

RESULTS

Mothers' of infant in the group I had a higher Knowledge score, mean and SD 27.3±1.57, SE-0.83, Cohen's'd' 5.20, Effect size 0.7 compared to group II score, mean and SD 16.4±2.62, SE-0.52, t value-1.95, Cohen's'd' 0.50, Effect size 0.1.

Morbidity status of infant's in group I and group II at 9 months were:131 (53%), 41 (18%) infant's had no illness were as 114 (45%), 193 (82%) infant's had illness in which 65 (27%), 110 (47%) belongs to minor illness, 43 (18%), 61 (26%) had exhibited moderate illness and 6 (2%), 22 (9%) infant's with severe illness respectively. Morbidity status of infant's in group I and group II at 12 months were: 224 (91%) 16 (7%) infant's had no illness were as 21 (9.0%), 218 (93%) infant's had illness in which 15 (6%), 86 (37%) had exhibited minor illness, 6 (3%), 89 (38%) had exhibited moderate illness and 0 (0%), 43 (18%) infant's with severe illness. Group I infants had a lesser morbidity score than the Group II infants respectively.

The study findings shows that the morbidity status of infant was analyzed at 9 months among group I the majority of infant's 131 (53%) had no illness (Fig. 1) were as 114 (47%) of infant's had illness (Fig. 6.7) in which 65 (27%) had exhibited minor illness, 43 (18%) had exhibited moderate illness and 6 (2%) infant's with severe illness.
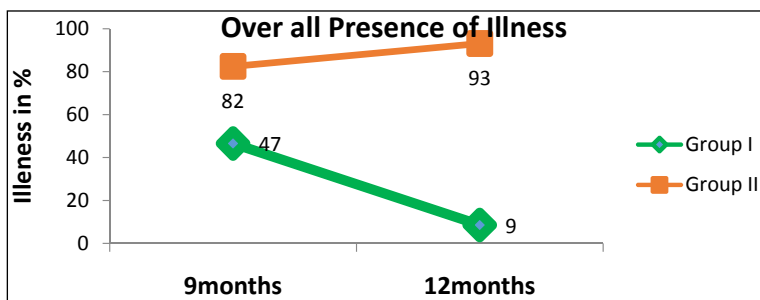
Fig. 1: Change in illness of infants at different time points
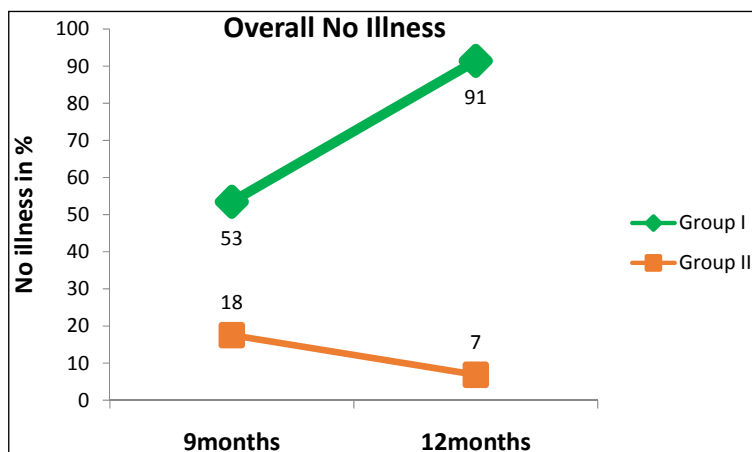
Fig. 2: Changes in no illness at different time points
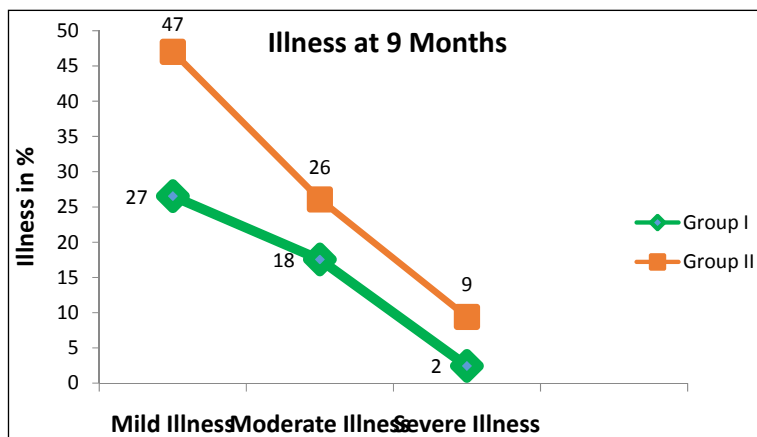
Fig. 3: Status of infant morbidity at 9 months

Morbidity status of infant's in group I and group II at 9 months were: 131 (53%), 41 (18%) infant's had no illness were as 114 (45%), 193 (82%) infant's had illness in which 65 (27%), 110 (47%) belongs to minor illness, 43 (18%), 61 (26%) had exhibited moderate illness and 6 (2%), 22 (9%) infant's with severe illness, it is clearly denoted in Fig. 3.

Morbidity Status of Infant's at 12 Months

Morbidity status of infant's in group I and group II at 12 months were: 224 (91%) 16 (7%) infant's had no illness were as 21 (9.0%), 218 (93%) infant's had illness in which 15 (6%), 86 (37%) had exhibited minor illness, 6 (4%), 89 (38%) had exhibited moderate illness and 0 (0%), 43 (18%) infant's with severe illness. Group I infants had a lesser morbidity score than the Group II infants, it is represented in Fig. 4.
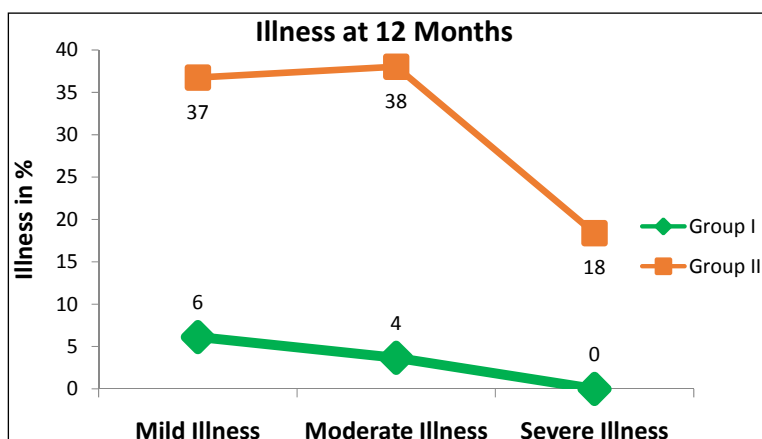
Fig. 4: Status of infant morbidity at 12 months

The decrease in morbidity from the both the groups followed a linear model (Fig. 4). The curve fit analysis shows 10.3 fold illness reduction by efficacy of educational intervention is achieved in group I.

Fig. 5 and 6 shows Correlation between Knowledge of Mothers and Morbidity Status of Infant in Group I and II. Comparison the scores of mothers knowledge on complementary feeding and morbidity status of infants in Group I and II respectively, $r = -0.427$, $r = -0.139$. It's clearly stating that improvement in Group I compared to Group II.
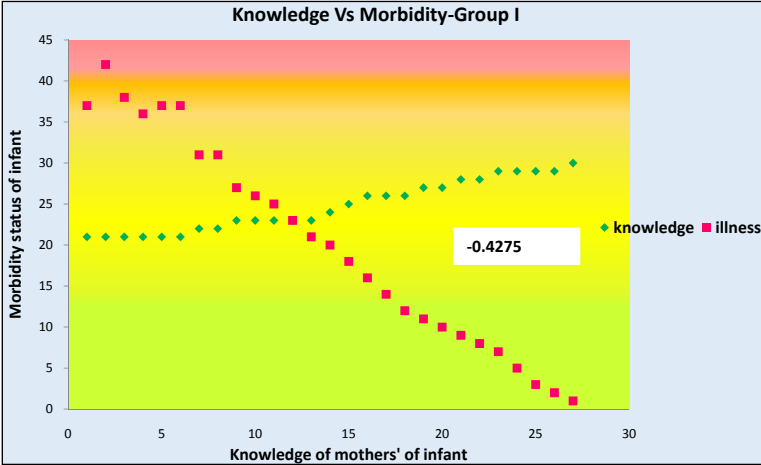
Fig. 5: Correlation between Knowledge of Mothers and Morbidity Status of Infant's in Group 1
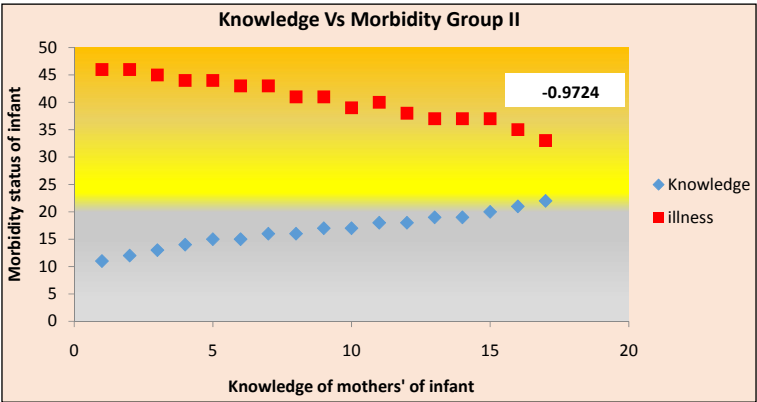
Fig. 6: Correlation between Knowledge of Mothers and Morbidity Status of Infant's in Group II

SUMMARY

This study showed that the educational intervention i.e. SCFI is effective at increasing the complementary feeding

knowledge among mothers' of infant in the target population. The knowledge improvement in the intervention group was 21.7% higher than the control group (p<0.0001), illustrating the educational intervention effectiveness in increasing knowledge on complementary feeding. Mothers' of infant who pass through the intervention achieved good nutritional status for the infants'. The improvements in mothers' knowledge on complementary feeding correlated with the anthropometric and morbidity outcome, supporting that the intervention is an effective tool to cope up with the knowledge required for effective complementary feeding techniques.

CONCLUSION

This study results shows that educational intervention on structured complementary feeding instructions is essential to improve the mothers knowledge, self-confidence and hygienic practices. Mothers' knowledge definitely influencing by reducing the morbidity status of infant's. The study concludes that knowledge of mothers' of infant on Complementary feeding is a peculiar cardinal factor for the growth, reduction of morbidity and mortality especially during the stage of infancy.

Recommendations

1. A study can be conducted to assess the role of the care givers in the complementary feeding.

2. A study can be conducted in different settings such as the rural and urban area to identify the complementary feeding practices

3. A study can be conducted to compare between both genders.

4. A longitudinal study can be carried out

5. A qualitative time series study may be carried out.

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