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Changes in Body Mass Index and Stoma Related Problems in the Elderly

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Abstract

Objectives—Weight gain can cause retraction of an intestinal stoma, possibly resulting in difficulty with wafer and pouch fit, daily care challenges, and discomfort. This cross-sectional study examined the association between body mass index (BMI) and ostomy-related problems among long-term (>5 years post-diagnosis) colorectal cancer (CRC) survivors.

Materials and Methods—CRC survivors from three Kaiser Permanente Regions completed a mailed survey. The response rate for those with an ostomy was 53% (283/529). Questions included stoma-related problems and time to conduct daily ostomy care. Poisson regression

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evaluated associations between report of problems and change in BMI. Our analysis sample included 235 survivors.

Results—Sample was 76% ≥65 years of age. Since their surgeries, BMI remained stable in 44% (ST), decreased in 20% (DE), and increased in 35% (IN) of survivors. Compared to ST, male IN (RR 2.15 [1.09–4.25]) and female DE (RR 5.06 [1.26–25.0]) were more likely to spend more than 30 minutes per day on stoma care. IN (vs. ST) were more likely to report interference with clothing (RR 1.51 [1.06–2.17]) and other stoma-related problems (RR 2.32 [1.30–4.14]). Survivors who were obese at time of survey were more likely to report interference with clothing (RR 1.88 [1.38–2.56]) and other stoma-related problems (RR 1.68 [1.07–2.65]).

Conclusion—A change in BMI is associated with ostomy-related problems among long-term CRC survivors. Equipment and care practices may need to be adapted for changes in abdominal shape. Health care providers should caution that a significant increase or decrease in BMI may cause ostomy-related problems.

Keywords

Colorectal cancer; ostomy; stoma; BMI; body mass index

INTRODUCTION

During 2012, in the United States, an estimated 143,460 cases of colorectal cancer (CRC) will be diagnosed, and an estimated 51,690 deaths from CRC will occur.[1] Death rates in the US among CRC patients have been on the decline since 1975.[2] During surgery, a larger percentage of patients with rectal cancer now undergo an anastomosis; however, one out of eight survivors still must cope with the challenges of an intestinal stoma, or ostomy.[3]

Colorectal cancer risk increases with age; 91% of the diagnoses occur in individuals 50 years of age and older.[1] As ostomates age, many physiological changes occur that may adversely affect ostomy management. These changes may include: cognitive impairment, musculoskeletal changes, sensory deficits, digestive and metabolic changes, urogenital changes, skin changes, and changes in functional abilities. These changes may result in a loss of independence and ability to perform self-care. If no caregiver is available, or if caregivers refuse to perform ostomy care, health-related quality of life (HR-QOL) is likely to decline. Moreover, body habitus changes with aging – body weight, total body fat, and fat distribution increase, as subcutaneous fat decreases and visceral fat, especially on the trunk, increases.[4] These physiologic changes, alone or in combination may create stoma-related problems.

Moreover, some elders may experience greater psychological impacts as a result of receiving an ostomy, whereas others may respond with more resilience– the ability to maintain physical and psychological health in the face of risk or threats.[5,6] For example, it has been found that older female ostomates report poorer health status than younger women on average, and older male ostomates appear to have more difficulty with emotional adjustment after surgery when compared to older females with ostomies.[5] Through resilience, an individual can more readily recover from burdensome conditions, while those who are less resilient may experience more significant stoma-related problems.

In patients with CRC, an intestinal stoma (colostomy) is most commonly created during abdominal perineal resection, although there are other instances when an ostomy is necessary. In addition to HR-QOL issues[7–9] and numerous other challenges,[10,11] we have observed that many ostomates have multiple ostomy-related problems that may be a

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result of a change in body mass index (BMI). But until now, evidence of that association has been lacking. There are advantages to have an optimally-placed stoma at the time of surgery.[12] However, a change in BMI post-operatively may alter ostomy function and lead to difficulty with pouch placement and fit, fecal leakage, skin irritation, time-consuming self-care, or interference with clothing. Furthermore, some evidence suggests that ostomates should be counseled about weight gain and potential tension on the stoma that may lead to retraction,[13] possibly resulting in other challenges.

In a sample of long-term (≥5 years post-diagnosis) CRC survivors with an ostomy, we examined the association of a change in BMI after ostomy placement and subsequent stoma management problems.

METHODS

This research was conducted within a non-profit integrated health care system that is a member of the Cancer Research Network: the Hawai‘i, Northern California, and Northwest and Regions of Kaiser Permanente, based in Honolulu, HI, Oakland, CA, and Portland, OR, respectively. The data coordinating center was located at the University of Arizona. Each of these systems provides comprehensive health services through closed-panel delivery models with salaried physicians. Other features of these systems include tumor registries, coverage of clinical preventive services, and integrated electronic medical record systems. Each organization provides private and public health insurance coverage, including Medicare Advantage and Medicaid risk contracts, resulting in diverse enrollments that generally represent their local communities. The study methods (including survey questions) are described in detail elsewhere.[14] Briefly, our study population consisted of Kaiser Permanente members in those three Regions who were CRC survivors at least 5 years since diagnosis and had undergone surgical placement of an ostomy at least 2 years prior to the survey. We excluded survivors if their ostomy had been reversed or if they were undergoing cancer treatment at the time of survey. The survey response rate was 53% (283/529). Our final analysis included 235 survivors with complete data. Our study protocol and survey materials were approved by the institutional review boards at Kaiser Permanente Northern California, Kaiser Permanente Northwest, Kaiser Permanente Hawai‘i, and the University of Arizona.

Data Collection

We obtained survivors’ BMI from the modified City of Hope-HRQOL-Ostomy (mCOH-Ostomy) survey that they completed by mail. We noted (1) preoperative BMI (time of surgery); (2) current BMI (time of survey); and (3) change in BMI between those two time points. A change in BMI of <1.5 was deemed “stable,” whereas a change of ≥1.5 in either direction was considered a clinically meaningful increase or decrease. BMI ≥ 30 indicated obesity.

Outcome variables from the mCOH-Ostomy were: time spent per day on stoma care (≤ or >30 minutes), self-reported problems with clothing caused by ostomy location (yes/no), and any other problems related to ostomy location, including interference with playing sports, traveling, or participating in social engagements (yes/no). Covariates included age, gender, race/ethnicity, and educational attainment. Using data from automated medical records, we calculated the Charlson-Deyo comorbidity score[15] and also ascertained whether or not survivors had undergone chemotherapy and/or radiation therapy. These records also provided ICD-9-CM diagnosis codes for ostomy-specific complications, which included: complication not otherwise specified (569.60), infection (569.61), mechanical complication (569.62), and other complication (569.69).

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Analysis

To compare categorical variables, we used multiple degrees of freedom Chi-square tests for heterogeneity (or the Fisher exact test). To compare continuous variables, we used the two-sample Student *t*-test. Ordinarily in a cross-sectional study, we would derive adjusted odds ratios (ORs) with 95% confidence intervals (95% CIs) using multiple logistic regression with presence of ostomy-related problems as the dependent variable in relation to preoperative BMI, current BMI, and change in BMI. However, because the prevalence of ostomy-related problems was high (>10%) in the referent groups, the OR was a poor approximation of the true relative risk, overestimating the risk ratio when it is more than 1.[16] Therefore, we derived risk ratios (RRs) with 95% CIs using multiple Poisson regression with robust standard errors to provide better estimates of the strength of association and true relative risk.[17] In this cross-sectional study, these RRs do not assess the temporal association between BMI status and ostomy-related problems. Analyses were performed with Stata version 10 (College Station, TX).

RESULTS

For our sample of 235 long-term CRC survivors, the mean time since ostomy placement was about 11.5 years, and 75.8% were ≥ 65 years old. Thirty-one percent of the population were diagnosed prior to the year 1992, one year prior to National Surgical Adjuvant Breast and Bowel Project R-03 (NSABP R-03), which led to neoadjuvant chemoradio-therapy becoming a standard of care for rectal cancer.[18] Of the 235 survivors with complete data, BMI remained stable in 44% (103 survivors), decreased in 20% (48 survivors), and increased in 36% (84 survivors). Survivors whose BMI decreased (vs. stable) had a significantly higher pre-operative BMI (29 (SD=5.8) vs. 26 (SD=4.1), p=0.0002). For survivors whose BMI decreased ≥ 1.5, the mean change was 3.8; for those whose BMI increased ≥ 1.5, the mean change was 4.4. For all 235 survivors combined, the overall mean BMI increased by 0.8.

Sociodemographic and medical characteristics by change in BMI are displayed in Table 1. Overall, the mean age was 72 years (SD=10); 62% were males; 34% had an undergraduate degree; and 75% were white/non-Hispanic. For 89% of the survivors, the tumor site was the rectum; 40% underwent chemotherapy; 41% received radiation therapy and 48% received either. The mean Charlson-Deyo comorbidity score was 1.7, with a range of 0 to 8.

We observed a tendency for a greater proportion of survivors whose BMI increased (vs. remained stable) to be female (p=0.06). A significantly higher proportion of survivors whose BMI decreased (vs. remained stable) were Hispanic, black, or Asian (p=0.02). A smaller number of survivors whose BMI decreased (vs. remained stable) underwent chemotherapy (p=0.05) and had a higher mean Charlson-Deyo comorbidity score (P=0.02). No significant differences were observed among the proportions of subjects with ostomy specific complications that occurred >30 days after definitive surgery with respect to change in BMI (decreased 13.2%, stable 19.1%, increased 20.9%).

Those reporting that they spent more than 30 minutes daily with stoma care had significantly longer time since surgery (14.5 years (SD=8.1) vs. 10.7 years (SD=5.8), p=0.0005). Time since surgery was not associated with interference with clothing or other problems. Those reporting interference with clothing were significantly younger (70.2 years (SD=11.4) vs. 73.2 years (SD=9.5), p=0.02). No association was found between comorbidity scores and ostomy-related problems.

The results of our analysis of the relationship between a change in BMI and ostomy-related problems, adjusting for gender, age, time since surgery, Charlson-Deyo comorbidity score,

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and tumor site (rectum vs. colon) are highlighted in Table 2. The model for "other problems" also adjusted for at least one complications > 30 days from the surgery. We observed effect modification by gender on the association between BMI decrease and time needed for daily stoma care, in which women who had lost weight were more likely to need more than 30 minutes, but men were not (p=0.06). To understand this potential modifying effect, we ran separate models by gender. Compared to those with stable BMI, men whose BMI increased (RR 2.15 [1.09–4.25]) and women whose BMI decreased (RR 5.06 [1.26–25.0]) were more likely to spend more than 30 minutes per day on stoma care. When we limit this analysis to age greater than 65, the effect of BMI decrease on time needed for daily care observed in women remains (RR 8.13 [1.09–60.6]), although the confidence interval is wide.

Survivors whose BMI increased (vs. remained stable) were more likely to report ostomy-related problems other than interference with clothing (RR 2.32 [1.30–4.14]). In addition, survivors whose BMI increased (vs. remained stable) were more likely to report interference with clothing (RR 1.51 [1.06–2.17]). Older subjects were less likely to experience interference from their clothing (adjusted RR 0.98 per year age, p=0.03).

The results of our multivariate analysis of the impact of current and pre-surgical obesity in Table 3 highlights ostomy-related problems, adjusted for gender, age, time since surgery, Charlson-Deyo comorbidity score, and tumor site (rectum vs. colon). Models for "other problems" also adjusted for at least one complication > 30 days from the surgery. Survivors who were obese at the time of the survey were more likely to experience interference with clothing (RR 1.88 [1.38–2.56]) as well as "other problems" (RR 1.68 [1.07–2.65]), but no statistically significant association with time required for stoma care was observed.

DISCUSSION

Health-related quality of life, in certain domains as measured by self-report surveys, is clearly decreased in ostomy patients.[7] For adults aging with ostomies, physiological changes may result in an impaired ability to perform optimal self-care, and place a more significant burden on caregivers. An important factor could be difficulty with stoma management because of weight change occurring after the surgery. In our secondary analysis of data on long-term CRC survivors, we found that a change in BMI increased the risk of ostomy-related problems and increased stoma care time in all patients regardless of age. Our findings add further evidence to the limited current literature that weight change is associated with ostomy-related problems.

We urge health-care professionals who work with ostomy patients to understand aging-related changes and how they may affect self-care. Evaluation of body weight and BMI should be performed each visit. Both increases and decreases in weight can lead to difficulties in placing pouches securely to assure that the skin is protected and the effluent does not leak onto the surrounding skin.

In addition, if weight changes, a referral to the ostomy nurse is needed where demonstration of new types of equipment may avert problems. Accurate placement of the pouch system may require use of a mirror if weight has increased substantially, and some patients may need to have assistance from a caregiver for changes of the entire pouch system.

Currently, health-care professionals typically discuss with patients the need to adapt clothing after initial ostomy placement. However, discussions regarding clothing should be reviewed during follow-up appointments long after the surgery. Health-care professionals should be aware of the style of clothing that each patient wears and take into consideration that, if BMI increases or decreases, a change in clothing style may be warranted that is consonant with

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any age-related functional changes. It is important that clothing should not excessively rub or compress the pouch area, which could lead to leakage, skin problems, or discomfort. In addition, loose-fitting clothing can aid in concealing the ostomy.

Both preoperatively and postoperatively, health-care professionals should caution patients that a significant change in BMI might lead to ostomy-related problems. Generally, loss of bowel function control and of bowel movement regularity/predictability are major issues.[10] Many ostomy patients find it difficult to maintain their diet and, as a result, may lose weight. Further weight loss can occur from the effects of chemotherapy and radiation. If BMI decreases, stoma placement may no longer be optimal for the patient's new postoperative weight. Conversely, BMI may increase in ostomy patients who decrease their recreational or sports activities postoperatively, compounding ostomy-related problems. Health-care professionals have started describing possible interventions to increase activity in CRC patients, such as a walking-centered intervention.[19]

In our study, we found that BMI change was greater in females and minorities. For stoma care time, however, we observed different effects by gender, specifically that weight loss in women and weight gain in men were associated with increased care time. Because the confidence intervals were wide in the finding among women, the increased risk is indicated but the magnitude of the effect is uncertain. Differences in deposition of adipose fat, with women generally pear-shaped and men generally apple-shaped, may account for the gender difference. Weight gain in men tends to be carried in adipose fat, which could hinder access to stoma and lengthen care time. Increased care time due to weight loss in women could be related to increased skin folds, especially as women age. In addition, weight loss in older women could be a marker of frailty, which in turn could be associated with increased care time. The relative lack of access to adequate health-care among minorities[20] may account for the racial difference in other populations studied. Kaiser Permanente members are fully insured and, therefore, face lower financial barriers to access, as well as fewer access problems that may result from language and communication difficulties. Gender and race/ethnicity issues need to be understood and examined at further length, so that health-care professionals can develop targeted interventions. While BMI increase or decrease were not associated with age, the population was primarily one of older colorectal cancer survivors. Aging-related changes may further add to the challenges of ostomy care.

One limitation of our study was that our patients self-reported their pre-operative and current weights and heights. Even though self-reported BMI is considered to be fairly accurate, recall bias may have been introduced, and several respondents did not provide preoperative or survey weight. We were unable to follow subjects longitudinally, so we did not have data reflecting how aging-related changes may have adversely affected their well-being and ability to perform self-care. Missing data from the survey and limited access to information from electronic medical records led to exclusion of 39 patients with incomplete data regarding weight, chemotherapy, radiation, tumor site, race, and education. Also, the population included those <65 years old and the results may be attributable in part to the younger individuals in the population. Finally, the risk ratios we report should not be interpreted as demonstration of a temporal or causal association between BMI status and ostomy-related problems, since all data were collected cross-sectionally.

Strengths of our study include a large sample size; a community-based setting with excellent long-term retention of patients; a relatively homogenous population in a single integrated delivery system; restriction to only CRC survivors; and availability of numerous socio-demographic and medical data (e.g., gender, age, time since surgery, Charlson-Deyo comorbidity score, and tumor site), allowing for adjustment for possible confounding variables.

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Future research needs to be directed toward better understanding aging-related changes affecting ostomy care. In addition, more studies must further examine the relationship between BMI and ostomy-related problems in women, minorities and the elderly.

CONCLUSION

A change in BMI is associated with stoma-related problems among long-term CRC survivors. Pre- and post-operatively, health-care professionals should caution their patients that a significant change in BMI may lead to such problems and should adapt equipment and care practices to ostomy patients' new abdominal shapes.

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Table 1

Socio-demographic and Medical Characteristics, by BMI Group.

	BMI Stable (n=103)	BMI Decreased (n=48)	BMI Increased (n=84)
Age at survey, years (%)			
≤49	1.9	2.1	2.4
50–64	22.4	14.6	25.0
65–79	51.5	54.2	52.4
≥80	25.2	29.2	20.2
Gender (%)			
Male	67.0	64.6	53.6
Female	33.0	35.4	46.4
Race/Ethnicity (%)			
White, non-Hispanic	80.6	62.5[a]	73.8
Hispanic	4.9	10.4	9.5
Black, non-Hispanic	1	12.5	2.4
Asian	6.8	10.4	10.7
Other/Mixed	6.8	4.2	3.6
Education (%)			
< High school graduate	8.7	16.7	16.7
High school/GED	26.2	20.8	29.8
Vocational/Secretarial/Business	5.8	4.2	6.0
Some college	24.3	25.0	19.1
College degree	17.5	18.8	14.3
Some graduate	6.8	4.2	6.0
Graduate degree	10.7	10.4	8.3
Tumor site (%)			
Colon	11.7	12.5	9.5
Rectum	88.4	87.5	90.5
Chemotherapy (%)[b]	45.6	29.2[a]	39.3
Radiation (%)[b]	44.7	29.2	42.9
Complication >30 days	19.4	14.6	21.4
Charlson-Deyo score (%)			
> 2	22.3	37.5[a]	19.0
≤2	77.7	62.5	81.0
Preoperative BMI [Mean (SD)][c]	25.9 (4.1)	29.1[a] (5.8)	26.2 (5.8)
Range	(17.9–37.8)	(20.8–48.6)	(13.8–51.7)
Current BMI [Mean (SD)][c]	25.9 (4.1)	25.2 (5.5)	30.6[a] (7.3)
Range	(16.8–38.9)	(16.7–44.4)	(19.5–66.8)
Time since surgery (yrs) [Mean (SD)]	10.4 (5.8)	12.5 (6.0)	12.1 (7.4)

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	BMI Stable (n=103)	BMI Decreased (n=48)	BMI Increased (n=84)
Range	(2.2–31.2)	(2.2–28.6)	(2.4–35.3)

[a] $p < 0.05$ when being compared to stable

[b] Reasons why patients may not receive neoadjuvant treatment include T1 or T2 lesions that are N0, higher rectal tumors (>12 cm), or patient refusal.

[c] ≥1.5 change in BMI was considered a clinically meaningful increase or decrease

BMI=body mass index; GED=general equivalency diploma, SD= Standard Deviation

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Table 2

Ostomy-Related Problems, by BMI Group[a,b]

	Prevalence of problem among those with stable BMI	BMI Decreased RR (95% CI) (n=48)	BMI Stable (n=103)	BMI Increased RR (95% CI) (n=84)
>30 min needed to conduct daily stoma care in men	15%	1.07 (0.41–2.82)	Referent	2.15 (1.09–4.25)
>30 min needed to conduct daily stoma care in women	6%	5.06 (1.26–25.0)	Referent	1.32 (0.25–7.1)
Interference with clothing	33%	1.11 (0.69–1.80)	Referent	1.51 (1.06–2.17)
Other problems	16%	1.98 (0.99–3.96)	Referent	2.32 (1.30–4.14)

[a] Information missing: Time to conduct daily care n=2, interference with clothing n=4, other problems n=15

[b] Poisson regression model adjusted for gender (except model of time needed to conduct daily stoma care), age, time since surgery, Charlson-Deyo comorbidity score, and tumor site (rectum vs. colon). Model for “Other problems” also adjusted for at least one complication > 30 days from the surgery

BMI=body mass index; CI=confidence interval; RR=risk ratio;

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Table 3

Impact of Obesity on Ostomy-Related Problems[a,b]

	Time of Survey		Before Surgery	
	Prevalence of problem among non-obese	**RR (95% CI)**	**Prevalence of problem among non-obese**	**RR (95% CI)**
>30 min needed to conduct daily stoma care	19%	1.01 (0.53–1.92)	19%	1.13 (0.53–2.39)
Interference with clothing	32%	1.88 (1.38–2.56)	36%	1.37 (0.96–1.97)
Other problems	21%	1.68 (1.07–2.65)	23%	1.48 (0.89–2.50)

[a] Information missing: Time to conduct daily care n=2, interference with clothing n=4, other problems n=15

[b] Poisson regression model with obesity (yes/no) at time of survey or before surgery, adjusted for gender, age, time since surgery, Charlson-Deyo comorbidity score, and tumor site (rectum vs. colon). Models for “Other problems” also adjusted for at least one complication > 30 days from the surgery

BMI=body mass index; CI=confidence interval; RR=risk ratio