

# Glycosylated Hemoglobin A1c and Lack of Association With Symptom Severity in Patients Undergoing Chemotherapy for Solid Tumors

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The American Cancer Society and American Diabetes Association (ADA) issued a joint statement in 2010 that provided evidence that diabetes was a risk factor for cancer (Giovannucci et al., 2010). Compared to patients without diabetes, patients with diabetes are at greater risk for pancreatic (Huxley, Ansary-Moghaddam, Berrington de González, Barzi, & Woodward, 2005), hepatocellular (El-Serag, Hampel, & Javadi, 2006), breast (Boyle et al., 2012), ovarian (Lee et al., 2013; Shah et al., 2014), endometrial (Zhang, Su, Hao, & Sun, 2013), kidney (Larsson & Wolk, 2011), colorectal (Luo, Cao, Liao, & Gao, 2012), gastric (Yoon, Son, Eom, Durrance, & Park, 2013), thyroid (Schmid, Behrens, Jochem, Keimling, & Leitzmann, 2013), and bladder (Xu et al., 2013) cancers, as well as hematologic malignancies (e.g., non-Hodgkin lymphoma, leukemia, myeloma) (Castillo, Mull, Reagan, Nembr, & Mitri, 2012). About 18% of patients diagnosed with cancer have preexisting diabetes (Barone et al., 2008) compared to only 11% of the general population (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2015).

Hyperglycemia is the hallmark sign of diabetes, and having preexisting diabetes further increases the risk for hyperglycemic events while undergoing treatments for cancer. In addition, hyperglycemia can occur in patients with cancer independent of a diabetic history. Older age (Kezerle, Shalev, & Barski, 2014), higher body mass index (BMI) (Roumen, Blaak, & Corpeleijn, 2009), nutritional imbalances (Butler, Btaiche, & Alaniz, 2005; Jenkins et al., 2002; Martin-Salces, de Paz, Canales, Mesejo, & Hernandez-Navarro, 2008), lower levels of physical activity (Katz, 2007; Moien-Afshari et al., 2008), higher stress levels (Butler et al., 2005; Godbout & Glaser, 2006), administration of glucocorticoids (Butler et al., 2005; Mazali, Lalli, Alves-Filho, & Mazali, 2008; Willi et al., 2002), some chemotherapy (CTX) regimens (Mazali et al., 2008; Ramos-Cebrián, Torregrosa, Gutiérrez-Dalmau, Oppenheimer, & Campistol, 2007;

**Purpose/Objectives:** To assess the effects of high blood sugar at the levels of diabetic or prediabetic states during cancer treatment because patients undergoing chemotherapy (CTX) experience multiple symptoms that vary among individuals and may be affected by glucose levels.

**Design:** Descriptive, cross-sectional.

**Setting:** Two comprehensive cancer centers, one Veterans Affairs hospital, and four community-based oncology programs.

**Sample:** 244 outpatients with breast, gastrointestinal, gynecologic, and lung cancers.

**Methods:** Patients completed demographic and symptom questionnaires. Glycosylated hemoglobin A1c (HbA1c) was evaluated to determine diabetic state. Descriptive statistics and one-way analyses of variance were used in the analyses.

**Main Research Variables:** HbA1c, symptom severity scores, patient and clinical characteristics (e.g., age, gender, comorbidities, sociodemographic information, body mass index [BMI], lifestyle factors).

**Findings:** HbA1c results showed 9% of the sample in the diabetic and 26% in the prediabetic state. Patients in the diabetic state reported a higher number of comorbid conditions and were more likely to be African American. Patients in the prediabetic state were older aged. Patients in the diabetic and prediabetic states had a higher BMI compared to nondiabetic patients. No differences in symptom severity or quality-of-life (QOL) scores were found among the three diabetic states.

**Conclusions:** This study is the first to evaluate for associations between diabetic states and symptom severity and QOL scores in patients receiving CTX. This study confirmed that older age, as well as having higher BMI and having multiple comorbidities, were associated with increased mean glycemic levels.

**Implications for Nursing:** Clinicians should assess and identify patients with diabetes or prediabetes undergoing treatment for cancer. Patients who are older aged, those with a high BMI, and those with multiple comorbid conditions may be at increased risk for higher glycemic states.

**Key Words:** glycosylated hemoglobin A1c; chemotherapy; symptom severity; breast cancer; lung cancer; gynecologic cancer; gastrointestinal cancer

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