



Telemedicine- versus outpatient-based initiation and management of ketogenic diet therapy in children with drug-resistant epilepsy during the COVID-19 pandemic

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ABSTRACT

Introduction: Initiation of ketogenic diet therapies (KDT) for pediatric epilepsy is usually done on an inpatient basis and the diet is managed during clinical appointments following a protocol of visits and routine tests. Because of the 2019 coronavirus disease (COVID-19) pandemic and the associated lock-down measures, we switched from outpatient to telemedicine-based KDT initiation.

Objective: To explore the feasibility, effectiveness, and safety of online KDT initiation and follow-up by comparing a group of children with drug-resistant epilepsy that was managed by telemedicine compared to a group that was treated on an outpatient basis.

Materials and Methods: An observational study was conducted in two groups of patients with drug-resistant epilepsy who initiated KDT and were followed up with an online versus an outpatient modality by the interdisciplinary KDT team of Hospital Pediatria JP Garrahan in Buenos Aires, Argentina. Dietary compliance, ketosis, retention rate, adverse effects, number of contacts, and clinical outcome were evaluated at 1, 3, and 6 months on the diet.

Results: Overall, 37 patients were included, of whom 18 started the KD by telemedicine and 19 on an outpatient basis. Minimum follow-up of the patients was 6 months. All patients received the classic ketogenic diet. No statistical differences between the two groups regarding efficacy and safety of the diet were found.

Conclusions: Our results support the feasibility and safety of initiating and management of KDT by telemedicine. Patients and their families should be carefully selected in order to guarantee a good outcome.

Introduction

Ketogenic diet therapy (KDT) has become an important option in the management of drug-resistant epilepsy and some of the inborn errors of metabolism in children, with increasing evidence of its favorable effects. KDT has also shown to be successful in adults and in other neurological conditions [1].

Although KDT was previously used as the last option for patients with drug-resistant epilepsy, currently its indications and effectiveness are better known [2]. Different studies have identified the most effective indications for KDT based on epileptic syndrome or type of seizure [3], which has led to the implementation of this treatment early in clinically more stable patients, and earlier in the course of their disease, with a

greater percent effectiveness in seizure control.

For almost 90 years KDT was managed strictly using rigid protocols that required prior fasting, several days of hospital admission to induce ketosis, and fluid and calorie restriction, making this therapy complex from the point of view of implementation and perception of the adverse effects it caused [4]. However, over the past 10 years the treatment has become more flexible, both regarding the diet itself, with currently five variants of the classical KD, as well as its implementation using in- and outpatient protocols [5].

Still, most centers continue to admit these patients, although in the latest consensus guideline most experts agree that KDT may be initiated on an outpatient basis [6].

The 2019 coronavirus disease (COVID-19) pandemic and the

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associated lock-down measures has forced hospitals to modify their care of chronic patients, to protect vulnerable populations and hospital staff from becoming infected with the virus. These changes have certainly affected patients that are candidates for KDT [7].

Our hospital is a reference center in Latin America for the management of epilepsy and since 1988, KDT has been used for the management of patients with drug-resistant epilepsy by an interdisciplinary team. In 2012, initiation of the KDT on an inpatient basis was limited by the scarcity of beds especially during the winter months, leading to a reorganization of the protocol towards initiation on an outpatient basis so that we could continue to offer this treatment [8].

During the covid 19 pandemic, we had to adapt a second time as a hospital and as a team. In Argentina, a strict phase-1 lockdown was implemented on March 20, 2020 lasting approximately 6 months. With 150 patients on the KD in follow-up, it was necessary to schedule on-line follow-up visits through email and video consultations. In addition, to respond to patients who were already on the waiting list to start treatment, KDT initiation through telemedicine was started, although little evidence was available on the modality.

Over the last years, telemedicine has progressively become a valid alternative to evaluate and manage epilepsy patients, mainly for those with difficult access to health care, and during the COVID-19 pandemic it has turned into an even more important option. Several studies have shown that telemedicine-based epilepsy care is possible and is as safe and effective as in-person consultation [9,10].

At our hospital, a Department of Telemedicine has been in place since 1997 and a telemedicine epilepsy program since 2013. This structure was used for the online initiation of KDT in drug-resistant epilepsy patients who were started on KDT.

The aim of this study was to explore the feasibility, effectiveness, and safety of online KDT initiation and follow-up by comparing a group of children with drug-resistant epilepsy that was managed by telemedicine to a group that was treated on an outpatient basis.

Material and methods

This observational study was conducted in a cohort of patients with drug-resistant epilepsy who initiated KDT and were followed up with an online modality by the interdisciplinary KDT team of Hospital Pediaatria JP Garrahan in Buenos Aires, Argentina. The patients were compared to a group of similar patients who started KDT on an outpatient basis in the same period of time.

Patients were considered for online diet initiation based on distance from the hospital and moment of the lockdown (more strict with more difficult access to the hospital). Patients were eligible to start KDT if they were medically stable and their families were considered to effectively perform the monitoring requirements as well as prepare KDT meals and/or formulas after dietitian and nursing education was provided.

Children between 0 and 18 years of age with drug-resistant epilepsy who started the classic ketogenic diet after failing 2 adequate trials of antiseizure medications (ASM) between January 2020 and April 2021 were included. Children who started the diet on an outpatient basis in the same period were selected as a control group. Patients in whom the diet was initiated during status epilepticus or inpatient basis were excluded. Minimum follow-up was 6 months.

The classic KD was used in all patients of both groups according to the Johns Hopkins KDT protocol and the national [11] and international consensus guidelines [6], without fasting or fluid restriction.

In the online patients, the initiation process was begun with a 1:1 ratio, which was increased each week as tolerated i.e. by 0.5 or 1.0 until ketosis was achieved, and parent/caregiver education was provided through 4 weekly zoom sessions (2 by the medical nutritionist and 2 by the dietitian) over 2–4 weeks.

In the outpatient group the initiation process was done in the day-hospital metabolic unit over 4 consecutive days with full calories and gradually increasing the ketogenic ratio combined with teaching

sessions in the same period, by the medical nutritionist, the nurses and the dietitians. Protocols for online and outpatient KDT initiation are shown in Table. 1.

Laboratory studies were performed pre-diet and at 3 and 6 months in the outpatient group and in the online group when possible. Anthropometric measurements were done by the parents at home in the online group and by the KDT team in the outpatient group. To measure effectiveness of and adherence to the diet, a diary to record seizures, ketosis, particularities regarding the diet, and adverse effects was used in both groups. Epilepsy syndromes and seizure types were defined according to the 2017 International League of Epilepsy classifications [12,13].

In the online group, parents/caregivers were instructed on how to use the different means of communication. Patients were seen by zoom and WhatsApp, e-mail, or telephone were used for scheduled visits and unscheduled contacts regarding emergency situations and doubts. There were no clinic visits during the initiation and follow-up periods. All patients were seen prediet, at month 1 and 3, and every 3 months thereafter. Outpatients had in-person visits and they could get in touch with the team only by institutional email.

The two groups of patients were compared regarding dietary compliance, ketosis, retention rate, adverse effects, number of contacts, and clinical outcome. Patient and family satisfaction with this new modality was assessed by survey after 6 months on the diet in the online initiation group.

The study was approved by the Ethics Committee of Garrahan Hospital. Informed consent was obtained from the parents or caregivers of all patients.

Statistical analysis

All the patient data were included in a database that was continuously updated and added to the electronic charts of the patients. The results are presented as median and range (or mean and standard deviation) for numerical variables and percentage for categorical variables. Fisher’s exact test or Chi-square test was used to compare the two groups for categorical variables and the Mann-Whitney U test for

Table 1
Comparison between outpatient or online protocols for induction in ketosis.

KD initiation	Outpatient (>1y old) Day hospital in Metabolic Unit for follow-up and teaching sessions	Online/Telemedicine (>1y old) At home zoom meetings
Pre-evaluation	3/4 face-to-face sessions (lab studies, nutritional status, dietitian)	2 sessions - zoom and by email (labs, studies, supplies)
Induction phase	The ratio is increased every 24 h according to tolerance - in 4 days full calories and ratio If the child is breastfed, the 2:1 ratio is increased to 4:1 after 48 h.	The ratio is increased every 7 days according to tolerance. If the child is breastfed, the 2:1 ratio is increased to 4:1 after 1 week. .
Method of dietary education/ Teaching materials	Parent guidelines (KDT, Epilepsy)	Parent guidelines in pdf, remote app, recorded sessions, cooking videos, powerpoint guidelines prepared at home by caregivers
Meal/formula provision	hospital food/formula preparation during total initiation duration	
Total duration of initiation	3–7 days	2 weeks-1 month until ketosis achieved
Parameters monitored 1st week	Glucose 4 times/day BHB pre-meal twice/day	BHB pre-meal once/day
Lab control Follow-up	at day 7 and 1, 3 and 6 month month 1, 3 (effectiveness) then every 3 months	at 1, 3 and 6 month month 1, 3 (effectiveness) then every 3 months
Type of contact during initiation	face-to-face/e-mail/ telephone during hospital hours (8–16hs)	e-mail, zoom sessions, WhatsApp, telephone

numerical variables. A p value of less than 0.05 was considered significant. The analysis was performed with Stata 14.1 software (StataCorp, Texas, USA).

Results

Overall, 37 patients were included, of whom 18 started the KD by telemedicine and 19 were outpatients controls. In all patients the diet was indicated by the neurologist after failing two or more ASMs. The baseline characteristics of the study population are presented in Table 2.

The patients in the online group were older at diet initiation than the outpatient group (5 vs. 3.8 years), although this difference was not statistically significant. The male-to-female ratio was higher in the online than the outpatient group (13:5 vs 8:11; p 0.099).

Intervention

Both groups of patients received the diet mostly orally, with a greater number of patients receiving the diet by nasogastric tube in the outpatient and by gastrostomy in the online group, although these differences were not statistically significant (p 0.147). In both groups a classic ketogenic diet was used, and most patients received the diet at a ketogenic ratio of 3:1. Anthropometric evaluation measured by body mass index (BMI) Z-score was performed in both groups at 3 and 6 months on the diet (Fig. 1); a Z-score close to zero was observed in all the children in both groups.

Most patients in both groups received a mixed diet with food and formula (10/18 in the online, 9/19 in outpatients). The most common type of formula used in both groups was powdered formula with a 4:1 ratio, followed by liquid formula 4:1 with 25% MCT oil. The variety of formulas was greater in group 1, although this difference was not significant (p 0.277) (Table. 3).

Onset of ketosis in the first 24–72 h was similar in both groups, although a higher percentage of patients in the online group entered ketosis 72 h after starting the diet (28% vs 10%), but this difference did not reach statistical significance either (p 0.625).

On the other hand, a difference with a trend towards significance (p = 0.074) was observed regarding the time to enter the therapeutic range of ketosis (BHB>2 mmol), with a shorter time observed in outpatients than in those who initiated the diet at home.

In the online patients more adjustments in the diet were made than in

Table 2
Patient characteristics of groups of virtual initiation and the control group.

Patient characteristics	Online (n:18)	Outpatients (n:19)	p
Age at onset KDT (years) median (range)	5 (0.68-16)	4 (1.5-11)	0.9033
Sex (female/male)	5/13	11/8	0.065
Epileptic Syndrome			0.187
West syndrome	5	3	
Myoclonic atonic epilepsy	3	3	
Dravet syndrome	0	2	
Focal epilepsy	1	0	
Multifocal epilepsy	0	2	
Rett syndrome	1	0	
Lennox-Gastaut syndrome	5	6	
Epileptic Encephalopathy with Spike-Wave Activation in Sleep	2	2	
Progressive myoclonic epilepsy	1	0	
Myoclonic status in non-progressive encephalopathy	0	1	
Etiology			0.170
Structural	7	6	
Genetic	5	4	
Metabolic	1	0	
Unknown	3	8	
Infectious	1	1	
Number ASM pre-diet median (range)	3 (2-4)	3 (2-4)	0.124

the outpatient group during the first (p 0.010) and third month of treatment (p 0.071).

Very similar results without statistically significant differences were also found in the mean total time on the diet: 9.5 months (3–17) in the online vs 12.5 months (1–24) in the outpatient group and the retention rate (10 patients in the online and 11 in the outpatient group).

Regarding reasons for treatment discontinuation, while the patients who discontinued in the online group did so mostly due to lack of efficacy of the diet, those in the outpatient group discontinued the diet because of a feeling of restrictiveness and non-compliance to treatment with a statistically significant difference (p = 0.045).

Mean time of the team spent on diet initiation was 12 h over 2–3 weeks in the online group versus 8 h over 4 days in the outpatient group. Access to communication, measured by the total number of consultations, showed that patients in the online group had an average of 43 (27–88) consultations during the first 3 months compared to 20 (8–32) consultations in the outpatient group, with a statistical significance (p = 0.000).

KDT interventions in the online and the outpatient groups are shown in Table. 3.

Treatment effectiveness

Seizure control

No significant differences in ASMs or seizure control were found between the two groups at 3 (p 0.115) and 6 months (p 0.382). The effectiveness of the treatment on seizure control over time is shown in Fig. 2a and b.

After 3 months on the diet, decrease in seizure frequency was > 90% in five (28%) and 50–90% in 11 (61%), while seizures were not adequately controlled (<50%) in two patients (11%) in the telemedicine group. On the other hand, in the outpatient group, two patients (10.5%) had a > 90% decrease in seizure frequency and 17 (89%) had a decrease in seizure frequency of 50–90%.

After 6 months, decrease in seizure frequency was > 90% in five patients (33%) and 50–90% in eight (53%), while adequate seizure control was not achieved in two patients (14%). In the outpatient group, two patients (12.5%) had a > 90% decrease in seizure frequency, 12 (75%) of 50–90%, and two (12.5%) of < 50%.

Adverse effects

There were no significant differences in the number of total adverse effects found before treatment initiation or during follow-up between the two groups. Nevertheless, in four patients in the outpatient group (21%) and in none of the patients in the online group vitamin D deficiency was observed prior to the start of KDT (p 0.039). Four patients (21%) in the outpatient group and none in the online group had hypoglycemia at treatment initiation (p 0.039). The outpatient group had a higher prevalence of increased GER/vomiting (17/18) compared to the online group (12/18) at 3 months of treatment (p = 0.035).

The outpatient group had a greater number of hospitalizations during the first 6 months on KDT than the online group (6 vs 1, p 0.043). Of the patients who required hospital admission during the first 6 months on the diet, in the outpatient group three were admitted due to increased seizure frequency in the first month, one died due to respiratory disease unrelated to the diet at 3 months on KDT, one patient was admitted due to COVID-19 6 months after diet initiation, and only one patient was admitted due to KDT-associated complications, consisting of vomiting and increased gastroesophageal reflux. In the telemedicine group, only one patient required hospital admission due to increased seizure frequency after one month on the diet.

Caregiver satisfaction

A caregiver satisfaction survey was sent to all the families of the patients who were initiated and followed-up via telemedicine; 10

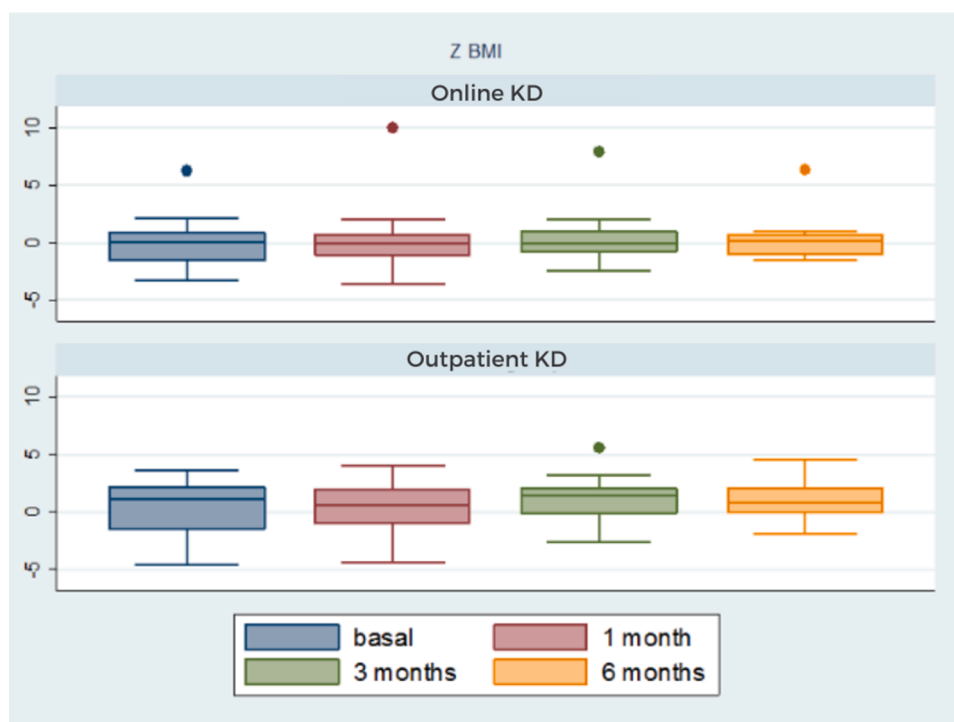


Fig. 1. BMI Z-score follow-up in both groups.

families sent the survey back (55.5% response rate). Two of 10 families responded that they were not familiar with the technology before starting online treatment. All families (10/10) thought the on-line consultations were helpful when initiating KDT and felt supported by the team during the treatment and nine responded that the modality was effective. All patients indicated that the educational materials (PowerPoint presentations) were useful and 5/10 thought educational videos would have been helpful. All 10 families felt positive about the online training to avoid going to the hospital, although 3/10 also stated that the training period was stressful.

Discussion

In this study we compared a prospectively followed series of 18 children with drug-resistant epilepsy in whom KDT was initiated and managed exclusively by telemedicine with a control group of 19 patients who started the diet as outpatients. We found no significant differences in feasibility, effectivity, and safety between the groups, showing that online initiation of the KD is feasible when supported by a multidisciplinary KD group.

At our hospital, yearly around 50 children and infants are started on the diet, since 1988 on an inpatient and since 2013 also on an outpatient basis, except for patients under 1 year of age (neonates or infants) and those with severe medical conditions (status epilepticus, oxygen requirement, clinically unstable).

Worldwide, the 2019 coronavirus disease (COVID-19) pandemic led to a reduction in patient admission and visits due to the risk of contagion and because hospitals were crowded with COVID-19 patients [14]. An online survey of world pediatric neurologists on the delivery of care for children with epilepsy during the COVID-19 pandemic, showed that for almost all who worked at a center where diet therapy is provided, the possibility to initiate the diet was very limited or not possible; 26.5% were unable to offer outpatient diet initiation to any child, and 70.5% could only start the diet as an outpatient in urgent cases; 51.4% offered follow-up via telemedicine only [15]. Likewise, at our hospital there was a stop on patients starting the diet, except for emergency cases, which made it necessary to develop a telemedicine protocol.

Several studies are available on the follow-up of the diet through telemedicine, already used before the start of the pandemic but mainly used for patients who were unable to visit hospitals due to residing in distant locations [15,16,17]. Nevertheless, little has been published on KDT initiation and the induction of ketosis 100% online. In 2020, Kossoff et al. published the experience of two centers starting five patients on the diet. Three received the modified Atkins diet (MAD) and two the classic KD, suggesting that KDT can be successfully initiated with creativity, an individualized approach, and advanced planning during this pandemic [18].

Our two groups were very similar in age, epileptic syndrome, etiology, prediet ASMs, (See Table 2), as well as outcome. In our study, all patients both in the online and in the outpatient groups received classic KD, although the less restrictive types of KDT, including the MAD or the low glycemic index treatment (LGIT), may be options that are easier to use for families starting the diet at home, with similar efficacy [19]. Nevertheless, our experience over the past 10 years in 350 patients started on the outpatient protocol allowed us to provide the classic KD with a slower induction period without complications or adverse effects, also in our online patients, without sacrificing effectiveness and seizure control.

In the comparative analysis one of the few variables that showed a statistically significant difference was the number of adjustments made to the diet, which was higher in the online than in the outpatient group. This may be explained by the fact that the online group was followed-up more closely with easier access to the KDT team.

Diet initiation and follow-up is time-consuming, because of its complexity. On-going follow-up is crucial to fine-tune the diet, manage adverse effects, and for its safe and successful discontinuation, especially in patients on the classic KD [20]. In our study, online initiation turned out to be slightly more time consuming (12 h) than outpatient initiation (8 h).

Ferraris et al. [21] showed that on the classical KD the number of unscheduled phone or e-mail contacts between the patient/caregiver and the team is higher during the first 3 months, as this is the induction period during which greater support is needed in order to solve complications or doubts regarding diet management. The authors considered

Table 3
Intervention: differences between the online and outpatient groups.

KDT intervention	Online patients	Outpatients	p
Route of administration			0.147
Oral	13	10	
Nasogastric tube	2	6	
Gastrostomy	3	1	
Mixed (oral+enteral)	0	2	
Ketogenic ratio			0.424
4:1	4	3	
3:1	7	10	
2:1	6	5	
1:1	1	1	
Type food			0.668
Food	2	3	
Formula	5	7	
Formula+food	10	9	
Formula+breastfeeding	1	0	
Type of formula			0.277
Powdered formula 4.1	10	14	
Liquid formula 4.1 with MCT 25% of the total calories	2	4	
Hydrolyzed formula with 14% MCT of the total calories	2	0	
Fluid with MCT 2.5:1	1	0	
Fluid 3.1 with MCT	2	0	
Onset ketosis in hours <24 hs			0.625
<24hs	5	5	
24-48hs	5	7	
49-72hs	3	5	
73 hs-96 hs	4	1	
>96 hs	1	1	
Fine tuning 1st month (median-range)	3 (0-8)	1(0-6)	0.010
Fine tuning 3rd month (median-range)	4 (0-8)	1(0-6)	0.071
Total time on KD in months (median-range)	9.5 (3-17)	12.5 (1-24)	0.2466
Retention rate (n-%)	10 (55.5%)	11(57.9%)	0.886
Reason for discontinuation			0.045
Lack of efficacy	5	-	
Death	1	1	
Intolerance to KDT	2	1	
Restrictiveness of the diet	-	2	
Non-compliance	-	3	
Access to communication (nr. unscheduled contacts) (median-range)	43 (27-88)	20 (8-32)	0.000

Abbreviation: MCT, medium-chain triglyceride oil.

that closer monitoring may lead to better compliance.

In our study, there was a significant difference between unscheduled contacts from the online versus the outpatient group during the first 3 months on the diet, 43 (range, 27–88) versus 20 (range, 8–32), suggesting that online initiation may increase the work for the team, although time may be saved with prerecorded educational materials.

On the other hand, no differences were found in the retention rate at 6 months on the diet between the groups, although the reasons for discontinuation were different; in the online group it was lack of efficacy in the majority of the patients [22] while it was lack of compliance and a feeling of restrictiveness in the outpatients group. This finding may point to the need for a closer follow-up in the outpatient group.

In the literature, one of the difficulties observed when following diet therapy during the COVID-19 pandemic was the need for laboratory testing [18]. In the above-mentioned survey on the delivery of care for children with epilepsy during the COVID-19 Pandemic, in 45.9% of cases the frequency of obtaining surveillance labs was reported to be reduced [7]. In our series, monitoring labs could be performed every 3 months; however, specialists agree that obtaining labs every 6 months would be sufficient in most cases when access to testing is difficult [23].

A BMI Z-score close to zero was observed in both groups showing that the BMI remained stable throughout the study period (Fig. 1) and suggesting that the diet was safe regarding nutritional status of the patients. On the other hand, it should be taken into account that measurements of the patient’s height and weight may be more imprecise as they are performed by the parents and clinical data obtained via zoom are less exact [18,21,24].

Similar to the observation by Ferraris et al. [21], family feedback regarding initiation via telemedicine was positive, and most of them were happy not to have to travel to the hospital (especially those living far away) with its associated health risks. There were parents who felt the lockdown and home-office work facilitated KD education and food preparation as they had more time available at home; time – probably a week – that they would have otherwise needed to take off from work during outpatient diet initiation. Adherence to the diet was also more straightforward as families found it easier to comply with the dietary regimen because of reduced meals out of home and less social meetings.

On the other hand, the team felt that the online modality facilitated the planning of follow-up visits and educational sessions. It was both easier to have multidisciplinary zoom meetings including different specialists of the team and with the members of the family, in case - for example - they lived in different houses due to divorce.

In our study, there were a number of technical challenges related to poor internet connections and inability to connect to the virtual

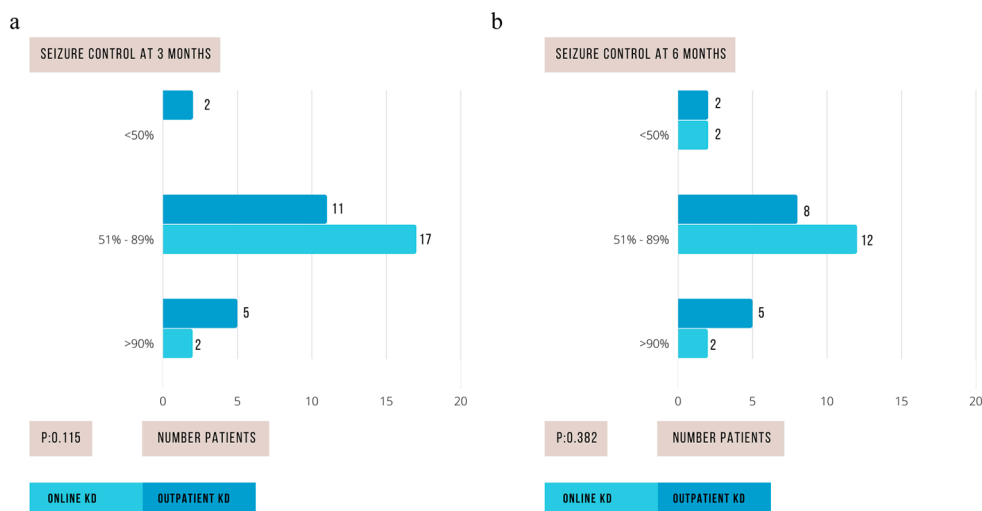


Fig. 2. a (Seizure control at 3 months) and b (Seizure control at 6 months).

platform. During the COVID-19 pandemic, Semprino et al. [25] followed their patients on KDT by telemedicine. Due to limited financial resources and levels of education of the families, WhatsApp was chosen as a tool as it was available on the cell phones of all the families and professionals. A parent satisfaction survey showed that the families felt safe and well supported by the KD team using this modality. Nevertheless, for online initiation, e-mail and zoom connections are needed for direct contact with the parents and audiovisual educational materials.

The main limitation of our study is its small sample size which made it difficult to draw robust conclusions. In addition, there inevitably was a selection bias. Although the patients were similar regarding syndrome and type of epilepsy, some of the patients in the outpatient group were neurologically more severely affected, shown by the greater number of emergency hospital admissions. Candidate patients for online initiation were more strictly selected, considering the possibilities of the families in the use of online communication platforms and because more severe patients need face-to-face care, as they are at a higher risk of complications.

Another limitation was that we did not calculate differences in hospital costs between the two initiation and follow-up modalities. A study by van der Louw et al. found that costs of outpatient initiation were almost three times less than those of inpatient initiation [5]. This difference may be particularly interesting to provide access to the KD for patients in low- and middle-income countries [5]. A future study on the cost-effectiveness of online initiation may be interesting for the planning of hospital policies. On the other hand, starting the diet entirely home based may be cost-saving for the families in some ways, regarding, for example, travel costs [10]; however, there are minimum requirements for the family, such as a well-working internet connection and access to special foods and/or formula, as well as skills of the parents to prepare the diet and use the computer for communication with the KDT team.

During the Covid-19 pandemic, the initiation of KDT by telemedicine was a question of force majeure. In this first attempt to implement an individualized approach together with a creative use of the protocol, we found that this modality may be an alternative option in certain circumstances; however, face-to-face clinic follow-up remains the method of choice. Therefore, online KDT initiation may be an option for selected patients with drug-resistant epilepsy managed at experienced centers, probably mainly for those who live far from a KDT center and with difficult access to health care.

In addition, in several other situations patients may benefit from online initiation of the diet. Such situations may include patients with reduced mobility and difficult access to the hospital due to logistic issues (single parent), patients whose parents are separated and cannot concur to same visits while the child lives in different homes part of the time, patients who live in a care home whose caregivers need instructions, or those with a mother with a newborn sibling.

To implement this modality, better technological support, such as a user-friendly platform with a combination of the clinical charts, would be necessary. Telemedicine should be considered as a complementary tool for developing the KDT beyond the Covid-19 pandemic. Further studies with adequate patient randomization and larger sample sizes should be conducted to confirm our findings.

Conclusions

Our study describing a first attempt at online initiation and follow-up of KDT in patients with drug-resistant epilepsy found that the modality was as effective as outpatient management in terms of seizure management. Positive aspects of online initiation were the absence of travel time, a reduced waiting list, more efficient appointments and an individual approach, and good coordination of the visits by zoom regarding medical and educational meetings. Nevertheless, there were technological limitations and inadequate anthropological measurements and clinical information. These limitations pose a risk, especially for more severe patients. Therefore, face-to-face KDT initiation and follow-up

remains the method of choice and telemedicine is a valuable complementary tool for KDT in patients with drug-resistant epilepsy.

Declaration of Competing Interest

The authors declare no conflict of interest in regards to this article entitled: Telemedicine- versus outpatient-based initiation and management of ketogenic diet therapy in children with drug-resistant epilepsy during the COVID-19 pandemic.

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