

Assessing the Impact of Multimedia-Based Nutrition Education Interventions for Cancer Patients

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Abstract

Cancer-related malnutrition is a major challenge. It effects treatment outcomes, quality of life, and survival among patients with cancer. Traditional nutrition counselling was a constrained in Covid 19 duration due to the limited healthcare resources, geographical barriers, and restricted follow-up visits. Recent advances in multimedia technologies including mobile health applications, multimedia nutrition platforms, web-based educational programs, video-assisted counselling, and digital caregiver support systems have transformed the delivery of nutritional care in oncology. This study synthesizes on the role of multimedia-based interventions in improving nutritional behaviour among cancer patients. Recent studies suggests that multimedia interventions enhance dietary adherence, symptom monitoring, and access to nutrition services. Telehealth-based nutritional counselling has expanded access to specialized care, particularly in rural and resource-constrained settings in covid 19. Future research should focus on culturally adapted, scalable, and evidence-based multimedia nutrition interventions integrated within routine oncology care.

Keywords: Cancer nutrition, multimedia interventions, multimedia nutrition method, oncology nutrition, e-content, digital health, nutritional counselling.

Introduction:

Cancer remains one of the leading causes of morbidity and mortality worldwide. While remarkable researches are dedicated to novel immunotherapies, precise surgical techniques, and complex chemotherapy regimens, an essential pillar of patient survival and quality of life is often under-addressed in daily clinical practice the nutritional status. 30-80% of cancer patients suffering from malnutrition due to the tumour type, stages and toxicity of treatment.

The Covid-19 pandemic brought the world to a standstill, presenting unprecedented challenges across all sectors particularly healthcare, which remains a fundamental aspect of human life. Initially all over the world governments implemented small scale telecommunication system to facilitate official, and public health updates, following this, communication channels expanded to connect patients directly with healthcare providers. This shift accelerated the global adoption of digital health technologies, enhancing broad scale communication. A multifaceted approach emerged in healthcare system utilizing mobile applications,

telemedicine consultations, online education modules, video based counselling and interactive caregiver support systems. These digital tools were instrumental in supporting and regulating healthcare delivery, ensuring vital services reached even in remote areas. Cancer related malnutrition causes treatment interruption, increased hospital visits, worsen the prognosis of disease, increased treatment related toxicity, decrease tolerance, and reduced health related quality of life, and increased mortality. Malnutrition is heavily linked to poor cancer patient outcomes, driving a 10% to 20% increase in direct mortality, lowering treatment tolerance, and shortening overall survival. Therefore, nutritional management is recognized as an integral component of comprehensive cancer care. Dieticians are ideally positioned to bridge the gap between tertiary oncology centres and home-based care by explaining systematic nutritional counselling, through e-content to manage treatment-induced barriers to eating, and providing family-centred counselling before, during and after the treatment. During the course of the cancer treatment gastrointestinal symptoms (loss of appetite, nausea, vomiting, abdominal pain etc.) are very common side effects which leads to the patients in malnutrition, further cachexia and treatment interruptions. Medical nutrition therapy, individualised dietary counselling mitigates this risk. During the COVID-19 pandemic, patient hospital visits were strictly restricted to minimize transmission risks. Multimedia-based tele-counselling bridged this gap by delivering accessible nutritional and dietary guidance directly to patients and their families at home with a single click. This research evaluates the specific impact of custom digital content designed to highlight the importance of macro and micronutrients in oncology treatment. Furthermore, it assesses the effectiveness of media-based interventions and measures the knowledge and awareness of patients both during active cancer therapy and post-treatment. It is on such merit that Virtual appointment (Telemedicine) feature, could step up to give patients across the world a reliable alternative solution for primary healthcare.

Objectives:

1. To assess the efficacy of e-content among the Cancer patients after intervention.
2. To study the readiness among cancer patients towards acquiring dietary practices, knowledge through e-content module in covid-19 pandemic.

Methodology:

This study was performed in November 2020 to April 2021 to evaluate the effects **of e-content*** that is A E-content on cancer (educational video) on nutritional behaviours, effectiveness and readiness of e-content/e-learning among cancer patients of all age group and gender.

e-content is defined as A E-content on cancer which elaborates about the causes symptoms, importance and myths about nutrition, role of different nutrients (macro and micro nutrients) anti-cancer diets, multimedia approaches, healthy life style tips before during and after the cancer treatment. Link of the video (<https://youtu.be/z0-H6XhLAFo>)

Inclusion criteria: All types of cancer patients attended the various oncology OPD were randomly selected for the study and were requested to participate in the study voluntarily. who were newly diagnosed of any type of cancer well proven by biopsy, having smart phone,

internet access, smart phone friendly, able to read at least Hindi very fluently, having good eyesight and hearing capacity.

Exclusion criteria: Those who were not willing to participate, who were not using smart phone or not having good internet access were excluded from the study. Those who did not attend all the questions were excluded from the study.

Outcome measures & intervention:

City Prayagraj and Lucknow were purposely selected due to covid 19 effect it was convenient for the researcher to select the patients. Patients were selected randomly from OPD's and record book of OPD. Their phone numbers were taken and were connected through tele communication on phone to participate in the study. Patients were also connected through zoom meeting, and physically who were regularly coming to OPD to participate in the study. The study protocol was clearly explained to all the participants through zoom meeting, and consent forms were sent to them on phone and google form for questionnaire were also send to them on phone who were willing to participate and filled the consent form for the study.

Participants were asked to complete the questionnaire with their responses, before intervention of e-content. Then the researcher set up a zoom meeting with participants, loaded with a 12-minute educational video titled, "role of nutrition in improving the knowledge in cancer patients" and also send the link of the video to each participant on their phone to avoid any technical glitch. After watching the video again same questionnaire was sent on their phone and asked to fill their responses.

The survey was designed to assess the constructs of knowledge, perceived benefit of nutrition and efficacy of e-content. To evaluate participant knowledge, nutritional perceptions, and the impact of the educational video, a comprehensive survey instrument was deployed. The questionnaire structurally categorized items into demographics (6 questions), disease pathology (causes, symptoms, side effects) and treatment options (4 questions), and cancer-specific dietary beliefs (15 questions). To measure the effectiveness of the e-content intervention, the post-intervention survey incorporated 9 supplementary questions. These items specifically assessed user experience variables, including content effectiveness, operational feasibility, participant satisfaction, pacing, graphical presentation, myth reduction, and video length. A 100% response rate was achieved for all surveyed metrics.

Development of the educational video:

The nutrition education intervention, the e-content (educational video), was designed by researcher and the supervisor of the study who is nutrition professor at (SHUATS). The script for the e-content (e-content) was written and narrated by the researcher. The primary focus of the e-content (e-content) was the common nutrition-related side effects of chemotherapy (weight loss, loss of appetite, nausea, vomiting, constipation, diarrhoea, changes in taste and smell, and mouth or throat dryness and soreness). The questionnaire was made after collecting review articles, research papers, educational videos of expert oncologists, dieticians,

and one to one patient interaction experience in hospital setup. The questionnaire was discussed by 4 clinical dietitian and oncologist. The e-content (e-content) elaborate the importance of good nutrition during and after the cancer treatment. A one-page leaflet was created to summarize the video e-content (e-content) and it was sent to all participants through multimedia methods by smart phone.

Sample size calculation:

$$N = Z^2 \times P \times (1-P) / M^2$$

Where:

- N = sample size for infinite population
- Z = Z score
- P = population proportion (Assumed as 50% or 0.5)
- M = Margin of error (10%)
- Z score is determined based on the confidence level. (95% Confidence Interval) standard (1.96)
- Design Effect= (cluster sampling) the text indicates a designer multiplier of 3:

$$N = 96 \times 3 = 288, 288/2 = 144, N = 144$$

Total sample size of the survey was 288 Subjects. 144 subjects for experimental group (intervention group) and 144 for control group.

Analysis: SPSS-20 was used to analyze the data collected from experts.

Results of the study

In total 144 participants from the different age group, background and education status in experimental group who received e- content completed the survey. The questions in survey was categorised in demography, disease pathology (causes, symptoms, side effects and treatment options) and nutritional behaviour during and after the treatment of cancer.

The main objective of the study was to assess the effectiveness of e-content intervention, among cancer patients. For this purpose survey incorporated 9 supplementary questions regarding the content, video graphics, usefulness, debunking myths , and also would they like more educational videos further for the information.

The result indicates that the maximum numbers of respondents of the experimental group were male with 65% and female 35%. The age group between of 26-35 years, were 46% , 31% from the age group of 36-45 years. Along with this 43% of the respondents were post graduate. There was only 4% of respondent who has completed their primary education only. None of the participants were illiterate. 78.5% respondents were working and was 24% were not working. Majority of the respondents 43% were from urban area 30% and 21% were from rural area.

Table :1 Demography

Sno.	Variables	Frequency N=144
1.	Gender	
	Male	94 (65%)
	Female	50 (35%)
2.	Age group	
	Up to 25 years	19 (13%)
	26-35	66 (46%)
	36-45	45 (31%)
	46 and above	14 (10%)
3.	Education level	
	Primary	0
	High school	20 (14%)
	Intermediate	29 (20%)
	Graduate	33 (23%)
	Post Graduate	62 (43%)
4.	Profession status	
	Working	113 (78.5%)
	Non working	31 (21.4%)
5.	Residence	
	Rural	30 (21%)
	Urban	62(43%)
	Sub urban	9 (6%)
	City area	(30%)

Result of e-content intervention:

The analysis shows the effectiveness of e-content. It was found in 85.7%, respondents said after watching the e-content was most effective, 10% respondents recorded that somewhat effective and 4.2% respondents were neutral. Usefulness and readiness of e-content was recorded very informative and feasible by majority of the respondents.

4% of the respondents were not willing to get information through multimedia methods due to the lack of interest in online content. For any audio-visual aids, it is necessary it should be connected with the topic The analysis shows 75% respondents were highly satisfied, 15% respondents recorded satisfied and 10% respondents were neutral about the graphics and visuals of the e-content. The educational e-content content should be very informative and concise. the evaluated e-content had an efficient runtime of 11 minutes. Preferences for duration was found favoured in 84% but 16% respondents willing to decrease the timing from 11 minutes. The e-content was developed to incorporate correct concise information among cancer patients and also one of the objective of the study. It was observed after the intervention of the e-content in respondents it sounds well, informative helpful in conveying knowledge regarding oncology nutrition. 92% respondents reveals that information about food and nutrition for cancer patients was very helpful. Less than 5% respondents were somewhat useful and neutral.

Multimedia model is a effective way for patients as well as general population to understand the symptoms of cancer disease, treatment options, food nutrition and its role in treatment,

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treatment related complications, during and after treatment to improve outcome. Due to the lack of awareness and dietary myths most of the patients were treating their diets wrongly this study also helped in debunking dietary myths. 92% of respondents were strongly agree that e-content was able to clear myths about food and nutrition in cancer disease treatment (before and after).

Table :2 Effectiveness of the E- Content

S.no.	Variables	Frequency
1.	Effectiveness of e-content	
	Neutral	4.2%
	Somewhat effective	10%
	Most effective	85.7%
2.	Usefulness of e-content	
	Feasible	14.2%
	Very feasible	85.7%
3.	Interest of usage of multimedia in future	
	Yes	96%
	No	4%
4.	Satisfaction from graphics and visuals	
	Neutral	10%
	Satisfied	15%
	Highly satisfied	75%
5.	Duration of e-content	
	Time should be decreased	15.7%
	Remain unchanged	84.2%
6.	Helpfulness regarding food and nutrition knowledge	
	Neutral	4.2%
	Somewhat helpful	4.2%
	Very helpful	91.4%
7.	Debunking myths	
	Agree	10%
	Strongly agree	90%

Discussion:

The goal of this study was to evaluate efficacy of e-content among different type of cancer patients, to enhance the knowledge and practices regarding food and nutrition during and after the treatment. The intervention tool e-content was designed to change dietary behaviour in a positive manner by modifying specific health information while increasing nutrition knowledge and improving dietary behaviours through e-content. Health conviction, perceived barriers, significantly changed in patients.

Aghamolaei *et al*, (2011) found that studies confirmed the importance of education and its effects on promoting the level of the individuals' knowledge. They also observed a significant increase in the mean score of perceived susceptibility in the intervention group following the

educational intervention and result was similar to other studies on prostate cancer screening, diabetes mellitus and breast self-examination. In this study effectiveness of e-content intervention was successful and appears to be associated with producing significant increases in nutrition knowledge in a effective way during and after the treatment of cancer disease. Our study was aimed to educate about food and nutrition through multimedia method due to the covid 19 infection and restricted hospital visits.

A study done in 2013 by Thompson et al, a pilot assessment was done with 50 patients with cancer (84% received chemotherapy) majority (58%) indicated that receiving nutrition education while going through treatment was very important. However, the majority (63%) had not received any nutrition education from a health care provider, although 64% reported having a weight change in the past four months. When asked to rank the topics (from a list of eight) to include in educational materials for patients with cancer, the most frequently chosen topics were coping with nutritional side effects of treatment and eating a balanced diet. In addition, most patients (56%) wanted one-on-one counselling. Due to limited resources, the health care team decided to develop a nutrition education DVD on the nutrition related side effects of chemotherapy (as a substitute for one-on-one counselling) and a one page handout for patients to take home that highlighted the main points of the DVD.

Importance of balance nutrition, role of macro and micronutrients, dietary fibre, fluid intake was very well recognised by the patients after watching the video (e-content). This supports our hypothesis that a health education program based on e-content/multimedia/audio-visual aids can be effective in promoting the adoption of nutritional behaviours to improve quality of life in cancer patients.

A study was performed with the objective of to assess efficacy and acceptability of an online game called 'ETIOBE Mates' that was designed to improve children's nutritional knowledge; furthermore, to compare it with the traditional paper-pencil mode of information delivery. A sample of 228 children participated in the study. Participants were divided into two groups: an experimental group (who used ETIOBE Mates) and a control group (who were given a pamphlet). Both groups increased their scores for nutritional knowledge. The interaction between group 3 time was also statistically significant; it indicated that acquisition of nutritional knowledge was superior in the experimental group. The children considered the serious games platform to be a useful medium for improving their nutritional knowledge. Online games can be an effective method of delivery for preventive and treatment tasks that are otherwise tedious for children. **Banos et al 2012.**

Usefulness of e-content was well proven, as the subjects enrolled in the study found e-content feasible to improve the nutrition and dietary information. A similar study was performed in head and neck cancer patients to promote comfort and nutritional status, oral hygiene for patients with cancer. Oral hygiene is inconsistent among patients with cancer and is a national patient care issue. Researcher had developed an evidence-based oral hygiene educational module (EM) for nursing and patient care technician (PCT) staff to promote consistent oral

hygiene patient education. A Pre- and post-EM data were collected using a developed oral hygiene assessment tool; nursing documentation data were collected by chart review. Post-EM data were collected eight weeks post-EM. It was found that twenty-two patient documentation pairs were collected. Compared to pre-EM, admission teaching, patient education, and patient oral hygiene practices improved post-EM. Post-EM oral hygiene documentation and PCT teaching increased. **Lola Coke et al 2015**. Our study also found that content available in video was very much useful to improve the nutrition knowledge and debunking dietary myths in cancer patients. Heather D. *et.al*, said that a nutrition literacy tool is most useful if it can predict increasing diet quality as nutrition literacy increases. Otherwise, there is little practical value for assessing nutrition literacy at the outset of nutrition education endeavours. **Heather D. Gibbs et al,2016**

Declaration:

The present study may have limitations. Nevertheless, self-report, because of its practicality and realism, is the norm in nutrition studies. As well as Quantitative dietary intake, quality of life tool was also not assessed, some of the participants delayed their use of the educational e-content video citing due to their busy schedule.

Conclusion:

Maintaining optimal nutritional status is vital for cancer patients. The purpose of this study is to develop digital content (e-content) focused on food and nutrition literacy specifically for cancer patients. This initiative aims to educate both patients and the broader community through a safe, reliable platform, providing effective guidance on healthy food choices, nutrition practices, and patients' perspectives regarding the role of food in enhancing quality of life and reducing treatment-related complications even during the COVID-19 pandemic. In this study, it was assumed e-content helped patient to improve their health and quality of life, both the parameters were not the part of the study so quantitative assessment was not done. The results indicates that the e-content design, its nutritional information, acceptability, and implementation have successfully fostered positive dietary changes. Furthermore, the engaging and user-friendly nature of multimedia makes it a highly effective tool for improving nutritional behaviour and practices among cancer patients. Respondents also noted that having access to this preserved content allows them to revisit the information for reassurance and clarity. This ongoing access addresses a critical limitation of one-on-one counselling, as the digital resources can be repeatedly shared with family members and caregivers to help them understand the fundamental importance and utility of proper nutrition. Nutritional literacy found were improved in respondents in this study.

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