

## Editorial

### AEROPHAGY, BLOATING AND EXCESSIVE FLATUS

"Gaseousness" is a common complaint in Pakistan. The patients with gas syndrome usually present with belching, bloating or abdominal pain and excessive passage of flatus.

Patients with the complaint of belching have a fear of having a chronic gastrointestinal disorder resulting in excessive production of gas. Composition of gastric air is similar to that of atmospheric air (Calloway 1968). Air contained in the food also forms a part of the gas in the stomach. About 2-3 ml of gas is swallowed during the ingestion of food and liquids (Maddock et al., 1949). It is believed that gastric gas increases with gulping the food, drinking through a straw, smoking and having loose dentures. It has also been observed that a large amount of gas enters the stomach during diagnostic and therapeutic procedures like intravenous pycnography and urethral catheterization (Maddock et al., 1949).

Patients with chronic repetitive belching have been shown fluoroscopically to swallow the air before every act of eructation (Alvarez 1940).

Intestinal gas contains mostly nitrogen (Spiro 1970) and variable amounts of carbon dioxide, oxygen, hydrogen and methane. Most of it may be swallowed and some of it diffuses from blood into the lumen of the gut (Bond and Levitt, 1978).

In healthy subjects 24-80% of intestinal gas is nitrogen, 0.1-2.3% oxygen, 6.6-47% hydrogen, 0-26% methane and 4.3-29% carbon dioxide (Levitt 1969).

Measurement of the volume of gastrointestinal gas is necessary in evaluation of symptoms of abdominal pain and bloating. The total abdominal gas volume was found to be 100ml using body plethysmographic technique (Bedell et al., 1956) and 30 to 200 ml (mean 90 ml) using intestinal wash out technique (Levitt 1971).

The intestinal gas volume and composition was not significantly different in patients with abdominal pain and bloating ( $176 \pm 28$  ml)

from that of normal subjects ( $199 \pm 31$  ml). The hydrogen content increases after intake of food (Lasser et al., 1976). In patients with bloating, gas infused in the jejunum more frequently refluxed back into the stomach instead of moving downwards when compared to the control subjects. It is therefore likely that patients with gaseousness may have normal volume of gas in their gut but it does not move forward due to motility disturbances and their pain response to distension is more exaggerated. Similar findings have been reported in radiological studies (Murphy and Calloway, 1972). Ritche (1973) produced pain more consistently by distending a balloon placed in pelvic colon in patients with irritable colon than in normal controls.

In the upper gastrointestinal tract carbon dioxide is produced when hydrochloric acid and fatty acids are neutralized by bicarbonates and in the lower gut by the action of bacteria on the intestinal contents.

All the hydrogen is formed in the colon by the action of bacterial flora on fermented Carbohydrates and Proteins (Levitt 1969). Increased production of hydrogen occurs in patients with Malabsorption Syndrome and lactose intolerance.

Methane is also produced by Colonic bacteria and its production does not need fermentable substances.

The passage of flatus in healthy subjects varies from 200 to 2000 ml per day with a mean of 600 ml/day (Kirk 1949).

Ingestion of food containing unabsorbable Carbohydrates greatly increases the passage of flatus due to the action of bacteria on these foods (Steggerda 1968). If the flatus contains more hydrogen, the excessive passage of gas may be due to aerophagia and if more carbon dioxide, it may be due to malabsorption of fermentable Carbohydrate.

Patients with aerophagia, bloating and excessive passage of flatus should be thoroughly investigated for the presence of an organic pathology. If no pathology is found, they should be reassured that no serious disease is present and repeated belching should be avoided. They should not go to bed immediately after meals to avoid interference with the normal eructation of Stomach gas. A low

fat diet and use of antacids may reduce the production of carbon dioxide from fatty and hydrochloric acid. Food containing non-absorbable Carbohydrates like legumes, some fruits and whole grains should be avoided. Exclusion of Lactose may also be helpful in some cases. Use of antibiotics to reduce microflora may not be helpful (Murphy and Calloway, 1972) as bacteria catabolizes as well as produces hydrogen. Reduction of gas catabolising organism, may increase the bloating and passage of flatus.

#### References

- Alvarez, W.C. An Introduction to Gastroenterology. 3rd ed. New York, Hoeber, 1940.
- Bedell, G. N., Marshall, R., Dubois, A.B. and Harris, J.H. (1956) Measurement of the volume of gas in the gastrointestinal tract. Values in normal subjects and ambulatory patients. *J. Clin. Invest.*, 35:336.
- Bond, J.H. Jr., Engel, R.R. and Levitt, M.D. (1971) Factors influencing pulmonary methane excretion in man. An indirect method of studying the in situ metabolism of the methane-producing colonic bacteria. *J. Exp. Med.*, 133:572.
- Bond, J.H. and Levitt, M.D. (1978) Gaseousness and Intestinal Gas. *Med. Cl. N. Am.*, 6:155.
- Kirk, E. (1949) The quantity and composition of human colonic flatus. *Gastroenterology*, 12:782.
- Lasser, R.B., Levitt, M.D. and Bond, J.H. (1976) Studies of intestinal gas after ingestion of standard meal (abstract). *Gastroenterology*, 70:906.
- Levitt, M.D. (1969) Production and excretion of hydrogen gas in man. *N. Engl. J. Med.*, 281:122.
- Levitt, M.D. (1971) Volume and composition of human intestinal gas determined by means of an intestinal washout technique. *N. Engl. J. Med.*, 284:1394.
- Maddock, W.G., Bell, J.L. and Tremaine, M.J. (1949) Gastrointestinal gas. Observations on belching during anesthesia, operations and pyelography; and rapid passage of gas. *Ann. Surg.*, 130:512.
- Murphy, E.L. and Calloway, D.H. (1972) The effect of antibiotic drugs on the volume and composition of intestinal gas from beans. *Am. J. Dig. Dis.*, 17:639.
- Ritche, J. (1973) Pain from distention of the pelvic colon by inflating a balloon in the irritable colon syndrome. *Gut*, 14:125.
- Spiro, H.M. *Clinical gastroenterology*, New York, MacMillan, 1970, p. 543.
- Steggerda, F.R. (1968) Gastrointestinal gas following food consumption. *Ann. N.Y. Acad. Sci.*, 150:57.