

ORIGINAL RESEARCH

Epidemiological and educational factors associated with the level of knowledge about gastric cancer prevention among medical interns from Lima, Peru

Factores epidemiológicos y educativos asociados al nivel de conocimiento sobre prevención de cáncer gástrico en internos de medicina de Lima, Perú

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Abstract

Introduction: Gastric cancer is one of the most lethal cancers; therefore, a high level of knowledge about its prevention is essential in the training of future physicians.

Objective: To determine the epidemiological and educational factors associated with the level of knowledge of gastric cancer prevention among medical interns from a private university in Lima, Peru.

Materials and methods: Analytical cross-sectional study conducted in 319 medical interns enrolled in 2020 and 2021 at the Faculty of Human Medicine of the Universidad Ricardo Palma. Participants' information was collected using surveys. In addition, their socioeconomic status and level of knowledge were measured using the Graffar classification and the knowledge test on gastric cancer prevention, previously validated in a health care center from Lima (Cronbach's Alpha: 0.84), respectively. A bivariate and a multivariate analysis were performed using a Poisson regression model, calculating prevalence ratios (PR) with a 95% confidence interval (CI) and a significance level of $p < 0.05$.

Results: The level of knowledge was high in 53.92% of medical interns. In the multivariate analysis, a significant association was found between having a high level of knowledge about gastric cancer prevention and the following variables: planning to enroll in a surgical specialty (aPR: 1.43, 95%CI: 1.13-1.81; $p = 0.003$) and having a socioeconomic status at levels I-II (aPR: 1.58, 95%CI: 1.26-1.99; $p = 0.000$). On the contrary, variables such as sex, age, having an immediate relative with cancer, having an immediate relative who is a physician, and attendance to cancer conferences were not significantly associated.

Conclusion: Planning to enroll in a surgical specialty and having a I-II socioeconomic status were the only variables associated with having a high level of knowledge about gastric cancer prevention. Therefore, the Faculty of Human Medicine should develop strategies aimed at improving the level of knowledge of medical interns about this topic.

Resumen

Introducción. El cáncer gástrico es uno de los cánceres más letales; por lo tanto, un alto nivel de conocimiento sobre su prevención es esencial en la formación de los futuros médicos.

Objetivo. Determinar los factores epidemiológicos y educativos asociados al nivel de conocimiento en prevención de cáncer gástrico en internos de medicina de una universidad en Lima, Perú.

Materiales y métodos. Estudio transversal analítico realizado en 319 internos de medicina matriculados en 2020 y 2021 en la Facultad de Medicina Humana de la Universidad Ricardo Palma. La información se recolectó utilizando encuestas. Además, el nivel socioeconómico y el nivel de conocimiento se midieron mediante la clasificación de Graffar y el test de conocimiento sobre prevención en cáncer gástrico, previamente validado en un centro de salud en Lima (alfa de Cronbach: 0.84), respectivamente. Se realizó un análisis bivariado y uno multivariado con un modelo de regresión de Poisson, calculándose razones de prevalencia, con un intervalo de confianza (IC) de 95% y un nivel de significancia de $p < 0.05$.

Resultados. El nivel de conocimientos fue alto en 53.92% de los internos. En el análisis multivariado, se observó una asociación significativa entre el nivel alto de conocimiento sobre prevención de cáncer gástrico y las siguientes variables: planear realizar una especialidad quirúrgica (RPa: 1.43, IC95%: 1.13-1.81; $p = 0.003$) y tener nivel socioeconómico I-II (RPa: 1.58, IC95%: 1.26-1.99; $p = 0.000$). Por otro lado, las variables sexo, edad, tener un familiar directo con cáncer, tener un familiar médico directo y asistencia a conferencias de cáncer no mostraron una asociación significativa.

Conclusión. Planear realizar una especialidad quirúrgica y tener nivel socioeconómico I-II fueron las únicas variables asociadas con tener un nivel alto de conocimientos sobre prevención del cáncer gástrico, por lo que se recomienda que la Facultad de Medicina Humana desarrolle estrategias dirigidas a mejorar el nivel de conocimiento de los internos de medicina en este tema.

Introduction

Gastric cancer is the most common malignant neoplasm of the digestive tract;¹ it is also the fifth most frequently diagnosed cancer and the third leading cause of cancer mortality worldwide.² In this regard, according to the global cancer statistics - GLOBOCAN, in 2018, 1 033 701 new cases of gastric cancer were reported and there were 782 685 deaths caused by this disease.² Also, this type of cancer has a poor prognosis, with a 5-year survival rate of only 20% in advanced stages.³

In Peru, gastric cancer is a frequent and aggressive disease, accounting for 14.7% and 13.4% of cancer deaths in men and women in the country, respectively.⁴ Reducing cancer incidence in the country requires the implementation of risk factor-based national cancer control plans (NCCP); however, only 29% of low-income countries have an NCCP in place, and in such cases, there are often deficiencies related to funding, monitoring, and expansion of information systems.⁵ Furthermore, the general population's poor knowledge of risk factors for gastric cancer and prevention measures has contributed to the high mortality rates of this disease; nevertheless, gastric cancer could potentially be preventable.⁶

Another fundamental strategy in the fight against gastric cancer is to prioritize primary prevention measures and educational interventions on this type of cancer among university students.⁷ In this regard, it has been reported that educational activities that promote general prevention measures such as positive lifestyle changes and the adoption of healthier habits could reduce the number of deaths from cancer by up to 30%. Furthermore, in the case of gastric cancer, the promotion of educational interventions in all educational settings (including university students) focused on the prevention of this type of cancer (e.g., the consumption of properly prepared and stored foods or limiting the consumption of salted or preserved foods, among others) could help reduce its incidence in the long term.⁸

The availability of published articles on the level of knowledge of gastric cancer among the general population, both at the national and international levels, is limited.^{9,10} For example, a study conducted in Panama in students of a master's program reported that they had a high level of knowledge about gastric cancer, but that their knowledge about prevention measures was low,¹¹ while another study conducted in Huánuco, Peru, found that the level of knowledge about stomach cancer in nursing students was low.¹²

Therefore, the training of future physicians should be focused on health promotion and prevention of diseases that represent a problem for public health. In view of the foregoing, the objective of this research was to determine the epidemiological and educational factors associated with the level of knowledge of gastric cancer prevention among medical interns at a private university in Lima, Peru.

Materials and methods

Type of study and sample

Analytical cross-sectional study conducted in medical interns enrolled in the Faculty of Medicine of the Universidad Ricardo Palma in 2020 and 2021 (N=360) who met the following inclusion criteria: voluntary participation in the research and medical internship during 2020 and 2021. Interns who had already graduated from another professional program were excluded. Once these inclusion and exclusion criteria were verified, the final sample consisted of 319 participants.

Procedures and instruments

Study variables were sex, age, having an immediate relative with cancer, having an immediate relative who is a physician, type of specialty planned (medical or surgical), attendance at cancer conferences, and socioeconomic status, which was established using the Graffar classification. Such classification comprises four parameters (profession of the head of household, education level of the wife or spouse, main source of household income, and housing conditions), each with a score ranging from 1 to 5, where the stratum is established depending on the total points obtained, as follows: stratum I (4-6 points), stratum II (7-9 points), stratum III (10-12 points), stratum IV (13-16 points) and stratum V (17-20 points); stratum I is the highest socioeconomic level and stratum V is the lowest socioeconomic level.¹³ This information was collected by means of a survey developed by the authors that was administered to the participants using the Google Forms online platform in October 2020 and 2021.

In addition, the level of knowledge of the participants was measured using the Gastric Cancer Prevention Knowledge Test (Appendix 1), for which a Cronbach's alpha of 0.84 and a binomial test value <0.05 have been reported, making it a reliable and valid test for this purpose.¹⁴ The test is made up of 15 questions, in which 1 point is obtained for each correct answer and 0 points for each incorrect answer, classifying the level of knowledge as follows:

- From 11 to 15 correct answers: high level of knowledge.
- From 7 to 10 correct answers: medium level of knowledge.
- From 0 to 6 correct answers: low level of knowledge.

Statistical analysis

Once collected, data were entered into the STATA statistical software, version 15, for processing. Data are described using absolute frequencies and percentages. A bivariate and a multivariate analysis were performed using a Poisson regression model, calculating prevalence ratios (crude and adjusted) and their respective 95% confidence intervals for all variables to determine their association with the level of knowledge about gastric cancer prevention. A significance level of $p < 0.05$ was considered for all statistical analyses.

Ethical considerations

The study followed the ethical principles of biomedical research involving human subjects established in the Declaration of Helsinki¹⁵ and was approved by the Research Ethics Committee of the Faculty of Human Medicine of the Universidad Ricardo Palma (Acta-PG-29-2020 of October 24, 2020). Informed consent was obtained from all participants, as it was filled out at the time of answering the questionnaire sent through Google Forms, and anonymity and confidentiality of the data were preserved at all times.

Results

Of the 319 medical interns included in the present study, 55.17% were female, 62.20% were over 25 years old, 83.39% did not have an immediate relative with cancer, 78.06% had no immediate relative who was a physician, 54.86% reported planning to pursue a surgical specialty, 79.62% had attended cancer conferences, and 44.83% belonged to socioeconomic stratum II according to the Graffar classification. In addition, the level of knowledge of gastric cancer prevention was high in 53.92% of the interns (Table 1).

Table 1. General characteristics of epidemiological and educational factors in participants (n=319).

Variables	Categories	Frequency			Percentage (%)		
		2020	2021	Total	2020	2021	Total
Knowledge level of gastric cancer prevention	High	107	65	172	62.94	43.62	53.92
	Medium	53	49	102	31.18	32.89	32.97
	Low	10	35	45	5.88	23.49	14.11
Sex	Female	96	80	176	56.47	53.70	55.17
	Male	74	69	143	43.53	46.30	44.83
Age	>25	111	97	208	65.29	65.10	65.20
	≤25	59	52	111	34.71	34.90	34.80
Immediate relative with cancer	Yes	17	36	53	10.00	24.17	16.61
	No	153	113	266	90.00	75.83	83.39
Immediate relative who is a physician	Yes	21	49	70	12.35	32.89	21.94
	No	149	100	249	87.65	67.11	78.06
Type of specialty planning to pursue	Surgical	98	77	175	57.65	51.68	54.86
	Medical	72	72	144	42.35	48.32	45.14
Attendance to cancer conferences	Yes	144	110	254	84.71	73.83	79.62
	No	26	39	65	15.29	26.17	20.83
Socioeconomic status according to Graffar classification	I	68	19	87	40.00	12.75	27.27
	II	70	73	143	41.18	48.99	44.83
	III	23	46	69	13.53	30.88	21.63
	IV	9	11	20	5.29	7.38	6.27

Source: Own elaboration

Table 2 shows the distribution of the levels of knowledge of gastric cancer prevention according to the categories established for each variable considered.

Table 2. Distribution of the levels of knowledge of gastric cancer prevention in the participants according to the categories established for the variables analyzed.

Variable	Level of knowledge	Level of knowledge		
		High n (%)	Medium n (%)	Low n (%)
Sex	Female (n=176)	102 (57.95)	56 (31.82)	18 (10.23)
	Male (n=143)	70 (48.95)	46 (32.17)	27 (18.88)
Age	>25 (n=208)	105 (50.48)	75 (36.06)	28 (13.46)
	≤25 (n=111)	67 (60.36%)	27 (24.32)	17 (15.32)
Immediate relative with cancer	Yes (n=53)	24 (45.28)	14 (26.42)	15 (28.30)
	No (n=266)	148 (55.64)	88 (33.08)	30 (11.28)
Immediate relative who is a physician	Yes (n=70)	33 (47.14)	22 (31.43)	15 (21.43)
	No (n=249)	139 (55.82)	80 (31.13)	30 (12.05)
Type of specialty planning to pursue	Surgical (n=175)	107 (61.14)	44 (25.14)	24 (13.72)
	Medical (n=144)	65 (45.14)	58 (40.28)	21 (14.58)
Attendance to cancer conferences	Yes (n=254)	138 (54.33)	78 (30.71)	38 (14.96)
	No (n=65)	34 (52.31)	24 (36.92)	7 (10.77)
Socioeconomic status	I-II (n=230)	140 (60.87)	69 (30.00)	21 (9.13)
	III-IV (n=89)	32 (35.96)	33 (37.08)	24 (26.98)

Source: Own elaboration

In the bivariate analysis, a statistically significant association was observed between the level of knowledge about gastric cancer prevention and socioeconomic level I-II (cRP: 1.63, 95%CI: 1.30-2.04; $p=0.000$) and planning to perform a surgical specialty (cRP: 1.41, 95%CI: 1.11-1.79; $p=0.003$). These two factors were also significantly associated with a high level of knowledge about gastric cancer prevention in the multivariate analysis (Table 3).

Table 3. Bivariate and multivariate analysis. Association of the factors evaluated with a high level of knowledge about gastric cancer prevention.

Variables	Crude			Adjusted		
	cPR	95%CI	<i>p</i> -value	aPR	95%CI	<i>p</i> -value
Sex *Female/Male	1.21	0.95-1.53	0.108	1.18	0.94-1.49	0.144
Age *>25/≤25	0.80	0.61-1.04	0.103	0.85	0.65-1.11	0.251
Immediate relative with cancer *Yes/No	0.81	0.61-1.07	0.142	0.84	0.61-1.15	0.301
Immediate relative who is a physician *Yes/No	0.83	0.64-1.08	0.180	0.84	0.63-1.13	0.273
Planning to pursue a specialty * Surgical/Medical	1.41	1.11-1.79	0.005	1.43	1.13-1.81	0.003
Attendance to cancer conferences * Yes/No	1.04	0.78-1.39	0.768	1.04	0.79-1.38	0.750
Socioeconomic status *I-II/III-IV	1.63	1.30-2.04	0.000	1.58	1.26-1.99	0.000

cPR: crude prevalence ratio; aPR: adjusted prevalence ratio; 95%CI: 95% confidence interval.

* Reference category.

Source: Own elaboration.

Discussion

Level of knowledge about gastric cancer prevention among medical interns is critical to their training as future physicians.

In the present study, only 53.92% of the medical students had a high level of knowledge about gastric cancer prevention, thus it is necessary that the medical program offered by the university in which the study was conducted includes specific courses on the topics of oncology and cancer prevention, so that most of the medical interns can obtain a high level of knowledge before they are able to practice as physicians. In this regard, Hafiz *et al.*,¹⁶ in a research conducted in Saudi Arabia that aimed to evaluate the level of knowledge about *Helicobacter Pylori* in 334 undergraduate university students at health sciences schools (faculty of medicine and nursing), found that students at higher educational levels (i.e., those in the last academic semesters of the program) had a higher level of knowledge compared to those in the first years, with a statistically significant difference ($p<0.001$). Therefore, it could be argued that the closer the medical student is to completing their studies, the more knowledge they will have about cancer.

On the other hand, Olano-Oblitas,¹⁷ in a study of 118 nursing students at the Universidad Nacional de Cajamarca (Peru), reported that 67% of the participants had an average

level of knowledge of gastric cancer prevention, while in our study only 32.97% had an average level of knowledge. This difference might be explained by the fact that the academic preparation of professional health care workers depends on the type of health career, which, in this case, includes nursing students in one study and medical students in the other.

It should be noted that the variable having an immediate relative with cancer was not significantly associated with having a high level of knowledge of gastric cancer prevention (cPR: 0.81, 95%CI: 0.61-1.07; $p=0.142$). This is different from the findings reported by Mansour-Ghanaei *et al.*¹⁸ in a study conducted between 2011 and 2012 in 3 457 residents of Rasht, in the northern region of Iran, an area with high prevalence of gastric cancer, who found that people who indicated no family history of gastric cancer ($n=3384$) presented a higher level of knowledge than those who did report having relatives with the disease ($n=72$), with this difference being statistically significant (mean score: 17.13 [SD= 3.97] vs. 16.4 [SD=3.71]; $p=0.001$). In this regard, the discrepancy between results may be explained by the fact that the study by Mansour-Ghanaei *et al.*¹⁸ was conducted in people from a region with a high prevalence of gastric cancer, and that, therefore, information and educational interventions aimed at the prevention of this disease in the general population have been carried out, which would explain why, in general, people without a close relative with this type of cancer had a high level of knowledge about its prevention.

Similarly, having an immediate relative who was a physician was not significantly associated with having a high level of knowledge of gastric cancer prevention (cPR: 0.83, 95%CI: 0.64-1.08; $p=0.180$). On this matter, Sanguinetti *et al.*,¹⁹ in a study that assessed the level of knowledge about cancer prevention in 100 inhabitants of the city of Salta, Argentina, found that the most frequent source of information among those who received any recommendation to prevent cancer was the physician (53%, 95%CI: 0.43-0.62). Therefore, if this source of information is embedded in the family environment, it would be expected that the level of knowledge about gastric cancer prevention would be adequate. However, in the present study, the proportion of interns with a high level of knowledge was slightly higher among those who did not have an immediate relative who was a physician (55.82% vs.47.14%).

In the present study, planning to pursue a surgical specialty was significantly associated with having a high level of knowledge about gastric cancer prevention (aPR: 1.43, 95%CI: 1.13-1.81; $p=0.003$). In this regard, Kulkarni *et al.*,²⁰ in a research conducted on 290 participants, including interns and final year medical students (making it clear that the latter were included because they had already completed the surgical theory courses and the clinical internship component) from the Kasturba Medical College, Mangalore, reported that 22.8%, 68.3% and 0.90% of last-year medical students exhibited an excellent, good and poor level of knowledge on colorectal cancer prevention, respectively. Therefore, it seems that completion of surgical theory courses and opting for a surgical specialty are factors that could contribute to a better understanding of cancer.

Furthermore, having a socioeconomic status level I-II (high level) was significantly associated with having a high level of knowledge about gastric cancer prevention (aPR: 1.58, 95%CI: 1.26-1.99; $p=0.000$). Pilco *et al.*,²¹ in a study carried out using data from the cancer registry of the Metropolitan Lima area, found that, compared to inhabitants of middle and low stratum residential areas, the incidence of gastric cancer was lower in residents living in high stratum areas. Similarly, Hafiz *et al.*¹⁶ also reported a statistically significant association between being a member of a high-income family and the level of knowledge about *H. pylori* infection ($p<0.007$) with the level of knowledge about *H. pylori* infection. Consequently, as this research was conducted in a private university, most of the medical

students had a middle and high socioeconomic status (71.43% were from socioeconomic level I and II), so it could be assumed that they have greater access to information and more knowledge about gastric cancer prevention.

Finally, it should be noted that one of the strengths of this study was the use of a validated instrument to measure the level of knowledge of gastric cancer prevention, with a Cronbach's alpha of 0.84 and a binomial test value of expert judgment <0.05 . However, it should also be pointed out that the questionnaire as such has a limitation, since it was originally designed for the general population and not for medical students, and it is therefore suggested that similar studies be carried out with a questionnaire designed specifically for this population. Moreover, since, for obvious reasons, the results of this study cannot be extrapolated to the whole country, it is also suggested to conduct studies with representative samples of medical interns from the different medical schools in the country.

Conclusions

Planning to pursue a surgical specialty and having a socioeconomic status level I-II were the only variables associated with having a high level of knowledge about gastric cancer prevention. Therefore, it is recommended that the School of Human Medicine develops strategies aimed at improving the level of knowledge of medical interns on this topic.

Conflicts of interest

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Appendix 1. Knowledge test on gastric cancer prevention

1. At which ages do you think stomach cancer is most common?

- 60 years and over
- 30 - 39 years old
- 40 - 49 years old
- 50 - 59 years old

2. Which sex do you think has a higher number of cases of stomach cancer?

- Males
- Females
- Both
- Unsure

3. Do you believe that having a history of relatives with gastric cancer could pose a risk that you may also have it someday?

- Yes
- No

4. Are there diseases that increase the risk of gastric cancer? Do you know the name of any of them?

- Yes
- No

If YES, which of the following diseases could be considered to increase the risk of developing gastric cancer? (You may check more than one)

- Pernicious anemia
- Menetrier disease
- Hepatitis
- Tuberculosis
- Atrophic gastritis

5. From the following types of work, please indicate the one that is related to the development of gastric cancer

- Coal, tire, iron and steel foundry industry.
- Notebook, pencils, desk furniture industry
- Cotton, linen and polycotton apparel industry
- Transportation industry

6. What foods do you think are strongly ASSOCIATED with the development of gastric cancer?

- Fruits and vegetables (oranges, papaya, broccoli, ...)
- Dairy products (milk, cheese...)
- Cold meats (ham, chorizo, sausages, ...)
- Bakery products (biscuits, cakes, ...)

7. Which foods do you think are PROTECTIVE against gastric cancer?

- Fruits and vegetables (oranges, papaya, broccoli, ...)
- Dairy products (milk, cheese...)
- Cold meats (ham, chorizo, sausages, ...)
- Bakery products (biscuits, cakes, ...)

8. Would eating food prepared the day before (“heated”) increase the risk of suffering from gastric cancer?

Yes ()

No ()

9. Will excessive consumption of salt increase the risk of developing gastric cancer?

Yes ()

No ()

10. Would eating breakfast, lunch or dinner at any time increase the risk of gastric cancer?

Yes ()

No ()

11. Do you think that personal hygiene and food hygiene would REDUCE THE RISK of gastric cancer?

Yes ()

No ()

12. Do you think that harmful habits such as frequent smoking INCREASE THE RISK of gastric cancer?

Yes ()

No ()

13. The bacterium that is known to be the “origin” of gastric cancer is:

() Salmonella

() *Helicobacter pylori*

() H1N1

() None of the above

14. Is this bacterium by itself capable of causing stomach cancer?

Yes ()

No ()

15. Could this bacterium cause lesions in the stomach that might develop into cancer?

Yes ()

No ()