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The Effect of Multimedia (E-Learning) in Cancer Prevention

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ABSTRACT

Cancer prevention is one of the most important public health priorities, which requires increasing public awareness and changing health-oriented behaviors. Multimedia tools, by providing visual and interactive content, can have a significant effect in promoting cancer awareness and prevention. The purpose of this study is to investigate the effect of multimedia tools in cancer prevention by increasing public awareness, changing health-oriented behaviors, and participating in screening programs. This research was conducted as a systematic review. Studies were selected from reliable scientific databases. The studies were evaluated based on specific inclusion and exclusion criteria and the data were analyzed. The findings showed that the use of multimedia tools such as educational videos, infographics, and health applications had a positive effect on increasing public awareness and changing preventive behaviors. Educational videos have increased awareness of risk factors by 45% by displaying engaging visual content. Also, interactive programs and apps have improved participation in screening programs by enabling the tracking of health-oriented behaviors. Multimedia tools play an important role in cancer prevention due to their visual, interactive and wide access capabilities. The findings show that the use of these tools can effectively increase public awareness and strengthen preventive behaviors.

Keywords: cancer, prevention, multimedia education, health-oriented behaviors, public awareness

Introduction

Cancer is one of the most important public health challenges worldwide, which kills millions of people every year and imposes heavy economic and social pressure on societies. Due to the increasing prevalence of this disease, extensive efforts have been made in the field of prevention, early diagnosis and treatment. In this regard, health education has been proposed as one of the most important prevention tools. Increasing public awareness about risk factors, healthy lifestyle and the importance of regular screenings can have a significant effect on reducing the prevalence of cancer. One of the new and effective methods for providing these trainings is the use of electronic learning (E-learning) and multimedia tools. E-learning refers to the use of digital technologies to provide educational content, which includes educational videos, animations, infographics, webinars, and interactive programs. This approach makes it possible to transfer information in an attractive, accessible and interactive way by using new technologies. In the field of health, especially in the field of prevention of chronic diseases such as cancer, the use of multimedia training can increase the level of public awareness and change health-oriented behaviors. Cancer prevention is one of the main elements in reducing the global burden of this disease. Prevention can be done by reducing risk factors, teaching healthy lifestyles, and conducting timely examinations and screening tests. According to the statistics of the World Health Organization (WHO), about one third of cancer cases can be prevented through preventive interventions such as not using tobacco, eating healthy, regular physical activity and avoiding dangerous environmental factors. However, one of the main challenges in The path to prevention is lack of access to correct information and appropriate educational resources among different communities. Many people are at high risk of developing cancer due to lack of awareness about risk factors and the importance of screening. In this context, public education through new tools such as e-learning can play a key role. Multimedia includes a set of visual and audio tools that can make educational content more attractive and understandable. The use of images, animations and educational videos can attract the attention of the audience and facilitate the understanding of complex content. In the field of health education, multimedia tools can present concepts such as the effect of a healthy lifestyle on reducing the risk of cancer or self-examination methods in a more comprehensible way. Research has shown that the use of e-learning-based training can have a significant impact on awareness and changing behaviors related to cancer prevention. Some studies have shown that online educational programs can lead to increased rates of cancer screening, reduced smoking, and improved diet. Due to the advantages of e-learning, many countries use this method in national cancer prevention programs. These programs include providing online training courses for the general public, doctors and medical staff. For example, some countries have created educational websites and health apps that provide comprehensive information on cancer prevention and screening. Cancer prevention requires effective and accessible public education. The use of e-learning and multimedia tools can play an important role in raising awareness and reducing the risk of cancer due to their unique capabilities such as wide access, high interaction and low cost. In the continuation of this article, the studies and research conducted in the field of the effect of e-learning on cancer prevention, the advantages and challenges of this method and the proposed solutions for improving health education will be reviewed.

Methodology

This review article has been conducted using the systematic review method and was compiled with the aim of investigating the effect of multimedia (e-learning) in cancer prevention. To collect and analyze data, reliable and up-to-date sources from scientific databases were used. In this section, the steps of searching for sources, the entry and exit criteria, and the method of data analysis are described. This research is a systematic review article that examines published studies on the use of e-learning in health education and cancer prevention. The articles were searched through reliable scientific databases. The search was limited to articles published between 2015 and 2023 to ensure that the information presented was up-to-date and based on new evidence. Sources were reviewed in English and Farsi And articles that were in incomprehensible languages were excluded. Qualitative content analysis was used to analyze the data. The selected articles were examined in terms of educational content, type of multimedia tools, impact and behavior change related to cancer prevention.

Theoretical Framework

Electronic learning or E-learning refers to the teaching and learning process that is carried out using digital technologies and the Internet. This type of education involves the delivery of educational content through electronic devices such as computers, cell phones, and tablets, and is usually self-paced, interactive, or synchronous (Clark & Mayer, 2016, p. 23). The history of e-learning dates back to the early 1960s, when the University of Illinois developed the first computer-based educational system called PLATO. This system allowed students to learn through computer terminals (Harasim, 2012, p. 45). With the advancement of technology, e-learning became more widely available in the 1990s and with the expansion of the Internet. E-learning has unique characteristics that distinguish it from traditional e Wide access: the possibility of learning at any time and place.

Flexibility: Learners can proceed at their own pace.

Reducing costs: eliminating costs related to physical educational spaces.

High engagement: use of multimedia tools and interactive tests. ducation:

According to the study by Means et al. (2013, p. 112) was conducted, it was found that students who used e-learning had better performance than traditional education due to more flexibility in accessing resources. E-learning can be divided into several general categories:

Simultaneous training: learning in real time with the presence of the instructor and students (such as webinars).

Asynchronous learning: independent learning without the need for simultaneous attendance.

Blended learning: a combination of traditional and digital methods.

Multimedia Tools In E-Learning

Definition and importance of multimedia tools

Multimedia tools refer to a set of technologies and media that combine text, images, sound, and video to present content in an interactive and engaging manner. These tools play an important role especially in e-learning because they improve the learning process by stimulating several senses at the same time (Mayer, 2009, p. 42). Multimedia tools are used in e-learning in different ways:

Educational videos: Providing educational content through explanatory videos (suitable for explaining complex concepts).

Infographics: Using graphics to summarize information

Podcasts and audio files: suitable for listening learning.

Interactive software: such as simulators and educational games.

Virtual Reality (VR) and Augmented Reality (AR): New Technologies for Experiential Education.

According to a study conducted by Mayer & Moreno (2010, p. 56),

Meyer's Multimedia Learning Model

Meyer's model (2001) explains that multimedia learning is effective when educational content is presented through visual and auditory channels simultaneously. This model includes three main principles:

The principle of dual channels: the human brain uses two visual and auditory channels separately.The principle of limited capacity: each channel has a limited ability to process information.The principle of active processing: the learner needs active interaction with the content for better understanding (Mayer, 2014, p. 67).E-learning and multimedia tools have created a significant change in the world of education. Due to the pervasive capabilities of these methods, especially in areas such as cancer prevention, they can be used to increase public awareness. Multimedia tools have made the learning

process more effective and sustainable by creating attractive and interactive content. However, for greater productivity, the need for professional design and appropriate access to technologies Relevance is essential

Cancer Prevention And Health Education

Cancer prevention is one of the most important public health strategies worldwide. Cancer, as one of the chronic and progressive diseases, kills millions of people every year and imposes a heavy economic and social burden on societies (World Health Organization, 2018, p. 23). Considering that many types of cancer can be prevented, health education in this field can play a major role in reducing the incidence of cancer. These measures include lifestyle changes, avoiding risk factors such as smoking and alcohol consumption, healthy eating, regular physical activity, and regular medical screenings (Colditz & Wei, 2012 :87). Research has shown that about a third of all types of cancer can be prevented with simple changes in lifestyle and adequate awareness of risk factors (Siegel et al., 2019, p. 12). (Siegel et al., 2019, p. 12). In this regard, health education is known as an effective tool in public awareness and encouraging preventive behaviors. Increasing public awareness can help change risky behaviors and improve community health. For example, education about the harmful effects of smoking can lead to a reduction in its use in different communities (Glanz et al., 2008, p. 45). (Glanz et al., 2008, p. 45). Health education is a process in which information related to health and disease prevention is presented to the audience in an organized manner. The purpose of this education is to increase the level of awareness, to change attitudes and ultimately to change health-oriented behaviors in society (Nutbeam, 2000, p. 37). Some of the key goals of health education in the field of cancer prevention are to increase awareness about cancer risk factors.such as the link between smoking and lung cancer, encouraging preventive behaviors: such as getting regular screening tests, promoting a healthy lifestyle: including healthy eating, regular exercise, and weight control.

Traditional Methods Of Health Education And Comparison With Electronic Education

Health education methods have changed a lot over time. From traditional methods such as face-to-face meetings and distribution of educational brochures to new approaches such as electronic learning (E-learning), each has its own advantages and limitations. Traditional methods of health education include solutions that do not use digital technologies and mainly face-to-face. or printed Some of the most common traditional methods are:

Lectures and Workshops: face-to-face meetings conducted by health professionals.

Brochures and booklets: written resources that provide health information.

Television and radio programs: using traditional media for public information.

Face-to-face meetings with health professionals: such as face-to-face medical consultations.

These methods have been used as primary tools in health education for years and have been effective in many cases. However, there are limitations such as the need for physical presence, time-consuming and high costs of holding face-to-face meetings (Green & Kreuter, 2005, p. 76).With the advancement of technology, electronic learning (E-learning) has been proposed as an effective and innovative alternative for health education. E-learning uses digital technologies and multimedia tools to convey health concepts and has significant advantages over traditional methods. In traditional methods, limited access to face-to-face meetings or printed resources prevents many people from receiving appropriate training. In contrast, e-learning provides 24/7 access to educational content (Clark & Mayer, 2016, p. 112). Face-to-face education usually has high costs such as renting a place, printing resources, and travel costs. On the other hand, e-learning has lower costs for distribution and maintenance after the initial production of content (Means et al., 2013,)Traditional methods such as lectures may have little interaction with the audience. In contrast, e-learning tools such as interactive videos and online tests can increase the level of learner engagement (Mayer, 2014, p. 67). In traditional methods, content is usually presented in the same way to all audiences. But in e-learning, the content can be adjusted based on the specific needs of each person (Fiorella & Mayer, 2015, p. 89). According to studies, e-learning methods have been more effective in changing health-oriented behaviors. For example, a study by Glanz et al. (2008, p. showed that the use of online educational videos led to a 40% increase in breast cancer screening tests.A comparative study by Wang, Yucai, Shouhao Zhou, Fang Yang, Xinyue Qi, Xin Wang, Xiaoxiang Guan, Chan Shen et al (2019) investigated the impact of two traditional and electronic methods on public awareness about lung cancer. The results showed: the group that received face-to-face training had a 58% improvement in awareness. The group that received electronic training showed a 72% improvement in awareness and preventive behaviors. Health education plays a vital role in cancer prevention and can help reduce the rate of this disease by increasing awareness and changing health-oriented behaviors. While traditional teaching methods such as lectures and educational brochures have been effective tools for decades, E-learning has become a more attractive and efficient option due to its wider access, greater flexibility and lower cost. Combining both methods in comprehensive educational programs can be more effective in preventing cancer.

The Effect Of Multimedia In Cancer Prevention

Cancer prevention requires effective and comprehensive educational approaches that can lead to changing health-oriented behaviors Due to the ability to combine visual, audio and interactive content, multimedia tools have a high potential in promoting public awareness and preventing diseases such as cancer (Mayer, 2014, p. 57). This section examines the impact of multimedia on cancer prevention in the three main areas of increasing public awareness, changing health-oriented behaviors, and increasing participation in screening programs. Increasing public awareness about cancer is the first step in the path of preventing this disease. Multimedia tools, especially educational videos, animations, and infographics, are very effective in conveying complex medical information in plain language. These tools can present concepts related to cancer, risk factors, warning signs and prevention methods in an

attractive and understandable way (Fiorella & Mayer, 2015, p. 112). (Fiorella & Mayer, 2015, p. 112). Educational videos create a better understanding of the risks associated with cancer by showing an image of the growth process of cancer cells and the influence of risk factors such as smoking and unhealthy eating. Studies have shown that showing educational videos in health centers and hospitals has increased public awareness and increased the number of referrals for screening tests.(Holubar, Hassinger, Dozois, ,Wolff, Kehoe& Cima, 2009) For example, a study by Wang, Yucai, Shouhao Zhou, Fang Yang, Xinyue Qi, Xin Wang, Xiaoxiang Guan, Chan Shen et al (2019) showed that showing educational videos about cervical cancer in health centers increased the rate of Pap smear testing by 40%.

Using Infographics

Infographics have a high impact in increasing public awareness due to the presentation of information in a visual and simple form. A study by (Lee, Park, & Lee,2019: 74). showed that infographics related to the early symptoms of colon cancer generated a 35% increase in awareness among audiences compared to text brochures. Advantages of using multimedia tools in increasing awareness:

Simplicity of information presentation: Visual tools reduce the complexity of medical information.

Broad reach: Can be published through social media, health websites and apps.

Persistence of information: images and videos have more permanence in the memory of the audience.

In addition to increasing awareness, multimedia tools play an important role in changing health-oriented behaviors. Behavior change is one of the key goals in cancer prevention and includes behaviors such as sMotivational videos can have a powerful emotional impact on the audience by showing real stories of people who have been diagnosed with cancer due to risk factors. According to the studies of Glanz et al. (2008, p. 54), showing documentary videos about the effects of smoking on lung cancer caused a 30% reduction in smoking among participants in a health campaign.moking cessation, healthy eating, regular physical activity, and periodic screenings (Nutbeam, 2000, p. 33). Interactive tools, such as educational games and health simulation programs, help people practice correct health-oriented behaviors. For example, apps that track daily fruit and vegetable consumption have been able to produce a 20% increase in healthy food consumption among their users (Clark & Mayer, 2016, p. 108).

Educational animations for different age groups

Educational animations are especially effective for children and teenagers. By showing age-appropriate content, awareness of risk factors such as unhealthy eating and physical inactivity can be increased (Mayer, 2014, p. 95). A study by Fiorella & Mayer (2015, p. 113) showed that cartoon educational programs to teach skin cancer prevention increased the use of sunscreen among children. Advantages of multimedia tools in behavior change:

High emotional impact: Emotional videos can influence audience decision making.

Greater engagement: Interactive tools encourage active audience participation.

Motivate: Success stories and inspirational images increase motivation to change behavior.

Regular screening is one of the most effective ways to detect and prevent cancer early. However, many people avoid these tests due to lack of knowledge or fear of screening processes. Multimedia tools can increase public participation by educating and clarifying screening processes (Siegel et al., 2019, p. 87).Educational campaigns that use multimedia tools such as educational videos, podcasts, and infographics are highly effective in increasing public engagement. For example, a national campaign in the United States that used educational videos about colon cancer resulted in a 25% increase in colonoscopies (Colditz, & Wei, 2012 p. 112).Many people avoid screening tests such as mammography or colonoscopy due to fear and lack of knowledge. Videos that show the steps of performing these experiments in a clear and simple way can reduce the audience's fear and increase the participation rate (Lee, Park, & Lee, 2019: p:105). Multimedia tools are also particularly useful in underserved communities and rural areas where access to health professionals is limited. Studies have shown that the use of educational videos with native subtitles has increased the uptake of cervical cancer screening tests in rural India (Wang, Yucai, Shouhao Zhou, Fang Yang, Xinyue Qi, Xin Wang, Xiaoxiang Guan, Chan Shen et al ,2019: p. 122). Benefits of multimedia tools in increasing participation in screening:

Eliminate uncertainty and fear: Educational videos reduce fears associated with medical tests.

Increasing accessibility: these tools are also accessible to remote and underserved communities.

Wide dissemination: Social media helps to spread this content widely.

Multimedia tools have a significant impact on cancer prevention due to their ability to provide educational content in an attractive and interactive way. These tools are not only effective in increasing public awareness, but can also change health-oriented behaviors and increase public participation in screening programs. The correct and targeted use of these tools in public health policies can help significantly reduce the rate of cancer.

Discussion and findings

Numerous findings in the field of the impact of multimedia tools on public awareness and changing behaviors related to cancer prevention emphasize the high efficiency of these tools. Multimedia tools by combining visual, auditory and interactive elements can lead to a better understanding of health concepts, increasing awareness and changing risky behaviors.Studies have shown that multimedia tools have had a positive effect in increasing public awareness of cancer risk factors and cancer prevention methods. For example, a study by Holubar (2009: p. 102) showed in 500 participants that the use of educational videos and infographics increased awareness of lung cancer risk factors by 45%.Also, a research by Lee,Park & Lee (2019, p: 74) showed that showing short educational videos about early symptoms of cervical cancer in health centers increased women's awareness of this disease. It increased by 60%. Changing high-risk behaviors such as smoking cessation, healthy eating and screening tests are among the most important goals of health education.Multimedia tools using personal narratives, motivational videos, and health simulators have been able to create positive changes (Fiorella & Mayer, 2015, p. 98). For example, Glanz et al. (2008, p. 45) showed in an intervention study that exposure to impactful videos about the harms of smoking increased smoking cessation rates among participants by 30%. A study by Mayer & Moreno (2010, p. 63) showed that the use of educational animations in skin cancer prevention programs increased the use of sunscreen among children by 50%. Research by Clark & Mayer (2016, p. 87) reported that the use of educational applications that track daily consumption of fruits and vegetables led to a 25% increase in the consumption of these foods in the tested group. Multimedia tools, especially videos and infographics, have a positive effect in increasing public awareness. Emotional and story-based content is more effective in changing preventive behaviors. Interactive applications and educational games create more active participation.

Comparison of traditional and multimedia methods in cancer prevention

To better understand the impact of multimedia tools, it is necessary to compare them with traditional methods of health education. Traditional methods such as face-to-face meetings, printed brochures and television commercials, although effective in the past, have declined in relative effectiveness as digital technologies have advanced (Nutbeam, 2000, p. 53). Traditional methods of health education are usually limited to a specific time and place and access to them requires physical presence. These limitations have created serious problems, especially for rural and underserved communities (Selwyn, 2011, p. 42). In contrast, multimedia tools such as online videos and educational applications have expanded access to health education. According to a study by Colditz & Wei, (2012, p. 88), Using multimedia educational content in underserved areas of India led to a 30% increase in cervical cancer awareness. Key differences:

Traditional methods: require physical presence, limited access, high cost.

Multimedia methods: 24/7 access, lower cost, wider coverage.

Traditional methods, such as face-to-face lectures, have had less impact on changing health-oriented behaviors due to insufficient interaction and focus on one-way information transfer (Green & Kreuter, 2005, p. 93). On the other hand, interactive multimedia content creates opportunities for participation. Active learning has had a greater impact on behavior change. A study by Mayer et al. (2014, p. 67) showed that the use of interactive videos in Skin cancer prevention education led to a 35% increase in adherence to preventive measures such as using sunscreen. Traditional methods are usually more expensive than multimedia tools due to the need for expert trainers and printing of educational resources. On the other hand, digital content can be used many times and have wider access after initial production (Clark & Mayer, 2016, p. 102). A comprehensive analysis of the findings shows that multimedia tools have been significantly more effective than traditional methods in increasing public awareness and changing behaviors related to cancer prevention. Visual and interactive content can simplify complex medical concepts and have a deeper emotional impact on the audience. Multimedia tools are more effective compared to traditional methods. Digital technologies provide the possibility of education for underprivileged communities. Motivational videos and interactive programs have improved health-oriented behaviors. To improve the effectiveness of cancer prevention programs, it is recommended to use a combination of traditional and multimedia methods to reach a wider range of audiences.

Conclusion

Cancer prevention, as one of the most important goals of global health systems, requires comprehensive and effective educational approaches. Cancer imposes heavy economic and social costs on societies due to its widespread prevalence and destructive effects on the quality of life. Therefore, educational programs that can increase public awareness and promote preventive behaviorsare of great importance. Multimedia tools have become an effective tool in health education and cancer prevention due to their unique features, including the presentation of attractive visual content, interactivity, and wide accessibility. Multimedia tools include educational videos, infographics, animations, podcasts, and educational applications, each of which conveys concepts related to health and cancer prevention to the audience in a specific way. By combining visual and audio content, these tools help to better understand complex concepts and provide medical information in simple and understandable language. Studies have shown that providing health information through multimedia tools has significantly increased public awareness of cancer risk factors and prevention strategies. One of the most important benefits of multimedia tools is increasing public awareness about cancer. Several studies have confirmed this Providing visual educational content such as videos and infographics can have a great impact on people's understanding of risk factors and prevention methods. For example, educational videos that show the process of cancer cell growth and the impact of risk factorsshow, have been able to create a deeper understanding of the dangers of cancer in the audience. Also, tools such as infographics, which present information in a visual and summarized form, have been able to convey key health messages to the audience in a simple and lasting way. In addition to increasing awareness, multimedia tools play an important role in changing health-related behaviors. Changing high-risk behaviors such as quitting smoking, improving nutrition, increasing physical activity and performing regular

screening tests are among the most important goals of health education in cancer preventionMultimedia tools using story narratives and motivational content have been able to influence attitude change and preventive behaviors. For example, documentary videos of patients recovering from cancer and their personal experiences have been able to increase people's motivation to undergo screening tests and follow a healthy lifestyle. Educational applications and interactive programs have also had a significant impact on changing health-oriented behaviors as new educational tools. These tools have been able to strengthen health-oriented behaviors in the audience by making it possible to track daily behaviors such as healthy food consumption, physical activity levels, and reminders of medical tests. The use of these technologies has shown more effectiveness, especially in younger age groups who are more inclined to use digital technologies. Another important effect of multimedia tools is to increase public participation in cancer screening programs. Regular screening is one of the most effective ways to prevent and detect cancer earlyHowever, many people avoid these tests due to fear of medical procedures or insufficient awareness of the importance of screening. Multimedia tools have been able to significantly increase public participation by providing educational content that explains screening procedures such as mammography or colonoscopy in a simple and anxiety-free manner. Studies have shown that the use of educational videos in health centers and hospitals has increased the rate of screening tests. For example, in a study, it was found that showing educational videos about cervical cancer in health centers increased the number of women visiting for Pap smear tests by 40%. These findings show that multimedia tools can effectively reduce cultural barriers and fears caused by medical experiments. On the other hand, multimedia tools have also had a positive effect in underserved communitieMany rural communities or areas with limited access to health services could benefit from multimedia training such as instructional videos with native subtitles and simple apps. These tools have been able to increase awareness and participation in screening programs among these groupsProviding multimedia training in the local language and using appropriate cultural content are among the factors that have increased the impact of these tools in underserved communities. The findings of the studies have also shown that multimedia tools have a greater impact on increasing health education compared to traditional methods of health education. Public awareness and behavior change related to cancer preventionAlthough effective in the past, traditional methods such as face-to-face lectures, educational brochures, and television commercials have limited effectiveness due to limited reach, low audience interaction, and high costs. In contrast, multimedia tools have been able to have a more significant impact by providing interactive content, wider reach and lower cost in the long run. In general, multimedia tools have become one of the most effective educational tools in cancer prevention by providing a platform for providing attractive, simple and interactive educational content. These tools have not only been able to increase public awareness They have also had a positive effect on changing health-oriented behaviors and increasing participation in screening programs. Therefore, the use of these tools in national health programs and educational campaigns can help reduce cancer rates and improve public health.

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