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Assessment of public awareness of the impact of risk factors on the development of gastric cancer in Chernivtsi region

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ABSTRACT

Background: The awareness of the adult population of Chernivtsi region of the risk of gastric cancer and a healthy lifestyle has been studied. The majority of people need more information of gastric neoplasms prevention and health habits. *Methodology:* The impact of risk factors on the development of gastric cancer among the population of Chernivtsi region and the need of its prevention by oncologists was studied through anonymous questionnaire using medical and sociological methods. The feedback form has been developed with the support of the Ukrainian Institute of Public Health. *Results:* Risk factors for the development of gastric cancer in Chernivtsi region were identified, the public knowledge of their effect if rather low. *Conclusion:* Not withstanding considerable effort of the oncologists in prevention of gastric cancer all over the world, it remains one of the most frequently diagnosed and the third fatal disease.

Keywords: gastric cancer, risk factors, prevention, level of knowledge.

1. INTRODUCTION

Gastric carcinoma (GC) is a dangerous disease, which is caused by both high mortality rate and the severity of its detection at an early stage. At the same time, GC is the fifth most common cancer worldwide (about 5.7% of all new cases) and the third leading cause of cancer-related deaths (Bray et al., 2018). More than one million new cases of GC are diagnosed worldwide each year (Bray et al., 2018). Statistically, approximately 1 in 12 cancer-related deaths is related to GC. The first symptoms of the disease are usually abdominal pain and nausea, which, however, can also be signs of gastritis or peptic ulcer, so people who have these symptoms may not always suspect a serious problem. In many cases, GC begins asymptomatically. Most of these diseases are caused by bad habits and heavy food intake, so raising patients' awareness of these factors (smoking, alcohol abuse, excess body weight, low physical activity)

will facilitate the process of understanding, perceiving, preventing and abandoning bad habits in the future to minimize the risk of GC in the population.

The incidence of GC is known to vary by geographic location, season, and socio-economic status. This suggests that elevated GC incidence is largely related to lifestyle and the resulting physiological risk factors. At the same time, a decrease in elevated levels of risk factors is accompanied by a decline in cancer morbidity and mortality in the population. On the basis of these interrelations the concept of risk factors was created, the essence of which lies in the fact that though the reasons of gastric tumor diseases development are not known definitively, however according to experimental, clinical and epidemiological researches the factors connected with environment, life style, human genetic features which contribute to development and progression of these diseases, are determined, being a scientific basis for prophylaxis (Bray et al., 2018; Chernousov, 2002; Kashkin et al., 2006).

Altogether in the basis of GC development interaction of three factors are singled out: genetic, presence of *H. pylori*, and also damaging environmental factors (Vasilenko & Surgai, 2003). So, in the majority of patients with such diagnosis in the family anamnesis there are gastric diseases in the closest relatives. Nearly 80% of all neoplasms arise under the influence of environmental factors (Rocco et al., 2003). In particular nitro compounds are the most common and cause real danger to humans (Lynch et al., 2005). Intestinal metaplasia and dysplasia foci are particularly sensitive to their effects. Dietary imbalances and antioxidant deficiencies also contribute to GC development; smoking raises the danger of GC by 1.5-3 times (Kashkin et al., 2006). A large intake of milk and dairy foods, fresh fruits and vegetables correlates with the reduction of GC mortality (approximately 1.4-fold in men and 1.3-fold in women). Most authors point to the relationship between concomitant diseases and GC (Vasilenko & Surgai, 2003).

Thus, having identified the main known GC compromising factors, we started studying the issue of public awareness of them, and to establish their connection with the cases of the disease.

Objective of the study

To assess the influence of risk factors and population awareness of them on the occurrence of precancerous conditions and gastric cancer among residents of Chernivtsi region

2. MATERIALS AND METHODS

The influence of risk factors on the occurrence of GC in the population of Chernivtsi region and their application in the preventive work of oncologists was studied by medical and sociological method using an anonymous questionnaire, which we had developed together with the Ukrainian Institute of Public Health. The questionnaire, which was filled out by the patient, included questions characterizing the social status (age, sex, marital status, education). The questionnaire was conducted during 2014-2019 among persons under treatment at Chernivtsi Regional Oncologic Dispensary with confirmed diagnosis of GC of different stages and localization. Analysis of the results of the survey of 1002 respondents (623 men and 379 women) was carried out. The questionnaire was self-administered by the patients and was anonymous. Results were calculated as a percentage. The total number of respondents was equal to 100%, and the required percentage of respondents was calculated by the equation method.

3. RESULTS AND DISCUSSION

Patients from all districts of Chernivtsi region, with a confirmed diagnosis of GC from 2014 to 2019 were involved in the study. A total of 1002 respondents aged 30 to 75 years and older participated in the survey; of them: (623) 62.2% men and (379) 37.8% women. The percentage distribution of respondents by gender and age group are shown in Figure 1.

Findings of the survey about marital status: never married – 2.2% of men, 0% of women; married – 79.8% of men, 58.7% of women; widowed – 11.9% of men, 26.1% of women; divorced – 7.1% of men, 15.2% of women. The level of education of the respondents: primary education – 2.4% of men and 2.2% of women; general secondary education – 28.6% of men, 13.0% of women; specialized secondary education – 54.8% of men, 41.3% of women; higher education – 14.3% of men, 43.5% of women. The respondents were divided into groups according to the duration of their illness (taking into account the number of years): from 30 to 75 years and more respectively (Table 1).

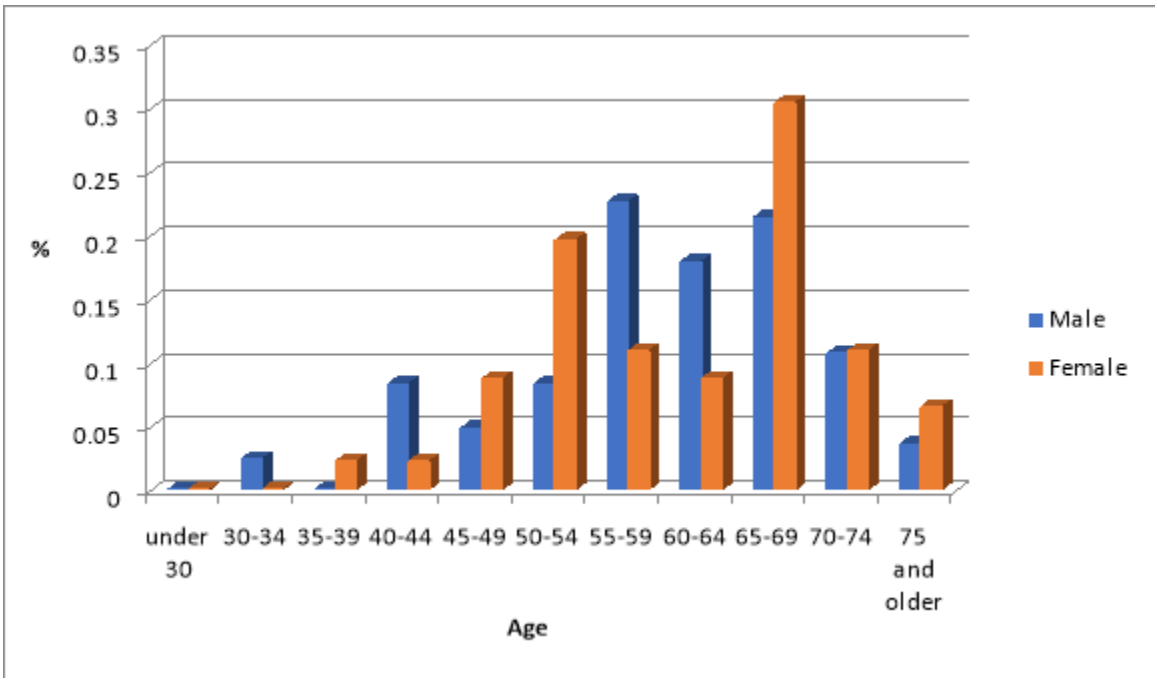

Figure 1 Distribution of respondents by gender and age groups

Table 1 Distribution of respondents by age, gender, and duration of illness

Illness duration	Gender				Total	
	Male		Female			
	abs.	(%)	abs.	(%)	abs.	(%)
Less than a year	243	63.9	420	67.4	663	66.2
Less than 2 year	27	7.2	72	11.6	99	9.9
Less than 3 year	18	4.8	0	0.0	18	1.8
Less than 4 year	4	1.2	44	7.0	48	4.8
5 year and more	87	22.9	87	14.0	174	17.4

Let us note that the need to study the population's awareness of the impact of risk factors on the GC onset is reasonable, since such data is the basis for the development, improvement and implementation of new prevention methods, especially in the early stages. Respondents were distributed according to their gender and main professional activity as follows (Table 2).

Table 2 Distribution of respondents by gender and main professional activity

Main professional activity	Gender				Total	
	Male		Female			
	abs.	(%)	abs.	(%)	abs.	(%)
Workers of intellectual labor	7	1.2	8	2.2	15	1.5
Workers of physical labor	45	7.2	0	0.0	45	4.5
Service employees	68	10.8	33	8.7	101	10.1
Those looking for a job	52	8.4	33	8.7	85	8.5
Retired people	309	49.6	198	52.2	507	50.6
Housemates	45	7.2	16	4.3	61	6.1
Disabled people	60	9.6	67	17.4	127	12.6
Others	37	6.0	24	6.5	61	6.1

We also paid attention to the presence of harmful factors (physical, chemical, psychological, etc.) associated with professional activity: recorded in 50% of men and 15.9% of women; absent in 50% of men and 84.1% of women. During occupational activity, the effects of dust, high temperatures, solids and metals, particularly chromium VI, also affect non-cardiac GC. Occupations related to

wood processing, food machinery manufacturing, rubber production, coal mining, and metalworking have been found to lead to an increased risk of neoplasms (World Cancer Research Fund, 2018). Scientists have recently analyzed 40 cohort mortality studies and found that asbestos was a cause of a moderate rise of GC risk. A meta-analysis of another 13 studies found that a rise in GC risk was attributed to continuous occupational contact with talc. A significant dependence was stated between crystalline silica handling and GC (Chang et al., 2020).

When asked to self-assess their health at the time of the survey, 31.7% of men and 34.1% of women defined their own condition as unsatisfactory; 54.9% of men and 52.3% of women defined it as satisfactory; 12.2% of men and 16.6% of women defined it as good; and only 1.2% of men and 0% of women described their own condition as excellent. To the question of the questionnaire "What in your opinion is the cause of your gastric cancer?" the following answers were received: improper diet – 55.1% of men, 56.5% of women; bad habits – 62.0% of men, 67.4% of women; sedentary lifestyle – 51.0% of men, 62.4% of women; hereditary factor – 44.0% of men, 47.9% of women; infection with *H. pylori* – 42.8% of men, 57.2% of women. The above data indicate that the respondents are aware of the "harmful behavior".

Let us elaborate on the bad habits that, according to our respondents, may have contributed to the onset of GC. Tobacco smoking rises the risk of cardia GC. Tobacco is associated with a recent increase in the incidence of GC in developed countries. Research groups estimate that 11% of gastric cancers worldwide and 17% of European cases are attributed to smoking (World Cancer Research Fund, 2018). Tobacco smoking men had almost 1.53-fold risk than women, as an analysis of scientific research showed. Studies confirm that hookah and opium use were risk factors for GC and precancerous lesions (Ladeiras-Lopes et al., 2008).

The following answers were recorded among the respondents when asked about smoking: never smoked – 19.3% of men, 95.5% of women; smoked before, but not anymore – 54.9% of men and 2.3% of women; smoked regularly – 25.3% of men and 2.3% of women, including more than one pack a day and more than 10 years. So, the bad habit of "smoking" covers the majority of the male population, but women also got used to it. Such an obsession leads to the onset of cancer in the short run. The risk of GC also rises due to alcohol intake, but the influence of the amount of alcohol consumed on the level of this risk was contradictory. The fact that mankind has not learned how to consume liquors correctly, without harming one's own health, and in recent years has become accustomed to this pernicious habit, is striking. To the question "How often do you drink liquors?" respondents answered as follows: less than once a month – 23.8% of men and 39.1% of women; once or twice a month – 41.7% of men, 13.0% of women; once a week – 16.7% of men, 0.0% of women; almost every day – 2.4% of men, 0.0% of women; do not drink at all – 15.5% of men, 47.8% of women. Moderate alcohol intake increases the risk of GC by 39%, and enhanced consumption further increases the chance of becoming ill. Scientists find no association between moderate alcohol consumption and GC risk. However, a positive correlation between GC and heavy alcohol intake was stated. Alcohol irritates and erodes the gastric mucosa, leading to gastritis, a foregoer of GC (Tramacere et al., 2012).

The following answers were received when asked about regularity of meals: 11.9% of men and 21.7% of women eat more than 5 times a day, 25.0% of men and 32.6% of women - 4-5 times a day, 52.4% of men and 45.7% of women - up to 3 times a day, 10.7% of men 0% of women - 1-2 times a day. Constantly spicy food is consumed by 20.7% of the interviewed men, 2.2% of women; salty food – 28.6% of men and 6.5% of women; fatty food, fast food – 9.8% of men and 0.0% of women; meat food – 67.9%, 68.9% of women; coffee and tea – 83.3% of men, 80.4% of women. Salt intake increases gastritis and enhances the effects of carcinogens such as N-methyl-N-nitro-N-nitrosoguanidine. Salt erodes the gastric mucosal barrier, leading to inflammation. Diets abound with salt and pickled foods (peculiar to Japanese culture, for example) exhibit higher GC rates. Canned meat rich in N-nitro compounds, also can cause erosion of gastric mucosal barrier. Red meat that is grain-fed, rich in sat fats and poor in polyunsaturated fatty acids like omega-3, triggers inflammatory processes and consequently rises the risk of gastric cancer (Tsugane & Sasazuki, 2007). As proved by researchers, GC risk had low correlation with coffee intake. Fruit and vegetables consumption moderate the risk of GC. They are reach in carotenoids, folates, phytonutrients and vitamin C; contain antioxidants that prevent metabolic disorders. Ascorbic acid, a powerful antioxidant is highly concentrated in citrus fruits. Studies have proved that frequent consumption of fruit and vegetables lowers risk of GC to 37%. As to other sources of antioxidants, namely nutritional supplements, green tea, their effect in preventing GC is disputable (Tsugane & Sasazuki, 2007).

When assessing the respondents' body weight, 22.6% of men and 17.4% of women were underweight; 45% of men and 39.1% of women had normal body weight; 25% of men and 34.8% of women had moderate weight gain; 4.8% of men and 6.5% of women had grade I obesity; 2.45 men and 2.2% of women had grade II obesity; no grade III obesity was detected. One of the major factors causing adenocarcinoma of the gastric cardia is obesity (Vaughan et al., 1995). A worldwide statistical meta-analysis showed that people with an excessive body mass index (more than 25 kg/m^2) had a 1.13 increased chance of developing cancer, having an increase in BMI. A recent prospective study in the United States showed that BMI was significantly associated with high rates of GC

mortality in men (Vaughan et al., 1995). Thus, esophageal adenocarcinoma and gastric cardia cancer appear mostly in patients with obesity, gastroesophageal reflux and Barrett's syndrome.

Besides *H. pylori*, many other factors influence the incidence of GC. Alcohol overuse and salty foods, as well as processed meats significantly increase the risk of noncardiac GC, while obesity is associated with a high risk of gastric cardiac cancer (World Cancer Research Fund, 2018). Other findings suggest that fruit, particularly citrus cultures, reduce the risk of the gastric cancer (Kushi et al., 2012). But before adding grapefruit to your diet, it is important to consult your physician: this fruit has the ability to interact with some medicines and worsen the health condition (Tsugane & Sasazuki, 2007; Kushi et al., 2012).

Dietary modification is the most important and reasonable form of GC prevention. A complete diet rich in fruit, vegetables, whole grains, elimination of alcohol, canned or processed meat, including red meat, low intake of smoked fish and meat, reduction of salty meals, pickled foods and processed, smoked or salted meats (especially red meat) reduces the risk of gastric mucosal inflammation and GC (Tsugane & Sasazuki, 2007) and prevents obesity and hypertension, reducing the risk of a wide range of chronic diseases (Kushi et al., 2012). Exercise is also an important for weight loss. Antioxidant supplements (particularly vitamins and minerals) and green tea are suggested to reduce GC risk.

4. CONCLUSIONS

GC remains the fifth most frequently diagnosed and third most deadly disease worldwide. *H. pylori* infection remains the most established risk factor for GC. Dietary modification, smoking cessation, and exercise show promise in preventing GC, while genetic testing can detect cancer early and prevent mortality. In order to prevent and treat GC in the population, it is necessary to clearly identify those responsible for health education and the provision of health education materials, to ensure access to quality medical care and modern medicines for people suffering from GC, and to create conditions to improve the socio-economic situation of the population.

Prospects for further research

Further research will ensure an adequate level of knowledge and skills among GC patients on the use of technologies for GC prevention, contributing to the improvement of public health.

Informed consent

Informed consent was obtained from all participants included in the studies.

Ethical Consideration

The study acquired ethical approval by the ethical commission at the Bukovinian State Medical University (order No. 447-Adm, November 13, 2019).

Author Contributions

Oryna Detsyk conceived and designed the research, compiled the original manuscript, reviewed and revised the manuscript. PhD Postgraduate Tatiana Domanchuk developed data collection tools, collected data, conducted initial analysis, analyzed and reviewed the manuscript. They developed a concept and designed research, coordinated and controlled data collection, and critically reviewed the manuscript for important intellectual content. All authors have approved the final manuscript and are responsible for all aspects of the work.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

Data and materials availability

All data associated with this study are present in the paper.

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