

RESEARCH ARTICLE

Awareness Survey on Knowledge of Microbial Infectious Causes of Cancer in Northern State of Sudan

Hussain Gadelkarim Ahmed

Abstract

Objective: The aim of this study was to assess the level of cancer awareness after delivering educational programs by assessing the awareness in regard to the role of microbial infectious agents in the etiology of some cancers. **Methodology:** Data were collected during Cancer Awareness and Educational Programs which were conducted at various places such as schools, clubs, mosques and Government health centres. This survey included 200 participants. **Results:** Of the persons who responded to the question, whether some viruses, bacteria, parasites and fungi, can cause cancer, 111/134 (82.8%), 105/129 (81.4%), 102/124 (82.8%) and 95/122 (77.8%), respectively, answered yes. **Conclusion:** The level of cancer awareness is low amongst Sudanese northern state inhabitants even after delivering an educational program.

Keywords: Sudan - cancer awareness - infectious agents

Asian Pacific J Cancer Prev, 13 (11), 5497-5500

Introduction

Infections with certain viruses, bacteria, and parasites are one of the biggest and preventable causes of cancer worldwide. Approximately 20% of cancers worldwide are induced by infectious agents (Zur, 2006; Bouvard et al., 2009). Cancers caused by infections generally have a higher mortality rates than other cancers. Out of the 12.7 million new cancer cases that occurred in 2008, the population attributable fraction (PAF) for infectious agents was 16.1%, meaning that around 2 million new cancer cases were attributable to infections. This fraction was higher in less developed countries (22.9%) than in more developed countries (7.4%), and varied from 3.3% in Australia and New Zealand to 32.7% in sub-Saharan Africa (IARC, 2008; Catherine et al., 2010). Cancer prevention and early detection through primary prevention and screening are among the key components of cancer control which, in turn, can lead to a decrease in cancer incidence and mortality in the population. This goes along with the development and implementation of sustainable awareness and education programs (IARC, 2012). Therefore, the role of the current study was to evaluate impact of ongoing cancer awareness, through measuring acquired knowledge after delivering seminars about the etiology of cancer in general. Section of Early Detection and Prevention.

Materials and Methods

All data were collected during Cancer Awareness and Educational Programs which were conducted at various

places such as schools, clubs, mosques and Government health centre. A total of 21,415 participants benefited from these programs. Two hundred individuals were randomly selected for filling a form regarding the relationship between cancer and microbial infectious agent. During the programs, information was given about cancer, causes and prevention. During the program, pamphlets related to cancer were distributed among the participants to educate them about cancer.

Results

This survey included 200 participants their ages ranging from 10-78 years with a mean age of 35 years old. Most of the participants their ages ranging between 18-29 years followed by 30-39, more than 50, 40-49, and 17 years old or less constituting, 41.3, 26.4%, 15.4%, 14.9% and 2% respectively. Of the 134/200 (64.7%), who responded to the question, whether some viruses can cause cancer, 111/134 (82.8%) answered yes and the remaining 23 (17.2%) have said no. Out of the 124/200 (62%), who responded to the question, whether some bacterial species can cause cancer, 102/124 (82.8%) answered yes and the remaining 23 (17.2%) have assumed no. The question, whether some Parasites can cause cancer, was answered by 129/200 (64.5%) participants of whom, 105/129 (81.4%), have said yes and the remaining 24/129 (18.6%) have said no. The question, whether some fungal species can cause cancer, was answered by 122/200 (61%) participants of whom, 95/122 (77.8%), have said yes and the remaining 27/122 (22.2%) have said no, as indicated in Table 1, Figure 1.

Table 1. Distribution of the Study Population by Knowledge of Infectious Cancer Causes

Variable	Yes	No	Total respondents
Viruses	111	23	134
Bacteria	102	22	124
Parasites	105	24	129
Fungi	95	27	122

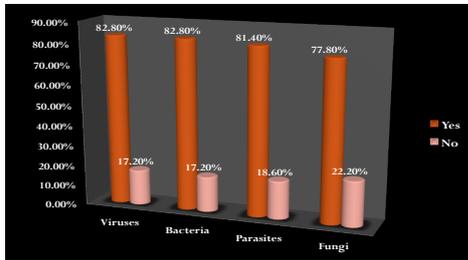


Figure 1. Description of Knowledge (Yes or No) of Infectious Cancer Causes

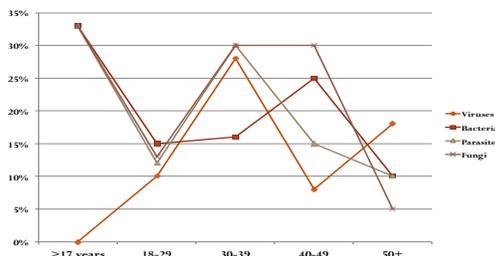


Figure 2. Description of the Study Subjects Answered (No) Infectious Agents Don't Cause Cancer by Age

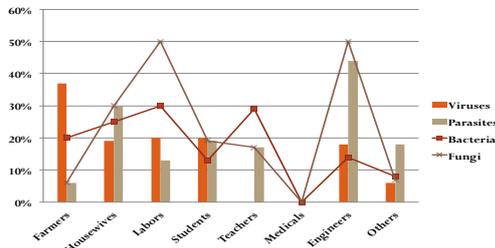


Figure 3. Description of the Study Subjects Answered (No) Infectious Agents Don't Cause Cancer by Occupation

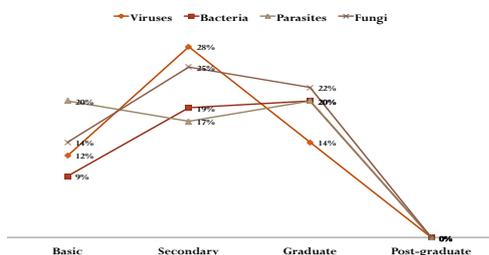


Figure 4. Description of the Study Subjects Answered (No) Infectious Agents Don't Cause Cancer by Education

In regard to knowledge, whether infectious agents can cause cancer, among different age groups, 33% of individuals in age range >17 years have supposed that, bacteria, parasites and fungi don't cause cancer. Also 30% in range 30-39 years have believed that parasites and fungi don't cause cancer, hence, the scores (No) for viruses and bacteria were 28% and 16%, respectively. Furthermore,

30%, 25% and 15% of participants among age group 40-49 years have stated the negative role of fungi, bacteria and parasite, in this order, in the etiology of cancer, as shown in Figure 2.

The relation between level of awareness and was indicated in Figure 3. High frequencies of answers (No) were identified among engineers, labors and housewife as shown in Figure 3.

When look upon the correlation between education level and knowledge of infectious agents as some can cause cancer, high frequencies of answer (No) were observed among secondary education level, followed by graduate and basic for all microbial infectious agents, but none of post-graduate have such suppose, as indicated in Figure 4.

Discussion

Cancer often creates fear which comes out of ignorance and misconception. More than 30% of cancer cases could be prevented by modifying lifestyle or avoiding key risk factors. About 1/3rd of cancer cases could be reduced if cases are treated and detected at an early stage. Many infection-related cancers are preventable (IARC, 2008). *Helicobacter pylori*, hepatitis B and C viruses, and HPV were responsible for 1.9 million cases, mainly gastric, liver, and cervix uteri cancers. Around 30% of infection-attributable cases occur in people younger than 50 years (Catherine et al., 2010).

It has been shown that Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are the major causative agent for hepatocellular carcinoma (Zemel et al., 2011; Yanming et al., 2012). HPV infection has been etiologically linked to cervical cancer (Elasbali et al., 2012), oropharyngeal squamous cell carcinoma (Rietbergen et al., 2012) and other cancers.

A high level of evidence exists for the association of *Helicobacter pylori* with carcinoma of the stomach (Lin, 2012), *Salmonella Typhi* with gallbladder and hepatobiliary carcinoma (Samaras, et al., 2010). *Opisthorchis viverrini* and *Clonorchis sinensis* with cholangiocarcinoma (Sripa et al., 2012) and *Schistosoma hematobium* with bladder cancer (Aly et al., 2012).

Aspergillus flavus is saprophytic soil fungus that infects and contaminates pre-harvest and post-harvest seed crops with the carcinogenic secondary metabolite aflatoxin (Amaike and Keller, 2011). Dietary exposure to aflatoxin B1 (AFB1) is associated with an increased incidence of hepatocellular carcinoma (Hui-Chen et al., 2009; Maryann et al., 2001).

The application of accessible public-health programs for infection prevention, including awareness to motivate people to seek suitable actions at time such as vaccination, safer injection practice, or antimicrobial treatments, could have a significant outcome on future burden of cancer worldwide. Therefore, this study highlights the need for cancer awareness program to be set on a national basis in light of the burden of infection-related cancers, particularly in a country like Sudan (a very low-income country). Although, this survey was preceded by educational program including public awareness seminars

and pamphlets, but still there is a lack of knowledge regarding the relation between microbial infectious agents and cancer development. However, a reasonable number of individuals ignore the role of fungi in the etiology of liver cancer, though, Sudanese are commonly using groundnuts crop, in preparation of different types of meals. This groundnut in most instances exposure to aspergillous flavus, which produces aflatoxin. Aflatoxin produces a tart test which is unfavorable, but because the crop is locally prepared by honing known as "Dacow", the aflatoxin will be distributed all over; the material and the tart test no longer exist.

For parasitic infection, many people think that the parasites have no role in the etiology of cancer, although, Sudan is one of endemic area for Schistosomiasis, particularly *Schistosoma Hematobium* 9 (Deribe et al., 2011). In a study investigated the prevalence of *Helicobacter pylori* in Sudanese subjects with gastroduodenal inflammation. *Helicobacter pylori* was found in 80% of patients with gastritis, 56% of patients with duodenal ulcer, 60% of patients with duodenitis and 16% of normal control subjects (Azim et al., 1994). The role of HPV, herpes simplex virus and Epstein-Barr virus in the etiology of oral cancers (Ahmed and Eltom, 2010; Jalouli et al., 2010), as well as the role of HPV in the development of cervical cancers cancer (Salih et al., 2010; Elsbali, et al., 2012; Ginawi et al., 2012) in different parts of Sudan was well established.

However, in comparison of the findings of this study with other findings in developed world, levels of awareness seemed to be higher among Sudanese and this might be attributed to the influence of the educational program that preceded the collection of data. Most available data regarding cancer awareness in relation to infectious agents are about HPV. In 1992 about 13% of women attending a southeastern university had ever heard of HPV and only 8% of them knew that it was associated with cervical cancer (Vail-Smith et al., 1992). In 2000, a population-based survey of women ages 18 to 65 living in the United States (US) found that only 28% had ever heard of HPV and only 41% of those knew that it was sometimes associated with cervical cancer (Lambert, 2001). In a national sample of women ages 18 to 75 years old, found that ~40% of women had heard of HPV, but less than half of those also knew that it caused cervical cancer. These low levels of knowledge are consistent with findings from other studies of US adult women (Mays et al., 2000; Holcomb et al., 2004; The Kaiser Family Foundation, 2006). In 39 studies published between 1992 and 2006 covering a total of 19,986 participants, the proportion of participants who had heard of HPV varied from 13% to 93%. Understanding that HPV is a risk factor for cervical cancer depended on whether the question was closed (8-68%) or open (0.6-11%). Between 5% and 83% knew about the association of HPV and (genital) warts. HPV was often mistaken with other sexually transmitted viruses. Health professionals and women had better knowledge about HPV than other participants (Klug et al., 2008).

In regard to occupation, most of those with low level of knowledge about the relationship between infectious agents and cancer were among engineers and

housewives, particularly for fungal infection. Notably, all medicals were found with full knowledge. Moreover, many participant at secondary education level lack the knowledge, particularly for viral and fungal infections, hence, all participant at post-graduate level were fully knowledgeable.

In conclusion, the level of cancer awareness has relatively increased amongst Sudanese northern state inhabitants after delivering an educational program. Cancer awareness can reduce the suffering due to cancer by educating patient choices and supporting cancer prevention.

References

- Ahmed HG, Eltoom FM (2010). Detection of Human Papilloma virus Types 16 and 18 among Sudanese patients with oral squamous cell carcinoma. *The Open Cancer J*, **3**, 1-5.
- Aly MS, Khaled HM, Emara M, Hussein TD (2012). Cytogenetic profile of locally advanced and metastatic *Schistosoma*-related bladder cancer and response to chemotherapy. *Cancer Genet*, **205**, 156-62.
- Amaike S, Keller NP (2011). *Aspergillus flavus*. *Annual Review of Phytopathology*, **49**, 107-33.
- Azim Mirghani YA, Ahmed S, Ahmed M, et al (1994). Detection of *Helicobacter pylori* in endoscopic biopsies in Sudan. *Trop Doct*, **24**, 161-3.
- Bouvard V, Baan R, Straif K, et al (2009). A review of human carcinogens--Part B: biological agents. WHO International Agency for Research on Cancer Monograph Working Group. *Lancet Oncol*, **10**, 321-2.
- Catherine de Martel, Jacques F, Silvia F, et al (2010). Global burden of cancers attributable to infections in 2008: a review and synthetic analysis. *The Lancet Oncology*, **13**, 607-15.
- Deribe K, Eldaw A, Hadziabduli S, et al (2011). High prevalence of urinary schistosomiasis in two communities in South Darfur: implication for interventions. *Parasites and Vectors*, **4**, 14.
- Elasbali AA, Saad El Din AA, Abdallah RR, Ahmed HG (2012). Cervical and oral screening for HR-HPV types 16 and 18 among sudanese women cervical lesions. *Infect Agent Cancer*, **31**, 17.
- Ginawi IA, Mahgoub EA, Ahmed HG (2012). Immunophenotyping of HPV types 16 and 18 among sudanese patients with oral lesions. *Oman Med J*, **27**, 201-6.
- Holcomb B, Bailey JM, Crawford K, Ruffin MT (2004). Adults' knowledge and behaviors related to human papillomavirus infection. *J Am Board Fam Pract*, **7**, 26-31.
- Hui-Chen Wu, Qiao Wang, Hwai-I Yang, et al (2009). Aflatoxin B1 exposure, hepatitis B virus infection, and hepatocellular carcinoma in Taiwan. *Cancer Epidemiol Biomarkers Prev*, **18**, 846.
- IARC Research sections (2012). Section of early detection and prevention. Lyon (France): IARC. Available at: <http://www.iarc.fr/en/research-groups/sec10/index.php>.
- International Agency for Research on Cancer (IARC) Working Group (2008). Agents Classified by the IARC Monographs. Vol. 61. Lyon (France): IARC.
- Jalouli J, Ibrahim SO, Sapkota D, et al (2010). Presence of human papilloma virus, herpes simplex virus and Epstein-Barr virus DNA in oral biopsies from Sudanese patients with regard to toombak use. *J Oral Pathol Med*, **39**, 599-604.
- Klug SJ, Hukelmann M, Blettner M (2008). Knowledge about infection with human papillomavirus: a systematic review. *Prev Med*, **46**, 87-98.

- Lambert EC (2001). College students' knowledge of human papillomavirus and effectiveness of a brief educational intervention. *J Am Board Fam Pract*, **14**, 178-83.
- Lin LL, Huang HC, Ogihara S, et al (2012). Helicobacter pylori disrupts host cell membranes, initiating a repair response and cell proliferation. *Int J Mol Sci*, **13**, 10176-92.
- Maryann ES, Sophie SC, Elisabeth AB, John ME (2001). The chemistry and biology of aflatoxin B1: from mutational spectrometry to carcinogenesis. *Carcinogenesis*, **22**, 535.
- Mays RM, Zimet GD, Winston Y, et al (2000). Human papillomavirus, genital warts, Pap smears, and cervical cancer: knowledge and beliefs of adolescent and adult women. *Health Care Women Int*, **21**, 361-74.
- Rietbergen MM, Leemans CR, Bloemena E, et al (2012). Increasing prevalence rates of HPV attributable oropharyngeal squamous cell carcinomas in the Netherlands as assessed by a validated test algorithm. *Int J Cancer*, **10**, 27821.
- Salih MM, Safi ME, Hart K, Tobi K, Adam I (2010). Genotypes of human papilloma virus in Sudanese women with cervical pathology. *Infect Agent Cancer*, **30**, 26.
- Samaras V, Rafailidis PI, Mourtzoukou EG, Peppas G, Falagas ME (2010). *J Infect Dev Ctries*, **3**, 267-81.
- Sripa B, Brindley PJ, Mulvenna J, et al (2012). The tumorigenic liver fluke *Opisthorchis viverrini* - multiple pathways to cancer. *Trends Parasitol*. Epub ahead of print.
- The Kaiser Family Foundation (2006). National Survey of Public Knowledge of HPV, the Human Papillomavirus. Available from: <http://www.kff.org/womenshealth/upload/The-HPV-Test-Coming-Soon-to-a-Doctor-s-Office-Near-You-Is-It-Better-than-the-Pap-Smear-for-Detecting-Cervical-Cancer-Chart-Pack.pdf>. Last updated: February 17, 2000. Accessed: August 30, 2006.
- Vail-Smith K, White DM (1992). Risk level, knowledge, and preventive behavior for human papillomaviruses among sexually active college women. *J Am Coll Health*, **40**, 227-30.
- Yanming Zhou, Yanfang Zhao, Bin Li, et al (2012) Hepatitis viruses infection and risk of intrahepatic cholangiocarcinoma: evidence from a meta-analysis. *BMC Cancer*, **12**, 289
- Zemel R, Issachar A, Tur-Kaspa R (2011): The role of oncogenic viruses in the pathogenesis of hepatocellular carcinoma. *Clin Liver Dis*, **15**, 261-79.
- Zur Hausen H (2006). Streptococcus bovis: causal or incidental involvement in cancer of the colon? *Int J Cancer*, **119**, 11-12.