Original Article

Relationship between Body Mass Index and Colorectal Adenoma in Thai Population Participating in Colorectal Cancer Screening Project at Chulabhorn Hospital

Kamonwan Soonklang MSc[1], Bunchorn Siripongpreeda MD[2,3], Prassanee Sattayarungsee MSc[2], Kasiruck Wittayasak MSc[1]

[1] Data Management Unit, HRH Princess Chulabhorn College of Medical Science, Chulabhorn Royal Academy, Bangkok, Thailand
[2] Chulabhorn Hospital, HRH Princess Chulabhorn College of Medical Science, Chulabhorn Royal Academy, Bangkok, Thailand
[3] Faculty of Medicine and Public Health, HRH Princess Chulabhorn College of Medical Science, Chulabhorn Royal Academy, Bangkok, Thailand

Objective: The present study aimed to determine the association between body mass index [BMI] and colorectal adenoma in a Thai population participating in a colorectal cancer [CRC] screening project at Chulabhorn Hospital.

Materials and Methods: A total of 1,404 Thai individuals participated in the present study during July 2009. The participants were asked to complete questionnaires about their risk factors of CRC. Body mass index was classified as follows: normal, <23; overweight, ≥23 to 24.9; obesity I, ≥25 to 29.9; and obesity II, ≥30 kg/m^2. Multiple logistic regression analysis was used to identify the association between BMI and colorectal polyps.

Results: Colorectal adenoma was noted in 274 subjects (19.5%). An increase in BMI was associated with a higher risk for colorectal polyps compared with normal BMI as follows: overweight, odds ratio [OR] 1.45 (95% confidence interval [CI] 1.04 to 2.03); obesity I, 1.58 (1.18 to 2.12); obesity II, 1.65 (1.09 to 2.48). However, the risk of occurrence of polyps in adenoma or advanced colorectal neoplasia was increased only among those with obesity: obesity I; OR 1.47 (95% CI 1.05 to 2.06), obesity II; 2.78 (1.18 to 6.75).

Conclusion: High BMI may increase the risk of development of colorectal adenoma, which may necessitate colonoscopy screening for colorectal cancer.

Keywords: Colorectal adenoma, Advanced colorectal neoplasia, Body mass index, Overweight, Obesity, Colorectal cancer screening

J Med Assoc Thai 2018; 101 [Suppl. 6]: S81-S85
Full text. e-Journal: http://www.jmatonline.com

Cancer is the second leading cause of death worldwide. Colorectal cancer [CRC] accounted for 8.8 million deaths in 2015[(1)]. According to statistics of the National Cancer Institute, CRC ranked between the first and third highest incidence among cancers during the past 5 years. In 2015, the incidence of colorectal cancer in men was ranked second after liver cancer and cholangiocarcinoma, whereas the incidence in women was ranked third after breast cancer and cervical cancer[(2)].

As part of the Royal Charity Project of colorectal cancer screening performed during 2009, a total of 1,404 participants aged 50 to 65 years underwent colonoscopy and 256 cases (18.2%) of adenoma or adenomatous polyp were identified. From a review of the literature, the chance of CRC development was 5%, 15%, and 20 to 25% if screening detected tubular adenoma, tubulovillous adenoma, and villous adenoma, respectively[(3)].

The risk factors for CRC include body mass

Correspondence to:
Soonklang K, HRH Princess Chulabhorn College of Medical Science, Chulabhorn Royal Academy, 54 Kamphaengphet 6, Talat Bangkhen, Laksi, Bangkok 10210, Thailand.
Phone: +66-2-5766402, **Fax:** +66-2-5766400
E-mail: kamonwan.soo@pccms.ac.th

How to cite this article: Soonklang K, Siripongpreeda B, Sattayarungsee P, Wittayasak K. Relationship between Body Mass Index and Colorectal Adenoma in Thai Population Participating in Colorectal Cancer Screening Project at Chulabhorn Hospital. J Med Assoc Thai 2018;101;Suppl.6: S81-S85.

index [BMI], which is associated with adenoma development[4]. However, there has been a lack of data confirming the correlation between BMI and adenomas in the Thai population. Therefore, this study aimed to identify the association between BMI and adenomas among the Thai population participating in the Royal Charity Project of colorectal cancer screening in 2009.

Materials and Methods

This retrospective study was conducted in individuals aged 50 to 65 years who participated in the Royal Charity Project of colorectal cancer screening during 2009. The 1,404 participants were asked to sign an informed consent and completed questionnaires designed to elucidate the association between body mass index and colorectal polyp.

Patient demographic data included gender, age, alcohol consumption, smoking, and family history of CRC in a first-degree relative.

Body mass index is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). The World Health Organization [WHO] classifies BMI for Asian populations as follows: normal <23, overweight ≥23 to 24.9, obesity I ≥25 to 29.9, obesity II ≥30[5].

In the present study, we defined colorectal polyps as hyperplastic polyp, low-grade dysplasia, tubular, serreted, tubulovillous, villous, high-grade dysplasia, or adenocarcinoma. Colorectal adenoma was defined by pathology results showing tubular, serreted, tubulovillous, villous, low-grade dysplasia, high-grade dysplasia, or adenocarcinoma. We defined advanced colorectal neoplasia as an adenoma of size ≥1 cm, villous or tubulovillous adenoma, or high-grade dysplasia or adenocarcinoma.

Demographic data were analyzed using descriptive statistics. Multiple logistic regression analysis was used to identify the association between BMI and colorectal polyps, adjusted by gender, age, alcohol consumption, smoking, and family history of CRC in a first-degree relative. The analysis was conducted using Stata/SE version 12 software (StataCorp LP, College Station, TX, USA), and significance was defined as a two-sided *p*-value <0.05.

The present study was approved by the Ethics Committee of Human Research, Chulabhorn Research Institute (Project code: 016/2560).

Results

The 1,404 participants included 429 men and 975 women with mean age of 56.9±4.2 years, current or past smoking (14.9%), current or past alcohol consumption (37.2%), and family history of CRC in a first-degree relative (9.3%). Normal BMI was observed in 466 (33.2%) individuals, overweight in 295 (21.0%), obesity I in 490 (34.9%), and obesity II in 53 (10.9%). Colonoscopy showed normal findings in 993 participants (70.7%), adenoma polyp in 256 (18.2%), and colorectal cancer in 18 (1.3%) (Table 1).

Analysis of the association between BMI and colonoscopy after adjustment by gender, age, alcohol consumption, smoking, and family history of CRC in a first-degree relative is shown in Table 2. Presence of colorectal polyps on colonoscopy was significantly associated with BMI as follows: overweight (odds ratio [OR], 1.45; 95% confidence interval [CI], 1.04 to 2.03), obesity I (OR, 1.58; 95% CI, 1.18 to 2.12), and obesity II (OR, 1.65; 95% CI, 1.09 to 2.48). The results of colonoscopy also showed an association between colorectal adenoma and obesity I (OR, 1.47; 95% CI, 1.05 to 2.06) and between advanced colorectal neoplasia and obesity II (OR, 2.78; 95% CI, 1.18 to 6.75).

Discussion

The present study focused on BMI among the Thai population according to the WHO classification for Asian populations into four groups: normal (BMI ≥22.9 kg/m^2), overweight (23.0 ≤BMI ≤24.9), obesity I (25 ≤BMI ≤29.9), and obesity II (BMI ≥30)[5]. This differs from the general WHO classification of BMI as normal (BMI ≤24.9), overweight (25.0 ≤BMI ≤29.9), obesity I (30.0 ≤BMI ≤34.9), obesity II (35.0≤ BMI ≤39.9), and obesity III (BMI ≥40)[6]. We found that high BMI increased the risk for colorectal polyp development after adjusting for gender, age, alcohol consumption, smoking, and family history of CRC in a first-degree relative, similar to previous studies showing that BMI ≥25 kg/m^2 was associated with a higher risk of polyps (OR = 1.61)[7]. Factors related to colorectal polyp development were age, BMI, total cholesterol, triglycerides, fasting glucose, creatinine, urinary nitrogen, systolic blood pressure, and diastolic blood pressure as covariates. A separate study also found that BMI (OR = 1.64) and systolic blood pressure were associated with the occurrence of colorectal polyps[8].

The association of BMI and colonoscopy results confirmed colorectal adenoma. In the present study, individuals with obesity I (25 ≤BMI ≤29.9) had an increased risk for colorectal adenoma development, but there was no correlation in the group of obesity II (BMI ≥30) after adjusting for gender, age, alcohol

Table 1. Demographic data and colonoscopy findings

Variable	Number	%
Gender		
Male	429	30.6
Female	975	69.4
Age (years)	56.9±4.2	
Smoking		
Never	1,195	85.1
Current or past	209	14.9
Alcohol consumption		
Never	881	62.8
Current or past	523	37.2
Family history of CRC in a first-degree relative		
Absent	1,274	90.7
Present	130	9.3
BMI (kg/m^2)		
Normal (BMI ≤22.9)	466	33.2
Overweight (23.0≤ BMI ≤24.9)	295	21.0
Obesity I (25≤ BMI ≤29.9)	490	34.9
Obesity II (BMI ≥30)	153	10.9
Colonoscopy findings		
Normal colonoscopy	993	70.7
Hyperplastic polyp and others	137	9.8
Adenoma polyp	256	18.2
Colorectal cancer	18	1.3

consumption, smoking, and family history of CRC in a first-degree relative. This was due to inadequate statistical power of the test for examination. Previous studies showed that individuals with colonoscopy findings of adenoma demonstrated higher BMI than the normal group[9]. In addition, a meta-analysis study found that a 65-unit increase in BMI increased the risk for colorectal adenoma (OR = 1.19)[10].

The association of BMI and colonoscopy findings of advanced colorectal neoplasia showed that individuals with obesity II (BMI ≥30) had an increased risk of developing advanced colorectal neoplasia after adjusting for gender, age, alcohol consumption, smoking, and family history of CRC in a first-degree relative. Previous studies found that BMI classifications of overweight (23.0 ≤BMI ≤24.9) and obesity (BMI ≥25) were independent risk factors for advanced colorectal neoplasia (OR = 1.52, OR = 1.56[11] and OR = 2.02, OR = 2.38[12], respectively). Other studies have also shown that higher BMI is related to the likelihood of developing advanced colorectal neoplasia[13].

The results of this study showed that BMI was a related factor for colorectal adenoma

Table 2. Association between BMI and colonoscopy findings

BMI		Colorectal polyp (n = 411, 29.3%)			Colorectal adenoma (n = 274, 19.5%)			Advanced colorectal neoplasia (n = 56, 4.0%)		
	%	OR (95%CI)	*p*-value+	%	OR (95%CI)	*p*-value+	%	OR (95%CI)	*p*-value+
Normal	25.3	Ref.	-	26.3	Ref.	-	21.4	Ref.	-
Overweight	22.9	1.45 (1.04 to 2.03)	0.030	19.7	1.06 (0.71 to 1.58)	0.776	26.8	1.69 (0.77 to 3.72)	0.191
Obesity I	39.4	1.58 (1.18 to 2.12)	0.002	41.2	1.47 (1.05 to 2.06)	0.023	32.2	1.22 (0.58 to 2.60)	0.601
Obesity II	12.4	1.65 (1.09 to 2.48)	0.017	12.8	1.50 (0.95 to 2.39)	0.085	19.6	2.78 (1.18 to 6.75)	0.020

Adjusted by gender, age, alcohol consumption, smoking, family history of CRC in a first-degree relative
+ Multiple logistic regression analysis; Ref., reference

development based on the calculation of score for prediction of advanced colorectal neoplasia development as follows: BMI ≥25 kg/m^2 = 1 score[14,15] and BMI ≥30 kg/m^2 = 1 score[16,17].

Conclusion

In our study, high BMI increased the risk of developing colorectal polyps in a Thai population. Obesity was associated with an increased risk for colorectal adenoma whereas obesity II (BMI ≥30) was correlated with an increased risk of developing advanced colorectal neoplasia. Higher BMI was associated with a higher risk for colorectal polyp and colorectal cancer. Hence, surveillance colonoscopy should be recommended in those with high BMI.

What is already known on this topic?

Previous studies showed that high BMI increased the risk for colorectal polyp, colorectal adenoma, and advanced colorectal neoplasia. However, the general BMI classification of BMI ≥23 kg/m^2, BMI ≥25 kg/m^2 or BMI ≥30 kg/m^2 for the correlation was not consistent with risk assessment of colorectal adenoma in the Thai population. Thus, the present study aimed to determine the association between BMI and development of colorectal polyp, colorectal adenoma, and advanced colorectal neoplasia according to BMI categories for Thai or Asian populations.

What this study adds?

This study showed the association of BMI and colorectal polyp, colorectal adenoma, and advanced colorectal neoplasia according to BMI categories for a Thai population. We found that high BMI increased the risk for colorectal polyp. In particular, BMI ≥25 kg/m^2 was related to colorectal adenoma and BMI ≥30 kg/m^2 was associated with advanced colorectal neoplasia.

Acknowledgements

We would like to convey our sincere thanks to the team of the Royal Charity Project 2009, Colorectal Cancer Screening, for valuable advice and suggestions for this study.

Potential conflicts of interest

The authors declare no conflict of interest.

References

1. World Health Organization. Cancer [Internet]. 2017 [cited 2017 Mar 6]. Available from: http://www.who.int/mediacentre/factsheets/fs297/en/.
2. National Cancer Institute, Thailand. Hospital-based cancer registry 2015 [Internet]. 2017 [cited 2017 Mar 6]. Available from: http://www.nci.go.th/th/File_download/Nci%20Cancer%20Registry/HOSPITAL-BASED%202015.pdf.
3. Kraiphibool P. Colorectal polyp [Internet]. 2017 [cited 2017 Mar 6]. Available from: http://haamor.com/th.
4. Jochem C, Leitzmann M. Obesity and colorectal cancer. Recent Results Cancer Res 2016;208:17-41.
5. Thai Health Promotion Foundation. Overweight and obesity [Internet]. 2012 [cited 2017 Mar 6]. Available from: http://www.thaihealth.or.th/Content/20399-html.
6. World Health Organization Regional Office for Europe. Body mass index-BMI [Internet]. 2017 [cited 2017 Mar 26]. Available from: http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi.
7. Ashktorab H, Paydar M, Yazdi S, Namin HH, Sanderson A, Begum R, et al. BMI and the risk of colorectal adenoma in African-Americans. Obesity (Silver Spring) 2014;22:1387-91.
8. Yang W, Chang Y, Huang H, Wang Y, Yu X. Association between obesity, serum lipids, and colorectal polyps in old Chinese people. Gastroenterol Res Pract 2013;2013:931084.
9. Liu Z, Hu X, Cui S, Gu J, Joe King MF, Fion Siu YC, et al. Association of colorectal adenoma and metabolic syndrome and relevant parameters. Zhonghua Wei Chang Wai Ke Za Zhi 2016;19:675-9.
10. Ben Q, An W, Jiang Y, Zhan X, Du Y, Cai QC, et al. Body mass index increases risk for colorectal adenomas based on meta-analysis. Gastroenterology 2012;142:762-72.
11. Wong MC, Lam TY, Tsoi KK, Chan VC, Hirai HW, Ching JY, et al. Predictors of advanced colorectal neoplasia for colorectal cancer screening. Am J Prev Med 2014; 46: 433-9.
12. Kwon HJ, Kim HJ, Park YS, Lim JH, Park KJ, Shin CM, et al. Body mass index as a predictor of advanced colorectal neoplasia. J Cancer Prev 2013;18:144-8.
13. Adamowicz K, Wrotkowska M, Zaucha JM. Body mass index as a predictor of colorectal cancer. Przegl Epidemiol 2015;69:779-85, 909-12.
14. Yang HJ, Choi S, Park SK, Jung YS, Choi KY,

Park T, et al. Derivation and validation of a risk scoring model to predict advanced colorectal neoplasm in adults of all ages. J Gastroenterol Hepatol 2017;32:1328-35.
15. Wong MC, Lam TY, Tsoi KK, Hirai HW, Chan VC, Ching JY, et al. A validated tool to predict colorectal neoplasia and inform screening choice for asymptomatic subjects. Gut 2014;63:1130-6.
16. Bortniker E, Anderson JC. A scoring system for estimating the risk of advanced colorectal neoplasia at colonoscopy. Gastroenterology 2014;147:1431-3.
17. Kaminski MF, Polkowski M, Kraszewska E, Rupinski M, Butruk E, Regula J. A score to estimate the likelihood of detecting advanced colorectal neoplasia at colonoscopy. Gut 2014;63:1112-9.