

toxins and leaky gut.⁴ However, when AST-120 aggregates, it is associated with severe defecation problems and may cause leaky gut owing to the deterioration of the intestinal environment. The AST-120 aggregation in this case occurred 1 month after SGLT-2 inhibitor administration, suggesting an association with SGLT-2 inhibitor. Several SGLT2 inhibitors have reduced the hazard ratio for the combined endpoint of renal and cardiovascular death in CKD patients with or without diabetes.³ The renal benefits of SGLT2 inhibitors are now well established and recommended by diabetes and nephrology societies in many countries.⁵ The most common side effects of SGLT2 inhibitors are urinary tract infections and genital fungal infections, which have a similar reported ratio in both real-world and clinical trials, with no reports of ileus or bacterial translocation, and they can be used safely in the majority of patients.⁶ However, SGLT2 inhibitors excrete glucose in the urine, which can lead to a tendency toward dehydration and the risk of hard stools. Elderly people tend to be more prone to the side effects of medications triggered by dehydration.⁷ BRASH syndrome, which is bradycardia, renal failure, AV node blockade, shock, and hyperkalemia, has been reported in an elderly patient with concomitant use of SGLT2 inhibitors.⁸

In conclusion, dehydration should be noted in elderly patients being treated with SGLT2 inhibitors. When AST-120 and SGLT2 inhibitors are used in combination in the treatment of CKD, dehydration may cause leaky gut owing to the fecal clumps of AST-120.

Disclosure statement

The author declares no conflict of interest.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

RESEARCH STUDIES

Association between muscle weakness and cap-grasping patterns when opening plastic bottles in community-dwelling older adults

Dear Editor,

Age-related muscle weakness is associated with several health risks, including falls, fractures, hospitalization, and death.¹ Therefore, early screening for and awareness of age-related muscle weakness are necessary.

In daily life, opening a plastic bottle can be a screening for muscle strength, and cutoffs have been given.^{2,3} However, the movements involved in opening a plastic bottle are diverse, and the patterns may reflect muscle strength, which may help screen for weaknesses. This study investigated the relationship between muscle weakness and cap-grasping patterns during the opening of a plastic bottle. We hypothesized that muscle weakness would result in a characteristic grasp pattern.

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How to cite this article: Nagamine T. Sepsis associated with sodium glucose co-transporter 2 inhibitor in an elderly patient with chronic kidney disease. *Geriatr. Gerontol. Int.* 2023;23:757–758. <https://doi.org/10.1111/ggi.14659>

A cross-sectional analysis on 336 community-dwelling older adults aged 65 years and older (mean age 74.6 ± 5.9 years, 58.3% women) was conducted using the Tarumizu Study 2021. The Tarumizu Study was a cohort of community-based health checkups conducted in Tarumizu, Kagoshima, Japan.⁴ Residents who (1) had a history of neurological diseases such as stroke ($n = 17$), dementia ($n = 3$), and other brain diseases ($n = 7$); (2) were unable to open plastic bottle caps ($n = 1$); and (3) had missing data ($n = 31$) were excluded. The Ethics Committee (ref. no. 170351) approved this study. Participants were asked to open an unopened plastic bottle (Oi Ocha 525 mL, ITO EN; <https://www.itoen-global.com>) in the usual way while seated. This action was observed, and the cap-gripping patterns during

Table 1 Associations of muscle weakness and cap-grasping patterns when opening plastic bottles

Grasping patterns	Crude		Adjusted model	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Lateral pinch grip	1 (ref)		1 (ref)	
Inverted power grip	2.51 (1.35–4.67)	<0.01	2.70 (1.38–5.28)	<0.01
Normal power grip	0.94 (0.30–2.94)	0.92	0.88 (0.26–3.00)	0.83
Three fingers pinch grip	1.68 (0.50–5.66)	0.41	2.37 (0.65–8.68)	0.19

Note: Significant P-values are indicated in bold. Adjusted model: age, sex, body mass index, number of medications, exercise habits, and chronic diseases (hypertension, diabetes, and angina pectoris).

Abbreviations: 95% CI, 95% confidence interval; OR, odds ratio.

opening were classified into four patterns⁵: lateral pinch grip (digits 1 and 2), inverted power grip (palm), normal power grip (palm), and three-finger pinch grip (digits 1, 2, and 3) (Figure S1). Muscle strength was determined by measuring the maximum grip strength of the dominant hand, using the first quartile value. Muscle weakness was defined as strength that was below the cutoff value (27.8 kg for men and 18.4 kg for women). Logistic regression analysis was performed with muscle weakness as the dependent variable; grip pattern as the independent variable; and age, sex, body mass index, number of medications, exercise habits, and chronic diseases (hypertension, diabetes, and angina pectoris) as covariates.

The cap-grasping pattern was lateral pinch grip in 248 (73.8%) participants, inverted power grip in 55 (16.4%), normal power grip in 20 (6.0%), and three-finger pinch grip in 13 (3.9%) (Table S1). Grip strength in the four grasping patterns was higher in the lateral pinch grip than in the inverted power grip, even after post-hoc analysis (Table S2). Logistic regression analysis showed that the inverted power grip was significantly associated with muscle weakness compared with the lateral pinch grip (odds ratio: 2.70, 95% confidence interval: 1.38–5.28). No significant association with muscle weakness was found for the normal power grip and three-finger pinch grip compared with the lateral pinch grip (Table 1). Similar results were also obtained when analyzing only those instances where the bottle caps were opened with the dominant hand ($n = 274$) (data not shown).

Opening a plastic bottle with an inverted power grip is associated with muscle weakness in community-dwelling older adults. Previous studies have shown that grip strength decreases with age, which makes it difficult to open a plastic bottle.³

Grip strength is an essential indicator of physical function and is related to health status and daily-living activities in older people.⁶ Although grip strength tends to decline with age, interventions such as appropriate exercise and maintenance of nutritional status can improve it or prevent decline.⁷ In cases of severe functional decline, however, improvements in physical function may not be achievable, underscoring the importance of early assessment and intervention.⁸ The results in this study suggest that muscle weakness can be screened for earlier by looking at grasping patterns than by looking at difficulty in opening plastic bottles.

This study has some limitations. Firstly, the generalizability of the results to other types of plastic bottles and containers remains unclear. Further, the study design does not allow for the establishment of a causal relationship. Nevertheless, this study provides evidence of the potential utility of the rapidly expanding global market for plastic bottles as a screening tool for muscle weakness. Overall, this study showed that muscle weakness can be easily detected by assessing opening movements.

Author contributions

DS: Conceptualization, formal analysis, investigation, methodology, and writing – original draft. HM: Conceptualization, funding acquisition, investigation, methodology, project administration, supervision, and writing – review and editing. MT and SA: Investigation and writing – review and editing. CT: Conceptualization, funding acquisition, resources, and writing – review and editing. MK and TT: Conceptualization, funding acquisition, and writing – review and editing.

Funding information

HM reports research funding from ITO EN Ltd for this study.

Data availability statement

Research data are not shared.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Table S1. Characteristics of participants according to the presence of muscle weakness

Table S2. Sex and grip strength characteristics in grasping patterns

Figure S1. Grasping patterns when opening plastic bottles.

How to cite this article: Shiratsuchi D, Makizako H, Tateishi M, et al. Association between muscle weakness and cap-grasping patterns when opening plastic bottles in community-dwelling older adults. *Geriatr. Gerontol. Int.* 2023;23:758–760. <https://doi.org/10.1111/ggi.14655>

Prevalence of aspiration pneumonitis not requiring antibiotics among patients with aspiration pneumonia

Dear Editor,

Antimicrobial resistance is a global health threat. Given the positive correlation between the prevalence of antibiotic-resistant bacteria and increasing antibiotic treatment,¹ indications for antibiotic use should be carefully determined. The percentage of older persons among the global population continues to increase owing to increasing life expectancy.² Aspiration pneumonia is a common mechanism of pneumonia development in older patients with community-acquired pneumonia and is characterized by patients having various swallowing disorders, including mis-swallowing and neuromuscular disorders, aging deterioration, and dementia.³ It is classified as chemical pneumonitis (aspiration pneumonitis), an inflammatory reaction to irritative gastric contents, and bacterial pneumonia (aspiration pneumonia with a bacterial source).⁴ Aspiration pneumonitis can be categorized into the Mendelson syndrome, characterized by massive gastric juice aspiration, and mild pneumonitis, characterized by oral secretion aspiration. The latter case appears to be mainly caused by aspiration pneumonitis in older people because cases presenting the diffuse lung infiltration observed in the Mendelson syndrome are rare in clinical practice.⁵

Most cases of aspiration pneumonitis improve spontaneously without antibiotic treatment.⁶ However, no specific diagnostic criteria for aspiration pneumonitis have been established, and its incidence among patients with aspiration risks and pneumonia remains unknown. A prospective study to clarify its prevalence would be ethically challenging because antibiotics should not be administered when aspiration pneumonitis is suspected. Occasionally, respiratory physicians in our hospital do not use antibiotics to treat some patients with pneumonia believed to have aspiration pneumonitis. Given this current standard of care in our hospital, we retrospectively assessed the incidence of aspiration pneumonitis and baseline characteristics of patients whose pneumonia improved and persisted without antibiotics for aspiration pneumonia.

Overall, 52 patients (≥75 years old) who completed treatment for community-onset aspiration pneumonia, remained hospitalized for rehabilitation, and subsequently developed recurrent pneumonia from January 2018 to December 2021 were included. Pneumonia was diagnosed based on clinical symptoms and chest radiographs. Patients were classified into two groups: those who

were treated with antibiotics within 7 days of recurrent pneumonia diagnosis and those who were not. Among patients who did not receive antibiotics, pneumonia that spontaneously improved in 7 days after its diagnosis was defined as “aspiration pneumonitis” not requiring antibiotics. The proportion of aspiration pneumonitis was calculated, and patients’ baseline characteristics were compared between patients whose pneumonia improved and those whose pneumonia persisted without antibiotics.

The study protocol was approved by the institutional ethics committee of our institution (approval number 2463; approval date 26 January, 2023). Informed consent was waived by the committee because of the retrospective design of the study.

Of the 52 patients (median age: 88 years, interquartile range: 86–91 years), 13 were not treated with antibiotics within 1 day of pneumonia diagnosis, whereas 39 received antibiotics immediately. Of the 13 patients who did not receive antibiotics, pneumonia improved in 4 (31%) without the use of antibiotics (Figure 1). These cases likely fit the diagnosis of aspiration pneumonitis. Baseline characteristics did not differ significantly between patients whose pneumonia improved and patients whose pneumonia persisted without antibiotics.

This analysis indicates that aspiration pneumonitis may occur in approximately 30% of the patients with a risk of aspiration and pneumonia. Possibly, a greater number of patients had aspiration pneumonitis because some patients receiving antibiotic therapy had the potential to improve without antibiotics. However, the analysis did not reveal which patient characteristics would be useful for distinguishing aspiration pneumonitis from aspiration pneumonia with a bacterial source among those with aspiration pneumonia. It was confirmed that a certain amount of aspiration pneumonitis exists among aspiration pneumonia, and the indication of antibiotics should be carefully determined. Furthermore, the presence of pneumonia with spontaneous regression is assumed to include not only typical aspiration pneumonitis caused by sterile materials but also diffuse aspiration bronchiolitis or mild aspiration pneumonia. Thus, diffuse aspiration bronchiolitis or mild aspiration pneumonia not requiring antibiotics needs to be further studied. A large-scale study is required to validate our results and determine the predictive