Alteration in small bowel motility, gut peptides and patient's symptoms in active Crohn's disease

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INTRODUCTION

Intestinal inflammation in Crohn's disease (CD) is associated with an increase in gut Polypeptide YY (PYY), Glucagon-like peptide 1 (GLP-1) and cholecystokinin (CCK). Patients with CD suffer from postprandial symptoms like fullness and nauseas. These symptoms are believed to be linked to the increase expression of gut peptides and to the alteration in intestinal motility.

Our aim was to investigate the link between gut peptide, small bowel motility and patient symptom response after a standard test meal.

METHODS

Subjects underwent baseline and postprandial MRI scans, symptom questionnaires and blood sampling (GLP-1, PYY, CCK) at intervals for 270 min following a test meal: soup (400g) (chicken or mushroom) (Heinz, Wigan, UK); (kcal) 51, protein 1.5 g, carbohydrate 4.7 g, fat 2.9 g per 100g.

MRI scans were performed using a 1.5T Philips Achieva MRI scanner. Gastric volume, small bowel water content (SBWC) and small bowel motility were assessed using MRI. Patients also underwent a standard contrast enhanced clinical MR enterography (MRE) and the MaRIA score applied to quantify disease activity. All subjects gave informed written consent.
Trial registration number: NCT03052465. Data is presented as mean +/- SEM.

RESULTS

16 CD patients with active small bowel disease (table1) and 20 age-, BMI- and gender-matched healthy volunteers (HV) were recruited (table1). Results are summarised in table 3 and figure1.

CD patients showed a significantly (P≤0.05) slower fasting small bowel motility (50±6a.u.) compared to HV (77±10a.u.). Postprandial SBWC was significantly greater in CD than HV (measured as area under the curve CD: 18452, HV: 13760, P≤0.05). Fasting PYY (CD: 236±16 pg/mL, HV: 118±11 pg/mL, P≤0.0001) and GLP-1 (CD: 50±8 µg/mL HV: 13±3 µg/mL, P≤0.0001) were significantly higher in CD compared to HV with this difference persisting at each time point of the study (P≤0.0001). The meal induced a significant increase (P≤0.0001) in fullness, bloating and abdominal pain scores in patients (28±4mm, 22±3mm and 12±2mm respectively) compared to HV (12±4mm, 3±3mm and 1±2mm respectively). No differences were noted in gastric volumes, CCK concentration and postprandial motility.

CONCLUSIONS

The fasting hypomotility noted in CD may be ascribed to the increased fasting GI peptides. An increase postprandial SBWC and postprandial symptoms has been observed in CD. We plan to replicate these pilot data in a larger cohort with the aim of identifying key biomarkers for pharmacological modulation to improve patient symptoms.

Harvey-Bradshaw Index	4.9±1.3
C-reactive protein	10.0±4.0mg/dl
faecal calprotectin	796.4±173.0µg/g
MaRIA score	21.7±1.8

Table1: table illustrating CD patients' demographics

	Healthy volunteer	CD patients
Age	31±3 years	36±3 years
Gender	10 Females 10 Males	8 Females 8 Males
BMI	24±1 kg/m²	26±1 kg/m²

Table2: table illustrating healthy volunteers and CD patients' demographics

	Healthy volunteers	CD patients	P value
Fasting small bowel motility	77±10a.u.	50±6a.u.	(P≤0.05)
Small bowel water content (AUC)	13760	18452	P≤0.05
Fasting PYY	118±11 pg/mL	236±16 pg/mL	P≤0.0001
Fasting GLP-1	13±3 µg/mL	50±8 µg/mL	P≤0.0001
Fullness	12±4mm	28±4mm	P≤0.0001
Bloating	3±3mm	22±3mm	P≤0.0001
Abdominal pain	1±2mm	12±2mm	P≤0.0001

Table3: table summarising the study results

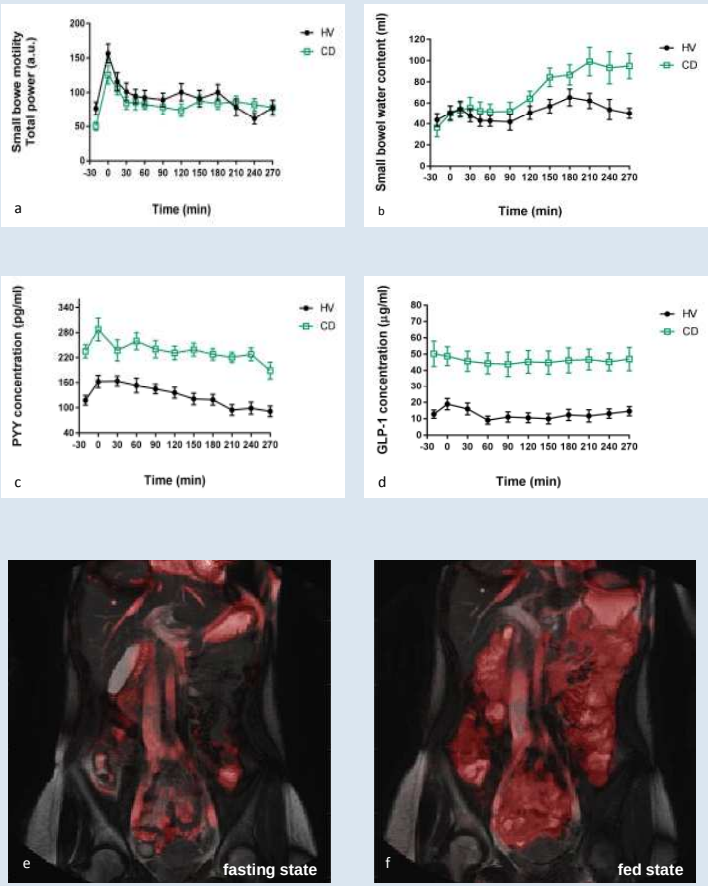

Figure 1: (a) changes in small bowel motility with time in CD patients compared to HV. (b) changes in small bowel water content with time in CD patients compared to HV. (c) changes in PYY levels with time in CD patients compared to HV. (d) changes in GLP-1 levels with time in CD patients compared to HV (e, f) illustrate the fasting and the fed state motility maps of the same subject.