ABSTRACT – Background – The colorectal cancer accounts for about 500,000 deaths/year worldwide and ranks third in death by neoplasia. Patient mortality is directly related to its stage when diagnosed. Screening allows early diagnosis, reason why it turns out to be an effective tool to reduce mortality. Aims – To assess the impacts of the colorectal cancer prevention campaign in a Brazilian municipality, to estimate the disease occurrence and to forecast reduction of its incidence in the long term. Methods – The Giant Colon, a replica of the human colon, created by ABRAPRECI, was exposed in the local Sports Gymnasium, in order to educate the population on the parts of the organ and the main diseases affecting it. Screening was then performed with the occult blood test kit, (Hemosure®), immunological type, in the population over 40 years of age, asymptomatic and without previous CRC screening. People with negative results were registered for annual control and those with positive result were referred to colonoscopy to determine the presence of neoplasia or pre-neoplasia lesions as well as their treatment. All patients were supposed to be followed up for at least 10 years. People needing surgery or other treatment were referred to neighboring specialized centers. Results – From August 2006 to March 2007, 4,567 Hemosure® tests were delivered to people who met the inclusion criteria. This figure corresponded to 54.8% of the local population over 40 years. Out of this total, 905 (19.8%) were not returned and 22 (0.5%) could not be analyzed. Therefore, 3,640 tests, 43.7% of the target population, were analyzed, totaling 79.7% of the tests handed out. Results were positive in 390 (10.7%) exams and negative in 3,250 (89.3%). Out of the 245 patients with positive result and referred to colonoscopy, 33 (13.5%) refused to undergo the exam. The results of the 212 performed colonoscopies were: 53 patients with diverticular disease, 59 with...
one or more polyps, nine with adenocarcinoma and 91 were normal. Out of the patients with adenocarcinoma, three were treated endoscopically since lesions were small and detected at an early stage and the other six were referred to surgery and chemotherapy. **Conclusion** – The preliminary results are not sufficient to estimate the actual impact of the campaign. However, it is possible to count on the reduction of CRC occurrence in the long term as well as better prognostics thanks to early detection and staging of the disease.

**ABSTRACT – Background – Aim - Methods – Results – Conclusions –**

**HEADINGS**

**INTRODUCTION**

Colorectal cancer (CRC) is the cause of death of about 500,000 people a year worldwide and is the third main cause of death by neoplasia. The mortality rate of these patients is directly related to the CRC stage when the diagnosis is made. Screening allows early detection and represents a very effective way to reduce the disease-related mortality. The disease is caused by colonic epithelium degeneration, which, before becoming an adenocarcinoma, appears in general as a pre-malignant lesion: the adenomatous polip. The ideal treatment for polyps consists of resecting the lesion – which in most cases is performed via endoscopy – without the need for surgical resection of large areas or lymphadenectomy, or even adjuvant or neoadjuvant treatment with chemoradiotherapy. Polyps usually take years to degenerate into adenocarcinoma.

The same way as treating colonic polyps is so simple, their screening is an effective means to reduce their occurrence and, consequently, mortality caused by CRC. Screening is primarily performed with FOBT - fecal occult blood test. In fact, a CRC screening campaign is essentially a prevention campaign.

A screening program aimed to reach large populations is only feasible with an inexpensive procedure that can effectively determine patients who are more likely to develop the disease. The most used one is the occult blood test which is available in two kinds: guaiac-based and immunochemical-based tests; the former detects the activity present in the hemoglobin heme group and the latter, the globin protein in the human hemoglobin.

Although flexible colonoscopy and retosigmoidoscopy are the best procedures for the CRC diagnosis, no study has ever proved it to be effective as a screening method for large populations. The fecal occult blood test, on the other hand, is suitable for this purpose since it is cheaper and more practical and also poses less risks and is more easily accepted by the population. However, it is less sensitive and specific and when results are positive, subsequent investigation, either through direct observation or endoscopes, is necessary.
Today a CRC screening program is in progress in the state of São Paulo. The Brazilian Association for Colorectal Cancer Prevention (ABRAPRECI), a non-government organization, started this campaign in 2006. For this purpose, a municipality was chosen and some of its characteristics were essential for the success of the project. The main one was the local government willingness to join ABRAPRECI’s effort, by offering human resources and facilities to mobilize the population. The selected municipality was Santa Cruz das Palmeiras. However, the City Hall good will was not enough; another important factor for choosing the city was how the health system was organized. The program Saúde da Família (family health), which has been introduced in a number of Brazilian towns, has been partially implemented there, and is attending about 65% of the population through reference health centers and by multiprofessional teams. Additionally, the community agents follow up the patients more frequently, including in home visits which greatly helped us to carry on the campaign.

Therefore, this paper aims to evaluate the effects of the CRC prevention campaign in a Brazilian municipality, to estimate the disease occurrence and to forecast the CRC reduction in the long term.

METHODS

The city population in 2006 was 28,318 inhabitants, among them 8,337 over 40 years. Migrating inhabitants are not so common, which facilitate longer follow-ups. Screening consisted of performing fecal occult blood test, immunological type, (Hemosure®), in the population over 40 years, asymptomatic and who had never been submitted to any screening for CRC. The testing did not require diets or special collection. People with negative FOBT were registered for annual control and those with positive FOBT were referred to colonoscopy to determine the presence of neoplasia or pre-neoplasia lesions as well as their treatment. All patients were supposed to be followed up for at least 10 years.

The adhesion to the campaign was encouraged in meetings with local authorities to determine the best strategy to call the population attention; banners spread throughout the city; advertisement in radio, TV, newspapers; contact with religious leaders; advertisement in schools and the engagement of the sanitation and health teams in the municipality for advertising in health centers.

For four days the “Giant Colon”, a replica of the human colon with built-in loudspeakers, created by ABRAPRECI, was exposed in the local Sports Gymnasium, in order to teach the population the parts of the organ and the main diseases affecting it.

An explanatory video about the colon, CRC and its prophylaxis was also shown to the population before they entered the Giant Colon. A number of volunteers were mobilized during these four days to raise people’s awareness of how important the campaign is. The team of multiprofessional and medical students answered questions and were responsible for the distribution of the occult blood test kits to people in the population group to be screened.
Soon after visiting the Giant Colon, people over 40 were interviewed by health professionals to identify habits promoting increased risks of CRC like: tabagism, alcoholism, sedentary lifestyle and diet. The interview determined the selection of people to be screened and excluded those with symptoms like active anal bleeding or those who had undergone colonoscopy over the past three years and those with CRC family history.

Hemosure® was presented in a kit for collecting and analyzing the result, without the need of specialized laboratories. The health team of the local health centers were trained to analyze the exams and the results were quickly determined.

In the four months following the Giant Colon exhibition, the kits were delivered in a passive way. Patients who went for appointments in the health centers or were interested in the exam received the kit and were oriented on how to collect the sample, how important the exam is and the role every citizen has to spread the campaign.

In the following three months, a more active way was adopted. Kits were taken to the population in their homes. On weekends, the local teams of nurses and community agents were invited to take part in the effort. ABRAPRECI team joined the effort by sending doctors and college students to help handing out the kits door to door. During the week, the community agents took the exam envelopes to the houses they regularly visited. All the four health center in the town were engaged in this stage of the campaign and by the end of the three months all the houses in the urban area had been visited. Patients with FOBT negative were registered for the exam in the following year and those with FOBT positive were called for the next screening stage, colonoscopy.

Patients with results showing the need for surgery or other kind of treatment were referred to specialized centers neighboring Santa Cruz (Ribeirão Preto and Campinas).

RESULTS

From August 2006 to March 2007, 4,567 Hemosure® tests were delivered to people who met the inclusion criteria. This figure corresponded to 54.8% of the local population over 40 years. Out of this total, 905 (19.8%) were not returned and 22 (0.5%) could not be analyzed since the material was not correctly collected. Therefore, 3,640 tests, 43.7% of the target population, were analyzed, totaling 79.7% of the tests handed out. Results were positive in 390 (10.7%) exams and negative in 3,250 (89.3%).

Out of the 245 patients with positive result and referred to colonoscopy, 33 (13.5%) refused to undergo the exam. The results of the 212 performed colonoscopies were: 53 patients with diverticular disease, 59 with one or more polyps (76 with low degree adenomatosis, four with high degree adenomatosis and 21 with hyperplasia); nine with adenocarcinoma and 91 were normal.
Fourteen biopsies resulted negative, that is, with edema or mucous inflammatory infiltrate.

Out of the patients with adenocarcinoma, three were treated endoscopically since lesions were early detected and small (1 polypectomy and 2 mucosectomies) and the other six were referred to surgical and chemotherapy treatment.

DISCUSSION

As expected, the positive results were usually a cause of concern for people who did not understand the exact meaning of a positive occult blood test result. In order to decrease the anxiety generated by the result, people were informed not only through mail, but whenever possible, by a phone contact. This way doubts were solved as fast as possible, thus decreasing the individual's expectations.

People presenting positive results were first called for a group explanation. Groups of about 60 people received together information about the real meaning of the result, had their questions answered and were again warned of the need to undergo colonoscopy, aiming to identify the bleeding origin. Patients who agreed to undergo colonoscopy were oriented about the exam preparation as well as medication and the exam was scheduled for the following day.

Colonoscopies were carried out at Santa Casa de Misericórdia by a team of colonoscopists, and all the equipment used was borrowed from companies specialized in colonoscope sales. A diversity of professionals was involved, from doctors, nurses, nurse helper to medical academicians. Two rooms in the hospital were allocated to the procedure and one to post-sedation recovery. The exams were performed as in out-patient clinics. However, patients with severe co-morbidity were admitted in the hospital where they stayed during preparation and post-sedation recovery. The exam reports were immediately generated and delivered to patients. The biopsy and resection materials were sent to anatomopathologic laboratory for processing and the results were sent to patients by ABRAPRECI.

An interesting aspect worth mentioning is that the number of colonoscopies performed was the highest so far when compared with equivalent periods in the municipality.

On the first four days of the campaign, 961 envelopes of Hemosure® were delivered to the population to start the screening with fecal occult blood testing. The sharp decrease in the passive delivery on the following days, however, determined a change in the strategy and a more active delivery was adopted, leading to good results. The figures became expressive then; in three months as many as 3,520 kits were delivered to the population. Therefore, for the coming campaigns, the use of both forms of delivery is suggested.
A number of cohorts submitted to the fecal occult blood test reported in the literature resulted in decreased mortality by colorectal cancer in North American and European countries. A meta-analysis of four large controlled studies, which applied biannual guaiac-based fecal occult blood test, in a total of 350,000 people, showed a reduction of 14% (varying from 15 to 33%) in mortality by CRC. Out of these, only three studies were randomized. In this study it is still hard to estimate the mortality decrease, considering that only one series of tests was carried out.

The screening adhesion rate varied from 59.6 to 89.9% in the first exam and 38-60% in the last exam of the screening series. In Santa Cruz das Palmeiras, the adhesion rate in the first exam of the series was 79.7%, an amount within the expected range. These studies presented a positive result rate of 9.8%, 1.5%, 1.3% and 1.5% out of which 28%, 2%, 1% and 1.4% of the participants, respectively, underwent colonoscopy. In this meta-analysis, CRC occurrence was not different comparing the individuals who underwent the screening program with the control group during the screening period. However, occurrence was 16% lower in the screening group in the period of 5-7 years after the end of the screening program.

In Santa Cruz das Palmeiras, the rate of positive results was 10.7%, a value above that observed normally. 5.8% of the participants underwent colonoscopy and the incidence rate of CRC detected in the present program through the screening campaign was 2.47 cases / thousand people, an amount above that registered in other studies, where the incidence/year among people who participated in the screening was 1.49 cases / thousand people/year. However, this amount refers to the incidence reported throughout the screening period, which lasted over 10 years and a follow-up period of 7.8 years, which is certainly related to a lower incidence when compared with Santa Cruz das Palmeiras.

Due to sponsoring and donations made by a number of companies and institutions, the real cost of the CRC screening campaign in Santa Cruz das Palmeiras cannot be accurately determined. It is known that the cost of the CRC treatment in advanced stages is very high since it includes long surgery and long periods in hospital and ICU; chemotherapy and radiotherapy which are usually necessary as complementary therapies as well as a post-treatment period, involving ostomies, thus demanding permanent special care and constant expenditure. Added to costs is the individual’s absence from work during treatment, since a large number of CRC patients are among the active population. On the other hand, early detected CRC can be often treated endoscopically, without any need of long hospital stay or adjuvant treatment with chemotherapy and radiotherapy. Individuals can return to normal life in a shorter time, thus lowering the absolute and relative cost of the treatment. In addition, it is possible to predict a reduced neoplasia incidence considering that the screening campaign is also a preventive one when preneoplastic polyps are removed resulting in less money spent on CRC treatment in the future.
CRC screening and prevention campaigns result in reduced mortality rate by cancer in up to 33%. These efforts do not require great technological resources and they can be carried out at any level of the health service, from primary, in small health centers, to tertiary, in large hospitals. Considering that their execution is simple and that their impact on mortality is so positive, new campaigns should be encouraged so that more and more people can be educated on how important prevention is.

**CONCLUSION**

The preliminary results are insufficient to assess the real impact made by the campaign. However, it is possible to predict that CRC occurrence is likely to decrease in the long term and that prognostics may also improve with the disease early detection.

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