Attitude of the Italian general population towards prevention and screening of the most common tumors, with special emphasis on colorectal malignancies

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Abstract Screening and early diagnosis of cancer represent relatively recent tools in the long-lasting battle against tumors. If the American public opinion manifests its enthusiasm towards screening, the attitude of European is less well known. The purpose of the present study was to assess the level of knowledge and awareness of cancer screening (with particular emphasis on colorectal neoplasms) among middle-aged individuals. The study group consisted of 945 healthy individuals (489 men, 456 women, average age 57 ± 12.4 years) who were asked to answer a series of questions about cancer screening and surveillance through a questionnaire presented by trained residents. Each interview lasted 20–30 min. Middle-aged Italians of both sexes seem to be aware of the fact that cancer is a frequent disease; moreover, many of the interviewed subjects believe almost all neoplasms are incurable. Diet, style of life, other environmental factors and familial factors are fully appreciated as relevant risk factors. The exact meaning of prevention was clear to less than half of the subjects. When various cancer sites were analyzed, the existence of preventive measures was well known for breast, cervical and prostate tumors, but their role was less clear for colorectal cancer. Only a fraction of the interviewed individuals were willing to undergo screening; the main reasons for refusal were lack of usefulness and fear of results. Among various tests, ultrasound and endoscopy were usually carried out in the presence of symptoms. Finally, multivariate analysis showed that the two factors significantly associated with the decision to undergo screening procedures were increasing age and level of education. The results of the study suggest that middle-aged Italian individuals, predominantly from Northern regions, have a correct perception of some aspects (frequency, risk factors) of cancer biology, whereas the knowledge of other aspects (outcome, prevention) remains poor or approximate. It follows that one of the main objectives of the Political Class should be to obtain a better education of overage individuals about cancer and the many problems related to this common disease.

Keywords Cancer · Prevention · Screening · Colonoscopy · Sigmoidoscopy · Hemoccult

Introduction

Despite the undoubted advancements in early diagnosis, molecular biology and treatment, malignant tumors continue to represent one of the main causes of death, and a tremendous challenge for developed as well as for many emerging countries [1–3]. Among malignancies, colorectal tumors constitute a public health problem in all Western Countries, and their incidence tends to increase even in many developing populations [4, 5]. Since the natural history and the biological basis of intestinal neoplasms are rather well known—in particular, the role of genetics and
of the adenoma-carcinoma sequence—[6, 7], these tumors are particularly suitable to be controlled by screening and surveillance procedures [8, 9].

“Screening” can be defined as testing a person for the presence of a disease. In the general population, this definition seems appropriate; however, if an individual is at major risk for a given disease, then the term of “surveillance” is preferable. At present, in many Western countries, several screening activities are on-going; especially for cervical tumors (Pap test), breast cancer (mammography), prostate neoplasms [prostate specific antigen (PSA)] and colorectal tumors [fecal occult blood test (FOBT), sigmoidoscopy and colonoscopy] [10–13]. Moreover, recent studies reveal a growing enthusiasm of the American population towards screening and early diagnosis of cancer in general [13]. This fact indicates a positive attitude of the population regarding their health, and suggests a high level of knowledge and awareness of what “cancer” means as a biological and social problem in current times. In contrast, very little is known about the attitude of the Italian population towards cancer, and the social relevance of the disease.

The main objective of the present study was to evaluate the level of knowledge and awareness on colorectal screening and surveillance in a predominantly middle-aged population. To reach this objective, a questionnaire was prepared and then submitted to a large series of normal individuals of both sexes, mainly in the age-range 40–60 years. The questionnaire consisted of about 20 items, and was constructed in a way to furnish information not only on screening attitude (for colorectal and other common neoplasms), but also on the most prevalent beliefs and knowledge of the general population regarding several aspects of cancer in a Western society.

Materials and methods

Study group and the questionnaire

The study group consisted of 945 individuals apparently in good health. These subjects were relatives or friends of patients hospitalized for various reasons, especially in internal medicine and general surgery. These relatives were contacted during courtesy visits to patients; they were invited to answer a series of questions that were in a questionnaire. The procedure, usually carried out by a trained resident, lasted an average 20–30 min. Of the 945 individuals, 489 were men, and 456 were women; the ages ranged from 40–80 years, with a mean of 57 (±12.5). Although this was a different from ordinary way to select a given sample, we are confident that our group is representative of the general population, and that their answers to the questions of the interviewers could be translated into what we might call the “prevalent opinion” about cancer and screening. Participation in the project was quite high; of the 971 contacted individuals, 945 (97.3%) gave their consent to be interviewed.

The questionnaire consisted of a series of items that can be summarized as follows:

Item 1: Anagraphic data, profession or job, level of education and income.

Item 2: Frequency of cancer: several possibilities were offered, from a “very rare” to an “extremely frequent” disease.

Item 3: Curability of cancer: again several options were offered, from “always curable” “to “inevitably fatal”.

Item 4: General factors predisposing to cancer; four items were selected (familial presence, style of life, environmental factors, chance), and interviewed subjects could indicate more than one factor.

Item 5: Utility of prevention in reducing cancer morbidity and mortality; 5 options were given: indispensable, very useful, useful, sometimes useful and useless.

Item 6: How prevention could be defined; several possible definitions were given.

Item 7: Subjects were asked whether there had neoplasms in the family; the anatomical site and the age of cancer onset among relatives were recorded.

Item 8: Screening: we asked whether they knew about the existence of screening procedures, and for which tumors.

Item 9: Further information about screening: which was the main source of information about screening? Several possibilities were taken into consideration (friends, family doctors, specialists, television, newspapers).

Item 10: The subjects were asked whether they underwent diagnostic tests for tumors, for what reasons (symptoms or prevention/screening), and who suggested the procedure (family doctors, specialists, public health services).

Item 11: Reasons for screening (familial, environmental risk, others).

Item 12: Individuals who did not undergo screening were asked whether they were willing to participate in a coordinated program of screening.

Item 13: In case of a negative answer, they were asked to indicate the reasons (excessive costs, skepticism about prevention, fear of the results, others).

Item 14: Usefulness of a nation-wide project of information about screening (yes or no).

Item 15: Ideal promoters of this possible project (choosing among Ministry of Health, Regions, Provinces, Health Care Districts and Associations against tumors, family doctors, specialists).
Item 16: Best way to advertise such a project (again television, newspapers, etc.).

Item 17: For patients who underwent diagnostic procedures for colorectal neoplasms, the interviewer asked information about family history, type of test performed, reasons for doing the test, existence of symptoms and previous operations.

Statistical analysis

Logistic regression was used to calculate both crude and adjusted odds ratio.

We evaluated the following variables:
- Gender: male (reference category) versus female
- Inheritance: absence of familial history versus presence of a positive family history
- Age: ≤60 years versus 61–70 years versus 71–80 years versus 80+ years
- Level of education: ≤high school diploma versus advanced licence or bachelor
- Income: <€600 versus €600–1,500 versus €1,600–2,500 versus ≥€2,500+
- Area of residence: North versus Central versus South + Islands.

A *P* value less than 0.05 were considered as statistically significant ("full model") [14]

Table 1 refers to all 945 investigated subjects, while Table 2 refers only to individuals with a family history positive for cancer (231 subjects).

We also used backward stepwise logistic regression analysis (this procedure begins with the full model, and includes all potential independent variables; variables are eliminated in an iterative process fitting the model, after the elimination of each variable, to ensure that the model still adequately fits the data) but the odds ratio and the *P* value that resulted were similar to those of the full model (results not shown).

Table 1 Factors influencing the decision to undergo screening tests: results of a multivariate analysis. (945 investigated subjects)

<table>
<thead>
<tr>
<th>Category of reference</th>
<th>Variable</th>
<th>Odds ratio</th>
<th>C.I. 95%</th>
<th>Odds ratio</th>
<th>C.I. 95%</th>
<th>P values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Crude</td>
<td></td>
<td>Adj</td>
<td>Adj</td>
</tr>
<tr>
<td>Sex: 489 men</td>
<td>456 women</td>
<td>0.85</td>
<td>0.63–1.16</td>
<td>0.93</td>
<td>0.66–1.33</td>
<td>0.721</td>
</tr>
<tr>
<td>714 subjects without familiarity</td>
<td>231 subjects with familiarity</td>
<td>1.1</td>
<td>0.81–1.49</td>
<td>1.1</td>
<td>0.80–1.51</td>
<td>0.529</td>
</tr>
<tr>
<td>546 subjects with age ≤60</td>
<td>399 subjects with age &gt;60</td>
<td>0.44</td>
<td>0.32–0.60</td>
<td>0.5</td>
<td>0.36–0.70</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>564 subjects with level of education none/elementary licence/High school diploma</td>
<td>365 subjects with advanced licence/bachelor</td>
<td>2.24</td>
<td>1.59–3.13</td>
<td>1.78</td>
<td>1.22–2.58</td>
<td>0.002</td>
</tr>
<tr>
<td>211 subjects with income &lt;600€</td>
<td>531 subjects with income 600–15,000€</td>
<td>1.64</td>
<td>1.13–2.38</td>
<td>1.52</td>
<td>1.00–2.30</td>
<td>0.048</td>
</tr>
<tr>
<td>16,00–25,000€</td>
<td>2.43</td>
<td>1.24–4.75</td>
<td>1.50</td>
<td>0.69–3.24</td>
<td>0.297</td>
<td></td>
</tr>
<tr>
<td>≥25,000€</td>
<td>2.06</td>
<td>0.73–5.80</td>
<td>1.33</td>
<td>0.44–4.00</td>
<td>0.612</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td>1.29</td>
<td>0.84–1.99</td>
<td>1.05</td>
<td>0.65–1.68</td>
<td>0.836</td>
<td></td>
</tr>
<tr>
<td>815 subjects with area of residence North</td>
<td>130 subjects with area of residence Center, South, Islands</td>
<td>1.45</td>
<td>0.67–3.12</td>
<td>1.54</td>
<td>0.67–3.51</td>
<td>0.303</td>
</tr>
</tbody>
</table>

Table 2 Factors influencing the decision to undergo screening tests in individuals with familiarity for cancer: results of a multivariate analysis. (231 subjects)

<table>
<thead>
<tr>
<th>Category of reference</th>
<th>Variable</th>
<th>Odds ratio</th>
<th>C.I. 95%</th>
<th>Odds ratio</th>
<th>C.I. 95%</th>
<th>P values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Crude</td>
<td></td>
<td>Adj</td>
<td>Adj</td>
</tr>
<tr>
<td>Sex: men</td>
<td>Women</td>
<td>0.85</td>
<td>0.57–1.27</td>
<td>0.94</td>
<td>0.59–1.49</td>
<td>0.808</td>
</tr>
<tr>
<td>Age ≥60</td>
<td>Age &gt;60</td>
<td>0.49</td>
<td>0.32–0.73</td>
<td>0.6</td>
<td>0.38–0.94</td>
<td>0.027</td>
</tr>
<tr>
<td>Level of education</td>
<td>Advanced licence/ bachelor</td>
<td>2.94</td>
<td>1.85–4.67</td>
<td>2.43</td>
<td>1.46–4.03</td>
<td>0.001</td>
</tr>
<tr>
<td>Income &lt;600€</td>
<td>600–1,500€</td>
<td>1.64</td>
<td>1.02–2.71</td>
<td>1.51</td>
<td>0.88–2.58</td>
<td>0.127</td>
</tr>
<tr>
<td></td>
<td>1,600–2,500€</td>
<td>4.24</td>
<td>1.55–11.59</td>
<td>2.29</td>
<td>0.77–6.83</td>
<td>0.135</td>
</tr>
<tr>
<td></td>
<td>≥2,500€</td>
<td>1.67</td>
<td>0.43–6.52</td>
<td>0.86</td>
<td>0.19–3.81</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>1.2</td>
<td>0.68–2.06</td>
<td>0.93</td>
<td>0.50–1.73</td>
<td>0.83</td>
</tr>
<tr>
<td>Area of residence</td>
<td>Center</td>
<td>1.32</td>
<td>0.47–9.70</td>
<td>1.06</td>
<td>0.36–3.10</td>
<td>0.915</td>
</tr>
<tr>
<td></td>
<td>South + Islands</td>
<td>0.95</td>
<td>0.60–1.50</td>
<td>0.91</td>
<td>0.55–1.49</td>
<td>0.717</td>
</tr>
</tbody>
</table>
All calculations were performed with Statistical Package for Social Sciences (SPSS) release 12.1

Results

A total of 945 apparently healthy individuals completed the questionnaire. There were 82 (8.7%) younger than 41, 161 (17%) 41–50, 299 subjects (31.6%) in age group 51–60 years, 269 (28.5%) between 61 and 70 years, 103 (11%) 71–80, and 31 (3%) were older than 80, and mean age was 58 ± 12.0 in men, and 57 ± 12.5 in women. All investigated subjects were resident in Italy, 681 (72.1%) in Northern regions, 43 (4.6%) in the Central regions, 221 (23.4%) in Southern Italy and main islands. As far as educational level was concerned, 313 individuals (33.1%) had primary school education, 505 (53.4%) obtained a high school diploma, and 111 (11.7%) had graduated.

When asked about the frequency of cancer, the large majority of interviewed subjects reported the impression that cancer was a very frequent disease (78.2%); rather surprisingly, almost half of them (42.1%) believed cancer to be always incurable. Figure 1 shows the main risk factors for common malignancies (diet, style of life, environment, familiality); all of them were fully appreciated by the interviewed population; it is noteworthy, however, that for about 15% of the subjects, cancer was attributed mainly to chance.

The correct meaning of “prevention” was clear to only 40% of the interviewed subjects (Fig. 2, panel a), who associated this concept with the execution of tests in a healthy individual or with the reduction of risk factors; for the remaining 60%, prevention was not correctly perceived (“cure of patients” or “execution of tests in presence of symptom”). Regardless of the meaning, however, almost everybody was convinced of the utility of preventive measures (panel b). When we asked what they knew about prevention for specific cancer sites, almost 90% of the interviewed subjects were aware of the fact that preventive measures could be taken for breast cancer, and about 70% considered it possible to prevent cervical and prostate neoplasms; however, this fraction fell to 53% for colorectal tumors. The majority of investigated subjects were not aware of tests for the prevention of lung tumors (Fig. 3).

As shown in Fig. 4, the main source of information about cancer was given by friends, followed by television and journal/newspapers; rather surprisingly, only a small fraction of the interviewed subjects was informed through family doctors or specialists.

When the study group was asked whether it could be acceptable to undergo preventive tests, 42.8% of the interviewed had a positive attitude, and an additional 19.2% made the decision dependent on a lack of invasiveness. However, nearly 21% declared a strong refusal of any type of screening procedures, and a further 17% did not answer (Fig. 5). Among skeptical individuals (i.e., those who were not available to undergo screening procedures), the main reasons for their refusal were lack of usefulness (38.5%) and fear of the results (36.7%); a minority only
reported that they could not afford these investigations, because they were too expensive (Fig. 6). The frequency by which the main screening procedures had been executed by the investigated population is illustrated in Fig. 7. Subjects were asked whether they had the test or not, and, in case of a positive response, if the test had been executed for symptoms or for screening purposes. As expected, chest radiograms, gastroduodenoscopy or abdominal ultrasounds were usually carried out for symptoms; in contrast, prostate specific antigen (in men), mammography and Pap tests (in women) were more often executed for purposes of screening. Figure 8 refers to the investigations carried out for colorectal neoplasms. The four main procedures—fecal occult blood test (FOBT), barium enema, rectosigmoidoscopy, and colonoscopy—had been carried out by a minority of the population; moreover, all procedures were executed more often for symptoms than for prevention. In particular, only in about 4.0% of the investigated population FOBT or colonoscopies were carried out for screening purposes. The very low frequency of proctosigmoidoscopy reflects the prevalent attitude in Italy to perform colonoscopy instead of sigmoidoscopy as a general approach to colorectal diseases (including screening for tumors).

Table 1 summarizes the results of a logistic regression analysis carried out with the purpose of identifying the main factors associated with the decision to undergo screening tests. As expected, increasing age and level of education were significantly related to the choice of screening, whereas no other variables reached the statistical significance. With a similar approach, Table 2 analyzes factors associated with the decision to undergo screening in individuals with a positive neoplastic family history; once again, increasing age and level of education were the only variables significantly associated with the choice to be tested.

**Discussion**

The results of the present study can be summarized as follows. First, middle-aged individuals of both genders...
seem to be aware of the fact that cancer is a frequent disease; many of them still consider all neoplasms to be incurable. Second, diet, style of life, environment and heredity are fully appreciated as relevant risk factors for cancer. Third, the exact meaning of prevention was clear to less than half of the subjects, nevertheless almost all were convinced that preventive measures were useful. Fourth, when asked for specific cancer sites, prevention was well known, by the majority of individuals, for breast, prostate and cervical tumors, while their knowledge about colorectal cancer prevention was lower. Moreover, only 40% of the interviewed subjects were willing to undergo screening procedures, and in only 4.0% of the investigated subjects for purposes of screening. Finally, multivariate analysis demonstrated that two factors were significantly associated with the decision to undergo screening: increasing age and level of education.

Screening for cancer has been in the past and without any doubt will continue to be in future one of the most debated and controversial topics in oncology [15, 16]. Although mammography has been recommended for all women over the age of 50 (40) years, some scientists have challenged the utility of such preventive measures [17, 18]. Similarly, questions have been raised whether or not to screen for prostate, colorectal and even for cervical neoplasms [19–22]. Thus, after more than 30 years of continuous studies and apparently firm conclusions, it may appear as discouraging that in a recent editorial, Moayyedi et al. [23], conclude that “the impact of fecal occult blood in reducing mortality from any cause is uncertain, and efficacies of this strategy for colorectal screening need revaluation.”

At the same time regions, provinces and even countries in the Western World are wondering whether they can afford the costs of population-based colorectal cancer screening; for instance, among Scandinavian countries, Norway and Sweden claim that Governments cannot afford the cost of hemoccult screening, whereas screening will be implemented in Finland [24]. In a recent study from Denmark, long-term colonoscopic surveillance significantly reduced the incidence and mortality of colorectal cancer in patients with adenomas; however, unacceptable (for screening) severe complications (including 3 deaths) were reported [25]. Even more surprising was the report by Fisher et al. [26], in which they find that fewer than half of
the patients with a positive FOBT have a full colonoscopic evaluation within 1 year. This fact was attributed to lack of coordination among primary care providers. In addition, other studies indicate that in approximately 35% of the patients the reasons for executing a fecal occult blood test were inappropriate, most commonly because of documented life-limiting comorbidities [27]. Finally, in a recent systematic review Moja et al. [28] tried to make a balance between good and harm from screening studies for breast cancer; they conclude that the available evidence does not show any significant survival benefit for mass mammographic screening.

Despite these (and many others) controversies, a recent study claims that the American public is enthusiastic about cancer screening in general; thus, almost 90% of the interviewed individuals believe that routine cancer screening is almost always a good idea, and a decision not to be screened for a 80-year-old individual was considered an “irresponsible behaviour”. Even more astonishing, 73% of the responders would prefer to receive a total body tomography instead of getting 1.000 dollars cash [29]. Because of this public enthusiasm, Walsh and Terdiman [30] suggest that instead of losing time in choosing the ideal test for colorectal cancer screening, the scientific community should ensure that all eligible subjects undergo some type of surveillance. Indeed, in the American white population, adherence to colorectal cancer screening (of any type) is on the order of 50% of individuals over the age of 50 years [31, 32], a value that would make most European oncologists quite happy, but a number that was considered unsatisfactory by the investigators. It is likely that this enthusiasm extends northward of the USA, since Bressler et al. [33] report that in some Canadian centers at least 35% of all colonoscopies are performed for screening purposes.

Thus, it seems that despite controversies and lack of stringent data on efficacy and feasibility of several screening tests, the Western World is gradually moving towards the acceptance of screening and surveillance as appropriate strategies in the battle against cancer. This is probably due to the fact that: (1) chemotherapy is advancing very slowly (with notable exceptions), (2) surgery has already reached its limits, (3) primary prevention, after the partial victory over smoking, has now the difficult task to drastically alter our eating habits and lifestyle, and (4) chemoprevention is trapped in a seemingly endless infancy.

Our studies have obvious limitations; the first being the method of the selection of individuals who were recruited in the research. Although we imagine that our group is representative of the general population, this might not be the case. Since we submitted our questionnaire to friends and relatives of patients, we cannot exclude a sort of selection, in the sense that these individuals could be more conscious about cancer as a social problem, or had an opinion regarding tumor biology and screening procedures. Thus, it would be of interest, in future investigations, to submit the same questions to a different target population.

However, at variance with other studies, which relied on telephone contacts [29], we did our interviews by directly asking each item to individuals who were visiting their relatives. Our group was well balanced by age and gender; however, level of education and income were lower than the average of Northern Italy, and this could have introduced some bias. Finally, in our investigation we had to rely on the answers that were given, without any way to control: (a) whether or not the question was understood properly and, (b) that the investigated individuals gave frank, responsible, and uninfluenced responses.

With all the above-mentioned limitations, our results show that middle-aged Italians predominantly from Northern provinces have a correct perception of some aspects (frequency, risk factors) of cancer biology, whereas their knowledge of other aspects (outcome, prevention) remains poor or approximate. Since the media suggest that awareness of cancer as a social problem is apparently higher in other European and American populations, it follows that a primary objective of our political class might be that to obtain a better education of average individuals about cancer and all problems related to this common disease. A second aspect is clearly evident from our studies; only a fraction of subjects seem to accept screening (about 50%), while the remaining seem reluctant to undergo preventive measures for two main reasons: skepticism or fear of invasive tests, two factors that, once again, might be cured by a proper education. In theory, this more adequate knowledge of cancer screening might be achieved by several means: direct contact (by family doctors or specialists), television, internet, newspapers, books and other media; in practice we do not know which one (ones) among these would positively affect the majority of the population. Future studies might address the problem of how to achieve a good education on cancer at a reasonable cost, [34, 35]. In the light of the above-mentioned observations, it is not surprising that our studies showed some screening procedures to be more acceptable than others. For instance, mammography and the Pap test seem the most popular measures for cancer prevention, whereas the various investigations proposed for colorectal cancer screening (occult blood test, barium enema, sigmoidoscopy, colonoscopy) were performed in less than 10% of the population entering the age of major risk, a value consistently lower than that reported in other Western series [36, 37]. It is likely that the invasiveness of endoscopic procedures and the embarrassment to deal with facts contribute to these figures. Again, a better education would be required; similarly, standard sedation might render colonoscopy more acceptable, whereas at present
preparation for endoscopy shows ample variations between Centers and Units [38].

Finally, it is not surprising that multivariate analysis indicates the level of education and advancing age are the two objective factors significantly associated with the decision to undergo screening. However, we should not forget that the true objective of scientists is not only to increase the awareness on the advantages of screening, and to get further evidence of this, but also to reduce the risk of over-testing and over-treating patients.

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