Summary of Supportive Research for Use of the ISO Swallowing Exercise Device in Dysphagia Therapy

The ISO Swallowing exercise device was designed as a more convenient, less strenuous alternative to the Shaker exercise for dysphagia. Like the Shaker exercise, it targets the suprahyoid muscles under the chin. The Suprahyoid muscles consist of: the Geniohyoid, Mylohyoid, Stylohyoid, and the Digastric. These muscles primarily assist in elevating the hyoid bone and opening the upper esophageal sphincter (UES) during the swallow. The Mylohyoid also functions to elevate the tongue and the floor of the oral cavity.

In 2015 Kraaijenga conducted a study using a Swallowing Exercise Aid device in connection with three exercises: Chin Tuck Against Resistance (CTAR), Jaw Opening Against Resistance (JOAR) and effortful swallow with resistance. Ten male subjects with a median age of 60, completed the exercises 3x/day for 6 weeks. Both CTAR and JOAR exercises were completed both isometrically (static hold for 60 seconds 3 times with a 60 second rest in between holds) and isokinetically (30 times with a 1 second contraction). They measured outcomes with a dynamometer (IOPI), MRI and VFSS, for the following: maximum chin tuck and jaw opening strength, maximum tongue strength and endurance, suprahyoid mass, and hyoid bone displacement. The authors concluded, "Outcomes measured following 6 weeks of exercise indicated a significant increase in all of the above along with increased mouth opening and no pain." (1).

The Shaker Exercise was developed by Dr. Reza Shaker, a gastroenterologist at the Medical College of Wisconsin. The exercise is completed by having the patient lie in a supine position and lift his head, so that he can look at his toes. The force of gravity provides the resistance. The purpose of this exercise is to strengthen the suprahyoid muscles to improve UES opening during the swallow.

In a study conducted in the year 2002, by Dr. Shaker, 27 out of 27 patients who were tube-fed before the study and performed the Shaker exercise three times a day for six weeks, were able to tolerate a soft p.o. diet by the end of the six weeks of treatment. Etiology and duration of dysphagia did not affect the outcome (11).

In 2009, seven institutions participated in a clinical trial to compare the Shaker exercise with traditional therapy. Each patient received a modified barium swallow study pre- and post-therapy. The authors concluded that although there were several improvements in the traditional therapy group, there was significantly less aspiration post-therapy in patients in the Shaker group (12).
In the year 2000 a study was conducted to evaluate surface EMG activities in the suprathyroid, infrathyroid, and sternocleidomastoid muscles groups during the Shaker exercise. The findings suggested that all three muscle groups were fatigued during the Shaker exercise (9). A similar study in 2008 indicated that the Shaker exercise fatigued all three muscle groups (10).

In 2013 Watts used surface EMG to compare the Shaker exercise to a jaw opening exercise. For the jaw opening exercise, he had participants open the jaw for 10 seconds against the resistance of a chin brace secured against the upper torso. He measured the activation of the geniohyoid, mylohyoid, and anterior digastric muscles. He concluded that activation in these muscles was significantly greater when participants performed the jaw opening exercise than when participants performed the head-lift (Shaker) exercise. This study indicates that the jaw opening exercise may be even more effective than the Shaker exercise and it supports further research in this area (7).

A study conducted in 2012 by Satoko Wada investigated the effects of the jaw opening exercise. The exercise consisted of participants opening the jaw to its maximum and maintaining it for 10 seconds, with 5 repetitions and 2 sets daily for 4 weeks. Pre- and post-therapy videofluoroscopy swallow studies were used to measure effectiveness. Significant improvements were observed in the upward movement of the hyoid bone, the amount of upper esophageal opening, and the time of pharyngeal passage. Pharyngeal residue also decreased in some subjects (8).

In a 2013 study by Wai Lam Yoon, the surface EMG activity of the suprathyroid muscles was compared between the Chin Tuck Against Resistance (CTAR) exercise and the Shaker exercise. During the CTAR exercise, the participant tucked the chin against the resistance of an inflatable rubber ball while in a seated position. There were 40 participants in this study, 20 males and 20 females. The results showed significantly greater maximum SEMG values during the Chin Tuck Against Resistance isokinetic and isometric exercises than during the equivalent Shaker exercises. The authors concluded that Chin Tuck Against Resistance exercises appear to be effective in exercising the suprathyoid muscles and therapeutic effects could be comparable to those of the Shaker exercise. They also found that clients reported the Chin Tuck Against Resistance exercises were less strenuous than the Shaker exercise and these exercises therefore have the potential for greater compliance by patients than the Shaker exercise (5).

The Effortful Swallow Maneuver is a dysphagia treatment exercise for increasing tongue base retraction and pharyngeal pressure during the swallow for reduced residue in the valleculae (2). To complete an Effortful Swallow Maneuver, squeeze hard with all of your muscles as you swallow.
Research of the Effortful Swallow Maneuver in healthy normal adults indicated significantly higher oral pressures, decreased oral residue and increased hyoid excursion and elevation during the effortful swallows (3). Research has also shown increased duration of pharyngeal pressure and increased duration of upper esophageal sphincter (UES) relaxation (4).

In 2012, Feng et al conducted a study of the relationship between atrophy of the Geniohyoid muscle, which is one of the suprahyoid muscles, and the occurrence of aspiration in older adults. The study authors concluded, "In summary, using head and neck CT scans, we found that decreased CSA (cross-sectional area) of GH (Geniohyoid) muscle was associated with aging and was greater in aspirators compared with nonaspirators in older men.... These findings may indicate an association between GH muscle atrophy and decreased swallowing safety and aspiration in older adults and warrants further investigation." (13).

References:


12. Jeri A. Logemann; Alfred Rademaker; Barbara Roa Pauloski; Amy Kelly; Carrie Stangl-McBreen; Jodi Antinoja; Barbara Grande; Julie Farquharson; Mark Kern; et al. (Profiled Authors: Jerilyn A Logemann; Barbara Roa Pauloski; Alfred W Rademaker) A randomized study comparing the Shaker exercise with traditional therapy: A preliminary study. Dysphagia. 2009;24(4):403-411.