

Knowledge of lactose intolerance among clinicians

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Abstract

Lactose intolerance is associated with the inability to digest significant amounts of lactose. Several conditions have symptoms that overlap with those of lactose intolerance. Thus, it is commonly misdiagnosed. There are established investigation procedures that aid diagnosis which include the lactose challenge and the hydrogen breath tests. However, differential diagnosis remains challenging. We aimed at identifying gaps in knowledge regarding lactose intolerance among medical practitioners using a survey consisting of 15 questions. It was completed by 98 doctors. Most questions were answered correctly by more than half of the participants. There was no significant difference in the frequency of correct answers between the different medical specialists or age of participating doctors. Crucially, one question relating to the hydrogen breath test was answered incorrectly by 85% of the participants. This highlights acceptable knowledge of general issues, but not the diagnostic aspects, of lactose intolerance among doctors.

Introduction

The clinical syndrome of lactose intolerance (LI) is a combination of symptoms that include: abdominal pain, diarrhoea, nausea, flatulence, borborygmi and bloating following the ingestion of lactose containing foods.¹ These common and non-specific symptoms leads to many adults believing that they are lactose intolerant, but without clear clinical confirmation. This set of symptoms is associated with considerable physical and mental health-related issues which result in poor quality of life.^{2,3} Perceived or even professionally diagnosed LI may lead to a restricted diet that excludes lactose-rich dairy products. This may significantly reduce calcium intake,⁴ which has been reported to be associated with an increased risk for osteoporosis and even cardiovascular disease.⁵

LI is commonly misdiagnosed as sever-

al separate diseases present with symptoms that overlap with those it.^{6,7} However, what is specific is that LI results from the inability to digest significant amounts of the milk sugar lactose.⁷⁻⁹ The main cause of the maldigestion of this disaccharide is the inability of affected individual to produce the enzyme lactase.⁸⁻¹⁰ This lack of lactase could be the consequence of lactase non-persistence, where lactase expression decreases during infancy following weaning. This is the most prevalent type of LI, followed by secondary lactose intolerance (acquired lactase deficiency). Conditions such as small bowel bacterial overgrowth, mucosal damage due to coeliac disease or inflammatory bowel disease may lead to a secondary reduced lactose absorption or the down regulation of lactase expression in the small intestine. Lastly there is congenital lactase deficiency resulting from a complete lack of the expression of the protein lactase. This is rare and presents with severe symptoms in new-borns.^{9,11,12}

The key principles of diagnostic strategies centre upon differentiating between these various causes of lactose malabsorption.^{6,7} These include the lactose challenge test and the hydrogen breath test (HBT) both supported by the patient's history and physical examination.² Other diagnostic approaches have been based on genetic tests to detect polymorphisms that are associated with lactase non-persistence. Small intestinal biopsies have also been used to directly measure lactase activity. The detection of substances in stool and urine (*e.g.* lactose: lactulose ratio) has also been used to aid diagnosis. However there is no one definitive diagnostic tool for lactose intolerance¹¹ The commonality of symptoms, the complexity of causes and the regional variability in prevalence of this condition all present major challenges to differential diagnosis. This study aimed at identifying gaps in knowledge about LI among doctors at a secondary care unit.

Materials and Methods

A cross-sectional survey of knowledge of lactose intolerance was conducted in a large teaching hospital in Bahrain in 2015. Participants were approached in person and were selected by convenience sampling. The participant group consisted of specialist doctors and interns (newly qualified doctors that were not assigned to any particular department). The survey was conducted using a questionnaire that consisted of 15 closed questions plus basic questions related to demographics. The 15 unambiguous questions were drafted and assessed for face

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validity by 10 medical students and post-graduates independently. Comments and suggestions were incorporated into the final version. Data from paper questionnaires were transferred to computer directly into IBM SPSS Statistics version 22.0 (IBM, Chicago, IL, USA). Frequencies were tabulated and comparisons of ratios were performed using Chi-squared or Fisher Exact where appropriate. Dichotomized data were further compared using odds ratios (OR). The protocol for this study was reviewed and approved by institutional Research and Ethics Committee of Royal College of Surgeons in Ireland. All participants submitted informed consent forms before completing questionnaires.

Results

106 questionnaires were distributed and 98 completed sheets were returned. This gave a response rate of greater than 90%. Each item promoted either a correct or incorrect response. No one single item was answered correctly by all participants. Most questions were answered correctly by more than half of the participants (Table 1).

The highest number of correct response (78.6%) was for the question “can a patient diagnosed with Cow’s milk protein allergy (CMPA) also presents with lactose intolerance” and the lowest number of correct responses (15%) was for “Is hydrogen breath test highly sensitive for the diagnosis of lactose intolerance?” Overall there was no significant difference in the number of correct answers recorded between: the various groups of health-care professionals, participants who were over the age of 30 years, participants who had practiced medicine for more than five years or if they had previously treated more than two patients with lactose intolerance in their professional career.

There was a highly significant difference ($P=0.002$) in the frequency of correct responses recorded for doctors that had previously treated more than two patients with LI as compared to all doctors who had treated less than two patients with regards to the question “Are intestinal biopsies commonly used to diagnose lactose intolerance?” More than 30% of interns gave the incorrect answer to this question.

Discussion and Conclusions

This study attempted to identify gaps in the knowledge of clinicians. Deficiencies in these areas may be the reasons behind misdiagnosing and inappropriate dietary management.⁶ Although LI is not life threatening, it does affect the quality of life and patient well-being and patients may experi-

ence extreme discomfort caused by futile treatment.¹³

Clinical practice is an important facet in establishing knowledge. This was demonstrated here in that doctors who had previously encountered LI cases knew that invasive techniques are not desirable in the diagnosis of LI.¹² This suggests that the discomfort of the patient, through inappropriate management, is likely to occur as a result of the lack of knowledge and practice on behalf of the doctor.

Less than 50% of the participants were aware that the presence of bacteria in the large intestine causes the fermentation of lactose molecules and the generation of hydrogen gas and that this is associated with the symptoms LI.¹² 15% of the participants knew that the HBT is used as the most sensitive diagnostic tool for lactose intolerance,^{12,14} whilst 85% were unaware of the importance of the production of hydrogen by bacteria in LI. Two questions in the survey that were very closely related: “Do symptoms of lactose intolerance arise as a result of fermentation of lactose in large intestine?” and “Is the hydrogen breath tests highly sensitive test for the diagnosis of lactose intolerance?”. It would be expected that a correct answer for one question should illicit a correct answer for the other and *vice versa*.

The majority of study participants were aware of primary lactose intolerance and that secondary LI is a complication of some gastrointestinal diseases as well as congenital lactose intolerance and the development of same symptoms during the neonatal period.^{12,15} Many respondents showed an

understanding of the need of life-long management strategies to improve the symptoms of lactose intolerance. However, approximately 40% of them were unaware of preventive practice and alternatives including lactase supplements and plant based milk.^{16,17}

Lactose intolerance and milk allergies result in similar symptoms. This was addressed in the question: “are rash and difficulty in breathing considered to be symptoms associated with lactose intolerance?”, which assessed the ability to differentiate between allergy and LI. 41% of respondents reported that rash and difficulty in breathing are symptoms of lactose intolerance. These symptoms are a result of the response of the immune system, whilst LI symptoms are associated predominantly with the presence of undigested lactose disaccharide in the gastrointestinal tract. Failure to recognize this may lead to misdiagnosis.^{18,19}

Diarrhea is one of the most common reasons for people to seek medical advice. Our study showed that 3 out of 10 doctors were unaware of the association of undigested lactose in large intestines and diarrhea. Low levels of knowledge about the symptomology of any condition would make it challenging in terms of differential diagnosis and prognosis.^{12,18}

The highest number of correct answers was in response to the question related to the immunological reaction to cow’s milk. This indicated that the participant group surveyed was reasonably well informed on this issue. Reports have highlighted the problems associated with differentiating between LI and CMPA and the potential for

Table 1. Frequency of correct response to individual questions related to lactose intolerance (LI) as answered by doctors from different disciplines and experience with LI patients. Cow’s milk protein allergy (CMPA).

	Overall (n=98)	Paediatricians (n=26)	Interns (n=25)	Family physicians (n=16)	Others (n=31)	Treated > 2 patients (n=22)
All cases of LI patients will develop symptoms	42 (42.9%)	17 (65.4%)	6 (24.0%)	6 (37.5%)	13 (41.9%)	12 (54.5%)
Can a child develop symptoms of LI during neonatal period?	71 (72.4%)	22 (84.6%)	21 (84.0%)	9 (56.3%)	19 (61.3%)	17 (77.3%)
Do symptoms of LI arise as a result of fermentation?	47 (48.0%)	14 (53.8%)	10 (40.0%)	11 (68.8%)	12 (38.7%)	13 (59.1%)
In all cases of LI patients will develop symptoms of after eating bread	63 (64.3%)	17 (65.4%)	10 (40.0%)	12 (75%)	24 (77.4%)	16 (72.7%)
Rash and shortness of breath are considered symptoms of LI	59 (60.2%)	19 (73.1%)	13 (52.0%)	10 (62.5%)	17 (54.8%)	16 (72.7%)
Does lactose act as a laxative?	64 (65.3%)	19 (73.1%)	14 (56.0%)	6 (37.5%)	25 (80.6%)	13 (59.1%)
Is LI genetically inherited in all affected individuals?	65 (66.3%)	21 (80.8%)	16 (64.0%)	10 (62.5%)	18 (58.1%)	17 (77.3%)
Can lactase supplements be used to improve symptoms of LI?	60 (61.2%)	20 (76.9%)	17 (68.0%)	7 (43.8%)	16 (51.6%)	16 (72.7%)
Can lactase supplements be used to cure LI?	50 (51.0%)	14 (53.8%)	15 (60.0%)	6 (37.5%)	15 (48.4%)	16 (72.7%)
Are intestinal biopsies commonly used to diagnose?	77 (78.6%)	24 (92.3%)	17 (68.0%)	14 (87.5%)	22 (71.0%)	22 (100%)
Is H-breath test highly sensitive?	15 (15.3%)	6 (23.1%)	3 (12.0%)	3 (18.8%)	3 (9.7%)	3 (13.6%)
Are life-long management strategies needed for LI?	72 (73.5%)	18 (69.2%)	19 (76.0%)	14 (87.5%)	21 (67.7%)	15 (68.2%)
Should LI patients avoid milk derived from plants?	56 (57.1%)	15 (57.7%)	11 (44.0%)	10 (62.5%)	20 (64.5%)	14 (63.6%)
Do some GI diseases result in LI?	75 (76.5%)	25 (96.2%)	18 (72.0%)	10 (62.5%)	22 (71.0%)	19 (86.4%)
Can a patient diagnosed with CMPA also presents with LI?	77 (78.6%)	23 (88.5%)	19 (76.0%)	14 (87.5%)	21 (67.7%)	19 (86.4%)

misdiagnosis.²⁰ Crucially, one question relating to the HBT was answered incorrectly by more than 80% of the participants. This highlights acceptable knowledge of general issues, but not the diagnostic aspects, of lactose intolerance among doctors.

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