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Dynapenia in paediatric patients with inflammatory bowel disease in a reference centre in Brazil

Dinapenia em pacientes pediátricos com doença inflamatória intestinal de um centro de referência no Brasil

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Abstract

Objective: *this study aims to identify dynapenia and evaluate possible associations with clinical and nutritional factors in pediatric patients with IBD.* ***Methods:*** *Cross-sectional study. The following data were collected by clinical diagnosis, drug therapy, disease activity, serum levels of vitamin D, erythrocyte sedimentation rate, weight, height, arm circumference, arm muscle area, sum of skinfolds and handgrip strength. Dynapenia was evaluated by the low relative handgrip strength. Data were evaluated by measures of central tendency, Pearson, chi-square test or Fisher exact test.* ***Results:*** *forty patients of both sexes, with a mean age of 12.39 (standard deviation = 3.28) years participated in the study. Dynapenia was identified in 35% of the participants and there was no association between the evaluated variables. However, there was a greater trend of dynapenia in: female patients (40%), under 10 years old (37.5%), overweight (50%), low muscle reserve (39.1%), vitamin D deficiency (38.5%), Crohn disease (41.2%), use of corticosteroids (33.3%).* ***Conclusion:*** *the presence of dynapenia among the participants of this study was high. It is important that this condition have to be evaluated as a systematic routine of nutritional status, allowing early identification of dynapenia and adequate guidance for prevention and treatment.*

Keywords: *Anthropometry; Crohn disease; muscle strength.*

Resumo

Objetivo: identificar a dinapenia e avaliar possíveis associações com fatores clínicos e nutricionais, em pacientes pediátricos com DII. Metodologia: trata-se de um estudo transversal em que foram coletados dados sobre diagnóstico clínico, terapia medicamentosa, atividade da doença, níveis séricos de vitamina D, velocidade de hemossedimentação, peso, altura, circunferência do braço, área muscular do braço, somatório de pregas cutâneas e força de preensão palmar. A dinapenia foi avaliada pela baixa força de preensão manual relativa. Os dados foram avaliados por medidas de tendência central, testes de qui-quadrado de Pearson ou exato de Fisher. Resultados: Participaram do estudo 40 pacientes, de ambos os sexos, com média de idade de 12,39 (desvio padrão = 3,28) anos. A dinapenia foi identificada em 35% dos participantes, e não houve associação entre as variáveis avaliadas. No entanto, houve maior tendência de dinapenia em pacientes do sexo feminino (40%), menores de 10 anos (37,5%), com excesso de peso (50%), baixa reserva muscular (39,1%), deficiência de vitamina D (38,5%), doença de Crohn (41,2%) e em uso de corticoide (33,3%). Conclusão: a presença de dinapenia entre os participantes deste estudo foi alta. É importante que essa condição seja avaliada como rotina sistemática do estado nutricional, possibilitando a identificação precoce da dinapenia e orientação adequada para prevenção e tratamento.

Palavras-chave: Antropometria; doença de Crohn; força muscular.

INTRODUCTION

The occurrence of low muscle strength, resulting in functional limitations without neurological or neuromuscular causes, is classified as dynapenia. Dynapenia is recognized as a modifiable risk factor for disability and health-related conditions throughout the lifespan[1-3]. Although dynapenia is commonly associated with aging, studies have shown that reduced muscle strength can occur at any stage of life due to inflammatory diseases, chronic conditions, and insufficient engagement in resis-

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tance exercise[4–6]. In childhood and adolescence, dynapenia has been used as a marker of poor metabolic profile and is associated with increased disease risk and higher mortality in adulthood[5,7,8].

The most commonly used method to identify low muscle strength and characterize dynapenia is handgrip strength measurement[9]. Handgrip strength testing is easy to perform, non-invasive, and feasible in clinical practice, including pediatric populations[5,9,10]. It is particularly useful for assessing muscle strength in children and adolescents when expressed relative to body size (maximum handgrip strength/body mass index), as this accounts for differences in growth and body size[9,10].

Inflammatory bowel diseases (IBD) are classified into Crohn's disease (CD), ulcerative colitis (UC), and, in some cases, unclassified colitis[11]. According to Kuenzig et al.[12] (2022), the incidence of pediatric IBD has been increasing, particularly in industrialized countries, although data from developing or underdeveloped nations remain scarce. The authors report that the incidence per 100,000 individuals per year ranged from 0.5 to 21.6 in Asia; 0.4 to 3.0 in Central and South America; 0 to 21.3 in Europe; 2.4 to 15.4 in North America; and 5.2 to 6.8 in Oceania[12]. In Brazil, data are still limited. However, one study showed that in the state of São Paulo, in 2021, the average annual incidence of IBD was 13.31 new cases per 100,000 inhabitants/year (CD = 6.14; UC = 7.16 new cases per 100,000 inhabitants/year) between 2012 and 2015[13]. Brito et al.[14] (2020) found that Brazil has followed the global trend of increasing cases, with the Southeast region showing the highest prevalence (45.33%) compared to other regions in the country[14].

When IBD occurs in the pediatric population and is not diagnosed and treated early, it can lead to clinical complications beyond gastrointestinal symptoms, such as impaired growth and physical development, malnutrition, reduced bone mineral density, micronutrient deficiencies, and loss of muscle mass and strength[15-17].

Given that dynapenia is associated with elevated cardiometabolic markers, increased fracture risk, and physical inactivity, identifying its presence in pediatric IBD patients is of great clinical relevance. Doing so enables the implementation of effective physical activity interventions and appropriate nutritional therapy. These measures can help prevent the worsening of clinical prognosis and promote improved health and quality of life in these patients. Furthermore, the scarcity of studies on this topic underscores the importance of further research. Therefore, the aim of this study was to identify the presence of dynapenia and to assess its association with clinical and nutritional factors in pediatric patients with IBD.

METHODOLOGY

This was a cross-sectional study conducted with pediatric patients diagnosed with IBD who were treated at the Pediatric Gastroenterology and Hepatology Service of the Professor Edgar Santos University Hospital at the Federal University of Bahia. Patients seen at the outpatient clinic between June 2020 and September 2021 were selected. It is important to note that, during this period, the number of in-person visits was reduced due to restrictions related to the COVID-19 pandemic. This outpatient clinic has been operating for over a decade and was established in response to the increasing incidence of IBD in the pediatric age group. It is the only multidisciplinary referral center within Brazil's public healthcare system (SUS) for managing these complex conditions in the state of Bahia.

Patients included were those clinically diagnosed with Crohn's disease or ulcerative colitis, of both sexes, aged between 6 and 18 years, regularly followed at the clinic, and who agreed to participate in the study by signing the informed consent form (and assent form in the case of adolescents). Patients with physical limitations or missing data were excluded. The lower age limit of six years was chosen because children at that age can adequately participate in the strength assessment. The study was approved by the Research Ethics Committee of the Professor Edgar Santos University Hospital (approval number: 3.847.159).

A standardized questionnaire was applied, developed for the study, collecting demographic data, lifestyle information, and clinical and nutritional variables. Among the lifestyle questions, physical activity was assessed. Physical activity was defined as engaging in physical exercise on three or more days per week[18].

Data on clinical diagnosis of CD or UC, pharmacological treatment, disease phase, and biochemical tests were obtained from medical records. Disease activity was assessed using the Pediatric Crohn's Disease Activity Index (PCDAI) for CD and the Pediatric Ulcerative Colitis Activity Index (PUCAI) for UC. The PCDAI ranges from 0 to 100: <10 points indicates inactive disease; 11–30 points, mild disease; and ≥31 points, moderate to severe disease. PUCAI ranges from 0 to 85: <10 points indicates remission; 10–34, mild disease; 35–64, moderate disease; and ≥65, severe disease[19].

Vitamin D levels were assessed based on the Endocrine Society's guidelines, with sufficiency defined as ≥75 nmol / L (≥30 ng /mL)[20]. For the inflammatory marker erythrocyte sedimentation rate (ESR), values above 22 mm/h were considered elevated[21].

Anthropometric measurements of weight, height, mid-upper arm circumference (MUAC), triceps skinfold thickness (TSF), and subscapular skinfold thickness (SSF) were performed using standardized procedures by two nutritionists trained for this research protocol. All equipment was calibrated at the beginning of each data collection period.

Height and weight were measured using a Welmy W 200/100A® digital platform scale, with a maximum capacity of 200 kg, a minimum of 2 kg, and 100g increments, along with a stadiometer measuring from 1 to 2 meters. Measurements were taken with the patient barefoot, standing upright in the center of the scale, arms at their sides, head in the Frankfurt plane, and with no headwear[22]. Two measurements were taken, with a maximum

allowable difference of 100 grams for weight and 0.5 centimeters for height. The final value was the average of the two measurements, performed by the same evaluator.

Nutritional status was classified using body mass index-for-age (BMI/A), expressed as a z-score, according to WHO 2009 growth charts for age and sex, using the WHO AnthroPlus software[23]. The classifications were as follows: thinness, z-score < -3 to < -2; normal weight, z-score ≥ -2 to ≤ +1; overweight, z-score > +1 to > +3.

MUAC was measured on the non-dominant, relaxed arm, flexed toward the chest at a 90º angle. The midpoint between the acromion and the olecranon was marked. With the arm extended alongside the body, an inelastic millimeter tape was wrapped snugly around the marked point without compressing the skin or leaving slack[22]. TSF was measured at the same marked point on the non-dominant arm.[22] SSF was measured 1 cm below the inferior angle of the scapula[22]. Two measurements were taken, accepting a maximum difference of 2 mm. The final value was the average of both measurements, performed by the same evaluator. Skinfolds were measured using a Lange® caliper. MUAC, TSF, SSF, and the sum of skinfolds were classified according to percentiles (P), based on Frisancho (1990), by age and sex: < P5 (deficit), P5–P95 (adequate), and >P 95 (excess). For analyses involving dynapenia, values were grouped as depletion versus adequate/excess[24].

Arm muscle area (AMA) was calculated using the equations: AMA = [(MUAC (cm) – π × TSF/10 (cm))² / 4π] – 10 for male, AMA = [(MUAC (cm) – π × TSF/10 (cm))² / 4π] – 6.5 for females. A value below or equal to the 15th percentile (P ≤ 15) was considered indicative of depletion or risk of muscle mass deficit. For association with dynapenia, patients were grouped as having either depleted/risk or adequate muscle mass reserves.

Nutritional status according to BMI/A was categorized into thinness, normal weight, and overweight/obesity. For analysis with dynapenia, this was grouped into thinness or normal weight versus overweight.

Dynapenia was assessed via handgrip strength, using the Saehan® DHD-1 digital hydraulic hand dynamometer, and results were expressed in kilograms-force. The dynamometer was adjusted to fit the hand size of each child or adolescent. Measurements were taken with the participant seated, the upper arm positioned at the side of the body, and the elbow flexed at 90 degrees. Each participant performed three maximal-effort grips, alternating between the right and left hands, holding for 2–3 seconds, with a one-minute rest between attempts. The highest value among all trials was recorded, as recommended by the American Society of Hand Therapists[25]. To account for maturation and body size differences, relative handgrip strength was calculated using the following formula: Relative handgrip strength = absolute handgrip strength / BMI[26,27].

Due to the absence of population-specific reference values, dynapenia was defined as a relative handgrip strength below the first tertile of the study population, stratified by age group and sex.

For strength analysis, age was categorized as <10 years, 10–14 years, and >14 years. For dynapenia association analysis, the categories were grouped into ≤10 years and >10 years.

Data were entered into Microsoft Excel, and analyses were performed using SPSS Statistics 20.0. Data normality was tested using the Shapiro–Wilk test. Quantitative variables were described using central tendency measures (mean and standard deviation or median and interquartile range, tertile, and frequency). Associations with dynapenia were analyzed using Pearson's chi-square test or Fisher's exact test, with a significance level of 5% (p < 0.05).

RESULTS

A total of 40 patients were evaluated, with a mean age of 12.39 years (standard deviation = 3.28), ranging from 6 to 17.7 years. Half of the sample (50%) were female. Most participants (72.5%) reported not engaging in regular physical activity. Regarding clinical diagnosis, 42.5% had Crohn's disease and 57.5% had ulcerative colitis. The majority were in remission (94.1% of patients with CD and 95.7% with UC), and 47.4% presented elevated erythrocyte sedimentation rate (ESR). Most patients (59.1%) had low vitamin D levels. Overweight was observed in 25% of participants (15.5% overweight and 7.5% obese). However, 30% had arm circumference depletion, 17.5% had excess adipose tissue based on skinfold summation, and 57.5% were classified as at risk or having low muscle mass (Table 1).

Table 1 – *Clinical and anthropometric characteristics of pediatric patients followed at the Inflammatory Bowel Disease outpatient clinic of a University Hospital Complex, Salvador, Bahia, Brazil, 2021.*

Variable	N	Percentual
Sex		
Female	*20*	*50,0%*
Male	*20*	*50,0%*
Age		
< 10 years	*8*	*20,0%*
≥ 10 and ≤ 14 years	*22*	*55,0%*
> 14 years	*10*	*25,0%*
Physical activity		
Yes *(≥ 3 times/week)*	*11*	*27,5%*
No *(< 3 times/week)*	*29*	*72,5%*
Clinical diagnosis		
Crohn's disease	*17*	*42,5%*
Ulcerative colitis	*23*	*57,5%*
Disease activity		
Crohn's disease (PCDAI)*	*17*	
Active[1]	*1*	*5,9%*
Remission	*16*	*94,1%*
Colite ulcerativa *(PUCAI)***	*23*	*4,3%*
Active[2]	*1*	*95,7%*
Remission	*22*	
Anthropometric nutritional status (BMI-for-age)		
Underweight	*3*	*7,5%*
Normal weight	*27*	*67,5%*
Overweight	*10*	*25,0%*

Aim circumference		
Deficit (< P5)	*12*	*30,0%*
Adequate (5 ≤ P ≤ 95)	*26*	*65,0%*
Excess (> P95)	*2*	*5,0%*
Arm muscle area		
Depletion or risk (≤ P 15)	*23*	*57,5%*
Adequate (> P15)	*17*	*42,5%*
Skinfold summation (triceps e subscapular)		
Deficit (< P15)	*4*	*10,0%*
Adequate (15 ≤ P≤ 85)	*29*	*74,5%*
Excess (> P85)	*7*	*17,5%*
Vitamin D		
Adequate (≥ 30 ng /mL)	*9*	*40,9%*
Low (< 30 ng /mL)	*13*	*59,1%*
Erythrocyte sedimentation rate (ESR)		
Adequate (≤ 22 mm/h)	*10*	*52,6%*
Elevated (> 22 mm/h)	*9*	*47,4%*

[1]Moderate to severe disease activity.
[2]Mild disease activity.
**Pediatric Crohn's Disease Activity Index (PCDAI).*
***Pediatric Ulcerative Colitis Activity Index (PUCAI)*

Source: Study data.

Table 2 presents the first tertile values of relative handgrip strength, according to age group and sex. Relative strength was higher in males than in females only among participants older than 14 years old.

Table 2 – *First tertile values of relative handgrip strength in pediatric patients followed at the Inflammatory Bowel Disease outpatient clinic of a University Hospital Complex, Salvador, Bahia, Brazil, 2021.*

	Strength relative (absolute strength/BMI)*
< 10 years	
Female	*0,51*
Male	*0,46*
10 to 14 years	
Female	*0,95*
Male	*0,78*
> 14 years	
Female	*1,09*
Male	*1,86*

**AMI: Body Mass Index*

Source: Study data.

Dynapenia was identified in 35% of participants. No statistically significant associations were found between dynapenia and the clinical or nutritional variables evaluated. However, a greater trend toward dynapenia was observed among female patients (40%), children under 10 years of age (37.5%), those who engaged in physical activity (54.5%), those with CD (41.2%), corticosteroid users (33.3%), overweight individuals (50%), those with low muscle reserve (39.1%), and patients with vitamin D deficiency (38.5%) (Table 3).

Table 3 – *Prevalence of dynapenia according to clinical and nutritional characteristics of pediatric patients followed at the Inflammatory Bowel Disease outpatient clinic of a University Hospital Complex, Salvador, Bahia, Brazil, 2021.*

Variable	***Dynapenia***				***P-value****
	Yes (n = 14 /35%)		*No (n = 26 /65%)*		
	N	*%*	*N*	*%*	
Sex					
Female	*8*	*40,0*	*12*	*60,0*	*0,507*
Male	*6*	*30,0*	*14*	*70,0*	
Age					
< 10 years	*3*	*37,5*	*5*	*62,5*	*0,868#*
≥ 10 years	*11*	*34,4*	*21*	*65,6*	
Physical activity					
Yes (≥ 3 times/week)	*6*	*54,5*	*5*	*45,5*	*0,110*
No (< 3 times/week)	*8*	*27,6*	*21*	*72,4*	
Clinical Diagnosis					
Crohn's disease	*7*	*41,2*	*10*	*58,8*	*0,481*
Ulcerative colitis	*7*	*30,4*	*16*	*69,9*	
Disease activity					
Active	*0*	*0*	*2*	*100,0*	*0,287#*
Remission	*14*	*36,8*	*24*	*63,2*	
Corticosteroid use					
Yes	*4*	*33,3*	*8*	*66,7*	*0,225#*
No	*7*	*25,7*	*20*	*74,1*	
Nutritional status					
Underweight or normal	*9*	*30,0*	*21*	*70,0*	*0,251*
Overweight	*5*	*50,0*	*5*	*50,0*	
Arm circumference (AC)					
Depletion	*3*	*25*	*9*	*75*	*0,507*
Adequate or excess	*10*	*35,7*	*18*	*64,3*	
Arm muscle area (AMB)					
Depletion or risk	*9*	*39,1*	*14*	*60,9*	*0,406*
Adequate	*5*	*29,4*	*12*	*70,6*	
Skinfold summation					
Depletion	*1*	*25*	*3*	*75*	*0,736*
Adequate or excesso	*12*	*33,3*	*24*	*66,7*	
Vitamin D					
Low	*5*	*38,5*	*8*	*61,5*	*0,806#*
Adequate	*3*	*33,3*	*6*	*66,7*	
ESR					
Adequate (≤ 22 mm/h)	*4*	*40*	*6*	*60*	*0,153#*
Elevated (> 22 mm/h)	*1*	*11,1*	*8*	*88,9*	

**Pearson's chi-square test. #Fisher's exact test.*

Source: Study data.

DISCUSSION

To the best of our knowledge, this is the first study to demonstrate the presence of dynapenia in pediatric patients with IBD. Dynapenia in the pediatric population is on the rise, and its occurrence at this age, if left untreated, tends to become chronic throughout life, potentially leading to physical disability after the age of 30[^1]. Furthermore, dynapenia in children and adolescents has been associated

with functional limitations in motor skill performance, as well as with cardiometabolic alterations, diabetes mellitus, and other risk factors in adulthood and older age[4,27,28].

Tenbrock et al.[29] (2000) showed that children with nephrotic syndrome and chronic kidney disease (non-dialytic) had lower muscle strength compared to healthy controls. In a cohort of adolescents aged 10 to 12 years, Peterson et al.[6] (2016) found a positive association between low muscle strength and cardiometabolic health markers, including high body fat percentage, elevated systolic blood pressure, high triglyceride and glucose levels, and an inverse association with HDL cholesterol. Similar findings were reported by Ramírez-Vélez et al.[5] (2017), who showed that lower handgrip strength in children and adolescents was associated with more significant cardiometabolic risk markers such as cholesterol, triglycerides, blood pressure, and nutritional status.

The literature describes an increase in muscle strength with age, regardless of sex, with peak values occurring after the age of 14[5,9]. In a cross-sectional study of healthy Chilean adolescents aged 10 to 17, Palacio-Agüero, Díaz-Torrente, and Dourado[9] (2020) found that between the ages of 10 and 13, handgrip strength was similar between girls and boys, whereas from age 14 onward, boys exhibited significantly greater strength than girls. In contrast, our results revealed that girls had greater strength than boys, except after age 14.

Puberty is characterized by a dynamic process of changes in body size, shape, and composition. Males experience higher levels of testosterone, a hormone responsible for muscle growth, which contributes to differences in strength and fat distribution between sexes[30]. In boys, peak growth occurs around age 14, accompanied by peak muscle mass, both directly linked to increased testosterone production. This gain and muscle maturation tend to enhance strength, speed, and endurance, especially with appropriate motor stimulation. In contrast, in girls, peak height occurs around age 12, and after this growth spurt, menarche is associated with increased estradiol and a less significant increase in testosterone. As a result, girls experience less muscle gain and more fat deposition, which does not support motor skill development or increases in muscle strength when compared to boys[31].

Ramírez-Vélez et al.[5] (2017) conducted a study with 1,950 healthy Colombian children and adolescents to identify handgrip strength and its relationship with cardiometabolic risk factors. They found that children aged 9 to 12.9 years had relative handgrip strength values of 0.359 for girls and 0.376 for boys; among adolescents, values were 0.440 for girls and 0.447 for boys. These values were lower than those observed in our population. The authors also showed that excess weight was associated with lower muscle strength when strength was adjusted for anthropometric nutritional status. Similarly, our results indicated that dynapenia was more frequent among participants who were overweight and those with excess adipose tissue, identified through the sum of skinfolds, although this difference was not statistically significant.

During puberty, due to variations in sex and growth hormones, girls tend to gain more fat mass, while boys gain more fat-free mass, with a greater tendency toward increased muscle strength at this stage of life[32]. However, clinical conditions induced by medications or diseases that affect nutrient use, demand, or energy expenditure may lead to malnutrition and delayed puberty, resulting in altered muscle strength[33].

Peak bone mass is also typically achieved during adolescence. However, children with IBD are at increased risk of low bone density, short stature, and reduced muscle mass due to malnutrition, delayed puberty, reduced physical activity, and corticosteroid use[34].

High levels of circulating pro-inflammatory cytokines directly affect protein, energy, and muscle mass metabolism, particularly when combined with prolonged exposure to glucocorticoids[35]. Corticosteroids interfere with protein synthesis and increase catabolism through various intracellular pathways, contributing to reduced muscle strength[36]. In our study, dynapenia was highly prevalent among participants using corticosteroids. Hanada et al.[37] (2016) found in a study of adult patients with interstitial lung disease that those on corticosteroids had significantly lower strength compared to controls, and muscle strength correlated positively with total corticosteroid dosage.

Reduced handgrip strength reflects nutritional impairment, even before changes in body composition occur[38]. Rechinelli et al.[39] (2020) found in a study of 158 adult and elderly cancer patients that handgrip strength indicated nutritional compromise even before anthropometric parameters revealed reduced muscle reserves through mid-arm muscle area and calf circumference. It is important to highlight that relative strength, calculated by dividing handgrip strength by BMI, is crucial for adjusting strength to body size, especially in a study like ours that evaluated children and adolescents undergoing growth and sexual maturation[5,9].

In our study, dynapenia was more frequent in patients with Crohn's disease (41.2%) than in those with ulcerative colitis (30.4%). This finding may be explained by the greater nutrient malabsorption, significant inflammatory burden, fistula-related sequelae, and nutritional impairment commonly observed in Crohn's disease[40]. The nutritional status of IBD patients has a multifactorial etiology. The main causes include suboptimal energy intake, malabsorption, nutrient loss through the gastrointestinal tract, severe intestinal inflammation, increased basal energy expenditure, and medications contributing to various nutritional deficiencies, anthropometric changes, altered body fat and muscle mass composition, and low bone mineral density[41].

Altered inflammatory markers such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) are expected in IBD patients, particularly those with Crohn's disease[18]. Participants in our study showed elevated ESR values. CRP values were not included due to methodological variability in CRP assessment across different laboratories.

Inflammatory markers such as interleukin-6 (IL-6), CRP, and fibrinogen have been linked to reduced muscle strength[42]. High levels of tumor necrosis factor (TNF) and IL-6 may contribute to muscle mass and strength reduction in IBD patients, as chronic inflammation alters protein turnover, increasing degradation and leading to the loss of myofibrillar proteins[43]. Among these markers, ESR and CRP are widely used for evaluating and monitoring inflammatory and autoimmune conditions. ESR is an indirect measure of fibrinogen, which has a longer half-life than CRP and is thus useful for monitoring chronic inflammation[44].

Vitamin D deficiency, particularly in IBD patients, is associated with increased chronic inflammatory status, disease activity, recurrence frequency, and reduced quality of life[45].

In our study, we observed a high prevalence of vitamin D deficiency, and among those affected, dynapenia was also prevalent. This may be explained by the fact that vitamin D receptors are present not only in intestinal cells but also in muscle cells, where they play a role in muscle function. Inhibition of these receptors reduces intracellular calcium uptake, impairing muscle contractility and leading to decreased muscle strength[10].

Other conditions that may contribute to dynapenia include low physical activity[46]. Physical inactivity is common among children and adolescents with IBD due to various factors, including clinical complications during disease flare-ups[47].

Despite the social isolation during the COVID-19 pandemic, which certainly affected physical activity levels, our study found that even among patients who reported being physically active, dynapenia prevalence was high. This suggests that physical inactivity may have contributed to the high dynapenia rates observed, but was not solely related to the pandemic's critical phase. Therefore, other variables such as type and intensity of physical activity should be considered when evaluating its effects on dynapenia.

This study has some limitations. One is the small sample size, which may have contributed to the lack of statistically significant associations between dynapenia and the evaluated variables. Additionally, biochemical test results were obtained from different laboratories using different methods, which, for example, prevented the use of CRP in our analyses. It is important to note that the study was conducted during the COVID-19 pandemic, a period in which face-to-face consultations decreased and telemedicine visits increased, preventing the collection of handgrip strength measurements and other data. Another limitation was the assessment of physical activity, which did not use a validated questionnaire accounting for modality and intensity. Furthermore, pandemic-related changes in daily routines may have contributed to muscle depletion.

Nevertheless, the data from this study are relevant, as they show that dynapenia is highly prevalent among pediatric patients with IBD. As noted by Balestrieri et al.[48] (2020), nutritional aspects, including functional capacity measured through muscle strength, are important factors that can influence clinical outcomes, treatment response, and patients' quality of life.

The reviewed literature revealed a lack of studies on dynapenia in pediatric IBD patients. Thus, this study aims to expand knowledge on the topic, highlight this health issue, and encourage further research in this area. We emphasize the crucial role of a multidisciplinary team working together to provide clinical and nutritional care for these patients, contributing to the development of early interdisciplinary prevention and treatment strategies to preserve muscle health in pediatric IBD populations.

CONCLUSION

The present study identified a high prevalence of dynapenia among the evaluated pediatric patients with IBD. Although no statistically significant association was found between dynapenia and the assessed factors, it is worth noting that patients with Crohn's disease, females, those with excess weight, vitamin D deficiency, and corticosteroid use showed a tendency toward a higher prevalence of dynapenia. It is important that handgrip strength assessment in children and adolescents—especially those with IBD—be incorporated as a routine component of nutritional status evaluation, enabling early identification of reduced muscle strength and the implementation of strategies aimed at nutritional recovery, overall clinical improvement, and prevention of further health complications.

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