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WHICH COMPONENT OF METABOLIC SYNDROME IS THE MOST IMPORTANT ONE IN DEVELOPMENT OF COLORECTAL ADENOMA?

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ABSTRACT

Metabolic syndrome raises the risk of colorectal caners. Most colorectal cancers originate from colorectal adenomas. We aimed to investigation relationship of metabolic syndrome with colorectal adenoma.

This cross-sectional study on 114 patients aged ≥50 years referred to a university hospital for total colonoscopy from Jan to Dec 2011. The frequency distribution of metabolic syndrome in all patients was determined and its relationship with presence of colorectal adenoma and high risk colorectal adenoma was evaluated. Blood pressure, waist circumference, fasting blood sugar (FBS), serum HDL-cholesterol and triglycerides were evaluated to investigate adenoma frequency.

5 patients didn't complete their laboratory studies and were not included in the final statistical analyses. Out of 114 patients, 73 (64%) were females. 22 (42.2%) patients had both adenoma and metabolic syndrome and 30 (26.3%) patients had metabolic syndrome but no adenoma. Between sex and adenoma there was significant correlation ($P<0.05$).

Out of the four secondary components of metabolic syndrome, only raised FBS and HDL were significantly associated with colorectal adenoma ($P<0.05$).

This study revealed a significant association of colorectal adenoma and metabolic syndrome. In addition to waist circumference, diabetes mellitus and HDL-c were the most important factors associated with colorectal adenoma.

Keywords: Colorectal adenoma, Diabetes mellitus, Metabolic syndrome

INTRODUCTION

Adenomas are mostly observed in over 50 year-old males **[1, 2]**. Almost all colorectal cancers are derived from adenomas. But, a very small portion of the latter develops into the former. The multi-step process of adenoma-cancer which averages 10-25 years could be accelerated by metabolic abnormalities. Abdominal obesity and sedentary lifestyle lead to free fatty acids flooding. They induce pro-inflammation and insulin resistance through the liver **[3, 4]**. Insulin resistance is the core stem of metabolic syndrome. Raised blood pressure, abdominal obesity, low HDL-cholesterol, impaired glucose tolerance and hypertriglyceridemia are characteristics of metabolic syndrome. Obesity, lack of physical activity and the resultant metabolic syndrome raise the risk of diabetes, cardiovascular diseases and many cancers **[5-22]**. These are the leading causes of deaths throughout of the world. For example, colorectal cancers causes over 50 thousands deaths in USA annually. They are second after lung cancers in cancer induced deaths in USA **[23]**. Understanding the relationship of adenoma development and metabolic syndrome could clarify important implications in prevention of colorectal cancer development. The current study tried to see if metabolic syndrome is significantly more frequent in patients with adenoma compared with those without adenoma in a population of ≥50 year-old Middle East patients referred to a university hospital for total colonoscopy.

MATERIALS AND METHODS

This cross-sectional study was carried out in Shariati teaching hospital (Isfahan, Iran) from June 2010 to June 2011.The research was approved by the Ethical Committee of the Islamic Azad University Najafabad branch.

Patient's history and current medications were evaluated by a general practitioner in the outpatient clinic three days before colonoscopy. Blood pressure (BP) was

assessed. Waist circumference was determined at the level of umbilicus in the horizontal plane. In order to determine biochemical markers, venous blood was taken after overnight fasting. Fasting blood sugar (FBS), serum HDL-cholesterol and triglycerides were measured at the hospital laboratory. Presence or absence of metabolic syndrome in all patients was determined. 2001 National Cholesterol Education Program/ATP III were used to identify patients with the metabolic syndrome,**[24]** that include any three of the followings: the presence of abdominal obesity, elevated BP≥ 130/85 mmHg, Fasting plasma glucose (FPG) ≥100 mg/dL, Serum HDL cholesterol <40 mg/dL in men and <50 mg/dL in women and triglycerides ≥150 mg/dL. Current treatment or medications for low HDL-cholesterol reflected the low HDL-cholesterol. Current treatment or medications for diabetes mellitus reflected the raised FBS. Medications received for hypertension was considered as the proof of high BP. The cutoff points of 102 and 88 centimeters in waist circumference were defined for abdominal obesity in white men and women, respectively **[25]**.

Exclusion criteria included: family and personal history of colorectal cancer, anemia, inflammatory bowel disease and weight loss. Patient's history and current medications were evaluated by a general practitioner in the outpatient clinic three days before colonoscopy. Waist circumference was determined at the level of umbilicus in the horizontal plane. Blood pressure (BP) was assessed. Calculation of body mass index (BMI) was carried out as weight in kilograms divided by height squared (m) **[26]**.

In order to determine biochemical markers, venous blood was taken after overnight fasting. Fasting blood sugar (FBS), serum high density lipoprotein-cholesterol (HDL-C) and triglycerides (TG) were measured at the hospital laboratory. The frequency distribution of colorectal adenomas in all patients was determined. PENTAX system (Japan) were used for colonoscopy.

Its association with the presence of metabolic syndrome and also with different secondary components of metabolic syndrome was evaluated through Pearson correlation. Statistical analyses were done using SPSS version 17 (Chicago, IL).

RESULTS

Patients aged 50-86 years. 5 patients didn't complete their laboratory studies and were not included in the final statistical analyses. Out of 114 patients, 73 (64%) were females. 70.2% of patients had BMI < 30 kg/m^2 and the rest had BMI ≥ 30 kg/m^2. Metabolic syndrome was prevalent in 52 (45.6%) patients. 22 (42.2%) patients had both adenoma and metabolic syndrome, 54 (47.4%) patients had neither adenoma nor metabolic syndrome, 30 (26.3%) patients had metabolic syndrome but no adenoma and only 8 (7%) patients with no metabolic syndrome had adenoma **(Table 1)**.

17 (41.5%) male and 13 (17.8%) female patients had adenoma.

Between sex and adenoma there was significant correlation. There was no significant correlation between adenoma and BMI **(Table 2, P<0.05)**.

Out of the four secondary components of metabolic syndrome, only raised FBS and HDL were significantly associated with colorectal adenoma **(Table 3, P<0.05)**.

Table 1: frequency of demographic and clinical of patient

Characteristic of patient		Frequency (percent)
Sex	Female	73 (64%)
	Male	41 (36%)
Age	>50 years	114 (100%)
BMI	< 30	80 (70.2%)
	≥ 30	34 (29.3%)
Metabolic syndrome	Suffering from metabolic syndrome	52 (45.6%)
	No suffering from metabolic syndrome	62 (54.4%)
Diagnosis of Metabolic Syndrome	Adenoma diagnosis	22 (42.2%)
	No adenoma diagnosis	30 (57.7%)
No diagnosis of metabolic syndrome	Adenoma diagnosis	8 (12.9%)
	No adenoma diagnosis	54 (87.1%)

Table 2: frequency of characteristics of suffering from metabolic syndrome and adenoma

Characteristic of patient		adenoma		p-value
		Diagnosis [frequency (percent)]	No diagnosis [frequency (percent)]	
sex	Female	13 (17.8%)	60 (82.2%)	0.006
	male	17 (41.5%)	24 (58.5%)	
BMI	< 30	22 (27.5%)	58 (72.5%)	0.666
	≥ 30	8 (23.5%)	26 (76.5%)	

The significance level is 0.05

Table 3: Association of colorectal adenoma and secondary components of metabolic syndrome.				
Number of Patients with		**Adenoma**		**P-value**
		Yes	**No**	
BP	**High or Under Treatment**	**17**	**33**	**0.1**
	Normal	**13**	**51**	
FBS	**High or Under Treatment**	**22**	**43**	**0.035**
	Normal	**8**	**41**	
TG	**High or Under Treatment**	**14**	**34**	**0.55**
	Normal	**16**	**50**	
HDL	**Low or Under Treatment**	**16**	**27**	**0.03**
	Normal			

The significance level is 0.05

DISCUSSION

The current study demonstrated a significant association of colorectal adenoma and metabolic syndrome in a population of Middle East aged 50 years or older. In addition, diabetic patients showed the most significant association with the presence of metabolic syndrome. Other studies have examined the relationship of colorectal adenoma and metabolic syndrome and found similar results in other areas of the world.[25, 26] These relationships point out that hyperinsulinemia and/or diabetes mellitus might play the major role in development of colon adenoma and cancer through insulin-like growth factor or through direct proliferative effect of insulin on tumor cells.[5, 10, 15-17] The advantage of the current research was the exclusion of people under 50 years because adenomas are mostly observed in patients aged 50 year-old and over. The relationship of age with colon adenoma when patients were bi-grouped into 50-60 years and >60 years was not statistically significant. Furthermore, there were some other factors associated with colon adenoma that were not evaluated in the current study including physical activity, smoking and alcohol use.[2, 16, 18, 23] Further studies are necessary to evaluate the concurrent effects of all these risk factors in development colon adenoma.

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