Perception of the population of the city of Passos on the factors that determine the appearance of cancer: myths and truths

Percepção da população da cidade de Passos sobre os fatores que determinam o surgimento do câncer: mitos e verdades

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ABSTRACT: Introduction: Malignant neoplasms are responsible for many deaths worldwide, which justifies the fear and curiosity of which population faces these diseases. To learn about cancer prevention, many people search for information in the most convenient means of communication, which does not always show the clinical evidence of the diseases correctly. Moreover, much of the knowledge is based on popular beliefs inherited from generations without any scientific basis. Objective: Analyze the population’s perception of the risk factors associated with cancer and classify them according to the level of evidence found in scientific literature. Methodology: 146 participants were randomly selected and answered a questionnaire sent by email asking what the respondent considers a risk factor for developing cancers. These data were tabulated, and a bibliographic search was carried out to recognize the risk factors mentioned by the population as scientifically evident or not evident. Results: Stress and psychological causes were mentioned by 43.84% of the people surveyed and classified as partially positive evidence by the bibliographic study. Cigarette smoking was mentioned by 39.04% of the participants. It was classified as positive evidence. The genetic inheritance was indicated by 38.36% and classified as positive evidence; unprotected sex was mentioned by only one person and was classified as positive evidence. Conclusion: The data obtained showed that most of the responses were related to published and proven scientific evidence; however, further studies and more impacting prevention plans should be carried out.

Keywords: Risk factors; Cancer; Brazil.

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**RESUMO**: As neoplasias malignas são responsáveis por inúmeras mortes em todo o mundo, por isso são encaradas pela população com muito temor e curiosidade. Sendo assim muitas pessoas recorrem aos meios de comunicação mais convenientes, que nem sempre abordam corretamente as doenças, para se informar sobre prevenção do câncer, ou então se baseiam na cultura popular passada por gerações sem nenhum embasamento científico. **Objetivo**: Analisar a percepção da população sobre os fatores de risco para o câncer e classificá-las de acordo com o nível evidência encontrado nas pesquisas científicas. **Metodologia**: Foram selecionados 146 participantes, de maneira aleatória, que responderam a um questionário enviado por e-mail o qual indagava o que o pesquisado considera que seja um fator de risco para se desenvolver cânceres. Esses dados foram tabelados e uma pesquisa bibliográfica foi realizada para reconhecer os fatores de risco mencionados pela população como evidentes ou não evidentes cientificamente. **Resultados**: O estresse e causas psicológicas foram mencionados por 43,84% das pessoas pesquisadas e pelo estudo bibliográfico foi classificado como evidência parcialmente positiva. O cigarro foi mencionado por 39,04% dos participantes e foi classificado como evidência positiva, a herança genética foi indicada por 38,36% e classificada como evidência positiva, sexo sem proteção foi mencionado por apenas uma pessoa e foi classificado como evidência positiva. **Conclusão**: Com os dados obtidos observamos que, a maioria das respostas possuem relação com evidências científicas publicadas e comprovadas, no entanto, mais estudos e divulgação acerca de formas preventivas devem ser realizados.

**Palavras chave**: Fatores de risco; Câncer; Brasil.

**INTRODUCTION**

The world population is facing a cancer pandemic, which annually kills millions of people of all age groups and social conditions; in this context, for Brazil, estimates for each year of the triennium 2020-2022 about 625,000 new cases of cancer. For this reason, the knowledge of preventive, effective, and scientifically proven measures to guide the population against the disease is urgent.

However, what is observed is a mistaken perception of the general population, both in the prevention of the pathology and its treatment methods. It is often due to access to the media, such as blogs and social networks, which spread information that is sometimes very individual and without scientific evidence. Added to this is the emergence of false news with promises of miracle cures for the disease. Consequently, the accumulation of conflicting information exposes the population to several risk factors that could be avoided. Moreover, it brings many misconceptions about prevention and treatment, hindering the role of health institutions in controlling the disease.

It is essential to highlight that cancer is a multifactorial disease, i.e., an interaction of non-modifiable risk factors, such as genetic predisposition, age, gender, and race, with modifiable risk factors such as smoking, alcoholism, obesity, exposure to environmental carcinogens and infectious agents, and reproductive history. The junctions of these interactions explain the pathogenesis of the disease and the individual character of each diagnosis.

An aim of the National Cancer Institute (INCA), with campaigns and publications, is to spread quality information for the benefit of the Brazilian population to encourage healthy behaviors that can help prevent modifiable risk factors. This concern began in a survey conducted in 2018, which showed a significant lack of knowledge among the Brazilian population regarding the real risk factors for the development of cancer. Thus, this work aims to know the opinion of the population from Passos/MG about the risk factors for cancer and classify them according to the level of scientific evidence found in the literature. The results obtained will be disseminated in basic health units, hospitals, and educational convention centers to benefit the population with quality information about cancer control.

**METHODS**

This research is characterized as an analytical, exploratory, cross-sectional study. Information was first collected from 146 participants by sending a questionnaire by email. In addition, they were also sent an informed consent form. The inclusion criteria were individuals over 15 years of age, with any level of education, except health professionals, because we aimed to observe the opinion of lay people on the subject. The survey was carried out in April 2020. The volunteers were asked what they believed to be the risk factors for a person to develop cancer. In addition, the volunteers filled in information about their age, education, and profession. After the information was collected, it was tabulated and characterized according to its prevalence.

Through periodicals, documents prepared by government institutions, and INCA publications, a literature review was started to classify the risk factor mentioned. The articles were selected using the PubMed, SciELO, and BVV databases to perform the study. The descriptors used were risk factors, cancer, and the risk factor researched in each search. Papers published from 1982 to 2020 in Portuguese, English, and Spanish were selected. Thus, 235 articles were found. A critical reading of the abstracts and methodologies was carried out to choose the papers included in this review. The articles included contained information about the risk factors mentioned by the population, and reports that did not address these factors were excluded. Thus, 147 articles remained, which were used in the present research.

Classifications about evidence level were made as: [1] Positive evidence, if there are no published objections that the risk factor is genuine; [2] Partially positive evidence, if there are studies that show its relationship as a
risk factor, but it still needs further studies or its relationship is relative to other factors; [3] Partially negative evidence when studies show no relationship but further studies need to be conducted; [4] Negative evidence when studies prove that there is no relationship between the cited factor and carcinogenesis, and [5]. Inconclusive when the published studies do not allow a conclusion about the impact of the cited factor on cancer development.

The Ethics and Research Committee of the Atenas School of Passos, MG, submitted and approved this work under protocol 4.209.308.

### RESULTS

The study population comprised 146 participants: 32.87% were male and 67.13% female, the mean age was 34.5 years (±16.5), being 39.04% (n=57) between 15 and 29 years, 47.79% (n=70) between 30 and 59 years, and 13.01% (n=19) between 60 and 92 years. Regarding the level of education, 0.68% (n=1) declared themselves illiterate, 13.69% (n=20) had an incomplete high school education, 27.39% (n=40) had a complete high school education, and 44.52% (n=65) had a complete college education.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Participants</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>67.13</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>32.87</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>between 15 and 29 years</td>
<td>39.04</td>
<td></td>
</tr>
<tr>
<td>between 30 and 59 years</td>
<td>47.79</td>
<td></td>
</tr>
<tr>
<td>between 60 and 92 years</td>
<td>13.01</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>High school incomplete</td>
<td>13.69</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>27.39</td>
<td></td>
</tr>
<tr>
<td>Higher Education Complete</td>
<td>44.52</td>
<td></td>
</tr>
</tbody>
</table>

The study showed that 43.84% of the participants pointed to stress and psychological causes causing cancer, 39.04% talked about smoking, and 38.36% indicated heredity as an isolated risk factor for cancer. The risk factors mentioned and their scientific evidence are shown in Table 1. We considered only the factors cited by more than 10% of the participants (Full table in Supplement 1).

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Frequencies</th>
<th>Percentages</th>
<th>Evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress and psychological causes</td>
<td>64</td>
<td>43.84%</td>
<td>2</td>
</tr>
<tr>
<td>Smoking</td>
<td>57</td>
<td>39.04%</td>
<td>1</td>
</tr>
<tr>
<td>Hereditary</td>
<td>56</td>
<td>38.36%</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate nutrition</td>
<td>46</td>
<td>31.51%</td>
<td>1</td>
</tr>
<tr>
<td>Processed foods</td>
<td>42</td>
<td>28.77%</td>
<td>1</td>
</tr>
<tr>
<td>Sedentary life</td>
<td>25</td>
<td>17.12%</td>
<td>1</td>
</tr>
<tr>
<td>Agrotoxic</td>
<td>24</td>
<td>16.44%</td>
<td>1</td>
</tr>
<tr>
<td>Alcohol</td>
<td>22</td>
<td>15.07%</td>
<td>1</td>
</tr>
<tr>
<td>Solar Radiation</td>
<td>19</td>
<td>13.01%</td>
<td>1</td>
</tr>
<tr>
<td>Radiation/X-Ray</td>
<td>16</td>
<td>10.96%</td>
<td>1</td>
</tr>
</tbody>
</table>

Author source.
DISCUSSION

Many participants pointed to stress as a risk factor for cancer, which Selye described in 1936 as a set of sensory or psychological experiences with harmful effects. In this sense, restriction of sleep and leisure, excess or lack of work, hunger, and social difficulties, which generate harmful metabolic and hormonal changes that may be related to the development of cancer. However, most of the population is subject to these factors, so it is necessary to determine the intensity and time of exposure to these factors related to oncogenesis.

Smoking is the leading risk factor for lung cancer, with a high mortality rate worldwide. Moreover, other studies have also linked smoking to head and neck cancer, affecting the kidneys and bladder. This is due to many toxins present in cigarettes, which are potentially carcinogenic to humans.

Regarding genetics, 38.36% of participants believe that cancer is hereditary, as many investigations have already demonstrated. Still, it should be noted that not all cancers are caused by inherited mutations but by those acquired after birth. Therefore, we note several specific types of cancers and their respective heritably mutated genes, such as the BRCA1 and BRCA2 genes related to breast and ovarian cancer in women and breast cancer in men. In hereditary rectal cancer, an absence of expression of the MLH1, MSH2, or MSH6 proteins is shown with alterations in APC and TP53 genes that trigger the disease.

Inadequate feeding also had an expressive percentage in the answers to the survey. Studies show that food can generate a process of initiation, promotion, and propagation of cancer. As the subject is broad, we highlight some items mentioned in the research, such as red meat, classified as “probably carcinogenic to humans” in 2015 by the International Agency for Research on Cancer, which showed a positive association between red meat consumption and colorectal cancer. However, today this same entity classifies the consumption of processed meats as “carcinogenic to humans” regarding colorectal and stomach cancer.

In a population-based case-control study conducted between 2005 and 2012, was observed that consumption of processed foods was associated with a higher risk of prostate cancer, while no processed or minimally processed foods were associated with a lower risk of developing this cancer. A case-control study conducted in Guangzhou, China, between 2006 and 2008, with 500 patients with epithelial ovarian cancer and 500 controls, showed a positive association between the intake of canned food and the incidence of ovarian cancer in southern China.

A study in Bangladesh has shown that several carcinomas, including skin cancer, are significantly increasing in patients who have drunk water polluted by arsenic and iron. These compounds promote cellular changes in keratinocytes that lead to their mutation and proliferation of already mutated cells. Thus, water treated with arsenic and iron or from near treatment plants in metal industries is a possible risk factor for cancer development.

It has been shown that physical activity as primary prevention reduces the risk of breast cancer by 15 to 20% and colorectal cancer by 24%. Thus, studies show that physical activity is essential to prevent cancer, obesity, and other diseases. Obesity was also a risk factor mentioned, interaction between adipocytes and cancer cells can lead to changes in the function and phenotype of both cell types. These interactions actively alter the tumor microenvironment (TME). In obesity, the increase in size and number of adipocytes leads to instability of the TME and increased hypoxia within the TME factors related to increased risk of tumor invasion and occurrence of metastases.

Another critical factor mentioned was alcohol consumption. Andrade et al. showed that the use of alcohol for more than 20 years increases the risk of developing the oral cancer by three times, and regarding the frequency of use, it was observed that individuals with a high frequency of consumption, drinking more than twice a week and in high quantities, had a five times higher risk of developing this cancer. Furthermore, it was observed that drinking distilled beverages such as cachaça, vodka, whiskey, and cognac increased the risk by almost six times. It is relevant to note that the authors of this study could not measure the amount in grams of alcohol associated with risk because the participants were imprecise in providing this data.

Pesticides have also been mentioned as possible risk factors for cancer. A meta-analysis has already demonstrated the association of pesticide dietary intake with an increased risk of developing bladder cancer. A cohort study of 57,310 pesticide applicators showed a positive association between pesticides such as imidazolone, imazethapyr, and imazaquin, aromatic amines, with an increased risk of bladder cancer.

Solar radiation was cited by 13.01% of the participants. According to a study conducted in India, UV radiation acts as one of the most potent genotoxic agents, affecting DNA stability and integrity. Moreover, the Brazilian Society of Dermatology research states that UV rays, besides increasing the occurrence of gene mutations, have a suppressive effect on the cutaneous immune system. Ionizing radiation, which can be a natural source, such as radon, found in closed environments like underground mines, and non-natural bases, such as those found in X-rays, CT scans, and radiotherapy, is a crucial carcinogenic agent in humans. Epidemiological studies showed direct evidence of organ dose. They increased cancer risk, with strong hypotheses that even at low doses of radiation, there is a significant increase in the risk of developing cancer.
Chemical products have also been mentioned as a potential risk factor, formaldehyde being an important example, being recognized by the World Health Organization (WHO) as a carcinogen, classifying it in group 1, i.e., with strong evidence of involvement in carcinogenesis. However, a cohort study of 14,008 chemical workers in 6 factories in England and Wales from 1941 to 2012 showed that exposure to formaldehyde does not increase the risk of myeloid leukemia, nasopharyngeal carcinoma, or other upper airway tumors. Therefore, this statement needs further studies.

Some causes mentioned by the research participants are not scientifically proven to be a possible risk factors for cancer. A highlight was the mention of chicken consumption due to the presence of hormones. Considering the main hormones used in food production, the development of breast cancer is the main risk and is, therefore, the most studied. Several studies have been done to evaluate the breast-related neoplastic potential of the residues of these hormones in food, such as meat and dairy products, but none have shown this relationship.

CONCLUSION

This research showed that most of the risk factors indicated by the population are related to published and proven scientific evidence. However, it is extremely important to highlight that cancer has its etiology in the multifactorial scope. Therefore it is not an isolated risk factor that will define if the organism will develop the disease. It is necessary to encourage the population to adhere not only to one but to several changes in their lifestyle that can contribute to the prevention of several types of malignant neoplasms and other comorbidities, favoring an increase in life expectancy and a higher quality of the population’s health. Furthermore, it is necessary to warn that some risk factors are not modifiable, such as age and heredity. In these cases, early diagnosis is the best measure. Later, we intend to carry out an extension project to take this information to the population.

REFERENCES


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