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THE ROLE OF HEALTH EDUCATION IN CANCER PREVENTION: A SYSTEMATIC REVIEW

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Abstract

Cancer is one of the main causes of death in the world; 8.2 million deaths occurred due to cancer in 2012. Meanwhile over 30 percent of cancer-related deaths can be reduced by correcting or avoiding key risk factors. In this regard, one of the most effective and low-cost intervention methods for creating healthy behavior and changing life style for preventing and controlling diseases is health education.

Therefore, the present study was conducted with the aim of determining the effectiveness of employed educational interventions related to prevention, screening, behavioral change and educational methods for determining the effectiveness and improvements of future interventions. The present study was a systematic review which searched in the information data bases Scopus, ISI, PubMed and Science Direct with the key word cancer prevention educational intervention, from 2010 to 2016. 35 appropriate papers were elected among the results and the rest of the papers were not used due to being repetitive and their employed research method. The studies were mostly of cluster non-randomized and randomized controlled trials (RCT) and the subjects were consisted of all age groups such as teenagers and students and of both sexes. The studies based on health education and health promotion theories were reported with work in schools, society and home. In the papers, church, market and the like in the city and village were selected as education place using traditional and modern educational methods with emphasis on the cultural characteristics and compatibility, income level, and being at risk in the target groups. Health education resulted in the increase of knowledge, change in the attitude and intention for cancer screening, acceptance of vaccine, vulnerability, perceived self-efficacy intensity and

facilitation and reduction of obstacles of social support for adopting the healthy behavior and timely diagnosis of cancer,

change of behavior and reduction of the disease risk factors and it was an approach with a high cost-effectiveness.

Keywords: Health Education, Cancer Prevention, Systematic Review.

Introduction

Cancer is one of the main causes of death in the world; according to statistics 8.2 million deaths occurred due to cancer in 2012 [Edwards, et al., 2010; Mirzaei-Alavijeh, et al., 2015]. ‘Cancer’ is a general term used for a large group of diseases that can impact any part of the body. One of the characteristics of the definition of cancer is fast development of unnatural cells that grow beyond their common boundaries and then attack the neighboring parts in the body and begin spreading to other organs. The second process is called metastasis; metastasis is the main cause of deaths caused by cancer [Rushton, et al., 2010]. Lung cancer, prostate cancer, colorectal cancer, stomach cancer, and liver cancer are the most common types of cancer in men while breast cancer, colorectal cancer, lung cancer, cervical cancer and stomach cancer are the most common types in women. In fact, cancer can lead to very serious health conveniences [Bray, et al., 2013]. Most causes of deaths due to cancer are: lung cancer (1.9 million deaths), liver cancer (745000 deaths), stomach cancer (723000 deaths), colorectal cancer (694000 deaths), breast cancer (521000 deaths) and esophageal cancer (400000) [Ferlay, et al., 2010]. Meanwhile over 30 percent of cancer-related deaths can be reduced by correcting or avoiding key risk factors. Smoking is the main risk factor for around 20 percent of the cancer-related deaths and 70 percent of the deaths caused by lung cancer in the world [Siegel, et al., 2014; Syamlal, et al., 2014]. Up to 20% of the cancer-related deaths in low-income countries are due to HBV and HPV infections. Knowledge of causes of cancer and extensive interventions for prevention and management of this diseases can result in the reduction of affliction with it [De Martel, et al., 2012]. Studies have indicated that there is a direct relationship between an individual’s lifestyle and occurrence of cancer in a way that the role of lifestyle is more significant than that of other factors in the occurrence of common cancers such as breast cancer, prostate cancer, and colon cancer. If appropriate actions for prevention of cancer begins now, 2 million cancer-related deaths are prevented by 2020. In this regard, it is necessary to correct individuals’ knowledge, attitudes, beliefs and lifestyles [Ott, et al., 2010]. Also, one of the most effective and low-cost intervention methods for creating healthy behavior and changing life style for preventing and controlling diseases is health education. The aim of health education is trying to change behavior for maintaining health and improving life quality [Kok, 2014;

Baghiani Moghadam, et al., 2012; Morowatishaifabad, et al., 2015; Ali Morowatishaifabad, et al., 2015]. Therefore, the present study was conducted with the aim of exploring the effectiveness of educational interventions for prevention, screening, behavioral change and educational methods in order to determine the effectiveness and the improvements of future interventions.

Material and Methods

The present study was a systematic review which searched in the information data bases Scopus, ISI, PubMed and Science Direct with the key word cancer prevention educational intervention from 2010 to 2016. 6590 papers were found with the aforementioned keywords, 6513 of which were omitted due to irrelevance. 77 papers were explored in the second stage and 33 of them were selected and the rest were eliminated due to the being repetitive and due to their methods.

In the final papers 17 were from PubMed, 6 from Science Direct, 9 from ISI and 3 from Scopus.

Explanations are given in the following tables for the assessment and combination of the evidences from the impacts of cancer prevention educational programs in the daily lives of all individuals.

Study Method

The studies were mostly of cluster non-randomized and randomized controlled trials (RCT) and a few before and after intervention (N=8) were reported. The subjects included all age groups such as teenagers and students and of both sexes. Also, teachers, engineers, students and parents in the studies were considered as the subjects of the intervention. In most studies women were considered as the most-employed group for the intervention.

The Employed Educational Methods

From the perspective a systematic training and based on logical frameworks and principles, 6 studies were theory-based in which health education and health promotion theories such as health belief model, the theory of planned behavior, stages of change theory, biopsychosocial model, for changing knowledge and attitude, self-efficacy and intention for preventive behavior were used.

Intervention Design

The school-based, society-based and home-based interventions were reported. The education places were school, church and club in the city and village. Educational campaigns, lectures, online practical educational workshops, distribution of

educational materials, emails and videos were used. Some interventions included only one educational methods and some others used a combination of educational methods.

2 interventions in the present study emphasized the cultural characteristics and compatibility of the education with the target group. In addition, educational reminders, supporters and facilitators were used for more effectiveness of the education and the emergence and continuation of the learning behavior.

The objectives of the studies

Most of the extracted studies had been conducted with the intention of doing screening and prevention strategies 1 and 2.

Table 1: Procedures of and the Characteristics of the Target Group.

Finding	Variables	Authors	target group	Years of study	Study Plan
Raise awareness of the (HPV) human papillomavirus and increase the effectiveness of health care and acceptance of the vaccine (HPV) within 5 years .This reduces the burden of cervical cancer (Cervical Cancer)) was in a vulnerable population.	Identifying the needs of target groups, vaccination (HPV), educational strategy	Effect of Educational Intervention on Cervical Cancer Prevention and Screening in Hispanic Women Foley OW, Birrer N ,et all. ,Rauh-Hain JA	American women	2015	RCT
Group of telephone than the other groups (appointment receive educational materials through the mail) showed higher rates of colorectal cancer screening behavior and the different educational	Approach different training methods, screening behavior, urban areas.	A Randomized Trial to Compare Alternative Educational Interventions to Increase Colorectal Cancer Screening in a Hard-to-Reach Urban Minority Population with Health Insurance. Basch CE, Zybert P, Wolf RL, et all.	People over age 50 with health insurance &180=N & 185=N 199=N	2015	RCT

methods to increase and improve screening behavior should be handled					
Given the role of nutrition in cancer prevention and behavioral change techniques and health education is very impressive.	Behavior change techniques ((BCT), diet, teenagers.	aPSCA: Evaluation of a Brief Cancer Prevention Education Programme to Promote Balanced Diet in French School Children. Rennie LJ, Bazillier-Bruneau C, Rouëssé J.	French adolescent students 12-14 years 1830=N	2015	RCT
The use of women in the church and peer health counselors and reminders and amplifiers to reduce barriers to screening, 6 months after treatment showed that the church and The applicability and acceptability is to improve cancer screening among Latinos.	Adolescent health consultant, peers, church women	A pilot test of a church-based intervention to promote multiple cancer-screening behaviors among Latinas. Allen JD, Pérez JE, Tom L,et all.	18-year-old low-income people in Latin	2014	RCT
Education based on the theory of self-efficacy and perceived susceptibility and screening efficiency and social protection, and intend to improve colorectal cancer screening to 4 months of follow-up.	Teaching-centered, self-efficacy, susceptibility, social perceived support and behavioral intention	Effectiveness of a theory-based intervention to increase colorectal cancer screening among Iranian health club members: a randomized trial. Salimzadeh H, Eftekhari H, Majdzadeh R	People 50 years and above, N = 360	2014	RT

<p>Training program to increase screening for colorectal cancer (EPICS) and community-based implementation strategies (Web Access facilitator of learning materials, etc.) may cause changes in the screening were</p>	<p>Arm educational intervention, social integration, barriers and enabling and various training techniques</p>	<p>Efficacy to effectiveness transition of an Educational Program to Increase Colorectal CancerScreening (EPICS): study protocol of a cluster randomized controlled trial. Smith SA, Blumenthal DS.</p>	<p>The 74-, 50 N = 7200</p>	<p>2013</p>	<p>CRT</p>
<p>Educational programs using traditional educational materials and training for community-based cancer screening behavior in low-income countries and low literacy could increase.</p>	<p>Prevention training programs, cancer screening, community-based training</p>	<p>Colorectal cancer educational intervention targeting latino patients attending a community health center. Castañeda SF, Xiong Y, Gallo LC</p>	<p>People 50 years and older N=130</p>	<p>2012</p>	<p>RCT</p>
<p>Home-based training to improve knowledge and attitudes for colorectal cancer screening was done. And interventions based on the culture of rural communities to reduce barriers and improve access to (CRC) and other screenings were.</p>	<p>Home-based education, cancer screening, cultural events, rural areas, promote</p>	<p>Improving knowledge and screening for colorectal cancer among Hispanics: overcoming barriers through a PROMOTORA-led home-based educational intervention. Moralez EA, Rao SP, Livaudais JC, Thompson B.</p>	<p>People 50 years and older</p>	<p>2012</p>	<p>RCT</p>
<p>Education is a cost - effective approach for screening and treatment for colorectal cancer</p>	<p>Patients, reminders, booster, fecal occult blood</p>	<p>Cost-effectiveness of a mailed educational reminder to increase colorectal cancer screening. Lee JK, Groessl EJ, Ganiats TG,</p>	<p>Patients ,blind N = 382 and N</p>	<p>2011</p>	<p>RCT</p>

screening increased after 6 months of Visits.	testing, cost-effectiveness proportion	Ho SB	= 387		
Participants in home-based training program by the developers, the incidence of breast cancer screening behavior	Home-based education, promoters	Educating Hispanic women about breast cancer prevention: evaluation of a home-based promotor-led intervention. Livaudais JC, Coronado GD, Espinoza N	79-40 year old women N=750	2010	RCT
The community based interventions at the community level, knowledge and practice of women and men with regard to BSE and testicular cancer and increased personal time.	Community-based intervention, self-exam	Self-examination for breast and testicular cancers: a community-based intervention study. Shallwani K, Ramji R, Ali TS, Khuwaja AK	Women and men over 18 years of N= 127	2010	RCT
Web-based Education on understanding women and their intention for mammography and readiness for change had a positive effect.	Mammography, the theory of TTM, web-based Education	Effects of a tailored web-based educational intervention on women's perceptions of and intentions to obtain mammography. Lin ZC, Effken JA	Women's N=821	2010	RCT
Campaign to increase knowledge and awareness of teachers and students was about cancer.	Campaign, biology teacher, the program "Cancer, training for prevention"	Cancer--Educate to Prevent"--high-school teachers, the new promoters of cancer preventioneducation campaigns. Barros A, Moreira L2, Santos H	Teachers (54) and students (500)	2014	RCT
Education is a potential for reducing the risk of sunburn and skin cancer and increased	Health Belief Model, sunburn.	The impact of Sun Solutions educational interventions on select health belief model constructs. Lee C, Duffy SA, Louzon SA	Engineers, N = 232	2014	RCT

susceptibility, severity and perceived benefits is included.					
Statistics showed that the knowledge and guide colorectal cancer screening in women in the class were positive change. Community health workers also influenced by taping on the behavior of individuals.	Community-based intervention, health workers, Pap smear, mammogram	Breast, Cervical, and Colorectal Cancer Education and Navigation: Results of a Community Health Worker Intervention. Mojica CM, Morales-Campos DY, Carmona CM	Women 75-18 years N = 691	2015	RCT
6 months after the intervention, awareness and intent to increased screening and finds a significant percentage of screening behavior.	Theory-based intervention	Increasing Cervical Cancer Awareness and Screening in Jamaica: Effectiveness of a Theory-Based Educational Intervention. Coronado Interis E, Anakwenze CP, Aung M, Jolly PE.	Women N = 225	2015	RCT
After the intervention of urban and rural students took Behavioral Protection from exposure to sunlight.	Urban and rural areas, sun exposure, protective behaviors	Educational Activities for Rural and Urban Students to Prevent Skin Cancer in Rio Grande do Sul, Brazil. Velasques K, Michels LR, Colome LM, Haas SE	12-9-year-old adolescents N140	2016	RCT
Training to increase understanding of human papilloma vaccine to prevent teenagers from cervical cancer and consequently it plans to vaccinate Grdyd.hmchnyn stronger peer support is	School-based education, peer support, human papilloma vaccine acceptance	The effect of school-based cervical cancer education on perceptions towards human papillomavirus vaccination among Hong Kong Chinese adolescent girls Tracy T.C. Kwan, Kar-fai Tam, Peter W.H. Lee	Students, N953	2011	RCT

a useful option.					
Education teachers, nurses, health workers, health promoting and distributing educational materials caused the level of knowledge and intent and action of women for screening and referring to health centers increased.	Educational strategies, campaigns, health promoters, Pap	An educational strategy for improving knowledge about breast and cervical cancer prevention among Mexican middle school students Calderón,AN- Garcidueñas,YF De León-Leal,S.	Students Help N = 831 class 9-7	2011-2013	Experimental Before &after
9 months after the intervention improved weight control students but did not have much effect on changing risk behaviors. And reduce healthy eating behaviors .	Online intervention, risk reduction behavior, lifestyle, text message, psycho-social model	Impact of a web-based intervention supplemented with textmessages to improve cancer prevention behaviors among adolescents: Results from a randomized controlled trial Lana A, Faya-Ornia G , , Luisa López M.	Youth N=2001	2009-2012	RCT
Educational intervention on knowledge about the prevention of cervical cancer and sexual behavior was safe and effective in reducing the number of sexual partners.	. Knowledge, Attitude, reduction of sexual partners	Effect of an educational intervention on Hungarian adolescents' awareness, beliefs and attitudes on the prevention of cervical cancer Marek E, Timea Dergezb T, Rebek-Nagy G.	N = 953 male and female adolescents	2010-2011	Experimental Before &after

Increase public information and knowledge and self-efficacy intervention on colon cancer, skin, diet, and tobacco use was in the short term.	Interaction with patients, Bandura's social cognitive theory, Lifestyle	Evaluating an intervention to increase cancer knowledge in racially diverse communities in South Carolina Marvella E. Forda, Amy E. Wahlquist Celina Ridgeway	People 21 years and older N= 164	2011	Experimental Before &after
Increased knowledge enable them may be involved in the decision to promote prostate cancer screening.	Community-based interventions, make decisions.	A community-based intervention to promote informed decision making for prostate cancer screening among Hispanic American men changed knowledge and role preferences: A cluster RCT	Mens N=161	2011	C RCT
Collaborative development, implementation and evaluation of community-based cancer screening, information, newspapers and raise awareness and increase the screening rate was.	Workshop, Community-based, indigenous, culturally appropriate education, evaluation	Community-Based Participatory Development, Implementation, and Evaluation of a Cancer Screening Educational Intervention among American Indians in the Northern Plains Subrahmanian K, Petereit DG, Kanekar SH.	N=400	2011	Experimental Before &after
There was a change in intention, awareness and Pap smear screening behavior, identify Perceived barriers after the intervention.	The theory of planned behavior, campaigns, health promotion, health behavior	Increasing Cervical Cancer Awareness and Screening in Jamaica: Effectiveness of a Theory-Based Educational Intervention Evelyn Coronado Interis ,Chidinma P. Anakwenze , Maug Aung ,and Pauline E. Jolly	N=225 Women	2015	Experi mental Before &after
The improvement in perceived behavioral control and intention	Perceived behavioral control,	Prevention of Esophageal Cancer: Experience of an Educational Campaign for Reducing Hot Tea	N=130 girl student	2014- 2015	Experimental Before &after

were observed and hot tea in the students was low.	behavior, theory of planned behavior	Consumption in Iran Mirzaei F, Dehdari T, Saki Malehi A.			
After 6 and 15 months of intervention aimed at increasing cultural mammography.	Breast Cancer Screening	The Effect of a Couples Intervention to Increase Breast Cancer Screening Among Korean Americans. Eunice Lee RN, Usha Menon RN, Karabi Nandy.	N=211 Women over 40 years	2016	cluster randomized, longitudinal, controlled
6 months of follow-up awareness about breast cancer risk factors and screening behavior increased.	TTM, HBM theory. Health behaviors, computer-based health education	Atheory –Based intervention to improve Breast cancer Awareness and Screening in Jamaica. Chidinma p, Pauline E.	Women 35 to 40 and more N=134	2013	Experimental Before &after
Study to increase awareness and promote healthy behaviors and prevention of lung cancer, respectively. And share lessons learned and women to communicate with relatives taken into consideration	Focus on women's education, primary prevention, management, self-care	A Woman-centered Educational Program for Primary Prevention of Lung Cancer in a Cuban Municipality, 2012-2013 Cruz, Abel; Castillo, Zeida; Perez, Julia; et al.	N= 133 Womens	2012-2013	Experimental Before &after
0,1,6 months after the intervention improved Krdd scale of protection from the sun and students took protective behaviors. Effective education and peer education approach to improve the	Cognitive and behavioral effects, peer education, theory-based intervention	Evaluation of Cognitive and Behavioral Effects of Peer Education Model-Based Intervention to Sun Safe in Children Hu, Ping; Han, Lingli; Sharma, Manoj; et al.	N= 304	2014	C RCT

understanding and the knowledge and behavior of students.					
Training and intervention techniques to increase the amount of cervical cancer screening in women's market	Educational campaigns, cultural sensitivity, communication .market	Community Education on Cervical Cancer Amongst Market Women in an Urban Area of Lagos, Nigeria Wright, Kikelomo O, Kuyinu, Y. A., Faduyile, F. A	N=350	2010	simple random sampling
After training (lecture, slideshow, video) to change to the awareness of the risk factors for cancer happened.	Undergraduate, cancer risk factors	Cancer Awareness Changes After an Educational Intervention Among Undergraduate Students Lih-Lian Hwang	Students N=455	2011	Experimental Before &after
Training and intervention techniques to increase the amount of cervical cancer screening in women's market.	Educational campaigns, cultural sensitivity, communication .market	Community Education on Cervical Cancer Amongst Market Women in an Urban Area of Lagos, Nigeria Wright, Kikelomo O, Kuyinu, Y. A., Faduyile, F. A	N=350	2010	simple random sampling

Discussion

The aim of the present study was exploring the effectiveness of health education in preventive cancers in general and to investigate the way by which educational interventions result in adopting cancer-prevention behaviors. The educational programs of most studies resulted in the change in the individual's attitude, knowledge and the beliefs regarding cancer [Choi, & Park, 2012]. The study of the papers indicated the effectiveness of health education in creating an intention for change and cancer screening behavior which is secondary prevention. Individuals do not act due to the lack of knowledge and the fear of cancer screening result. They show cancer self-examination with the increase of knowledge, awareness and perceived susceptibility and severity of the disease seriousness [Donadiki, et al., 2014]. Also, the role of diet (fruit and vegetable and hot tea consumption), observing a balance in diet have been paid attention to and the role of smoking as a risk factor has been pointed out [Ismail, et al., 2012; Lana, et al., 2014]. Following an educational framework that is based on appropriate principles is highly important for the effectiveness of education. The use of

psychology theories may be a way for the change of behavior. The valuable theories in psychology in this regard include health belief mode, the theory of planned behavior and trans-theoretical model of behavior change that have also been used in cancer prevention studies [Buchanan, 2006]. The results of theory-based educations in the papers reviewed resulted in the improvement of perceived behavioral control and behavioral intention, reduction of barriers, the increased susceptibility and perceived severity of the disease and emergence of healthy behavior which included undergoing screening (mammography, colonoscopy, breast and testicular self-examination, protective behaviors against sunshine, reduction of number of sexual partners). The more the individual considers himself susceptible to the diseases, the more likely he adopts preventive actions. Perceived susceptibility is a strong cognitive element and is dependent to the individual's knowledge to some extent [Coronado Interis, et al., 2015]. A regulated educational program with different and combinational education strategies increases the effectiveness of education. In this regard, using traditional methods such as campaigns, distribution of brochures, practical workshops, lectures and video and modern methods such as online education, education through email, electronic education, website-based education, education through phone message together transfer knowledge and information more and better [Edwards, et al., 2010; Smith, & Blumenthal, 2013]. The use of one educational method alone may do not lead to change in risky behaviors [Lana, et al., 2014]. Peer educational programs are logic-based and have a high impact on the individuals' behaviors. It seems that peer educators who are the members of the same target group have a level of trust in and comfort with their peers and allow the sensitive issues to be discussed more [Campbell, & MacPhail, 2002]. According to the findings of the present study the use of this approach has resulted in the acceptance of cancer screening behaviors, and intention and preparedness for the change of behavior towards health promoting behaviors [Ping, et al., 2014]. The women-centered educational programs for primary prevention with the aim of prevention and control of cancer, the increase of knowledge and correction of incorrect behaviors in the present study emphasizes the key role of women for transfer of the learned materials and sharing information with family, friends and social networks as women have a significant role in health at home and in the society. And a healthy society is dependent on women's health [Cruz, et al., 2015; Mojica, et al., 2015]. Educational interventions should be compatible with the individuals' cultural characteristics, income level and even their living place (village or city) in the society so that they can cover the susceptible groups in the society in whom there are risky behaviors such as factors that make the individuals susceptible to cancer. The results verify the usefulness of cancer-

prevention educations in the society. An intervention that is compatible with rural culture results in the reduction of the barriers and the improvement of access to colorectal cancer screening and other types of screening [Moralez, et al., 2012; Subrahmanian, et al., 2011]. Teenagers are among other vulnerable groups in the society who, due to social, mental and physical characteristics, are at risk of health dangers such as cancer-related factors. In addition, some behaviors are formed in this period of life and due to this, the extracted papers have paid a special attention to this target group. The change in harmful behaviors, the creation of protective behaviors and reduction of cancer rate can be facilitated by providing this target group with health education related to elements of a healthy lifestyle in relation to fighting cancer risk factors [Rennie, et al., 2015; Velasques, et al., 2015; Kwan, et al., 2011]. One of the advantages of school-based interventions is the involvement of teachers and students in the health education process with the aim of reviewing the learnings related to cancer and prevention strategies as health promoters which in turn results in measuring and increasing learning in students and teachers and employing necessary recommendations on the issue [Barros, et al., 2014; Calderón-Garcidueñas, et al., 2015]. Society-based interventions include a high number of individuals in the society and increase the public knowledge, sensitivity and performance regarding cancer by major providing of information. And to some extent, it results in the behavioral change and increase of people's perception for healthy decision-makings. In line with this, the use of key figures such as nun paves the way for change. In addition, society's health staff has impacts. The advantages of society-based education is the participation of people in health and the development of teaching strategies [Shallwani, et al., 2010; Mojica, et al., 2015]. House-based and workplace-based interventions are done through social health promoters for resolving the barriers of preventive behaviors and access improvement [Livaudais, et al., 2010; Lee, et al., 2014].

Conclusion:

Health education is a potentially cost-effective that can enable individuals to manage their disease or prevent new cases of cancer by leading to adoption of preventive behaviors and improvement of health education and knowledge in individuals.

However, the approaches and techniques needed for the implementation of educational interventions are better to be combinational and cover all groups in the society. And, considering the occurrence of cancers in some population groups, the designing of the programs is recommended to be done with an appropriate sample size.

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