Original Article :

Level and Predictors of Adherence to Colorectal Cancer Screening Recommendations in Average-risk Individuals in Riyadh Peripheral Provinces, 2019-20

Nasser Sulaiman Alsubaihi,[1], Muna Hassan Hassanein, [2], Lolwh Mohammed Almoheteb,[3], Abdullah Fahad Alkhudhayri,[4].

1.Head of Health Programmes and Chronic Diseases Department,
Riyadh Region General Directorate of Health Affairs, Saudi Arabia.

2.Head of Health Programmes Section, Riyadh Region General Directorate of Health Affairs, Saudi Arabia.

3.Coordinator of Breast Cancer Screening Programme,
Riyadh Region General Directorate of Health Affairs, Saudi Arabia.

4.Coordinator of Colorectal Cancer Screening Programme,
Riyadh Region General Directorate of Health Affairs, Saudi Arabia.

Received on 26/09/2021 Accepted for Publication on 08/12/2021 dx.doi.org/10.5455/mjhs.2022.02.002

Corresponding Author:

Name: Muna Hassan Hassanein
Address: Riyadh Region General Directorate of Health Affairs, Riyadh, Saudi Arabia
Mobile phone: +96656270052
E-mail address: mhmhs67@hotmail.com

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Abstract

Background and Aims:

Adherence to screening recommendations is central to the success and effectiveness of colorectal cancer screening programmes. The aim was to identify the level and predictors of adherence to colorectal cancer screening recommendations in the population at average risk to colorectal cancer.

Methods:

This was a retrospective study conducted in Riyadh›s Peripheral Provinces. We utilized secondary data collected from 403 individuals at average risk to colorectal cancer who were invited to perform a Faecal Immunological Test by the primary health care physician. The data included sociodemographic characteristics and the results of the Faecal Immunological Test. Proportions were calculated for the categorical variables. Bivariate and multivariate analyses were conducted using binary logistic regression to evaluate the effect of the independent variables on the probability of completing the Faecal Immunological Test. A p-value of <0.05 was considered significant.

Results:

The proportion of individuals completing the Faecal Immunological Test was 83.0%. In the bivariate analysis, the completion rate was more among females (p-value = .007), and

among those from two provinces (Al Kharj and Al Dawadmi) (p-value < 0.05). In the Multivariate analysis, only the province was found to predict the completion of the Faecal Immunological Test.

Conclusion:
There was a high level of Faecal Immunological Test completion rate most probably due to the enhanced accessibility to the screening services. The effectiveness of the screening programme can be further improved through interventions targeting programme implementation at the province level.

Key-words:
Colorectal cancer screening, Adherence, Completion Rate, Faecal Immunological Test, Saudi Arabia

Introduction:

Colorectal cancer (CRC) ranks third among cancer sites in incidence and mortality for both sexes[1]. In the majority of developed countries, CRC is the second and third most common form of cancer in men and women respectively. The lifetime probabilities of dying from colorectal cancer among men and women are 3.5% and 3.1%, respectively[2,3].

Screening is currently the most promising approach to decrease the burden of CRC4. The majority of colorectal cancers develop from slowly growing colonic polyps that may change to cancers[2].

CRC screening could be considered as an approach for primary prevention through the removal of premalignant polyps, and for secondary prevention through the early detection and treatment of cancers[1,2,5-7].

Screening programmes have been launched in many countries using methods such as faecal occult blood testing (FOBT), flexible sigmoidoscopy (FS), and colonoscopy[2]. There is accumulating scientific evidence about the effectiveness of these methods in reducing the morbidity and mortality associated with CRC[1,6].

According to the Saudi National Cancer Registry (2017), CRC was the second commonly diagnosed Cancer in the country, constituting 12.3% of all cancer cases. It is the first commonly diagnosed cancer in men and the third commonly diagnosed cancer among women. The Saudi National Cancer Registry statistics also showed that the number of CRC had increased from 647 in 2004 to 1387 in 20138.

In response to this increase, the Saudi Ministry of Health has launched the National Programme for CRC screening in 2017 in Riyadh region. The programme targets individuals at average risk for developing the disease (45 to 75 years of age), and those aged less than 45 years of age with an increased risk of developing the disease.

Recommendations of the CRC screening programme include the performance of annual Faecal Immunochemical Test (FIT) for average-risk individuals and colonoscopy every 10 years for individuals with a positive FIT test and those at an increased risk of developing the disease[9].

For the screening programme to be effective it should have high coverage of the total population, however, currently, the coverage by CRC screening in Riyadh Region is suboptimal. A recent study in Riyadh city reported a screening coverage among its participants of only 12.5%[10]. This rate was higher than the rate of 6% reported in 2015 in Riyadh[11,12] but it was still low. Also, Riyadh CRC Screening programme data showed that only 21.4% of the screen-eligible population had ever been screened[13].

The success of CRC screening programmes requires that the target population demand the services, that they accept it when offered to them and that they adhere to the provided instructions[14]. Specifically, adherence to screening recommendations has been shown to be central to the success and effectiveness of CRC screening programmes[1,15,16].

The predictors of adherence with screening could be either patient-related such as demographic and medical history factors, and knowledge, attitudes, beliefs, and health-related behaviours1, or it could be health system-related such as accessibility to screening services and provider performance in delivering screening[17].

The pattern and predictors of adherence to screening are context-specific and efforts to improve adherence should consider the local situation. To our knowledge, no studies assessed the degree of compliance of individuals receiving an invitation for CRC screening and specifically not in the context of Riyadh Peripheral Provinces (RPP). This study aimed to determine the completion rate of Faecal Immunochemical Test (FIT) in the population at average risk to colorectal cancer and its predictors, in Riyadh's Peripheral Provinces.

Methods:

Study setting and population:

We conducted a retrospective study in five of RPPs which are located around Riyadh city. Health care is provided through governmental hospitals and a network of primary health care centers (PHCC). In 2019, the CRC screening programme was implemented in five RPPs, namely; Al Kharj, Al Dawadmi, Al Majma'a, Shagra, and Al Muzahmia. Recommendations of the CRC screening programme include the performance of annual FIT for average-risk individuals[9]. The study population included medical records of individuals at average

risk of developing CRC attending governmental PHCC in RPP, who were invited to perform CRC screening and offered two FIT kits in the period from January 2019 to June 2020. Individuals at average risk of developing CRC were defined as persons in the age group 45 to 75 years with no CRC symptoms or family history of CRC or polyps. Data were collected at two points of time, the first time was when the study population were invited for the screening and were offered the FIT kit. Data collected at this visit included the background information of the respondents. The second time was when the respondents brought the completed FIT to PHCC, and the results of the tests were recorded. For the sample size calculation, we assumed a total population of 1000, a frequency of outcome factor in the population of 0.5 (conventionally), a desired margin of error of 0.05, and a confidence level of 95%. This yielded a sample of 400 medical records, that were selected from the 5 targeted provinces using the stratified, systematic sampling technique. The sample size was stratified, proportional to the weight of the eligible population in each of the 5 provinces during the study period. From each province the records of the eligible participants were selected using the systematic sampling technique.

Data and variables:

We utilized the data collected from the study participants by the health center physician using a form designed by the National CRC screening programme. The data were collected at two points of time: First: data were collected from participants at the time of invitation to CRC screening when the individual was offered two test kits and educated on how to use them and when to return them to the PHCC for the results to be recorded. At this point, the collected data included background information (age, sex, marital status, education, occupation, and province). Second: data were collected after the individual had completed the two FITs and brought the results to PHCC, where the results of the two FITs were recorded.

Only individuals with 2 FIT results documented in their medical records were considered as having completed FIT screening.

Statistical analysis

The statistical analysis was performed using the Statistical Package for Social Sciences (SPSS), version 21.0. Binary logistic regression analysis was used to examine the possible association between independent variables and the completion of FIT. Crude and adjusted Odds ratios (OR) and their corresponding 95% confidence

intervals(CIs) were calculated. A P-value less than 0.05 at a 95% confidence interval was considered significant.

The study protocol was approved by the Central Institutional Board of the Ministry of Health (Central Institutional Review Board (IRB) log number: 20-218M). We utilized secondary data from the patients' medical records, and the IRB approved a waiver of the informed consent.

Results:

Data were collected from 403 medical records of the study population. Table (1) shows the background characteristics of the study population. Around 62% of the population were females, and the highest proportion of them (around 39%) were in the age group 60 years and above. The highest proportion (84 %) of the respondents were married and also the highest proportion of them (43.3%) were illiterate. The variable (economic status) was derived from the occupation of the respondent. Those who were employed either by the governmental or the private sector and the retired respondents were classified as having (regular income), self-employed respondents were classified as having (irregular income) and those not involved in any type of economic activity were classified as having (no income). The highest proportion of the study population (around 59%) were not economically active and had no income.

Table (1) Background Information of individuals at average risk to colorectal cancer, Riyadh's Peripheral Provinces 2019-2020

	Frequency	Percent (95% C.I.*)
Gender		
Female	251	62.3 (57.4 - 67)
Male	152	37.7 (33 – 42.7)
Age		
≤ 50 years	105	26 (21.8 – 30.6)
51 to 59 years	142	35.2 (30.6 – 40.1)
≥ 60 years	156	38.8 (34 – 43.7)
Marital status		
Single	16	3.9 (2.3 – 6.4)
Married	338	84 (80 – 87)
Divorced/widow	49	12.1(9.1 – 15.8)
Educational level		
Illiterate	175	43.3(38.5 – 48.4)
Primary	85	21.2 (15.2 – 25.4)
Intermediate	32	7.9 (5.5 – 11)
Secondary	48	11.9(9.0 – 15.5)
University and above	33	8.2 (5.7 – 11.3)
Read and write	30	7.4(5.1 – 10.5)
Economic status		
Regular income	138	34.2 (29.6 – 39.1)
Irregular income	28	6.8 (4.7 – 10)
No income	237	58.9 (53.8 – 63.7)
Province		
Al Kharj	152	37.7 (33 – 43)
Al Dawadmi	54	13.4 (10.2 – 17.1)
Al Majmaa	62	15.4 (12 – 19.3)
Shaqra	81	20.1(16.3 – 24.4)
Al Muzahmia	54	13.4(10.2 – 17.1)

*C.I: Confidence Interval §

Table (2) shows that 83% (CI: 79.0% – 86.4%) of the study population complied with the doctor's recommendation and completed two FITs.

In the bivariate analysis, the compliance was less among males compared to females (p-value = .007). Study population

Table (2) Compliance with Faecal Immunochemical Test (FIT) recommendation among Individuals at average risk to colorectal cancer Performing FIT, Riyadh's Peripheral Provinces 2019-2020.

	% Completing FIT (95% C.I.*)	Unadjusted Odds Ratio (95% C.I.*)	Sig.
All	83.0 (79 - 86.4)	-	-
Sex			
Female	86.9 (82 – 90.8)	1	
Male	76.3 (68.8 – 82.8)	.488 (.289 - .823)	.007
Age			
50 and below	84.7 (77.1 – 91.6)	1.215 (.257 - 5.737)	.806
51-59	85.2 (78.3 – 90.6)	1.230 (.250 - 6.058)	.799
60 and above	80.2 (73 – 86.1)	1	.806
Marital Status			
Married	75.6 (78.5 - 87)	.386 (.115 - 1.296)	
Single	82.5 (48 - 100)	.000 (.000 - .)	.390
Widow/divorced	90.2(80 – 98.5)	1	.287
Education			
Illiterate	85.1 (84 – 94.3)	.489 (.137 - 1.753)	.296
Primary	85.7(80.7 - 96)	.545 (.175 - 1.698)	.036
Intermediate	87.5(79 - 99)	.098 (.011 - .855)	.016
Secondary	79.1(65.1 – 91.2)	.246 (.079 - .770)	.006
University and above	80.1(63.1 - 94)	.250 (.093 - .672)	.041
Read and write	69.3(48.2 - 86)	1	.272
Economic Status			
Regular income	80.0 (75 - 90)	.308 (.040 - 2.396)	.584
Irregular income	90.6(75.1 - 99)	1.198 (.628 - 2.286)	.419
No income	84.1(71.5 – 83.2)	1	.261
Province			
Al Kharj	98.7 (95.4 - 99)	943.750 (167.774 - 5308.703)	000
Al Dawadmi	98.1 (90.1 - 99)	14.225 (3.125 - 64.759)	.001
Al Majmaa	95.2 (87 - 99)	3.839 (.626 - 23.560)	.146
Shaqra	84.1 (74.4 – 92.3)	1.425 (.127 - 16.032)	.775
Al Muzahmia	7.4 (2 - 18)	1	.000

*C.I.: Confidence Interval

from Al Kharj province and Al Dawadmi province showed higher levels of compliance compared to the population from the other provinces (p-value <0.05). The age, marital status, educational level, and economic status were not associated with compliance with the doctor's recommendation to perform the FIT (Table 2).

The logistic regression model for the multivariate analysis was statistically significant (p-value < 0.001, it explained 69%% (Nagelkerke R2) of the variance of the FIT completion, and correctly classified 82.9 % of the cases. Only the province

was found to predict the completion of the FITs. Study populations from Al Kharj province and Al Dawadmi province were more likely to comply and perform the two FITs compared to the study population from other provinces (Table 3).

Table (3) Logistic regression model for the level of compliance with doctor recommendation to perform the Faecal Immunochemical Test (FIT) among Individuals at average risk to colorectal cancer, Riyadh's Peripheral Provinces 2019-2020

	Adjusted Odds Ratio	95% C.I.*		Sig.
		Lower	Lower	
Gender				
Female	1	-	-	
Male	.528	.213	1.312	.169
Province				
Al kharj	890.533	157.642	5030.693	.000
Al Dawadmi	15.411	3.347	70.964	.000
Al Majmaa	3.694	.600	22.737	.159
Shaqra	1.271	.112	14.394	.846
Al Muzahmia	1	-	-	
Constant	.019	.004	.085	.000

*C.I.: Confidence Interval

Discussion:

This study aimed to determine the level and predictors of adherence with performing FITs, among individuals at average risk to CRC attending governmental PHCC at RPP.

Our results showed that the level of adherence with performing and reporting the results of two FITs was high, especially when compared to other countries. Studies evaluating faecal occult blood test completion reported a median compliance rate between 40.0% and 50.0% depending on the population studied[14]. In countries where occult blood testing kits were offered to patients at the point of care the rate of test completion ranged from 14.8% in the United States of America (USA) to 77.2% in Singapore18-23. Even in instances where multifaceted interventions to improve compliance were applied, the faecal occult blood testing completion rate did not exceed 69.5%[14,24].

Interventions that were found to be effective in increasing CRC screening, fall under three strategies: increasing community demand for screening through reminders and education, enhancing access through reducing structural and economic barriers, and increasing screening service delivery by healthcare providers through reminders, assessment, and feedback[17, 25-27].

In the context of RPP, CRC screening services are provided opportunistically within the setting of primary health care (PHC), where health care providers invite users of the PHCC to screening directly. Embedding the screening services within the set-

ting of routine health care has been found to be effective in increasing the coverage by screening services1. This organization of screening services in RPP has four characteristics that enhance accessibility, and to some extent community demand.

First, the PHCCs have high physical accessibility to most of the population in these provinces. There is strong evidence that enhancing accessibility and reducing structural barriers are effective in increasing colorectal cancer screening by faecal occult blood testing[17] as it reduces the effort associated with the receipt or return of FIT kits[27].

Second, during the visits to PHCC, the FIT kits are provided to the screening-eligible individuals. Offering the test kits to screening illegible individuals either directly or through mail had been shown to increase participation in screening in other countries[17,19,28,29], especially when the kits were provided free of charge[30].

Third, the direct contact during the visit avails the opportunity for issuing a physician invitation to screening, which was found to be a significant predictor of accepting and adhering to CRC screening[5,6,7,31,32].

The direct contact also offers the chance for delivering one-on-one education about CRC screening and how to perform the test. This type of education was found to be effective in increasing colorectal cancer screening[17].

Finally, the Ministry of Health is almost the sole provider of PHC services in RPPs, and this avails a regular source of health care for the population, which was also found to be a predictor of adherence to CRC screening[1,7,32].

Another factor that might have contributed to the high test completion rate was the use of FIT as the initial screening test for average-risk individuals by the Saudi National CRC screening programme. The advantages of FIT over the other faecal occult blood tests are that it does not require diet restriction and has a well-favoured and simple stool-sampling method[33,34]. Consequently, FIT was found to be associated with improved patient acceptance, better patient compliance, and higher participation in CRC screening[9,19,29,33].

All these factors were possibly behind the observed high completion rate. To further improve this rate, reduce the waste due to unused test kits and improve the effectiveness of the screening programme as a whole, the subgroups of the population with the least compliance level should be targeted by suitable interventions.

In our study, we did not detect associations between the sociodemographic characteristics of the respondents and the completion of FITs. In this instance, our results did not differ from reports of other stud-

ies regarding the association between sex, age, or marital status of the respondents and adherence to CRC screening recommendations.

Data from other studies, showed inconsistent patterns of CRC screening rate by sex[1], with some studies reporting high screening adherence among females[3], some reporting high adherence among males[7], and some reporting no significant difference[7,33,35].

Likewise, studies reporting the adherence to screening by age reported inconsistent results, with some reporting more adherence among older age groups[1,5,6], and others reporting more adherence among younger age groups[1,3], and others finding no association[1,35].

Very few studies reported adherence to CRC screening by marital status. The results of these studies were also inconsistent with some reporting that CRC screening adherence was more among married persons and others reporting lack of association[1].

Regarding the educational level, unlike ours, most studies reported an association between higher educational level and adherence to screening[1,9,15]. The lack of association in our study might be because of the less variation and the prevalent low educational level among our population16. Also, unlike ours, results of other studies consistently reported higher economic status, as a significant predictor of adherence to CRC screening[1,3,32]. In RPP, the high physical accessibility to health services coupled with the provision of free-of-charge health care in governmental health facilities – including CRC screening - are the most probable reasons behind the lack of association in our study. Our results are consistent with the results of a recent study conducted in Riyadh where the financial burden was not perceived as a barrier to CRC screening by the study respondents[12].

Our results revealed that FITs completion rates were more among individuals from two provinces, namely Al Kharj and Al Dawadmi compared to individuals from the other provinces. This variation of FITs completion by an administrative/geographical region was reported by other studies32, however, it is unexpected in our context. Whereas in other countries there were regional disparities regarding health care resources, in RPP, the structure, organization, and financing of the public health care sector are the same. Since we did not detect association with individuals' characteristics, our results suggest that the variations in the FITs completion rate between provinces could be attributed to differences in local programme administration, and efforts in patient education and follow-up. It could also be attributed to the local availability of health providers

other than the Ministry of Health diverting the population from their regular source of care. More investigations are needed to identify the factors that caused the variations between the provinces before designing the appropriate interventions to improve the situation.

The strength of our study was that we ascertained FITs completion objectively through a review of patients' records containing the result of FITs. However, the use of the secondary data set had limited our ability to include more potential predictors of compliance with screening recommendations in our analysis.

Conclusion:

In conclusion, we detected a high level of FITs completion rate among individuals at average risk to CRC in RPP. There were significant differences in the completion rate among provinces, while the individuals' sociodemographic characteristics had no significant association with the completion rate. The enhanced accessibility to the screening services was probably behind the high test completion rate.

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