Abstract

Knowledge for multivitamin, iron, and calcium adherence is high to 44%. Predictors of supplement adherence included higher IBD, and predictors of adherence were primarily psychosocial, family involvement (for iron and calcium adherence), and adherence. Few relationships between supplement adherence and inflammation, growth, or nutritional outcomes were found.

Conclusion: Supplement adherence is problematic in pediatric IBD, and predictors of adherence were primarily psychosocial rather than biological variables. Future research should focus on larger sample sizes and assessments of supplement adherence that do not rely solely on patient self-report.

Introduction

Overview of IBD

Inflammatory bowel disease (IBD) is a lifelong autoimmune disorder that causes chronic inflammation in one or more sections of the gastrointestinal tract (Goor, Bhatnagar, Omar, 1998; Hommel & Baldassano, 2010). The location of the inflammation, as well as the depth of inflammation in the intestinal tissue, can indicate one of three types of IBD: Crohn’s disease (CD), ulcerative colitis (UC), or intermediate cases it is found in the terminal ileum. When diagnosing CD, the gastroenterologist will look for inflammation of the mucosa lining, epithelium invaded with neutrophils, and granuloma formation, which are considered the definitive features of CD. UC, unlike UC, in which patients experience inflammation localized mainly in the mucosa of the colon and rectum (Eiden, 2003; Gore et al., 1996). In CD, the annual incidence of CD in children is 48 out of 100,000 (Kappelman, Moore, Allen, & Cook, 2012). The large number of individuals afflicted by IBD demonstrates the necessity to explore the many challenges faced by IBD patients.

Medication Adherence in IBD

Medication adherence is defined as the extent to which a patient follows the guidelines given by their physician or health care team regarding their medical regimen (Stowell & Schiff, 1992). Across multiple pediatric conditions, nonadherence rates of approximately 50% are normal and nonadherence is considered the greatest cause of treatment failure among those with chronic medical conditions (Quittner, Mock, Lemanske, & Ashton, 2009). Reasons considered of IBD patients are often complex, sometimes involving multiple medications with varying dosing schedules and pill quantities, nutritional supplements, dietary modifications, medications delivered via infusions, clinic visits, and surgery (Hommel et al., 2008). Regimen complexity and other psychological factors likely combine to make treatment adherence challenging. Several studies have explored behavioral and family functioning in pediatric IBD, but few studies have focused on treatment adherence in IBD (Hommel et al., 2008). Existing studies of treatment adherence in pediatric IBD have focused mainly on adherence to oral IBD maintenance medications (i.e., medications taken to sustain disease remission). As summarized by Hommel et al. (2008), the prevalence of nonadherence to oral medication in IBD ranges from 38% to 66% depending on the type of medication and method of adherence assessment used.

Little is known about adherence to dietary supplements among youth with chronic illnesses, particularly those with IBD. Potential differences in supplement adherence and medication adherence may be important to note and understand. Therefore, trends unique to supplements including: larger pill size compared to IBD medications, bad taste, and potential high dose active ingredients, purpose of the supplement, disease activity, experience of symptoms, and differences in adherence to dietary supplements are also important. IBD medication adherence may also influence adherence to supplements. A lack of attainment to full height potential and development of bone disease (Moorey & Day, 2011). Thus, oral micronutrient supplementation may be a potential treatment option to prevent or treat nutritional deficiencies.

Relevance of Supplement Adherence in Pediatric IBD

It is important to look at supplement adherence in adolescents because disease and medication side effects associated with IBD can cause nutritional deficiencies. Because adolescents are still developing, nutritional deficiencies may have implications for short and long-term health including affecting the development of full height potential and development of bone disease (Moorey & Day, 2011). Thus, oral micronutrient supplementation may be a potential treatment option to prevent or treat nutritional deficiencies.

Nutritional Deficiencies in IBD

Patients with IBD experience many specific nutritional deficiencies that may cause deficiencies in multiple areas. Many IBD patients have one or more episodes of anemia, resulting from iron deficiency. Patients can also experience multiple iron deficiencies that are below the threshold for a diagnosis of anemia (Bager et al., 2011). Across multiple studies it has been found that the approximate prevalence of anemia in IBD (36%) is only slightly lower than the approximate prevalence of iron deficiency (45%) (Munoz, Gomez-Ramirez, & Garcia-Erao, 2009). A lack of iron effects multiple essential physiological functions including oxygen transport, immune response, and fibroblast proliferation. Anemia in IBD is the most common occurrence and is associated with a decrease in growth, a decrease in functional capacity, and a decrease in disease symptoms. IBD associated anemia is most often caused by blood loss from the bowel or decreased iron absorption due to inflammation of the digestive tract (Bager et al., 2011; Eiden, 2003). Hematological evaluations for anemia consist of a complete blood count, which includes hemoglobin (HGB), hematocrit (HCT), and iron indices such as mean corpuscular volume (MCV) or mean corpuscular hemoglobin (MCH) (Strople & Gold, 2008; Zemel, 2008). Physicians define anemia via low levels of hemoglobin or hematocrit (Strople & Gold, 2008).

Medication Adherence in IBD

Medication adherence is necessary to validate these findings and to understand other factors that can affect adherence. It is important to look at supplement adherence in adolescents because disease and medication side effects associated with IBD can cause nutritional deficiencies. Because adolescents are still developing, nutritional deficiencies may have implications for short and long-term health including affecting the development of full height potential and development of bone disease (Moorey & Day, 2011). Thus, oral micronutrient supplementation may be a potential treatment option to prevent or treat nutritional deficiencies.

Disease Activity in IBD

Disease activity in the context of IBD is a multidimensional construct that can be assessed through serum biomarkers, self-report of inflammation, patient report, and physical examination. The presence of inflammation is one indicator of disease activity and serum biomarkers of inflammation can be useful in the diagnosis of IBD. Level of inflammation is used for diagnosis, determining disease activity, predicting relapse and assessing the effect of treatment (Lok et al., 2008). C-reactive protein (CRP) is used to assess the inflammatory burden, and C-reactive protein (CRP) is used to assess the inflammatory burden and reflects a number of factors that influence disease activity. The residue of 100,000. The annual incidence of UC in children is 28 out of 100,000 (Kappelman, Moore, Allen, & Cook, 2012). The large number of individuals afflicted by IBD demonstrates the necessity to explore the many challenges faced by IBD patients.

Conclusion: Supplement adherence is problematic in pediatric IBD, and predictors of adherence were primarily psychosocial rather than biological variables. Future research should focus on larger sample sizes and assessments of supplement adherence that do not rely solely on patient self-report.
Aim 1
Aim 1 was to summarize rates of multivitamin, iron, and calcium adherence within the youth of sample with IBD. It was hypothesized that adherence rates regarding iron and calcium were higher when attempting to improve adherence versus before participating in the study. Additionally, the study hypothesized that disease activity would be similar or slightly lower than previously documented medication adherence rates within this sample population (i.e., 90% higher; Greenley et al., 2012).

Aim 2
Aim 2 was to examine the role of specific biological and psychological factors in predicting adherence status in adolescent IBD. Adolescents reported similar indices of adherence in the 12 months following study participation as recommended by the Food and Drug Administration (FDA, 2011). Few patients adhered to medications at the same level as adherence to parents' recommendation. Additionally, a variety of psychological factors were also associated with higher adherence levels at 12 months post-study participation.

Aim 3
Aim 3 was to examine relationships between adherence for the study, disease, and linear growth outcomes during the 12 months following study participation. Specific outcomes of interest included: a) indices of disease activity based on patient report at 6 months follow up; b) specific laboratory-based indices of nutritional deficiencies based on hematological markers of iron deficiency and low total calcium in the 12 months after study participation; and c) linear growth improvement in the 12 months following study participation. It was hypothesized that, 1) higher adherence during the study would be associated with lower levels of disease activity based on patient report of symptoms over the 12 months follow up, as well as a lower proportion of hematological lab abnormalities indicating inflammation in the 12 months following study participation; 2) higher adherence during the study would be associated with a lower proportion of laboratory-based indices of nutritional deficiencies; and 3) higher adherence during the study would be associated with linear growth improvement in the 12 months after study participation.

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