

The use of K.Flo for an established gastrostomy-fed ketogenic patient

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K.Flo is part of the Vitaflo keto portfolio of products for the dietary management of epilepsy and other neurometabolic disorders.



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Age:

18 years

Gender:

Female

Relevant family and social history:

Lives at home with parents and older siblings. She attends a school for children with special educational needs and has regular respite.

Patient details and medical history

Diagnosis

- Severe drug-resistant epilepsy, secondary to pneumococcal meningitis in infancy
- Constipation

Relevant medical history

Prior to commencing a ketogenic diet (KD), the patient had daily seizures including generalised tonic clonic seizures, tonic seizures, atonic seizures and absences.

At the age of 14 years old, she was commenced on a 4:1 classical KD via a gastrostomy. She had been fully gastrostomy fed for many years due to a reduced oral intake and poor weight gain.

Medications

Previously tried medication: Clobazam, Clonazepam, Sodium Valproate, Lamotrigine, Carbamazepine, Topiramate, Rufinamide

Current medication: Levetiracetam liquid 7.5ml bd and Laxido – 2 sachets per day.



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Dietetic management

Aims of the ketogenic diet

Reduce
seizure
frequency

Improve
quality
of life

She had a good response with seizure control continually improving throughout her first two years on the KD. She achieved periods of seizure freedom and was much more alert and brighter on the diet.

She maintained a good level of ketosis and it was noted that if her ketones were high, her seizure control was better.

After 2 years, and in a period of relative stability and good seizure control, a wean off KD was attempted. Unfortunately, on reducing the ratio of feed to 2.5:1, her status was deemed much worse and the feed ratio was increased back up to 4:1. Ketones increased again up to 4-5mmol/l and the patient was clinically much improved, she was still having daily seizures but they were not as severe and long lasting.

After 4 years on KD, the patient participated in the K.Flo clinical trial. At this point she was having 2 - 3 tonic clonic seizures per day and was on the waiting list for vagal nerve stimulation (VNS) therapy.



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Ketogenic diet prescribed

Classical 4:1 ratio.

Nutritional requirements	
Weight	50kg
Daily estimated energy requirements (EER) ¹	1410kcal/d*
Protein (RNI) ²	45.4g/d
Minimum safe level of protein (0.82g protein/kg/day) ³	41.1g/d
Fluid requirements ⁴	1800ml/24hrs

*Calculated using low physical activity level factor.

Dietary goals

- Ensure a good level of ketosis is maintained
- To achieve as high an intake of protein as possible within KD restriction
- To meet micronutrient requirements

Tube feeding plan before the K.Flo trial

Feed: Proprietary ketogenic 4:1 liquid feed.

Feed plan provided:	
Energy	1410kcal/d
Protein (0.58g /kg/day)	29g/d (70% min safe level of protein)
Fibre	10.5g/d
Fluid	1800ml [†]

**Feed times and rates were flexible according to tolerance.

[†]Target fluid intake was achieved with regular 60ml of water flushes throughout the day and before and after each feed.

Target Feed Volume:

940ml/24hrs

- **Daytime:** 2 x 235ml bolus feeds – pump rate at 250ml/hr**
- **Overnight:** 470ml – pump rate at 75ml/hr**

Due to the patient's low energy requirements and need for a high ratio feed, it had been an ongoing challenge to achieve the minimum safe level of protein. It was not possible to meet the patient's minimum safe protein intake whilst maintaining a 4:1 ratio, without dramatically increasing energy (kcal) and her weight had already increased significantly prior to starting the trial.

Tube feeding plan during the K.Flo trial

Direct swap from proprietary ketogenic 4:1 liquid feed to K.Flo.

K.Flo feed plan provided:

Energy	1410kcal/d
Protein (0.64g /kg/day)	32g/d (78% min safe level of protein)
Fibre	13.2g/d
Fluid	1800ml

Target Feed Volume:

940ml/24hrs

- **Daytime:** 2 x 235ml bolus feeds – pump rate at 250ml/hr**
- **Overnight:** 470ml – pump rate at 75ml/hr**

The protein intake was still suboptimal and did not meet the patient's minimum safe level of protein, however, it was reassuring that K.Flo pushed her protein intake in the right direction and both the pre trial feed and K.Flo met the UK reference nutrient intake (RNI) for all micronutrients.



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Monitoring

Anthropometry:

Weight on starting trial: 50.1kg (between the 9th and 25th centile).⁵ Unfortunately, no further weight was obtained at the end of the 1 month trial as the family were unable to get the patient weighed due to Covid-19 restrictions.

Her weight 1 year later was: 51.4kg which remained between the 9th and 25th centile.

Biochemistry: Patient maintained a good level of ketosis for the duration that they were on K.Flo with ketones consistently 4+mmol/l.

Six monthly routine keto bloods were all acceptable and not of concern before the K.Flo trial and for the duration that the patient was on K.Flo.

Follow-up

For the duration of the trial, the patient had a period of stability. Her seizure control did not change and there was no change to her anti-epileptics during the trial period.

The patient has always suffered from constipation. Prior to starting the K.Flo trial, she was on a daily laxative, Laxido, to help maintain a regular bowel movement and this was reduced to 2-3 times per week.

During the trial her parents noted that the need for daily Laxido reduced and they attributed this from swapping to K.Flo. K.Flo contains more fibre* than the pre-trial proprietary ketogenic feed, increasing total fibre from 10.5g to 13.2g fibre per day.

Outcomes

The patient adhered to the use of K.Flo for the duration of the trial. She maintained a good level of ketosis and no change was noted in seizure activity. Her parents were keen to continue K.Flo as the benefit to her bowel health was maintained, her bowels opened much better and she required less Laxido.

The patient remained on K.Flo after the completion of the 4 week trial period.

*K.Flo contains IS50™, a proprietary fibre blend containing 50% insoluble fibre (pea fibre) and 50% soluble fibre (made up of 40% fructooligosaccharides (FOS), 20% inulin, and 40% gum acacia).



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Conclusions and key learnings

- K.Flo is **well tolerated**, and it is reassuring the patient saw no change in ketones or seizures for the duration that they were on the trial
- The slightly **higher protein content** of this feed can be useful to help meet the protein requirement of those patients who have very low energy requirements
- The **increased fibre intake** and the IS50 fibre blend may help with the management of constipation
- This patient had always struggled with constipation and this was exacerbated whilst on a KD. Mum reported a **significant improvement in bowel movements** after swapping from her pre-trial KD feed to K.Flo and she was able to reduce the quantity of Laxido
- Parents also liked that there was an **alternative ketogenic feed available**



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Learning resources

Kathryn Lightfoot presenting on ketogenic liquid feeds



The use of ketogenic liquid feeds for the dietary management of epilepsy and other neurometabolic disorders

Kathryn Lightfoot & Rachel Meskell

Learning objectives are to gain an understanding of:

1. The rationale and implementation of ketogenic liquid feeds as part of a ketogenic diet.
2. K.Flo, as the latest nutritionally complete feed for use in the ketogenic diet.

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Each 100ml of K.Flo contains:

- 150kcal Energy
- 14.7g Fat
- 3.4g Protein
- 0.35g Carbohydrate
- 1.4g Fibre


Includes:

- Vit D 3.0µg
- Calcium 130mg
- Selenium 8.5µg


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K.Flo key features:

- **nutritionally complete** - minimising need for additional micronutrient supplementation
- **favourable fatty acid profile** - high in monounsaturates and includes essential fatty acids
- **resealable bottle** - convenient to transport and helps to reduce product waste
- **fibre blend IS50™** - shown to have a normalising effect on bowel function and is well tolerated when given to patients requiring full enteral feeding (12,13)



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K.Flo is a food for special medical purposes and must be used under medical supervision.
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All information correct at the time of print: May 2024



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