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Original Research

Eating Behaviours and Prevalence of Gastroesophageal Reflux Disease in Japanese Patients with Type 2 Diabetes Mellitus: The Dogo Study

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Key Messages

The prevalence of gastroesophageal reflux disease (GERD) among patients with diabetes mellitus is high.

No evidence exists regarding the association between eating behavior and GERD among patients with type 2 diabetes mellitus.

Late-night dinner was independently positively associated with the prevalence of GERD among patients with type 2 diabetes mellitus.

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ABSTRACT

Objectives: In the general population, late-night dinner is positively associated with gastroesophageal reflux disease (GERD). No evidence exists regarding the relationship between eating behaviours and GERD in patients with type 2 diabetes mellitus, though the prevalence of GERD in patients with type 2 diabetes is higher than in those without diabetes. We conducted this study to investigate the association between eating behaviours and GERD in Japanese patients with type 2 diabetes.

Methods: The study's subjects were 817 Japanese patients with type 2 diabetes. GERD was defined as being present when a subject had a Quality of Life and Utility Evaluation Survey Technology (QUEST) score of 4 or higher. The assessment of eating behaviour was performed by self-administered questionnaire. Subjects were considered positive for late-night dinner if they answered yes to the question "Do you eat dinner within 2 hours before bedtime at least 3 times per week?"

Results: The prevalence values of GERD, skipping breakfast, bedtime snacking, late-night dinner and fast eating were 32.0%, 13.7%, 27.1%, 28.8%, and 44.4%, respectively. Late-night dinner was independently positively associated with GERD in patients with type 2 diabetes; the adjusted odds ratio was 1.46 (95% CI 1.03 to 2.05). No relationships were found between skipping breakfast, bedtime snacking or fast eating and GERD.

Conclusions: Late-night dinner may be positively associated with GERD in Japanese patients with type 2 diabetes.

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All authors made equal contributions to this work and share first authorship.

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R É S U M É

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Objectifs : Dans la population générale, le souper tardif est associé de manière positive au reflux gastro-œsophagien (RGO) pathologique. Aucune donnée probante n'existe au sujet de la relation entre les comportements alimentaires et le RGO chez les patients atteints du diabète sucré de type 2, pourtant la prévalence du RGO chez les patients atteints du diabète de type 2 est plus élevée que chez les patients non diabétiques. Nous avons mené la présente étude pour examiner l'association entre les comportements alimentaires et le RGO chez des patients japonais atteints du diabète de type 2.

Méthodes : Les 817 sujets de l'étude étaient des patients japonais atteints du diabète de type 2. Le RGO était défini comme étant présent lorsqu'un sujet obtenait un score de 4 ou plus au Quality of Life and Utility Evaluation Survey Technology (QUEST). Le questionnaire auto-administré a permis d'évaluer les comportements alimentaires. On considérait les sujets comme étant positifs en ce qui concerne le souper tardif s'ils répondaient par oui à la question « Prenez-vous votre souper 2 heures avant d'aller au lit 3 fois par semaine? ».

Résultats : Les valeurs de la prévalence du RGO, du déjeuner escamoté, de la collation au coucher, du souper tardif et de l'alimentation rapide étaient respectivement de 32.0%, 13.7%, 27.1%, 28.8%, et 44.4%. Le souper tardif était indépendamment associé de manière positive au RGO chez les patients atteints du diabète de type 2; le ratio d'incidence approché était de 1,46 (IC à 95 %, de 1,03 à 2,05). Aucune relation n'était observée entre le déjeuner escamoté, la collation au coucher ou l'alimentation rapide, et le RGO.

Conclusions : Le souper tardif peut être associé de manière positive au RGO chez les patients japonais atteints du diabète de type 2.

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Introduction

Gastroesophageal reflux disease (GERD) is 1 of the most common gastrointestinal diseases. In the general population, GERD affects health-related quality of life (1). A similar detrimental effect of GERD on health-related quality of life was seen in patients with type 2 diabetes mellitus (2). Several pieces of epidemiologic evidence exist regarding the association between late-night dinner and GERD in the general population. The dinner-to-bedtime interval was significantly inversely associated with GERD in a Japanese study (3), in an Iranian study (4), in an Albanian study (5) and in a Korean study (6). In a Japanese study, dinner just before bedtime was significantly positively associated with GERD (7). In a Turkish study, the frequency of lying down within 2 hours after a meal was positively associated with GERD (8).

Unhealthy nocturnal eating behaviours, including late-night dinner, were positively associated with hyperglycemia and metabolic syndrome in the general population (9,10). The prevalence of GERD in patients with type 2 diabetes was higher than in those without diabetes (11). Furthermore, the association between type 2 diabetes and proton pump inhibitor (PPI) failure was observed in an American study of obese patients with GERD (12). We hypothesized that unhealthy eating behaviours, including late-night dinner, might be related to GERD in patients with type 2 diabetes. However, no evidence exists regarding the association between eating behaviour and GERD in patients with type 2 diabetes. The importance of research into the possible role of dietary behaviour in GERD is emphasized by the fact that dietary behaviour is modifiable. Thus, we aimed to evaluate this association in Japanese patients with type 2 diabetes.

Methods

Study population

The study's subjects consisted of patients in the baseline data of The Dogo Study, which is an ongoing multicentre prospective-cohort study that recruited 1051 Japanese patients with type 2 diabetes. Excluded were 234 patients because of incomplete data concerning the variables under study. Thus, the final analysis sample consisted of 817 patients. The study's protocol conformed to the ethical guidelines of the 1975 Declaration of Helsinki (6th revision,

2008) as reflected in a priori approval by the institutional review board of Ehime University Graduate School of Medicine. In brief, The Dogo Study is a cohort study aimed at evaluating the cross-sectional and prospective association among lifestyle, dietary behaviour, biomarkers, micro- and macrovascular complications, GERD and lower urinary tract syndromes in Japanese patients with diabetes. Our diabetes research group consisted of Ehime University Hospital and its affiliated 12 hospitals in Ehime Prefecture. Of these hospitals, 10 decided to participate in The Dogo Study, thus named because half of our research group hospitals are located near Dogo Hot Spring (the oldest and most famous hot spring in Japan). Collaborating physicians from these 10 hospitals, physicians who specialize in diabetes, were responsible for the diagnoses of type 2 diabetes. Eligible subjects were patients visiting the above-mentioned 10 hospitals for treatment of diabetes. Well-trained staff obtained written informed consent from patients who had been introduced by their attending physicians.

Clinical examination and laboratory measurements

Each participant completed a self-administered questionnaire that addressed diabetes duration, alcohol intake, smoking habit, use of antihypertensive medication, use of antihyperlipidemic medication, height and weight. Each patient's body mass index was calculated as the patient's weight (kg) divided by the square of the patient's height (m²). Current smoking was defined as positive if a study subject reported smoking at least 1 cigarette per day. Current drinking was defined as positive if a study subject reported a habit of consuming alcoholic beverages at the time of the baseline survey, regardless of frequency or amount. Blood pressure was measured by a cuff while the subject was in the sitting position and after a rest period of more than 5 minutes. Hypertension was defined as systolic blood pressure ≥ 140 mm Hg, diastolic blood pressure ≥ 90 mm Hg, or both, or if the patient had received antihypertensive medication. Dyslipidemia was defined as a total serum cholesterol concentration ≥ 5.69 mmol/L, a triglyceride concentration above ≥ 1.69 mmol/L, a high-density lipoprotein-cholesterol concentration < 1.03 mmol/L, or if the patient was already being treated with lipid-lowering agents. Stroke and ischemic heart disease were assessed based on the self-administered questionnaires, medical records and/or admission data. Glycated hemoglobin level was measured at first visit, after receiving informed consent.

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