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Quantifying differences in pill swallow patterns in adults

Catherine A. Sullivan
New York Medical College, csulliva6@nymc.edu

Luis F. Riquelme
New York Medical College, luis_riquelme@nymc.edu

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QUANTIFYING DIFFERENCES IN PILL SWALLOWING PATTERNS IN ADULTS

Luis F. Riquelme, Ph.D., CCC-SLP, BCS-S^{1,2} & Catherine A. Sullivan, B.A.²

1. NewYork-Presbyterian Brooklyn Methodist Hospital, Brooklyn, New York, USA; 2. New York Medical College, Valhalla, New York, USA

INTRODUCTION Difficulty swallowing pills has become an increasing complaint among patients visiting swallow evaluation centers across the globe. Deficits are reported in healthy individuals as well as in clinical populations. In the USA, 40% of 679 persons responding to a survey reported to have difficulties swallowing pills (Business Wire, 2009). In efforts to facilitate pill intake, several modifications have been reported: use of liquid formulations, crushing tablet, opening capsule, whole pill mixed with food or via feeding tube (Cornish, 2005). A survey of 40 nurses revealed the most common modification was to use applesauce (Riquelme et al., 2009). In some cases, crushing the medication was also used. Current literature focuses mostly on esophageal transit of pills in adults and on how to feed pills to children. Little attention has been given to the physiology responsible for pill swallowing.

PURPOSE

The purpose of this prospective study was to identify patterns employed by adults during self-administration of pills and determine differences by medium used (i.e., water, semisolid).

METHODS

Participants included 42 adults, 28 female, referred for Videofluoroscopy (VFSS). Age range was 86-27, mean: 66 years. Fluoroscopy data was captured on the Kay Pentax DSW. The contrast material employed was a barium-filled capsule with EZ-HD powder. Each participant completed two trials with water and two with applesauce. A total of 129 swallows were analyzed: 71 pill + thin liquid and 58 pill + applesauce.

Swallow Pattern	Description	Frequency
Lingual Hesitation	Atypical lingual forward-backward motion; 9 often occurs on briefly delayed initiation of lingual motion	9
Lingual Pumping	Rhythmic forward-backward lingual motion (3+ cycles)	3
Cohesive Swallow	Bolus (medium) and pill remain together and are swallowed in unison	74
Separation: Anterior or Posterior	Bolus (medium) and pill are separated for swallows. Separation may occur in the anterior or posterior oral cavity	9 (anterior), 6 (posterior)
Ineffective Transport	Pill not swallowed; removed anteriorly	9
Head Back	Hyperextended neck, chin facing upward for extended period of time	13
Head Back Jerk-Motion	Quick head back/neck hyperextension, usually to assist in posterior oral transport	12

Clearing	Description	Frequency
On Primary Swallow	Pill transported to cervical esophagus on first swallow	90
On Secondary Swallow	Pill transported to cervical esophagus on subsequent swallows	33

REFERENCES

- Carnaby-Mann, G. & Crary, M. (2005). Pill swallowing by adults with dysphagia. *Arch Otolaryngol Head Neck Surg*, 131(11), 970-975.
- Chisaka, H., Matsushima, Y., Wada, F., Saeki, S., & Hachisuka, K. (2006). Dynamics of capsule swallowing by healthy young men and capsule transit time from the mouth to the stomach. *Dysphagia*, 21(4), 275-279.
- Chisaka, H., Matsushima, Y., Wada, F., Saeki, S., & Hachisuka, K. (2006). Is taking medicine with jelly a better method for dysphagic patients than taking medicine with water for medicine esophageal transport? *Dysphagia*, 21(4), 306.
- Cornish, P.L. (2005). Avoid the crush: Hazards of medication administration in patients with dysphagia or a feeding tube. *Canadian Medical Association Journal*, 172(7), 871-872.
- Kaplan, B.J., Steiger, R.A., Pope, J., Marsh, A., Sharp, M., & Crawford, S.G. (2010). Successful treatment of pill-swallowing difficulties with head posture practice. *Paediatrics & Child Health*, 15(5), e1-e5.
- McLeod, A.D., Vella-Brincat, J., & Frampton, C. (2003). Swallowing capsules. *Palliative Medicine*, 17(6), 559-560.
- Schiele, J.T., Schneider, H., Quinzler, R., Reich, G., & Haefeli, W.E. (2014). Two techniques to make swallowing pills easier. *Annals of Family Medicine*, 12(6), 550-552.
- Stagnitti, M. (2004). The top five outpatient prescription drugs ranked by total expense for children, adults, and the elderly. *Medical Expenditure Panel Survey*, 180.
- Study finds pills coated in innovative Med-eez shell significantly easier to swallow. (2009). Retrieved from: <https://www.businesswire.com/news/home/20090113006374/en/Study-Finds-Pills-Coated-Innovative-Med-eez-Shell>
- Wilson C, O'Mahony B, Farrell T, Friend B, Taylor D. Modern tablet film coatings and influence on ease of swallowing. (2003). Retrieved July 22, 2019 from: <https://www.colorcon.com/products-formulation/all-products/22-opadry-ii/79-aaps-2003-modern-tablet-film-coatings-and-influence-on-ease-of-swallowing>
- Yamamoto, S., Taniguchi, H., Hayashi, H., Hori, K., Tsujimura, T., Nakamura, Y., Sato, H., & Inoue, M. (2014). How to tablet properties influence swallowing behaviours? *Journal of Pharmacy and Pharmacology*, 66(1), 32-39.

RESULTS

- All analyses were conducted using IBM SPSS Statistics: Version 26 (2019).
- Chi-Square analyses were conducted to determine relationships between variables. Specifically, we explored whether bolus medium was associated with swallow pattern and whether bolus medium and swallow patterns were associated with swallow outcome.
- Data collected:
 - Within thin liquid trials, **36.4%** participants changed swallow pattern
 - Within semisolid trials, **27.3%** participants changed swallow pattern
 - Between thin liquid & semisolid trials, **63%** participants changed swallow pattern
 - Between all trial types, **18.2%** participants changed swallow pattern
- Bolus medium was found to be significantly associated with swallow pattern (p=0.016)
 - Individuals were more likely to demonstrate **anterior separation** during thin liquid trials
 - Individuals were more likely to demonstrate **multiple patterns** during semisolid trials
- Swallow pattern was found to be associated with swallow outcome (p<0.0001)
 - A **cohesive swallow pattern** more often resulted in adequate pill transport
 - Multiple patterns** or **ineffective pill transport** more often resulted in inadequate pill transport (i.e., subsequent swallows, regurgitation)

DISCUSSION

- Swallow patterns differed within and between participants for both thin liquid and semi-solid trials.
- Of note, there was statistical significance to support higher usage of anterior pill separation for thin liquid trials and the use of multiple swallow patterns for transporting a pill with a semi-solid.
- Data also supported improved pill transport when a cohesive swallow pattern was used.
- Further work is needed in this area to identify differences in swallow pathophysiology in the presence and absence of a pill.
- This combined data may serve to explore compensatory strategies to improve pill swallow efficiency and overall safety.



For further information, contact lfr9002@nyp.org

NewYork-Presbyterian
Brooklyn Methodist Hospital



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