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RESEARCH ARTICLE

THE AWARENESS OF HEALTHY INDIVIDUALS ABOUT ATTRIBUTABLE RISK FACTORS OF CANCER

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ABSTRACT

Purpose: This study aimed to determine the awareness of healthy individuals about the attributable risk factors of cancer and investigate the consistency of their ideas.
Material and Methods: A review of relevant literature was undertaken to assemble a list of possible causes of cancer. Seventy-six healthy individuals were interviewed. Individuals were asked to declare their opinion by scoring the potential 15 cancer risk factors between 0-4. One week later, the opinions were retaken to evaluate intra-rater reliability.
Results: Individuals mostly agreed with the attributable risk factors including nuclear accident (96.0%), smoking (94.8%), stress (93.5%), having a family history of cancer (92.1%), alcohol (90.8%), air pollution (86.8%), plastic (84.2%), mobile phone use (79.0%), washing agents (77.7%), sunlight exposure (69.77%), occupational exposure (67.1%), being overweight (63.1%), infection (57.9%), fatigue (54.0%), except age (34.2%). All risk factors had significant intra-rater consistencies in different levels (fair to perfect) between the two-time points ($p<0.05$).
Conclusion: It was determined that 14 out of the 15 risk factors carried a cancer risk according to the individuals. The formation of sufficient awareness and acceptance of risk factors has revealed the necessity of raising awareness in the fight against cancer.

Keywords: Awareness, cancer, public health, risk

INTRODUCTION

Cancer is one of the most common diseases. In 2020, there were 19.3 million new cancer cases and approximately 10.0 million cancer deaths worldwide (1). It is predicted that the annual number of new cancer cases anticipated to reach 21.6 million in 2030. With the declaration of 30-50% of cancer cases as preventable in the draft resolution adopted at the 70th meeting of the World Health Assembly, the importance of the measures that help society reduce cancer risk has increased (2). Some risk factors included smoking; excess body weight; alcohol intake; consumption of red and processed meat; low consumption of fruits and vegetables, dietary fiber,

and dietary calcium; physical inactivity; ultraviolet radiation exposure; and infection with Helicobacter pylori, hepatitis B virus, hepatitis C virus, human herpesvirus type 8, human immunodeficiency virus, or human papillomavirus (HPV) were reported (3). It was reported that up to one-third of incident cancers are attributable to modifiable factors in a recent study completed in Australia (4).

It is known that studies about estimating the various attributable risk factors to cancer provide helpful information for health planning and setting health priorities (5, 6) and cancer prevention priorities, such as sustainable goals (7) and cancer prevention campaigns. Typically, policymakers look to studies for estimates of preventable cancers. Risk factors are selected according to the level of evidence for a causal relationship and the relevancy of the risk factors for population health (5, 8).

It is also known that other factors are associated with lower cancer risk (9) and can take precautions on time. Cancer prevention is assumed to involve making patients aware of the risk factors and helping them minimize exposure to the risk factors via early detection of initial manifestations (10). General knowledge of these issues is also influenced by the mass media, literature, and observation. Unfortunately, ignorance of cancer affects a large percentage of the population—the late presentation to specialists results in a low cure rate (11).

In literature, attributable cancer risk factors in people's lifestyle, environment, and reproduction have been investigated (8, 12). Despite the volume of information about risk factors for cancer, only limited studies have investigated the perceptions of healthy individuals and the consistency of their perceptions about cancer-related risk factors (11). This study aimed to determine the awareness of healthy individuals about known risk factors attributable to cancer and evaluate the consistency of their ideas one week later.

MATERIAL AND METHODS

First, the researchers reviewed the literature to identify 35 possible risk factors for cancer. A list of these factors was then given to 6 experts with fourteen years (IK), four years (KO; SSK; SBY), and two years (MA, HUB) experience for their evaluation. In their opinion, the initial list was reduced following 15 attributable cancer risk factors contained references. Because, tobacco use (12), obesity and being overweight (13), alcohol consumption (14), high perceived stress levels (15), sun exposure (12), plastic including such materials as vinyl chloride or polyvinyl chloride (16), oncogenic viral infection (11, 12, 17, 18), occupational exposure to environmental pollutants (19), fatigue (20), nuclear accident (21), air pollution (22), smoke (23) and mobile phone usage (24) are known as attributable risk factors for the development of several types of cancer. Several unpreventable risk factors for cancer have also been reported, such as age, familial aggregation, etc. (25, 26). It is known that at least 5 individuals for each item should be enrolled to a study evaluated intra rater reliability (27). For this reason, 76 healthy individuals over 18 were included to the study. Written informed consent was obtained from the volunteer individuals for the study.

During data collection, the researchers first obtained relevant demographic information (age, gender, and occupation) from each individual. Afterward, individuals rated their opinion about the potential of each of the 15 attributable risk factors to trigger cancer by scoring each factor between 0 - 4 (0: Strongly Disagree, 1: Disagree, 2: Not Sure, 3: Agree, 4: Strongly Agree). The proportion of individuals who reported agree or strongly agree with attributable risk factors of cancer was defined as agreement level. The same items were applied to the individuals a week later (28) to test intra-rater reliability of their ideas.

Statistical Analysis

Statistical analyses were performed using the SPSS software version 15.0 (SPSS Inc. Chicago, IL, USA). Descriptive analyses were prepared using tables of frequencies and percentages for the ordinal variables and median (min-max) for the non-normally distributed variables. The intra-rater reliability of the individuals between the first and second assessments was tested by obtaining a Kappa value. The consistency was categorized as slight (0.00-0.20), fair (0.21-0.40), moderate (0.41-0.60), substantial (0.61-0.80), and almost perfect (0.81-1.00) (29). The correlations between the first and second assessments were tested with the Spearman Correlation Coefficient Test. All tests of significance were based on the 0.05 level. An overall 5% type I error level was used to infer statistical significance.

Ethical Consideration

This study was conducted at the Department of Physiotherapy and Rehabilitation, Faculty of Health

Table 1. Sociodemographic characteristics of the participants and study variables

		n (%)
Gender	Female	44 (57.89)
	Male	32 (42.10)
Occupation	Employed	73 (96.05)
	Unemployed	3 (3.94)
Education level	Primary/	3 (3.94)
	Secondary	16 (21.05)
	High School Graduate	6 (7.89)
	Pre-Graduate	6 (7.89)
	Bachelor	30 (39.47)
	Postgraduate education (Master / Doctorate)	15 (19.73)

Table 2. The consistency and correlation between first and second assessments of participant's ideas on attributable risk factors for cancer

Risk Factor	**First assessment**	**Second assessment**	**Consistency and correlation between first and second assessment**			
	n (%)	**n (%)**	**K**	**p_1**	**CC**	**p_2**
Smoking / Tobacco Usage	72 (94.73)	56 (73.68)	1.00*	<0.001	0.77	<0.001
Mobile phone	60 (78.94)	48 (63.15)	0.81*	<0.001	0.61	<0.001
To be overweight	48 (63.15)	39 (51.31)	0.67	<0.001	0.62	<0.001
Family history of cancer	70 (92.10)	53 (69.73)	0.70	<0.001	0.56	<0.001
Alcohol	69 (90.78)	57 (75.00)	0.45	<0.001	0.63	<0.001
Stress	71 (93.42)	59 (77.63)	0.56	<0.001	0.55	<0.001
Sunlight exposure	53 (69.73)	40 (52.63)	0.57	<0.001	0.77	<0.001
Plastic	64 (84.21)	46 (60.52)	0.45	<0.001	0.62	<0.001
Infection	53 (69.73)	43 (51.31)	0.42	<0.001	0.62	<0.001
Occupational exposure	51 (67.10)	40 (52.63)	0.49	<0.001	0.68	<0.001
Fatigue	41 (53.94)	32 (42.10)	0.59	<0.001	0.54	<0.001
Nuclear accident	73 (96.05)	58 (76.31)	0.59	<0.001	0.58	<0.001
Age	26 (34.21)	25 (32.89)	0.51	<0.001	0.60	<0.001
Air pollution	66 (86.84)	54 (71.05)	0.40	0.02	0.53	<0.001
Washing agents	59 (77.63)	43 (56.57)	0.32	<0.001	0.53	<0.001

*** Perfect Agreement K: Kappa value CC: "Correlation Coefficient"**

Science. The Clinical Ethics Committee of Gazi University approved the study (approved number and date: 77082166-604.01.02-1496, 22/01/2014). The study was recruited between 2014 and 2016.

RESULTS

The median age of individuals was 28 (16-69) years old. Gender, working, and educational status were reported in Table 1. Twenty-four individuals had first or second relatives diagnosed with cancer, and 17 individuals knew of somebody diagnosed with the disease. The sample of healthy individuals included 10 individuals with comorbid diseases such as diabetes mellitus (n:1), rheumatoid arthritis (n:3), and metabolic disorders (n:7).

As shown in figure 1, the individuals in the present study mostly agreed with the 15 attributable risk

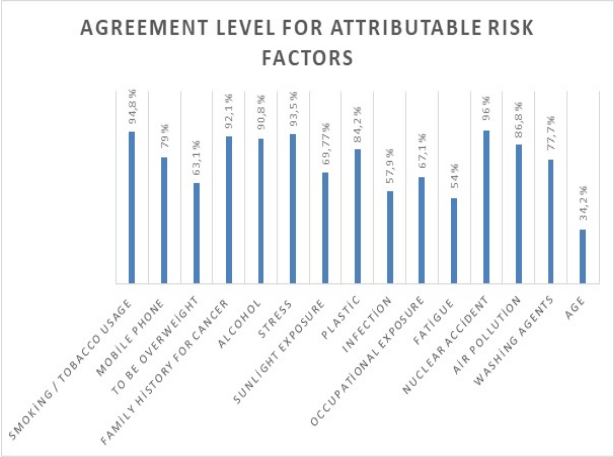

Figure 1. The ideas on attributable risk factors of the participants.

factors for cancer identified by our experts, except age.

For each risk factor, the consistency and the correlation results between the assessments were summarized in Table 2. The intra-rater reliability results were statistically significant between the assessment for all the 15 attributable cancer risk factors ($p<0.05$). In addition, the perfect consistency was found between the two tests for smoking/tobacco usage and mobile phone; substantial consistency for being overweight and having a family history of cancer; moderate consistency for alcohol, stress, sunlight exposure, plastic, infection, occupational exposure, fatigue, nuclear accident, age; fair consistency for air pollution and washing agents ($p<0.01$). The details of consistency and correlation between first and second assessment are shown in table 2.

DISCUSSION

While many public information sources on cancer and its reasons, individuals' perceptions are critical to their attitudes and efforts toward prevention (23). Previous research has considered the risks associated with specific types of cancer; however, only a limited number of studies (5) have sought to determine the awareness of healthy individuals about the variety of risk factors associated with cancer. To the best of our knowledge, the present study is the first to test the consistency of individuals' ideas. Most healthy individuals agreed with most of the examined factors, and their ideas did not change over time in this sample. The importance of attributable fractions lies in helping to quantify where prevention strategies may be deployed to achieve the most significant effect (30). Studies like the current one may help improve such efforts by testing the awareness of healthy people about cancer-related issues and what they think they can do to alleviate them.

Although the agreement rates of the individuals for 15 attributable risk factors were reduced one week later, there were fair to almost perfect intra-rater consistencies for the risk factors between the first and the second assessments.

Our survey cohort was most aware of the cancer risk associated with nuclear accidents, with a 96.0% agreement rate and perfect intra-rater consistency regarding attributable risk factors. Anyone exposed to the fallout of a nuclear accident is at risk of experiencing thyroid dysfunctions and cancer (31). The high agreement rate we obtained on the cancer risks associated with nuclear accidents may be due to the significant coverage given to the incidents and the ongoing attention.

The second highest agreement was smoking/tobacco use, with a high rate of 94.8%. Our sample had high awareness and perfect intra-rater consistency of the cancer risk associated with this factor. Pham et al. also reported that almost all the participants (94.9%) were recognized that smoking is a risk factor for cancer (32). Tobacco contains more than 7000 chemicals, of which at least 250 are known to be harmful, and more than 50 are known to be important predisposing factors for several types of cancer (11). From this perspective, public health training programs and multivariate campaigns could be considered adequate for both smoking and passive smoking. Tobacco is the single, most significant, and avoidable risk factor for cancer worldwide.

The third most agreed factor was stress, with a rating of 93.5% and moderate intra-rater consistency. Our sample of healthy people is aware of the link between high levels of perceived stress and cancer, but it may not be expressly aware that it has been seen to heighten the risk of developing cancer (15).

The fourth most accepted attributable factor for cancer risk was family history, with a rating of 92.1% agreement and substantial intra-rater consistency. Familial aggregation is now well-established to increase the risk of many different types of cancer (25). Awareness of increased cancer risks informs the planning of treatment, screening practices, and prevention options for cancer can be well established (33). According to a higher awareness level, it is possible to diagnose earlier.

In our sample, alcohol was placed fifth as a factor, rated 90.8% agreement and moderate intra-rater consistency. Similarly, alcohol intake was recognized a risk factor with a 92.3% rate for cancer in a study (32). Alcohol consumption is a risk factor for developing esophageal and oral cancers in many countries (18). Alcohol likely mediates the effect of other carcinogens as a solvent, free-radical generator, or inducing local tissue reactions (30).

Our sample recognized air pollution as a cancer risk, rated 86.8% agreement and moderate intra-rater consistency. This high ratio may reflect public concern about the growing evidence of the harmful effects of polluted air, especially in urban areas (22). Comprehensive media coverage has also been given to the association between exposure to black smoke, traffic, and lung cancer incidence (34). In this study, individuals were aware of the risk of air pollution, which can be interpreted as the success of public health campaigns. In a study, air pollution was agreed by 61.3% of the participants as a risk factor for cancer (35).

Similarly, our sample strongly agreed that plastic in various forms is a cancer risk, rated 84.2% agreement and moderate intra-rater consistency. Kabalan et al reported that participants were agreed that plastic bottles were a cancer risk factor with 58.4% agreement rate (36). Individuals are likely familiar with the much-publicized hazards associated with the material and its detrimental impact on the environment. However, they may not necessarily know which plastics to avoid, or the cancer risks associated with exposure to material containing vinyl chloride or polyvinyl chloride, which presents a specific risk of liver cancer (16).

Another attributable risk factor was mobile phone usage, with a 79.0% agreement rate and moderate intra-rater consistency. In a study, the agreement rate of mobile phone usage as a cancer risk factor was 48.3% (36). Most of the individuals associate the long-term use of these devices with cancer. While little evidence has been produced to substantiate this attribution, most people remain skeptical or suspect that frequent exposure carries cancer risk. For this reason, significant coverage was given to reports of a significant association between mobile phone usage of more than five years and glioma risk (24). Because phone use is wide spreading without awareness of the risks.

Our sample agreed washing agents are a significant attributable risk factor for cancer, with a rating of 77.7% and moderate intra-rater consistency. Several scholarly articles have demonstrated various risks associated with exposure to chemicals used in washing agents, such as lauric acid and linear alkyl benzene sulfonate. Lauric acid may trigger antiproliferative and pro-apoptotic effects in breast and endometrial cancer cells. In addition, linear alkylbenzene sulfonate may have a tumor-promotion effect on colon cancer cells, and it has toxicological effects even at low concentrations. Such information appears to have engendered a high level of public awareness, but this result may also mirror the assumptions of healthy individuals.

Exposure to the sun was also thought to pose a significant cancer risk, with a rate of agreement of 69.77% and moderate intra-rater consistency. Occupational sun exposure is positively associated with the risk of non-Hodgkin lymphoma (11). However, in this case, individuals' responses may be less informed by their awareness of skin cancer risks than their familiarity with sunburn and information presented in weather reports that warns them to stay out of the sun when dangerous levels of ultraviolet are forecast.

Our healthy group also identified occupational exposure as a cancer risk, with 67.1% agreement moderate intra-rater consistency. Most healthy people in our sample know that conditions for workers in industrial areas are improving but that some occupations face significant cancer risks. They are also likely to have noticed enhanced precautions for handling, labeling, and safe use of toxins at work, reminding them of health risks across various occupations. Our sample's high level of recognition reflects ongoing concerns about safety at work and cancer. As evidenced by reports, occupational exposure to gasoline and flammable products may play a role in the causation of male breast cancer (37), or occupational exposure was reported for several cancers (16, 19, 38).

Our sample shared a rate of 63.1% agreement and substantial intra-rater consistency that being overweight/obese increases cancer risk. Lizama et al. stated that being overweight or obese was recognized as cancer risk factor by %86 of the participants (4). It was reported that 17294 excess cancer cases in 2010 were due to being overweight and obese (5.5% of all cancers). Bowel and breast cancer are the body sites that contribute most to this excess (13). Such information has been used in various campaigns that raise awareness of the need

to tackle obesity, the general benefits of being fit, and the attendant risk of obesity to cancer. Most of our sample know the link, but some may require more information to acknowledge this risk.

Our healthy group thought that infection has cancer risk at a 57.9% agreement ratio and moderate intra-rater consistency. Oncogenic viral infections are risk factors for cancer development (11, 17, 18). However, the frequency of such infections is not so high in Turkey. The relationship between cancer and infection may not have been communicated to the public.

The agreement ratio for fatigue was 54.0% and this risk factor had moderate intra-rater consistency, yet many studies have investigated the effects of strenuous exercise and fatigue on immune functions. Endogenous estrogens are thought to play an active role in breast cancer development. Strenuous physical exercise decreases the estrogen level, is related to delay at the beginning of menses, and enhances the number of anovulatory cycles. Moreover, the effect of exercise, the role of natural immune changes, and biological relevance on breast cancer development are not apparent. It seems that the middling recognition of our sample reflects the current scientific debate, which may have resulted in a lower priority being given to communicating this risk via public health policy. It was reported that the number of neutrophils, lymphocytes, natural killer cells, tumor necrosis factor-alpha, and interleukin 1, 6, and 10 increased during strenuous exercise (39). Such findings demonstrate that supervised exercise had several beneficial effects on the function of the immune system, which is a critical biological factor in cancer.

Age was only predicted to have cancer risk at a 34.2% agreement ratio and fair intra-rater consistency by our sample. This low figure contrasts with reports in the literature that advancing age is the most critical risk factor for cancer overall and many individual cancer types (40). Health policymakers know that population screening for cancer may cause significant changes in its total and age-specific incidence, as witnessed in some cancers like cervical cancer (2). They would also know that age of onset is essential for evaluating familial risks (26). There is a need to improve public awareness about age-related cancers because it would help the population achieve early cancer diagnosis.

It has been estimated that one-third of cancers can be prevented and treated. However, assessing patient knowledge and acceptance of cancer has become necessary to increase awareness of cancer in society successfully. As awareness of risk factors increases, so do the opportunities to detect disease in its early stages. For this reason, society needs to engender positive attitudinal changes through promotional campaigns that aim to spread information about cancer and raise individuals' awareness of the disease (41).

The most significant contributors to the cancer burden are tobacco smoking, physical inactivity, and excess body weight, important targets for future cancer prevention initiatives. Furthermore, if all the risk factors included in a prevention project are considered adaptable, we would know that any increase in the proportion of the population at the theoretical minimum risk level of exposure can reduce the cancer burden in a specific population (11).

Despite all efforts, several studies have also exposed that a sizeable part of the population (19) is misinformed about cancer risk (42). For this reason, some studies were conducted to investigate the patients' understanding of cancer-related risk factors. A considerable need for implementing prevention programs was necessary to address low levels of patient awareness of cancer risk factors and ignorance of screening tests to detect subsequent cancers (41).

The general public's awareness of attributable cancer-related risk factors is needed to be improved, and protection is essential for identifying knowledge deficiencies. Moreover, informing the policymakers about effective and targeted health promotion strategies is needed (4).

Awareness is fundamental to the fight against cancer, and efforts to promote health and encourage society to undergo cancer screening should be expanded. Education in this respect should be started from the youngest age group. This education should reach all communities, especially those at the most significant cancer risk. Public education, especially education of people, may help to change harmful behaviors and increase cancer patients' survival (43).

Limitation

The healthy people who participated in this study could not spend much time answering the questionnaire, and their answers may not accurately reflect their knowledge and attitudes.

CONCLUSION

In our study, the healthy individuals agreed that 14 of the 15 cancer-related risk factors were identified by experts. According to our results, individuals were aware of these factors and the attributable risk factors are highly accepted and, there were fair to almost perfect intra-rater consistencies. Most individuals did not accept that age was a factor that can carry cancer risk and were stable in their ideas over time. There is a need to improve the understanding that age is an essential factor for cancer through more goal-oriented precautions and screening programs in the future.

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