Pediatric Ulcerative Colitis in Kazakhstan: First Case Series from Central Asia and Current Clinical Management

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Abstract: The diagnoses of ulcerative colitis have increased in pediatric patients in the last two decades. Whereas there are several reports from most areas of the world, no clinical studies describing the clinical management of pediatric ulcerative colitis are currently available from Central Asia. In this article, we first describe a case series of pediatric patients affected with ulcerative colitis in Kazakhstan. This is a retrospective study including 25 consecutive pediatric patients diagnosed with ulcerative colitis in a tertiary pediatric hospital. The available demographic, clinical, hematological and inflammatory parameters at diagnosis and at the first one-year follow-up have been provided and analyzed. Most pediatric patients diagnosed with ulcerative colitis were older than 12 years, with prevalence of male gender. The analysis of clinical, laboratory, endoscopic parameters at the diagnosis suggested a significant diagnostic delay compared to developed countries; however, most of them showed clinical, laboratory and endoscopic improvements at the one-year follow-up. Even though the therapeutic approach and outcomes resulted to be consistent with other clinical studies from developed countries, several aspects of the medical follow-up should be improved, especially in pediatric patients with extensive disease.

Keywords: ulcerative colitis; pediatric inflammatory bowel diseases; Kazakhstan; Central Asia; body mass index (BMI); anemia; medical monitoring; eosinophils; pediatric gastroenterology

1. Introduction

Inflammatory bowel diseases (IBDs) basically include Crohn's disease (CD) and ulcerative colitis (UC). The definition and distinction between these diseases are based on specific clinical, endoscopic and, in particular, histopathological aspects, since some clinical manifestations and laboratory parameters may be shared by both conditions [1]. In detail, UC is characterized by a chronic/relapsing inflammatory process of the colon, extending continuously from the rectum to a varying level up to the ascending colon, thus, defining a picture of pancolitis. Typical symptoms are bloody diarrhea, abdominal pain, fecal urgency and tenesmus; however, the diagnosis relies on the colonoscopy, which can show continuous colonic inflammation starting in the rectum and characterized by the typical histopathological findings, such as the inflammatory process limited to the mucosal layers (not transmural) with the presence of crypt abscesses, lymphocytes/plasma cells and granulocytes infiltrates, leading to a distortion of crypts architecture [1–3].

UC usually arises in adult patients with a peak of incidence in the age group of 30–40 years. Indeed, it is less common in children, even though the number of diagnoses has increased in pediatric

and, in particular, adolescent patients in the last two decades; moreover, cases of UC can appear even in children younger than 6 years, named as very early onset IBD (VEO-IBD) [1].

The overall prevalence of UC varies according to geographic and ethnic factors: in general, it is considered lower in developing countries and, in particular, in Asian populations, where the prevalence is estimated to range from 5.3 to 63.6/100,000 (compared to a figure of 37.5–238/100,000 people in North America, for instance) [4,5]. Importantly, the incidence and prevalence of IBDs have been rising in several developing countries since 1990; however, most of prevalence data in Asia are calculated from epidemiological studies coming from the Indian subcontinent, south-eastern Asia, China and Japan [5], as also evidenced by our group for other gastrointestinal diseases (e.g., celiac disease) [6].

Unfortunately, there are no clinical and epidemiological studies describing pediatric IBDs in Central Asia. Only recently, Kaibullayeva et al. published a cross-sectional study investigating the prevalence of IBDs in the adult population in Kazakhstan [7]. Through our case series of pediatric UC patients from Kazakhstan, we provide the first description on the clinical aspects and medical management of pediatric UC in Central Asia.

2. Patients and Methods

This is a retrospective study including 25 consecutive pediatric patients (1–18 years) diagnosed with ulcerative colitis (UC) and followed-up at the National Research Center for Mother and Child Health (NRCMCH) of the University Medical Center (UMC), affiliated with the Nazarbayev University School of Medicine (NUSOM) in Nur-Sultan, capital of the Republic of Kazakhstan (RKZ). This study was approved after full board review by both the Institutional Research Ethical Committee of the Nazarbayev University (submission n. 196/11112019, approved on 13 February 2020) and the Institutional Review Board of UMC (decision n.2-2 of 20 December 2019).

This study included all UC pediatric patients diagnosed and treated at this hospital between January 2015 and December 2018. In this period, 29 patients were initially diagnosed with UC, but the final diagnosis was converted to Crohn's disease (CD) for 4 of them. Therefore, only those 25 patients with a confirmed diagnosis of UC were considered and analyzed.

The available (secondary) data about demographic, clinical, laboratory, endoscopic, histopathologic and therapeutic aspects were retrospectively retrieved from patients' clinical records. In general, the data were collected in Excel file format and the quantitative variables are expressed as mean values (± standard deviation, SD); the patients' age is expressed as median values (and interquartile range, IQR). Wherever appropriate and feasible, the statistical paired data analysis was carried out: the differences in specific variables/parameters between two or among more groups of patients were assessed for statistical significance by using the GraphPad Prism® software and, in detail, *t*-test (Mann-Whitney test) and one-way ANOVA test (Kruskal-Wallis test), respectively.

3. Results

3.1. Demographic and Clinical Patients' Characteristics at Diagnosis

The patients' age range (at the UC diagnosis) was 1–16 years; among 25 patients, 16 were boys and 9 were girls. The growth development (height; weight and, in detail, body mass index/BMI) was assessed as an important indicator of the general clinical conditions. Due to the age variability among all patients, height and BMI were both expressed in terms of z-score/standard deviation score (SDS), as showed in Table 1. Importantly, most patients (16 out of 25) were older than 12 years, whereas 6 patients were in the age group between 6–12 years, and only 3 patients were in the pre-school age (younger than 6 years).

Table 1. Characteristics of pediatric patients affected with ulcerative colitis (UC) (*N* = 25). BMI = body mass index, IQR = interquartile range, SD = standard deviation.

GENDER	
Male *(N)*	16
Female *(N)*	9
AGE	
Overall *(median, IQR)*	13.6 (5.1)
Male *(median, IQR)*	11.5 (6.8)
Female *(median, IQR)*	13.9 (2.2)
<6 years *(N)*	3
6–12 years *(N)*	6
>12 years *(N)*	16
HEIGHT *(z-score ± SD)*	
Overall	−0.89 (±1.14)
Male	−1.00 (±1.16)
Female	−0.58 (±1.08)
<6 years	−2.50 (±0.95)
6–12 years	−1.04 (±0.64)
>12 years	−0.46 (±1.03)
BMI *(z-score ± SD)*	
Overall	−0.75 (±1.36)
Male	−0.84 (±1.28)
Female	−0.59 (±1.54)
<6 years	−1.02 (±0.06)
6–12 years	−0.35 (±0.77)
>12 years	−0.87 (±1.61)

Between male and female patients, the age at diagnosis did not result to be statistically significant. There was no significant difference in height impairment at the diagnosis between boys and girls (−1.00 SDS vs. −0.58 SDS, respectively), as well as in BMI (−0.84 SDS vs. −0.59 SDS, respectively). However, the height impairment was significantly different among the three groups (<6 years, 6–12 years, >12 years) and the impact of the disease was greater the lower the patient's age group at diagnosis (−2.50 SDS vs. −1.04 SDS vs. −0.46 SDS, respectively; p = 0.0243). There was no statistically significant difference in BMI among the three age groups.

In terms of chief medical complaints, all these patients sought medical attention because of persistent/recurrent diarrhea with bloody stools.

3.2. Hematological and Laboratory Parameters at Diagnosis

The following parameters were retrieved for all the patients: white blood cells (WBC), neutrophil absolute count (NEU), eosinophil absolute count (EOS), hemoglobin concentration (Hb), erythrocyte mean corpuscular volume (MCV), C-reactive protein (CRP), erythrocyte sedimentation rate (ESR) and calprotectin (CPT). All these findings are summarized in Table 2, where the PUCAI (Pediatric Ulcerative Colitis Activity Index) score is also reported.

In general, there were no significant differences in these parameters, according to the gender and the age class, with very few exceptions. Indeed, the hemoglobin concentration and MCV values differed across the age groups, but this finding is explained by the physiological age-related variations of these parameters. Interestingly, the eosinophils count significantly differed between male and female patients (0.45 ± 0.31 vs. 0.18 ± 0.10, respectively; p = 0.0421).

Table 2. Overview of the hematological and inflammatory parameters at diagnosis.

Parameter	Overall (N = 25)	Male (N = 16)	Female (N = 9)	< 6 yrs. (N = 3)	6–12 yrs. (N = 6)	> 12 yrs. (N = 16)
WBC (10^3/μL)	9.23 (±4.19)	9.96 (±4.46)	7.92 (±3.51)	11.65 (±1.17)	9.80 (±5.12)	8.56 (±4.17)
Neutrophils (10^3/μL)	4.79 (±2.71)	5.06 (±2.77)	4.32 (±2.69)	5.76 (±1.39)	4.69 (±3.43)	4.65 (±2.72)
Eosinophils (10^3/μL)	0.36 (±0.29)	0.45 (±0.31)	0.18 (±0.10)	0.76 (±0.24)	0.44 (±0.36)	0.27 (±0.22)
EOS>500/μl (N)	(6)	(6)	(0)	(2)	(2)	(2)
Hemoglobin (g/dL)	10.24 (±2.17)	10.26 (±2.41)	10.22 (±1.79)	6.8 (±2.13)	11.18 (±1.39)	10.54 (±1.68)
Anemic patients (N)	(22)	(14)	(8)	(3)	(4)	(15)
MCV (fL)	77.7 (±10.1)	75.1 (±7.6)	82.6 (±12.5)	68.8 (±4.6)	78.3 (±9.2)	79.3 (±10.6)
Thrombocytes (10^3/μL)	395 (±130)	408 (±142)	372 (±110)	371 (±146)	433 (±77)	448 (±122)
CRP (mg/L)	8.89 (±13.93)	7.49 (±10.32)	11.39 (±19.26)	4.27 (±1.14)	6.86 (±9.34)	10.53 (±16.50)
ESR (mm/h)	22.5 (±11.1)	24.3 (±11.2)	19.3 (±11.1)	28.3 (±10.4)	26.8 (±14.2)	19.8 (±9.8)
PUCAI (score)	44.4 (±21.0)	40.6 (±19.4)	51.1 (±23.1)	40 (±5.0)	40.8 (±25.0)	46.6 (±21.9)
Calprotectin (mg/L)	610.2 (±419.4)	553.5 (±422.0)	710.9 (±419.4)	970.7 (±50.8)	424.9 (±404.0)	612.1 (±432.4)

3.3. Endoscopic Picture and Correlation with Demographic, Hematological and Inflammatory Aspects

All patients underwent colon endoscopy at diagnosis. A total of 14 patients showed endoscopic pictures of pancolitis, whereas the remaining 11 had a different grade of colon involvement, in terms of extension: only rectal disease (*n* = 2), up to the sigmoid colon (*n* = 1), up to the descending colon (*n* = 3) and up to the transversal colon (*n* = 5).

We assessed potential differences in the demographic, hematological and laboratory parameters, between patients with and without pancolitis (Table 3).

Table 3. Hematological and inflammatory parameters according to the extension of colonic disease, at diagnosis (columns 1 and 2) and at one-year follow-up (columns 3 and 4) [N/A, not available].

	UC without Pancolitis (11)	UC with Pancolitis (14)	UC without Pancolitis (11)	UC with Pancolitis (14)
AGE	12.0 (IQR:4.6)	13.8 (IQR:5.1)	12.8 (IQR:4.7)	14.8 (IQR:5.3)
GENDER (M:F)	7:4	9:5	7:4	9:5
BMI	−0.85 (±1.56)	−0.73 (±1.19)	-0.81 (±1.30)	−0.33 (±1.09)
HEIGHT	−0.70 (±1.23)	−1.04 (±1.09)	-0.44 (±1.43)	−1.03 (±1.07)
WBC (10^3/μL)	6.88 (±1.87)	11.08 (±4.65)	6.52 (±1.98)	9.43 (±5.54)
Neutrophils (10^3/μL)	3.30 (±1.44)	5.94 (±2.96)	3.09 (±1.54)	4.81 (±3.72)
Eosinophils (10^3/μL)	0.28 (±0.22)	0.42 (±0.32)	0.32 (±0.35)	0.46 (±0.52)
Hemoglobin (g/dL)	10.78 (±1.74)	9.82 (±2.43)	11.32 (±2.34)	11.24 (±2.18)
Thrombocytes (10^3/μL)	365 (±118)	419 (±138)	386 (±87)	377 (±160)
C-reactive protein (mg/L)	5.30 (±9.62)	11.72 (±16.35)	6.93 (±11.52)	8.04 (±10.83)
ESR (mm/h)	20.6 (±13.5)	24.0 (±9.2)	22.7 (±13.8)	27.2 (±13.8)
Calprotectin (mg/L)	540.4 (±432.4)	671.3 (±412.2)	N/A *	N/A *
PUCAI (score)	40.0 (±20.9)	47.9 (±21.1)	22.3 (±17.8)	31.8 (±24.4)

* Calprotectin values at follow-up were not available for a sufficient number of patients to allow a reliable subgroups statistical analysis.

Between these groups (with and without pancolitis), there was no statistically significant difference in age, and the sex ratio was similar (M/F: 9/5 vs. 7/4, respectively). No statistically significant differences were obtained for most of the aforementioned parameters, except for WBC count (11.08 ± 4.65 vs. 6.88 ± 1.87 [10^3/μL]; *p* = 0.0200) and neutrophil absolute count (5.94 ± 2.96 vs. 3.30 ± 1.94 [10^3/μL]; *p* = 0.0231), which resulted higher in patients affected with pancolitis. Interestingly, the eosinophils count was higher in the group with pancolitis (0.42 ± 0.32 vs. 0.28 ± 0.22 [10^3/μL], *p* = ns), but such a difference was not statistically significant.

3.4. Demographic and Clinical Patients' Characteristics at Diagnosis

All patients without pancolitis underwent variable therapeutic regimens including oral (500 mg, 1–3 times a day) and rectal (1000 mg, once a day) mesalazine. In this group, there was one patient younger than 6 years (namely, VEO-IBD): this was the only patient who was initially treated with systemic steroids (starting with around 2 mg/kg prednisone-equivalent) to induce the remission. Four patients were treated with infliximab (5 mg/kg every 6–8 weeks).

A variable combination of oral/rectal mesalazine was also used in patients affected with pancolitis. Among these 14 patients, at least 10 received systemic steroid therapy at variable dosage. In 5 patients, the use of azathioprine was reported (50–100 mg per day, according to the weight), and 3 of them also received infliximab (5 mg/kg every 6–8 weeks).

The patients were usually re-assessed at our center 9 to 15 months after the UC diagnosis. The mean age at the first endoscopic follow-up was similar between patients with and without pancolitis; the interval between this endoscopic control and the diagnosis was shorter in the group of patients with pancolitis than without (9.7 ± 1.6 vs. 12.9 ± 4.8 months, respectively; p = ns), but such a difference was not statistically significant. The histopathological remission was reported for 5 patients (out of 11) in the group without pancolitis and only 2 patients (out of 14) in the pancolitis group.

As summarized in Table 4, all the main inflammatory (clinical and laboratory) parameters assessed at diagnosis showed a positive trend at the follow-up, even if most differences were not statistically significant, likely due to the small sample size. However, despite this limitation, the hemoglobin levels (10.24 ± 2.17 vs. 11.27 ± 2.20 [g/dL]; p = 0.0158) and, importantly, the PUCAI score (44.4 ± 21.0 vs. 27.6 ± 21.9; p = 0.0067) showed a significant improvement, through paired analysis.

Table 4. Overview of the hematological and inflammatory parameters at one-year follow-up [N/A, not available].

	Overall (N = 25)	Male (N = 16)	Female (N = 9)	<6 yrs. (N = 3)	6–12 yrs. (N = 6)	>12 yrs. (N = 16)
WBC (10^3/µL)	8.15 (±4.52)	8.79 (±5.15)	7.02 (±3.05)	16.20 (±7.82)	8.47 (±2.56)	6.52 (±2.55)
Neutrophils (10^3/µL)	4.06 (±3.04)	4.42 (±3.52)	3.42 (±1.94)	9.71 (±5.10)	4.04 (±1.53)	3.00 (±1.72)
Eosinophils (10^3/µL)	0.40 (±0.46)	0.52 (±0.54)	0.21 (±0.17)	0.28 (±0.28)	0.60 (±0.64)	0.90 (±0.88)
EOS>500/µL (N)	(4)	(3)	(1)	(2)	(1)	(1)
Hemoglobin (g/dL)	11.27 (±2.20)	11.28 (±2.12)	11.27 (±2.47)	9.9 (±2.52)	11.97 (±2.66)	11.28 (±2.98)
Anemic patients (N)	(16)	(10)	(6)	(2)	(3)	(11)
MCV (fL)	80.0 (±8.21)	79.5 (±7.6)	81.0 (±9.6)	84.9 (±5.7)	79.2 (±7.0)	79.4 (±8.4)
Thrombocytes (10^3/µL)	381 (±131)	404 (±134)	341 (±120)	489 (±262)	401 (±106)	353 (±105)
CRP (mg/L)	7.55 (±10.92)	8.02 (±11.25)	6.55 (±10.85)	7.35 (±11.04)	1.62 (±3.58)	20.45 (±11.35)
ESR (mm/h)	25.3 (±13.7)	19.9 (±9.8)	34.7 (±15.1)	27.9 (±15.0)	17.5 (±8.3)	26.5 (±12.3)
PUCAI (score)	27.6 (±21.9)	27.2 (±23.9)	28.3 (±19.0)	50 (±32.8)	20 (±13.8)	26.2 (±20.8)
Calprotectin * (mg/L)	N/A *	N/A *	N/A *	N/A *	N/A *	N/A *

* Calprotectin values at follow-up were not available for a sufficient number of patients to allow a reliable subgroups statistical analysis.

The overall calprotectin (CPT) value (for all 25 UC patients) at the diagnosis was 610.2 ± 419.4 mg/L. Unfortunately, the CPT value was not available for all patients at the follow-up: only 15 patients received this test at follow-up, showing a mean value of 499.7 ± 436.2 mg/L. If only these 15 patients with CPT assessment at the follow-up are considered, their CPT value at the diagnosis was 706.9 ± 378.5 mg/L, which indicated a statistically significant reduction through paired analysis (vs. 499.7 ± 436.2 mg/L; p = 0.0456). By comparing UC patients with and without pancolitis, the CPT values were respectively 504.5 ± 499.6 mg/L (n = 8 out of 14 patients; vs. 728.7 ± 393.7 at diagnosis, p = ns) and 423.7 ± 372.2 mg/L (n = 7 out of 11 patients; vs. 682.0 ± 389.9 at diagnosis, p = ns). Therefore, the paired analysis between these specific subgroups achieved no statistical significance.

4. Discussion

Here we first provide our initial clinical data on pediatric UC in Kazakhstan and, more in general, in Central Asia. No epidemiological data on pediatric IBDs are known from this area of the Asian continent [5]. Although several clinical studies on IBDs in Asia have been published, no patients from Central Asia were substantially included [8,9]. Very recently, Kaibullayeva et al. published the first study on IBDs in Kazakhstan, which is actually focused on adult patients only [7].

Even though our study is limited by the small number and the mono-centric provenience of all pediatric UC patients, it definitely represents the first attempt to describe the clinical features and medical management of pediatric UC in Central Asia.

In the pediatric age, several studies reported a greater frequency of disease onset during adolescence than during childhood [4,10]. Our study is consistent with this observation, since most patients (16 out of 25) were older than 12 years. Among the remaining 9 children, 3 patients can be defined as VEO-IBD and only 1 of them was an infantile IBD. Most clinical studies have shown a slightly male predominance or an equal distribution of pediatric UC between genders [10,11]. Our patients' cohort confirmed a male predominance (64% vs. 36%), that was actually more pronounced compared to the previous reports.

Some interesting indications may derive from the analysis of parameters such as height and BMI (expressed as z-score), which assess the impairment of growth (and, thus, general health status) at diagnosis. Despite some variability, overall our cohort of patients clearly resulted below the age- and gender-related average for both height (−0.89 SDS) and BMI (−0.75 SDS) and, exactly, both were in the lower quartile. Yerushalmy-Feler et al. found that a prolonged time to diagnosis (as well as high disease activity) was significantly associated with a BMI in the lower quartile, in children affected with IBDs [12]. Considering that the BMI impairment is usually more pronounced in CD than in UC children, it is reasonable to hypothesize a relevant diagnostic delay in our cohort of patients [13]. Additional findings from the laboratory parameters may support this consideration on the diagnostic timing, like the low hemoglobin level and, thus, the high prevalence of microcytic anemia in our cohort of patients. Anemia is a frequent finding in children with IBDs. Aljomah et al. analyzed this specific clinical problem in 153 children affected with IBDs in the United States: they reported a general diagnosis of anemia in 80% of CD children, whereas it was present in much fewer UC patients (around 40%) [14]. Overall, 22 out of our 25 patients resulted to be anemic, which corresponds to a percentage (88%), which is much higher than previously described in UC pediatric patients, specifically [14–16].

As for the laboratory parameters, overall there were no statistically significant differences among gender and age groups, except for the eosinophil count, which resulted to be higher in males (0.45 ± 0.31 vs. 0.18 ± 0.10, respectively; $p = 0.0421$). Tissue eosinophilia is recognized as a common histopathological finding in UC and some studies correlated it with disease activity [17,18]. In children, Morgenstern et al. and Sadi et al. also correlated peripheral eosinophilia with disease activity and/or severity in UC [19,20]. However, no information regarding gender differences in this regard were reported in these articles. In our cohort of patients, despite the more prominent peripheral eosinophilia in males, the PUCAI score, CRP and CPT levels resulted to be lower than in females, but these differences were not statistically significant. In any case, a different disease activity or severity does not seem to explain the difference in peripheral eosinophils between our female and male UC patients. Interestingly, this trend of relatively increased peripheral eosinophils number in male patients persisted at one-year follow-up. Moreover, there was no difference in the gender ratio between UC patients with and without pancolitis. In this regard, higher counts of peripheral eosinophils were present in patients with pancolitis, at diagnosis and one-year follow-up, even if this result was not statistically significant either.

An objective analysis of the treatment plan is basically impossible with the available information. However, some observations can be made about the monitoring and short/mid-term therapeutic outcome. In Kazakhstan, pediatric UC patients are treated according to the recommendations provided by the national diagnostic-therapeutic protocols approved by the Ministry of Health [21] and,

according to our retrospective data, all key drugs (according to the Joint ECCO and ESPGHAN Evidence-based Consensus Guidelines) [22] are available, including topical and rectal 5-ASA, thiopurines and infliximab. However, the local national guidelines may present some differences, whose discussion is beyond the purpose of this article. A tight medical monitoring after the first phase of induction of the clinical remission in the inpatient department is hampered by some aspects related to health system organization, as mentioned later among the study limitations. Therefore, most patients can be followed up at the tertiary center only after several months. Indeed, at one-year follow-up, the disease control was not completely achieved or maintained in most patients. Even though at one-year follow-up the PUCAI score (44.4 ± 21.0 vs. 27.6 ± 21.9, $p = 0.0067$) and the hemoglobin levels (10.24 ± 2.17 vs. 11.27 ± 2.20, $p = 0.0158$) showed statistically significant improvements, other inflammatory parameters were still significantly altered (e.g., CRP, CPT) and the histopathological healing was achieved only in 28% of patients (7 out of 25). However, this result is not much lower than what is reported in the study by Santha et al.: they described the histopathological healing in pediatric IBDs patients at first/second endoscopy, which was 35.7% for children affected with UC [23]. Ashton et al. reported histopathological healing in 27.6% of their pediatric UC patients in a three-year follow-up study at the colon endoscopy performed around 1.5 year after the diagnosis [24]. Therefore, our histopathological outcome was not different from the results obtained in other studies considering similar time points.

Importantly, CPT was not obtained in all patients at the follow-up: it was available for only 60% of patients. Moreover, some laboratory parameters were not investigated at all, such as ferritin or cholestasis indexes. Finally, the timing of the follow-up colon endoscopy was not precisely standardized, as well as the information available through the histopathological reports. For all these reasons, it is not possible to precisely analyze and make clear conclusion on the therapeutic management and outcomes of pediatric UC in our patients. However, these considerations highlighted that several aspects of the medical monitoring during the follow-up may be improved through a standardization and completion of the current medical management; nonetheless, our histopathological outcomes were as good as other experiences from the medical literature. Anyway, patients with more extensive colon involvement and higher disease activity at diagnosis are likely to require a more intensive therapeutic approach and medical monitoring. Indeed, the histopathological remission was reported in only 14% (2 out of 14) patients with pancolitis, compared to 45% (5 out of 11) patients without pancolitis. Overall, the control of the disease inflammatory activity was insufficient: at one-year follow-up, CPT resulted to be 504.5 ± 499.6 mg/L and 423.7 ± 372.2 mg/L in patients with and without pancolitis, respectively; importantly, both groups showed no statistically significant reduction compared to the paired values at the diagnosis (728.7 ± 93.7 mg/L and. 682.0 ± 389.9 mg/L, respectively). Among UC patients, CPT showed a high degree of correlation with mucosal endoscopic and histopathological healing [25,26]. Therefore, a more extensive and routine use of this biological marker might have improved the medical management of our UC pediatric patients, by optimizing the endoscopy timing and reducing some costs and clinical risks related to this invasive procedure.

Unfortunately, as already mentioned, our retrospective data collection was hampered by several aspects related to the health system organization in Kazakhstan (e.g., long distance between patients' hometown and our tertiary hospitals, mixed medical management between these hospitals, need of adhering to the national diagnostic-therapeutic protocols also for administrative reasons, use of non-electronic records, etc.), as also observed and discussed by our research group in other clinical studies on different autoimmune diseases [27,28]. Therefore, it was not always possible to retrieve reliable and complete data on the full clinical presentation (including extra-gastrointestinal manifestations potentially associated with UC), time elapsed between first symptoms onset and the diagnosis and detailed therapies.

5. Conclusions

In conclusion, this first and limited report on pediatric UC management in Kazakhstan (and, more in general, Central Asia) highlighted the need to increase the diagnostic awareness and timing for pediatric IBDs and, in detail, UC in this country. Even though the therapeutic approach and outcomes resulted to be appropriate overall, several aspects of the medical monitoring could be improved and standardized, especially in pediatric patients with more extensive UC.

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