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Original article

Polymeric formula is more palatable than elemental formula to adults with Crohn's disease

Catherine L. Wall [a], Richard B. Gearry [b], Andrew S. Day [a, *]

[a] University of Otago Christchurch, Department of Paediatrics, PO Box 4345, Christchurch 8140, New Zealand
[b] University of Otago Christchurch, Department of Medicine, PO Box 4345, Christchurch 8140, New Zealand

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SUMMARY

Background & aims: It is often assumed that polymeric formula is more palatable than elemental formula however there is limited research to support this assumption. This study aimed firstly to compare the palatability of polymeric and elemental nutrition formulae and secondly to gauge the acceptability of these formulae as a treatment option for active Crohn's disease.
Methods: patients with Crohn's disease attending adult gastroenterology outpatient appointments were approached to complete an oral taste test of two nutrition formulae. Patients were asked to taste 10 ml of elemental and 10 ml of polymeric formula and rate each for drinkability, flavour, mouth feel, aftertaste, acridity and overall preference. Patients were also asked if they would consider using exclusive enteral nutrition for eight weeks if they had severe, moderate or mild Crohn's disease symptoms.
Results: 35 patients participated, median age was 39 years old (range 19-77 years) and 63% were males. Polymeric formula was preferred by 91% of patients and rated favourably compared with elemental formula for drinkability, flavour, mouth feel and acridity ($p<0.001$) but not aftertaste ($p=0.09$). Exclusive enteral nutrition for eight weeks was considered as a treatment option for severe symptoms by 97% of patients, for moderate symptoms by 80% of patients and for mild symptoms by 43% of patients.
Conclusions: adults with Crohn's disease prefer a polymeric over elemental nutrition formula. If exclusive enteral nutrition could put their disease into remission most patients would consider using it for 8 weeks if they had severe or moderate symptoms.

1. Introduction

Exclusive enteral nutrition (EEN) is a non-pharmacological therapy that is widely used to treat active Crohn's disease (CD) in paediatric centres around the world. EEN involves consuming a liquid nutritional formula as the sole source of nutrition for approximately 6 – 8 weeks whilst excluding all other food and fluids apart from water. Elemental or polymeric formula may be used for EEN as they are equally efficacious [1]. EEN has been shown to be as effective at inducing disease remission in children and adolescents as corticosteroids [2] and is thought to induce disease remission through improved gut mucosal healing [3], alteration of intestinal flora [4] and improved nutrition status [5]. A Cochrane review of randomised controlled trials comparing EEN and corticosteroids has not supported its use with adults [1], however it has been suggested that patients that can adhere to EEN respond favourably [6].

The effectiveness of EEN relies heavily on patient adherence to the treatment. Barriers to treatment adherence may include lack of social support and poor palatability of the enteral formula. Studies involving adults with CD conducted in the 1990s often had high study withdrawal rates (13 – 41%) attributed to unpalatable enteral formula [7–10]. One reason for this may have been that these studies used an elemental formula (EF) provided orally whereas recent research in children has mainly used polymeric formula (PF) administered orally with few withdrawals due to unpalatable enteral formula [11,12]. Also, changes in EF and PF formulations in recent years may have led to enhanced taste characteristics and increased palatability [13].

Elemental formula (comprising amino acids and/or peptides) is often assumed to be less palatable than PF primarily based on its

Abbreviations: EEN, exclusive enteral nutrition; PF, polymeric formula; EF, elemental formula; CD, Crohn's disease; NZ, New Zealand.

* Corresponding author. Department of Paediatrics, University of Otago Christchurch, 2 Riccarton Ave, PO Box 4345, Christchurch 8140, New Zealand. Tel.: +64 3 364 0747; fax: +64 3 378 6355.
E-mail address: andrew.day@otago.ac.nz (A.S. Day).

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distinct smell and flavour. PF (containing whole proteins) may also have a distinct smell and flavour but it is often less marked. The palatability or taste preference of nutritional formula has been examined [14–17] and taste preferences between patients and healthy controls are often similar [18–20]. In patients undergoing cancer treatment, the acceptance of nutritional formula may vary depending on the treatment phase and treatment side effects [16] although this is not the case for all cancer patients [20]. Milk-based supplements are rated more highly than fruit based products in most patient groups and countries [14,20,21]. Few studies however have compared patient preferences or palatability of EF compared with PF [15,17].

The use of PF and EF for EEN has been studied in children with CD [17]. Rodrigues et al. [17] found that use of PF did not increase adherence to EEN treatment. However, children using PF were less likely to need a nasogastric tube inserted to deliver the required volume of PF compared with those receiving EF.

There is a lack of research that compares palatability of PF and EF in adults with CD. The aim of this study was firstly to compare the palatability of PF and EF in a sample of New Zealand adults with CD and secondly to gauge the acceptability of these formulae as a treatment option for active CD instead of corticosteroids.

2. Methods

2.1. Study outline

Patients diagnosed with CD attending gastroenterology outpatient clinics at Christchurch Hospital, Christchurch, New Zealand (NZ) were invited to take part in the study. Patients were told that they were taking part in a taste test to compare the palatability of two different nutritional formulae. Participants were asked to taste 10 ml of an EF (Alitraq, Abbott Nutrition, NZ) and 10 ml of a PF (Ensure Plus, Abbott Nutrition, NZ). Alitraq is a powdered nutritional formula specifically designed for acute gastrointestinal dysfunction/malabsorption. The protein source is a combination of peptides and free amino acids. It was prepared according to the manufacturer's instructions to a concentration of 1 kcal/ml. Ensure Plus (1.5 kcal/ml) was provided in a ready-to-drink form. Both formulae were vanilla flavoured and were served chilled. Participants were blinded to the names and characteristics of the formulae. Participants were provided with each formula in alternating order and given 10 ml of water to rinse their mouth between samples. These products were chosen because they are both vanilla flavoured milk based formulae, whereas other EFs available in NZ are fruit flavoured or unflavoured.

2.2. Questionnaire design

The palatability questions used in this study were based on those used by Makai et al. [15]. This report used a 15 item semantic differential method to assess palatability. The current study used five of the 15 items. These five items were those with the highest factor loadings in the factor analysis performed by Makai et al. The items were chosen from the three palatability categories: compliance, feeling of taste and strength of taste. Participants were asked to rate each drink as 0 = extremely, 1 = slightly, 2 = neither, 3 = slightly, 4 = extremely as follows: (1) difficult to drink/easy to drink, (2) unpleasant flavour/pleasant flavour, (3) poor mouth feel/good mouth feel, (4) weak aftertaste/strong aftertaste, and (5) not acrid/acrid. Two additional questions were also asked in a slightly different format. Participants were asked to indicate whether they preferred one drink over the other and asked to indicate how likely it was that they could drink 200 ml of each drink 6 − 8 times per day on a scale of 0-10.

Participants were also asked a series of questions based on the assumption that using either of the drinks for EEN can greatly improve their symptoms and may put their disease into remission. These questions included whether they would rather use EEN for eight weeks or take a course of corticosteroids for eight weeks. They were also asked if they would consider using EEN for eight weeks if it could put their disease into remission if they had severe, moderate or mild symptoms due to active CD.

2.3. Statistical analysis

Statistical analyses were undertaking utilising R Version 3.0.1 (Vienna, Austria). Differences in formula palatability were determined using the Wilcoxon signed rank test. EEN acceptability was calculated using the Chi-square test. Formula preference was analysed using a paired t-test. Statistical significance was present with $p < 0.05$.

Ethical approval for the study was provided by the University of Otago Ethics Committee.

3. Results

3.1. Participant characteristics

Thirty-five patients agreed, and no patients declined, to take part in the study. The median age of participants was 39 years old (range 19–77 years): 63% were males and 71% ($n = 25$) had previously used prednisone. Only one participant had previously used EEN to treat CD symptoms. Several participants had previously used nutritional formulae to supplement their usual diet.

3.2. Palatability ratings

PF was rated as being easier to drink, had a more pleasant flavour, good mouth feel and was less acrid compared to the EF ($p < 0.001$ for each variable)(Fig. 1). There was no statistically significant difference in aftertaste between the two formulae ($p = 0.09$).

Overall the participants preferred the PF (91%) to the EF (9%) ($p < 0.001$). On a scale of 0 − 10 (0 = very unlikely, 10 = highly likely) participants felt that they would be more likely to be able to drink 200 ml of the PF 6 − 8 times per day (M = 7.3, SD = 2.4) compared to the EF (M = 2.4, SD = 2.4); $t(34) = 8.66$, $p < 0.001$).

3.3. Acceptability of enteral nutrition

Of the 25 participants that had previously used prednisone to treat CD flare ups, 15 (60%) indicated that they would rather use EEN for 8 weeks than take another course of prednisone, 8 (32%) indicated that they would rather use prednisone than EEN for 8 weeks and 2 (8%) were unsure which they would prefer.

All participants were asked if they would consider using EEN if it could put their disease into remission. If they had severe symptoms 97% of participants would consider using EEN but only 43% of participants would consider it if they had mild symptoms (Fig. 2).

4. Discussion

The palatability of enteral formulae has been studied previously [14–17,19,20] but comparisons between PF and EF palatability has not been examined widely [15,17]. For this study a convenience sample was used of CD patients who attended gastroenterology outpatient appointments at Christchurch Hospital, NZ. The study design and questionnaire were both based on that of Makai et al.