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Cancer Knowledge among Mexican Immigrant Farmworkers in North Carolina

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Abstract

Background—Latino farmworkers are exposed to a number of carcinogens in the workplace. Cancer survival rates for Latinos are below average. This paper describes Mexican immigrant farmworkers' knowledge of colorectal, breast, and testicular cancer, and compares farmworkers' cancer knowledge to that of other Mexican immigrants.

Methods—Survey interviews for this study were conducted with 100 farmworkers and 100 non-farmworkers in 2015 in North Carolina as part of an ongoing community-based participatory research project.

Results—We found low to moderate levels of knowledge about colorectal, breast, and testicular cancer among farmworkers. Compared to non-farmworkers, farmworkers had similar levels of knowledge about breast and testicular cancer, but slightly lower knowledge about colorectal cancer ($p = 0.0087$).

Discussion—Few studies have used quantitative methods to assess farmworkers' knowledge of specific types of cancer. Our results demonstrate a need for increased dissemination of existing cancer education programs and further research to develop additional educational tools.

Keywords

Cancer; farmworkers; community-based participatory research; Latino; knowledge

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Compliance with ethical standards

Research Involving Human Participants/Informed Consent: Informed consent was obtained from all individual participants included in the study

Cancer is the leading cause of death among Latinos in the United States (US) [1]. Occupational chemical exposures may put Latino farmworkers at an elevated risk for certain types of cancer [2–4]. This population also has limited healthcare access, which may result in the underutilization of cancer screenings and late stage diagnoses [5]. Migrant farmworkers, who move to do seasonal work, often have poor continuity of care and can easily be lost to follow-up [6]. Farmworkers earn low wages and usually lack health insurance, which makes quality cancer treatment difficult to obtain [6]. This paper describes Mexican immigrant farmworkers' knowledge of colorectal, breast, and testicular cancer, and compares farmworkers' cancer knowledge to that of other Mexican immigrants in North Carolina (hereafter referred to as non-farmworkers).

BACKGROUND

This study focuses on three types of cancer that disproportionately burden Latinos in the US. Colorectal cancer (CRC) is the third most common cancer in the US [7] and the third-leading cause of death from cancer among Latino men and women [8]. CRC incidence rates are increasing among adults younger than 50 years old [1]. Breast cancer is the most common type of cancer in women [9] and the most common cause of death from cancer among Latina women [9]. Testicular cancer is the most common cancer among males aged 15–39 years [10] and incidence of the most common type of testicular cancer has increased among Latino adolescents and young adults in recent years [11]. Testicular cancer survival is lower than average for Latino males [12].

Research on Latino farmworkers' cancer knowledge is limited and dated. A 1994 qualitative study conducted with migrant farmworkers in Wisconsin revealed a lack of knowledge about cancer etiology, prevention, screening, and symptoms [2]. Results from focus groups conducted with farmworkers along the US-Mexico border indicated low levels of CRC knowledge and awareness [13]. Two quantitative studies have documented a lack of knowledge about breast cancer among female farmworkers [14, 15]. Few studies have focused on testicular cancer knowledge among ethnic minority groups [16]. Studies of cancer knowledge among other Latino communities [17–20] and the US population in general [21–24] indicate a widespread lack of understanding of cancer. Knowledge is a key factor in cancer screening utilization, which affects early detection and treatment [14, 18, 22, 23].

METHODS

Data were collected in 2015 as part of an ongoing community-based participatory research collaboration between the Wake Forest School of Medicine (Winston-Salem, NC) and several partner organizations including the North Carolina (NC) Farmworkers Project (Benson, NC), El Buen Pastor Latino Community Services (Winston-Salem, NC), and Student Action with Farmworkers. These partner organizations work directly with farmworkers or other Latino communities. Staff from these organizations contributed to the research project by providing input on topics to be covered in the research; reviewing interview question design; and assisting with recruitment. Results of the research are shared with community partners at meetings such as the North Carolina Farmworker Institute. Staff

from partner agencies also collaborate with the research team in writing policy briefs and disseminating results to the farmworker community. The Wake Forest School of Medicine Institutional Review Board approved the study protocol.

Recruitment

The project partners collaborated to recruit 200 adults, 100 farmworkers and 100 non-farmworkers. Inclusion criteria were being aged 18 and older, having been born in Mexico, being a native Spanish-speaker, and being a farmworker living in Johnston County, NC or a non-farmworker living in Forsyth County, NC. Anyone currently employed in agriculture or having co-resident family members currently employed in agriculture qualified as a farmworker.

The NC Farmworkers Project recruited 80 male and 20 female farmworker participants. Data collectors visited grower-provided residences during non-work hours and asked for volunteers. Data collectors recruited no more than five participants from each residence to minimize the effect of clustering. Other local service organizations helped to identify and recruit female farmworker participants. To recruit 50 male and 50 female non-farmworker participants, staff from El Buen Pastor Latino Community Services identified potential participants from their client base and by working with other organizations serving the Latino population in Forsyth County. Project data collectors screened potential participants for eligibility, described the study, answered potential participants' questions, obtained informed consent, and provided participants with a \$20 cash incentive for completing the interview.

Data collection

Trained Spanish-speaking data collectors conducted interviews lasting about 30 minutes. The interviews covered personal demographics and CRC knowledge for all participants, as well as breast cancer knowledge for female participants and testicular cancer knowledge for male participants. Data collectors recorded responses on tablet computers with Research Electronic Data Capture (REDCap) software hosted at Wake Forest School of Medicine [25].

Measures

Demographic characteristics included farmworker status, gender, age (grouped into categories 19–29 years, 30–39 years, 40–49 years, and 50+ years), education (0–6 grade, 7–11 grade, 12+ grade), and years lived in the US (< 5 years, 6–10 years, 11–15 years, 16–20 years, and 21+ years).

We assessed cancer knowledge using true-false items adapted from previous studies [18, 26, 27]. The survey interviews included 8 CRC knowledge items [18], 6 breast cancer knowledge items [18, 26], and 17 testicular cancer knowledge items [27]. Items assessed knowledge of risk factors, screening, and treatment for each type of cancer. Scores represent the percent of correct responses for each measure.

Analysis

Participant characteristics were summarized by farmworker groups using counts and percentages. Chi-square tests were used to examine differences in personal characteristics between farmworkers and non-farmworkers. The percent correct and its standard deviation for knowledge of CRC, breast cancer, and testicular cancer were calculated by farmworker status, gender, education, age, and years in US. Kruskal-Wallis tests were conducted to evaluate whether the mean number of total correct responses varied by these characteristics. After considering Bonferroni correction, p values < 0.01 ($=0.05/5$) were considered statistically significant. The number correct and percent correct for each item of knowledge for the three cancer types were also presented.

RESULTS

Participants

Farmworkers were slightly younger ($M = 37.6$ years; $SD = 10.1$) than non-farmworkers ($M = 41.1$ years; $SD = 11.7$, $p = 0.0516$) (Table I). Farmworkers had completed less formal education than non-farmworkers ($p = 0.0001$). Non-farmworkers had lived in the US for longer ($M = 16.2$ years; $SD = 7.5$) than farmworkers ($M = 10.6$ years; $SD = 6.9$; $p < 0.0001$).

Colorectal cancer knowledge

On average, farmworkers correctly answered 55% ($SD = 18$) of CRC knowledge items, while non-farmworkers correctly answered 61% ($SD = 21$; $p = 0.0087$; Table II). Participants with less than a seventh grade education scored lower on the CRC knowledge measure (53% of items correct) than participants with higher levels of education ($p < 0.0001$). Nearly all participants knew that CRC could be cured if found at an early stage (93%) and that screening tests exist to detect CRC (91%; Table III). Most participants mistakenly believed that CRC is the most commonly diagnosed cancer in the US (13% correct). Participants knew more about CRC screening and treatment than risk factors and symptoms.

Breast cancer knowledge

Female farmworkers correctly answered an average of 73% ($SD = 15$) of breast cancer knowledge items while non-farmworkers correctly answered an average of 77% ($SD = 17$; Table II). Nearly all female participants knew that breast cancer could be cured if found at an early stage (99%) and that mammograms can detect breast cancer (93%; Table IV). Less than half of participants (47%) knew that a woman's chance of getting breast cancer increases as she gets older. Participants knew more about breast cancer screening and treatment than risk factors.

Testicular cancer knowledge

Male farmworkers correctly answered an average of 42% ($SD = 17$) of testicular knowledge items while non-farmworkers correctly answered an average of 38% ($SD = 18$; Table II). Participants with less than a seventh grade education scored lower on testicular cancer knowledge measure (34% of items correct) than participants with higher levels of education

($p = 0.0034$). Most male participants (78%) knew that testicular cancer can be cured (Table V). The misperception that a biopsy will be recommended when testicular cancer is suspected was common (9% correct). Participants knew more about testicular cancer treatment than risk factors and screening.

DISCUSSION

Farmworkers have a moderate level of knowledge about breast cancer and a low level of knowledge about CRC and testicular cancer. Farmworkers had slightly lower knowledge of CRC compared to non-farmworkers, but both groups had similar levels of knowledge about breast and testicular cancer. The difference in farmworker and non-farmworker knowledge of CRC may be due to the difference in the level of education between the two groups. Non-farmworkers had completed more formal education than farmworkers. People with lower levels of education had lower knowledge of all three types of cancer, although the difference was not statistically significant for breast cancer. Cancer knowledge did not vary significantly by age or time in US. Participants scored higher on items related to cancer screening and treatment compared to items related to risk factors.

Participants' limited knowledge of cancer and cancer risk factors is consistent with previous findings. National survey data indicate a lack of knowledge about cancer risk factors and the benefits of early detection among the US population [23, 28]. Goldsmith and Sisneros [29] found a lack of understanding of cancer causes and treatment among California farmworkers in a qualitative study. Lantz et al. [2] and Luque et al. [30] documented many misconceptions about cancer risk factors among farmworkers.

Our findings on CRC knowledge are similar to those of other studies. Participants in the Crookes et al. [18] study answered an average of 58% of CRC knowledge items correctly. We used the same knowledge measure and found similar scores, although participant demographics were different. Participants in the Crookes et al. [18] study were mostly females older than 65, and only about half were Latino. Moralez et al. [31] found limited knowledge of CRC and CRC screening methods among Latinos living in a farming community Washington. In a qualitative study, Coronado et al. [13] found that few farmworkers had heard of CRC or CRC screening tests. Participants held misperceptions about CRC causes, but correctly identified prevention strategies and knew that cancer could be treated if detected early [13]. Latino participants in the Walsh et al. [20] study had comparable education levels to our sample, and most (96%) also knew that CRC could be cured if found at an early stage.

Knowledge of breast cancer in our sample is slightly higher than that documented in previous studies, although the use of different measures makes direct comparison difficult. Ramirez et al. [32] found that 58.3% of Mexican Americans knew the guidelines for breast cancer screening and 21.5% disagreed with the notion that cancer is curable. Meade et al. [15] assessed farmworker women's general cancer knowledge as well as specific breast and cervical cancer knowledge and found a mean score of 5.17 out of 10. Sunil et al. [17] found low to moderate levels of breast cancer knowledge among Latina women living in Texas border communities. Research on testicular cancer knowledge among minority groups is

limited [16]. Our results are consistent with the low levels of testicular cancer knowledge found in studies of young adults and college students [22, 27, 33].

Participants scored very high on items assessing awareness of screening and treatment. This contrasts with existing literature, which emphasizes fatalism, the belief that death is inevitable when a person is diagnosed with cancer, as a key component of cancer knowledge and screening behaviors among Latinos [2, 13, 29, 34]. In our study, most participants knew that cancer could be treated if detected early enough.

Participants' lack of cancer knowledge is a public health concern because knowledge is associated with screening uptake [14, 17, 21, 22]. In the US, Mexicans have lower than average use of CRC (36%) and breast cancer (66%) screening, although the difference is not statistically significant for breast cancer [35]. Due to the low incidence of testicular cancer and effectiveness of available treatment, the US Preventive Services Task Force does not recommend testicular cancer screening for asymptomatic males [15, 36].

Our results demonstrate a need for cancer education among farmworkers. Several evidence-based interventions are designed to increase cancer knowledge among the Latino population. Crookes et al. [18] developed a culturally targeted CRC educational program, *Esperanza y Vida*, and found that it increased CRC knowledge and intention to get a colonoscopy. Morales et al. [31] developed a home-based educational intervention and found it improved CRC knowledge among Latino residents of a farming community in Washington. The National Center for Farmworker Health has also developed a video about CRC screening [37].

Fernández et al. implemented a lay health worker intervention, *Cultivando la Salud*, to increase breast and cervical cancer screening among Latina farmworkers [38]. The National Center for Farmworker Health provides training to health organizations serving farmworkers to implement the *Cultivando la Salud* curriculum [39].

Compared to breast cancer and CRC, less research has focused on increasing testicular cancer education among farmworkers. The lack of educational interventions could be due to the relatively low prevalence of testicular cancer and the fact that routine screening is not recommended [36]. More research is needed to determine the most effective way to convey essential information about testicular cancer to farmworkers.

LIMITATIONS

These results should be interpreted in the context of the small sample size and convenience sampling method. Latinos are a diverse group and our sample was recruited from a limited geographic area. Due to the convenience sample methodology, there could be substantial selection bias meaning that participants who were more trusting of health organizations may have been more likely to participate. This combined with the fact that participants may have been exposed to health promotion activities of the community partner organizations could have resulted in a higher level of knowledge in our sample compared to other members of these communities. The cancer knowledge measures were part of a larger interview, so they were not comprehensive and did not include all types of cancer that disproportionately affect

Latinos. Despite these limitations, this study is one of few quantitative studies examining farmworkers' knowledge of specific types of cancer. Many of the existing studies are dated and have not been done in the eastern US.

CONCLUSIONS

Mexican immigrant farmworkers in North Carolina have limited cancer knowledge, which is similar to the cancer knowledge of other Mexican immigrants. These findings provide further evidence of the need for public health education about cancer risk factors. Increased dissemination of existing health education programs and further research to develop additional educational tools and cancer prevention interventions for these populations is necessary.

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Table I

Demographic characteristics, Mexican immigrant farmworkers and non-farmworkers, North Carolina, 2015

Participant characteristics	Farmworkers (n=100)	Non-farmworkers (n=100)	p-value
	n	n	
Gender			<0.0001
Women	20	50	
Men	80	50	
Education			0.0001
0–6 grade	45	37	
7–11 grade	44	27	
12+ grade	11	36	
Age, years			0.0516
19–29	27	16	
30–39	30	33	
40–49	30	25	
50+	13	26	
Years lived in US			<0.0001
5	30	9	
6–10	19	11	
11–15	27	31	
16–20	17	27	
21+	7	22	

Table II

Knowledge of cancer among Mexican immigrant farmworkers and non-farmworkers in North Carolina

Participant characteristics	Percent correct $\pm$ standard deviation		
	Colorectal cancer (n = 200)	Breast cancer (n = 70)	Testicular cancer (n = 130)
Farmworkers	55 $\pm$ 18 [*]	73 $\pm$ 15	42 $\pm$ 17
Non-farmworkers	61 $\pm$ 21	77 $\pm$ 17	38 $\pm$ 18
Women	59 $\pm$ 20	77 $\pm$ 17	-
Men	58 $\pm$ 20	-	41 $\pm$ 18
Education			
0–6 grade	53 $\pm$ 20 [*]	70 $\pm$ 17	34 $\pm$ 19 [*]
7–11 grade	58 $\pm$ 18	78 $\pm$ 15	43 $\pm$ 16
12+ grade	69 $\pm$ 19	80 $\pm$ 17	48 $\pm$ 14
Age			
19–29	58 $\pm$ 19	80 $\pm$ 13	41 $\pm$ 17
30–39	58 $\pm$ 21	78 $\pm$ 20	42 $\pm$ 18
40–49	59 $\pm$ 18	72 $\pm$ 17	44 $\pm$ 18
50+	56 $\pm$ 21	73 $\pm$ 15	32 $\pm$ 15
Years in US			
5	55 $\pm$ 21	83 ^a	41 $\pm$ 19
6–10	59 $\pm$ 18	72 $\pm$ 15	45 $\pm$ 15
11–15	60 $\pm$ 20	73 $\pm$ 17	42 $\pm$ 17
16–20	58 $\pm$ 20	78 $\pm$ 20	35 $\pm$ 15
21+	58 $\pm$ 19	83 $\pm$ 15	35 $\pm$ 19

^{*} p < 0.01; Significance was determined using Kruskal-Wallis tests by comparing the mean number of total correct responses between groups.

^a Only one participant in this category

Table III

Colorectal cancer (CRC) knowledge among Mexican immigrant farmworkers and non-farmworkers by item
(N = 200)^a

Item	Correct response	N correct	% correct
If CRC is found at an early stage, it can be cured.	True	185	93
A person can have a screening test to find out if they have CRC.	True	182	91
Polyps are growths that are not cancer, but could become cancer someday.	True	141	71
A person can have CRC without having any pain or discomfort.	True	132	66
I feel fine and have no symptoms; I can't have CRC.	False	118	59
If you have a parent, brother, or sister with CRC, you are more likely to get it.	True	101	51
I would feel it if I had a growth in my colon.	False	41	21
Colorectal cancer is the most commonly diagnosed cancer in the USA.	False	26	13

^aMeasure developed by Crookes et al. [18]

Table IV

Breast cancer knowledge among Mexican immigrant farmworkers and non-farmworkers by item (N = 70)

Item	Correct response	N correct	% correct
If breast cancer is found at an early stage, it can be cured. ^a	True	69	99
Mammograms can detect breast cancer in its early stages.	True	65	93
Breast cancer is the most commonly diagnosed cancer among women in the US. ^{b,c}	True	59	84
If a woman has a mother or sister with breast cancer, she is more likely to get it. ^a	True	56	80
A woman is only at risk of getting breast cancer if someone in her family has had breast cancer. ^b	False	37	53
A woman's chance of getting breast cancer decreases as she gets older. ^b	False	33	47

^aAdapted from Crookes et al. [18]^bModified from Kratzke, Amatya, and Vilchis [26]^cExcept for skin cancer. A diagnosis of skin cancer, other than melanoma, is distinctly different in terms of treatment and outcome, and so non-melanoma skin cancer is often not discussed in the context of cancer more generally.

Table V

Testicular cancer knowledge among Mexican-immigrant farmworkers and non-farmworkers by item (N = 130)^a

Item	Correct response	N correct	% correct
Testicular cancer can be cured.	True	101	78
Surgical removal of the testicle that contains the cancer is an option for the treatment of testicular cancer.	True	86	66
Removal of a man's penis is an option for the treatment of testicular cancer.	False	83	64
Your testicle needs to be removed if you have testicular cancer.	True	71	55
Being Latino increases your risk of getting testicular cancer.	False	68	52
If testicular cancer is found in one testicle, the doctor will remove both testicles.	False	64	49
Family history increases your risk of getting testicular cancer.	True	62	48
Testicular cancer usually occurs in men 15 to 40 years old.	True	48	47
Watchful waiting is an option for the treatment of testicular cancer.	False	50	39
High blood pressure increases your risk of getting testicular cancer.	False	49	38
After treatment for testicular cancer, most men can still have children.	True	45	35
Undescended testicle in childhood increases your risk of getting testicular cancer.	True	45	35
If you find a lump on your testes, you have testicular cancer.	False	44	34
Radiation is an option for the treatment of testicular cancer.	False	22	17
Older men are more likely to get testicular cancer than younger men.	False	16	12
Getting older increases your risk of getting testicular cancer.	False	14	11
When testicular cancer is suspected, a biopsy will be recommended.	False	11	9

^aMeasure developed by Sacks et al. [27]