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Assessment of Asian Pacific Screening Score for Risk Factor Stratification of Colorectal Cancer Patients: A Retrospective Audit from a Tertiary Care Institute, Pakistan

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1. Introduction

Colorectal cancer (CRC) is the third most commonly diagnosed cancer and the second leading cause of cancer-related deaths throughout the world [1]. It accounts for an estimated 2 million new cases and over one million cancer related deaths per year and accounts for almost 11% of all cancer diagnosed [2]. Reports from World Health Organization (WHO) data set show that in the past few decades there is 2-4 folds rise in the incidence of colorectal cancer in Asian countries. In 2018 Asia has the largest proportions of both incidence (51.8%) and mortality (52.4%) per 100000 populations [3]. Despite numerous attempts to detect cancer at an early stage more than half of the cancers still diagnosed only when the disease progressed to regional and distant metastasis [4].

The five year survival rates have varied in different parts of the world, a study from Japan documents a rate of 71.6% for colon and 71.6% for rectal cancers [5]. While in India it is 40% [6]. Our local study indicates that an approximated 5 year survival rate of Pakistani population for all stages combined was 46.9% [7].

The drive to rid all colorectal cancers from society has been with the motto of early diagnosis through screening In the case of CRC colonoscopy has been considered a gold standard modality for screening [8]. CRC usually presents as a slowly progressing disease and follows the adenoma-carcinoma sequence [9] where colonoscopy helps in early detection of this lesion even in the precancerous stage. However, this invasive procedure has a low acceptance in asymptomatic individuals [10]. Also, limited resources produce a financial burden especially in low-middle income countries (LMICs) where screening programs are not functional or are under development [11]. These obstacles compromise the feasibility of the gold standard screening tool and look to generate the need for other acceptable screening protocols, especially in LMICs.

To address CRC screening issues, various risk stratification scoring models have been introduced in general asymptomatic populations in which Asian Pacific Colorectal Screening (APCS) model is the most well known risk stratification score. The original APCS score included 4 variables including age, sex, family history of CRC in a first-degree relative, and smoking [12]. The APCS tool was modified to include body mass index as it was identified as a significant risk factor for CRC [13]. The individuals can be divided into 3 groups based on the risk calculated by the modified APCS tool into low risk (LR) 0, moderate risk (MR) 1-2, and high-risk (HR) ≥3 (Table 1).

The scores suggest that moderate risk group individuals should undergo fecal occult blood test (FOBT) and if it turns out positive consider for colonoscopy while high risk group individuals should offer colonoscopy in first go. Low risk group and moderate risk group individuals with negative FOBT does not need any further screening test. This risk stratification model helpful to facilitate discussion between physician and screening participant regarding need for the screening test based on score stratification. So that participant can chose the screening modality (FOBT / Colonoscopy) according to their risk threshold [14].

The rationale of this retrospective analysis of data of the diagnosed

patients of CRC in our local population will be able to suggest and enhance strategies for developing screening protocols for our population.

The objective of this study is to evaluate the reliability of risk stratification based screening model (Asian Pacific Colorectal Screening Score) in patients diagnosed with colorectal carcinoma (all stages included).

2. Methodology

A retrospective cohort study included all diagnosed patients above the age of 12yrs with biopsy proven adenocarcinoma of colorectal

carcinoma registered at the institute from January 2016 till May 2022. Those that had variable histopathology were excluded from the study. The proposal was approved by the ethics committee after all identifier were removed.

2.1. Data collection procedure

The data was recorded from the medical records maintained for each patient using a proforma based on the modified APSC score. The modified APCS score includes 5 variables including age, gender, and family history of CRC in a first-degree relative, smoking and body mass index (Table 1).

Operational definition:

Table 1: The Modified Asian-Pacific Colorectal Screening Score

Parameter	Description	Score
Age	≤ 54	0
	55-64	1
	≥ 65	2
Sex	Female	0
	Male	1
Family history of CRC for a first-degree relative	Absent	0
	Present	1
Smoking	Negative	0
	Positive	1
Body Mass Index	< 23	0
	≥ 23	1
Low risk (AR) 0, Moderate risk (MR) 1-2, High-risk (HR) ≥ 3		

2.2. Body Mass Index

Body mass index is a value derived from the mass and height of a person. The BMI is defined as the body mass divided by the square of the body height, and is expressed in units of kg/m².

2.3. Data Analysis

All the data was analyzed using SPSS version 23. The APCS score was calculated for individual participants and stratified using the categories into low risk (LR) 0, moderate risk (MR) 1-2, and high-risk (HR) ≥ 3. Frequencies and percentages were computed for categorical variables while mean ± standard deviation for quantitative variables. Chi square or Fisher's exact test used to determine the association between groups. P value of less than < 0.05 considered statistically significant.

3. Result

A total of 338 patients presented to SIUT from January 2016 till May 2022 with the diagnosis of colorectal adenocarcinoma. Out of 338 patients reviewed 209 patients (61.8%) were male. According to age distribution as per Proforma 207 patients (61.2%) were aged less than 55 years. Positive family history for colorectal cancer was reported in 119 patients (35.2%) while 123 patients (36.4%) patients were smoker. Body Mass Index (BMI) of more than 23 Kg/M2 was noted in 128 patients (37.9%).Only 38 patients (11.2%) had diabetes mellitus.

On the basis of Asian Pacific Colorectal cancer Screening score (APCS) out of total 338 patients 20 patients (5.9%) were in low risk group while 168 patients (49.7%) were in moderate risk and 150 patients (44.4%) fall in high risk group (Table 2).

Out of total 209 male patients 42.5% were in moderate risk group and 57.44% were in high risk group. Age less than 55 years was reported in 207 patients out of which 66.67% fall in moderate risk group while 23.6% of them fall in high risk group. For patients age between 55 and 64 years 36.67 % fall in moderate group while 63.3% fall in high risk group. For patients age more than 65 years 9.8% fall in moderate risk group while 88.7% fall in high risk group. Positive family history for colorectal cancer was noted in 119 patients out of which 28.7% fall in moderate risk group while 71.4% fall in high risk group. Form total data of 123 smokers 40.65% were in moderate risk group while 59.34% were in high risk group. BMI of more than 23 kg/m2 was reported in 128 patients of which 36.7% fall in moderate risk group and 63.28% of them fall in high risk group.

Association of risk factors with APSC score in our patients strongly validated this score and showed that age more than 55 years, male gender, and positive family history of colorectal cancer, smoking and BMI more than 23 kg/m2 are all statistically significant with P-value 0.001 (Table 3).

Table 2: Variables

RISK FACTORS		NUMBER (n)	PERCENTAGE
	≤54 YEARS	207	61.20%
	55-64 YEARS	60	17.80%
	≥65 YEARS	71	21.00%
Gender	MALE	209	61.80%
	FEMALE	129	32.80%
Family History	POSITIVE	119	35.20%
	NEGATIVE	108	32.00%
	MISSING	111	32.80%
Smoking	POSITIVE	123	36.40%
	NEGATIVE	123	36.4
	MISSING	92	27.2
BMI	<23	167	49.40%
	>23	128	37.90%
	MISSING	43	12.70%
Risk group	LOW	20	5.90%
	MODERATE	168	49.70%
	HIGH	150	44.40%

Table 3: Risk factor association with APCS score

RISK FACTOR	NUMBER (n)	RISK FACTOR			P-VALUE
		Low	Moderate	High	
AGE n = 338	**<55 YEARS n=207**	20 (9.6%)	138 (66.6%)	49 (23.6%)	<0.001
	55-64 YEARS n=60	0	22 (36.6%)	38 (63.3%)	
	>65 YEARS n=71	0	8 (9.8%)	63 (88.7%)	
GENDER n=338	**Male n= 209**	0	89 (42.5%)	120(57.4%)	<0.001
	Female n= 129	20 (15.5%)	79 (61.2%)	30 (23.2%)	
Family history n=227	**POSITIVE n= 119**	0	34 (28.5%)	85(71.4%)	<0.001
	NEGATIVE n= 108	12 (11.1%)	67 (62%)	29 (26.8%)	
SMOKING n=246	**POSITIVE n=123**	0	50 (40.6%)	73 (59.3%)	<0.001
	NEGATIVE n=123	13 (10.5%)	69 (56%)	41 (33.3%)	
BMI n=295	**<23 n=167**	16 (9.5%)	97 (58.0%)	54 (32.3%)	<0.001
	>23 n=128	0	47 (36.7%)	81 (63.2%)	

4. Discussion

This current study was conducted to evaluate and elucidate the diagnostic accuracy of internationally accepted APCS score for the detection of colorectal cancer in asymptomatic screening population. Association between specified risk factors for colorectal cancer as mentioned in APCS score and diagnosis of colorectal cancer has been discussed in various studies like a prospective multicenter study conducted in China which evaluate APCS score reliability as a tool for screening of asymptomatic population and concluded that parameters of this score are efficient in selected group of population [15].

The present study included all patients' already diagnosed case of colorectal adenocarcinoma and retrospectively evaluate association of colorectal cancer with these risk factors and APCS scoring system. Our results concluded that 168 patients (49.7%) had moderate risk and 150 patients (44.4 %) had high risk to develop colorectal cancer. Keeping in view APCS scoring system details

94.1% of patients in our study fall in the criteria of evaluation for screening of asymptomatic individuals. Hence our studies strongly validate this scoring system to be applicable in our general asymptomatic population for screening purpose. Our study results also validated by a cross sectional study conducted under the frame work of cancer screening program in Urban China and concluded that the modified APCS screening score seemed the preferable system to classify high risk subjects based on its highest relative risk, sensitivity and predictive ability in the selected population [16].

In a low economic country where still screening program for colorectal cancer is in question because of limited resources, lack of awareness, insufficient advocacy by health care providers and poor compliance because of invasive nature of colonoscopy following a risk stratification model like APCS score is easy to use by all health care providers as the information required is based simply on history and calculation based on scoring only. At the same time it's simple enough to be understandable for general population [17].

However in this study only one risk stratification scoring model has been evaluated and it is warranted to assess other existing scoring models which will help to develop a more extensive colorectal cancer screening model. Additionally in this scoring system other potential risk factors for colorectal cancer like dietary intake of red meat, saturated fat, fibers, reduced physical activities, waist circumference [18, 19], which is somewhat more accurate than BMI are not included which should be addressed to strengthened the screening program in general asymptomatic population. In this risk stratification score individuals with age less than 55 years have given 0 score while multiple local and international studies indicate that colorectal cancer is progressively becoming more prevalent in younger population [20, 21].

International data consider age less than 50 years as young age group while most of colorectal cancer screening programs consider screening age above 50 years and hence young age group individuals potentially at risk of colorectal cancer not included in screening program [22]. Therefore screening program based on this scoring system can miss a significant number of individuals with potential hazard of having colorectal cancer during screening. Hence we should design a screening model which address this age group as well.

Our study has certain limitation, like it was a single center study and limited number of patients available for analysis. Another limitation is retrospective nature of study with compromised data collection because of incomplete information as 111 patients (32.8%) had missing data.

5. Conclusion

Our study validate APSC risk stratification model as a tool for screening of colorectal cancer in general asymptomatic population. This is an easily acceptable, feasible and cost effective model to be used in clinical practice and community setting. However introducing additional risk factors to this score and conducting a prospective study on general population will further evaluate and help to validate a new more comprehensive scoring model in future.

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