

Resistance Exercise and Submental Contour: A Narrative Review

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Abstract

Background. Neck "toning" exercises are widely promoted for sagging necks, but their evidence base is scattered across cosmetic dermatology, exercise physiology, muscle rehabilitation, sleep medicine and facial plastic surgery. The central clinical question is not whether exercise can remove skin or fat, but whether repeated resistance can strengthen the submental musculature and alter structural support beneath the jaw.

Aim. To assess whether resistance exercise of the neck can improve submental contour, and by which mechanisms: muscle hypertrophy and tone, hyoid elevation, skin mechanics, blood flow or systemic exercise effects.

Findings. Ball-assisted chin tuck against resistance and resisted jaw opening strongly activate the suprahyoid muscles, and controlled training studies show measurable gains in muscle activation and, in some protocols, thickness within approximately 4–8 weeks. One uncontrolled study found rapid jaw-opening exercise raised the resting hyoid by about 4.5 mm in older adults. Independently, the hyoid descends with age, a low hyoid makes the cervicomental angle more obtuse, and the submental skin is tethered to the hyoid by the hyoplatysmal ligament. Surgical elevation of the hyoid sharpens the angle and improves patient-rated neck appearance. Small facial-exercise studies also report firmer neck skin and increased digastric muscle size. Local cosmetic outcomes from a ball-based neck programme have not yet been directly tested.

Conclusion. A mechanistic chain from resistance exercise to stronger submental musculature, to altered hyoid support, to potentially improved neck contour is plausible and partly evidenced. The best-supported element is muscular training. The cosmetic effect remains unmeasured directly. A ball-based programme should therefore be positioned as targeted resistance exercise for submental and cervical support, with appearance benefits treated as a testable hypothesis rather than an established clinical outcome.

1. Introduction

The sagging neck is a multi-layer problem: skin laxity, submental fat, platysmal banding and a descending hyoid all blunt the chin-to-neck contour. Exercise can plausibly act on only some of these layers, so the question is which ones, by how much, and with what evidence.

The target contour. Surgeons still benchmark against Ellenbogen and Karlin's 1980 criteria: a distinct lower jaw border, a subhyoid depression, a visible thyroid cartilage, a visible anterior sternocleidomastoid border, and a cervicomental angle (CMA) of 105–120° [1]. A 2025 crowdsourcing study broadly confirmed these features but placed the ideal CMA nearer 100° [2].

What changes with age.

Skin and dermis: thinning and loss of elasticity; exercise cannot directly reverse photoageing, but may alter dermal mechanics (Section 6).

Suprahyoid muscles: the geniohyoid shows age-related atrophy and fatty infiltration on CT [6], and suprahyoid cross-sectional area falls with age on ultrasound [7].

Hyoid position: the hyoid descends with age on CT and cephalometry [3–5], and a low hyoid makes the CMA more obtuse [3].

Platysma: bands form as the cervical fascia weakens and the medial platysma borders separate; they are typically treated by relaxing the muscle with neurotoxin [36].

The question. Can resistance exercise of the neck — chin tucks against resistance, head lifts, resisted jaw opening, isometric tensing — improve submental contour? And through which mechanisms: muscle hypertrophy and tone, hyoid elevation, skin mechanics, blood flow, or systemic exercise effects?

Why the answer sits in two literatures. The cosmetic facial-exercise literature measures appearance but rarely isolates the submental region. The muscle-physiology and rehabilitation literature trains the same suprahyoid muscles with much more precise measures such as surface electromyography, ultrasound and hyoid displacement, but generally does not assess cosmetic appearance. This review bridges those evidence streams.

2. Methods

This is a narrative, not systematic, review. Searches ran in September 2026 across PubMed, PubMed Central, publisher sites and Google Scholar-indexed sources.

Search themes: facial exercise and rejuvenation; chin tuck against resistance; ball-based resistance exercise; Shaker head-lift exercise; jaw-opening exercise; suprahyoid muscle thickness and activation; resting hyoid position; hyoid ageing; cervicomenal angle; hyoplatysmal ligament and hyoid suspension; oropharyngeal and myofunctional exercise; exercise and skin ageing; platysma bands.

Inclusion: human studies reporting a measured outcome (sEMG, ultrasound, radiography, Cutometer/Myoton, standardised photography or validated appearance scales), plus key anatomical and surgical papers linking hyoid position to neck contour. The two additional ToneBall positions are presented as product-specific exercise concepts because no direct trials of those exact geometries were identified in the source review.

Grading: each study is described by design, sample size and outcome so readers can weigh it. No risk-of-bias scoring or meta-analysis was done.

Limits: English-language sources only; several studies were read at abstract level where full text was not accessible.

3. Evidence: facial and neck exercise, skin and muscle

Small uncontrolled studies consistently show firmer skin and larger facial muscles after 8–20 weeks of exercise, including the digastric under the jaw. Reviews rate the evidence as low, and one controlled study found no effect.

Study	Design, n	Programme	Neck-relevant finding
Kim et al. 2016 [27]	Pre–post, 16 women aged 35–58	Facial resistance programme (KFRP), 8 weeks	Cutometer: firmness and elasticity improved at all sites including the neck; re-deformation did not improve over the platysma

Study	Design, n	Programme	Neck-relevant finding
Hwang et al. 2018 [29]	Pre–post, 50 women	Pao device, 30 s twice daily, 8 weeks	Ultrasound: digastric and zygomaticus major cross-sectional area increased; jawline and lower-face surface measures changed on laser scan
Alam et al. 2018 [28]	Pre–post, 16 completers, women 40–65	Face yoga, 20 weeks	Blinded raters: cheek fullness improved; neck not assessed; programme founder was a co-author
Çelik Güzel et al. 2025 [30]	Pre–post, 12 women, mean age 50	Intensive face yoga, 8 weeks	MyotonPRO: tone and stiffness fell in expression muscles; the digastric showed the largest gains in tone, stiffness and elasticity
De Vos et al. 2013 [32]	Controlled	4 exercises claimed to reduce wrinkles and sagging	No effect could be concluded

Reviews. Van Borsel et al. (2014) found the evidence insufficient to judge effectiveness [31]. A 2021 Korean systematic review of 11 studies found gains in skin mechanics of the face and neck, muscle thickness and cheek fullness, but rated the evidence low [33].

What this adds. Two independent methods — ultrasound [29] and myotonometry [30] — show the digastric responds to training. The neck skin itself became firmer in one study [27]. None used a control group, none measured the CMA.

4. Evidence: suprahyoid resistance exercise

Resistance exercise reliably loads the suprahyoid muscles, can improve activation over repeated training, and in several protocols increases muscle thickness within 4–8 weeks. One small study also raised the resting hyoid by about 4.5 mm. This is the strongest objectively measured part of the evidence base relevant to a ball-based submental exercise product.

4.1 Which exercises load the submental muscles

Shaker head-lift: lying supine and lifting the head to look toward the feet. It provides a useful comparator because it recruits the same broad anterior-neck region, but it also heavily recruits the sternocleidomastoid and can fatigue that muscle before the deeper submental target [13, 14, 20].

Ball-assisted chin tuck against resistance: seated, with the chin gently compressing a ball positioned beneath the jaw. Surface EMG studies show strong suprahyoid recruitment and, compared with head-lift exercise, a more selective loading pattern with less relative sternocleidomastoid activity [15–18]. This is the closest published analogue to the core ToneBall exercise.

Low-cost devices: chin tucks with a \$5.89 cosmetic "neckline slimmer" produced roughly twice the suprahyoid activation of a head lift, with less sternocleidomastoid activity, in 20 healthy adults [17].

Older adults: in 90 healthy people aged 65–90, sustained ball-assisted chin-tuck resistance produced higher normalised activation and fatigue in the suprahyoids than in the sternocleidomastoid, regardless of the instructional method [18].

Jaw opening against resistance: isometric or rapid maximal jaw opening trains the same submental muscle group because the suprahyoids contribute to jaw opening [20, 21]. It provides a useful independent line of evidence that the tissues beneath the jaw can adapt to repeated loading.

4.2 Two additional ToneBall resistance positions

Lateral ball-supported isometric. The ball is positioned between the side of the neck/jaw and the shoulder, with the same-side hand supporting the outer surface of the ball. The head gently inclines toward the ball while the torso remains upright. This creates a controlled lateral isometric load through the cervical musculature. It is best regarded as an adjunct exercise for neck support and control rather than a proven suprahyoid-specific exercise, because the source literature reviewed here did not directly test this exact position.



Figure 1. Proposed ToneBall lateral ball-supported isometric. Product-specific exercise concept; this exact position has not been directly evaluated in the studies cited in this review.

Rotated chin-on-ball compression. The ball remains supported at the side of the neck/upper shoulder while the head is rotated approximately 90 degrees and lifted slightly so that the underside of the chin rests on the top of the ball. A gentle downward compression can then be applied without forcing end-range rotation. Mechanistically, this is intended to combine chin compression with a rotated head position and may alter the distribution of load across the anterior and lateral neck. It should be treated as a product-development extension of the established resistance principle, not as a clinically validated variation.



Figure 2. Proposed ToneBall rotated chin-on-ball compression. Product-specific variation derived from the resistance-exercise rationale; direct clinical evidence for this exact position is not yet available.

Clinical interpretation of the two additions. Neither new position should be represented as independently proven to tighten skin, reduce submental fat or elevate the hyoid. Their purpose is to broaden controlled resistance around the neck while preserving the central principle of progressive muscular loading. The strongest published evidence remains for direct submental resistance and resisted jaw-opening exercises.

4.3 Muscle size after training

Study	Design, n	Programme	Outcome
Jaw-opening vs head-lift pilot, Medicine 2020 [22]	Pilot clinical cohort	Jaw-opening or head-lift exercise, 6 weeks	Digastric and mylohyoid thickness increased in both groups; hyoid moved further forward and up
Kinesiology-tape resistive swallowing, Medicine 2023 [23]	RCT, community-dwelling older adults	50 resisted swallows/day, 6 weeks	Taped group gained more suprahyoid activation and digastric and mylohyoid thickness than placebo
Park et al. 2024, Sci Rep [19]	RCT, 34 older adults	Multi-directional vs vertical CTAR, 5 days/week, 6 weeks	Multi-directional CTAR gave greater tongue pressure, tongue thickness and suprahyoid activation
Park et al. 2025/26, J Oral Rehabil [24]	Placebo-controlled RCT, older adults with oral hypofunction	Neck-collar resistance device	Greater suprahyoid activation and thickness than placebo; additional functional improvement in the original clinical study

4.4 Resting hyoid position after training

Matsubara et al. (2018) trained 21 community-dwelling adults (mean age 74) with rapid maximal jaw opening: 3 sets of 20, twice daily, for 4 weeks [20]. On videofluoroscopy, the resting hyoid's vertical distance below the Camper plane fell from 70.7 ± 9.9 mm to 66.2 ± 9.0 mm ($p = 0.01$, $d = 0.48$). That is a rise of about 4.5 mm. The horizontal resting position did not change significantly.

The authors attribute the rise to suprahyoid hypertrophy and improved tone, especially of the mylohyoid [20]. An earlier isometric jaw-opening study from the same group also elevated the hyoid during swallowing [21]. There was no control group, so ageing, measurement drift or posture cannot be excluded.

4.5 Supporting evidence from sleep medicine

Oropharyngeal exercise for obstructive sleep apnoea offers a further, controlled signal. In a randomised trial of 31 patients, 3 months of daily exercise reduced neck circumference from 39.6 to 38.5 cm with no change in BMI; the sham group did not change [25]. A later RCT adding exercise to CPAP also found a significant fall in neck circumference [37]. A meta-analysis confirms myofunctional therapy reduces apnoea severity [26]. None of these studies measured contour.

5. Evidence: hyoid position, ageing and the cervicomentale angle

The hyoid descends with age, a low hyoid blunts the cervicomentale angle, and the skin and platysma are tethered to the hyoid by a ligament. Surgery that lifts the hyoid measurably sharpens the angle.

5.1 The hyoid descends with age

CT, 282 scans: AI-assisted 3D analysis found the hyoid moves downward with age in both sexes, and forward and down with rising BMI. The authors conclude this makes the CMA more obtuse [3].

Cephalometry, 459 patients aged 22–84: the hyoid shifted lower, backward and rotated with age, most markedly in men over 60 [4].

CT, 80 adults: hyoid–mandible distance was larger in older than younger adults [5].

Muscle substrate: the geniohyoid, which helps lift and stabilise the hyoid, atrophies and infiltrates with fat in older adults [6]; suprahyoid cross-sectional area falls with age [7]. Matsubara et al. link the low resting hyoid of old age to this atrophy plus ligament laxity [20].

5.2 The hyoid anchors the skin of the neck angle

Anatomical dissection describes a hyoplatysmal ligament running from the body of the hyoid to the platysma and its overlying dermis [10]. Le Louarn argues this ligament creates and stabilises the acute cervicomandibular angle [10]. A related cervicomentale suspensory ligament fixes platysma and dermis to deeper hyoid-linked structures and sits at the first neck crease [11].

This matters for the exercise hypothesis. If skin is tethered to the hyoid, lifting the hyoid should tension the submental skin — not just add volume under it.

5.3 Lifting the hyoid sharpens the angle

Langsdon et al.: facelift patients with a low hyoid, large submental fat pad and obtuse angle respond poorly to standard platysma surgery. A submental muscle suspension technique gave about 2 cm more cervical-point depth than a traditional facelift in 141 patients [8].

Nizam & Branman 2018: re-establishing the hyoplatysmal ligament by hyoid suspension produced an 11.37° better CMA than controls ($p = 0.0051$) [9].

Nieri et al. 2026: in a prospective controlled cohort, hyoid myotomy and suspension for sleep apnoea reduced the CMA at 6 weeks. Patient-rated FACE-Q scores for the area under the chin rose by 17.2 Rasch units and for the neck by 10.95; septoplasty controls did not change [12].

Together these show hyoid position causally affects neck contour. What they cannot show is whether the few millimetres achievable by exercise are enough to be seen.

6. Other mechanisms: skin, blood flow and the platysma

Whole-body exercise improves skin structure through circulating factors, which may add to any local effect. Local blood flow is plausible but unmeasured in the neck. The platysma is a special case where strengthening may not help.

6.1 Systemic exercise and skin

Resistance training: 16 weeks in 56 sedentary middle-aged women improved skin elasticity and upper dermal structure; only resistance training also increased dermal thickness. The proposed pathway is lower circulating CCL28 and higher dermal biglycan [34].

Endurance training: 12 weeks of cycling in sedentary older adults altered skin structure toward a younger profile. The mechanism runs through muscle AMPK and exercise-induced IL-15 acting on skin mitochondria [35].

These are whole-body effects. They suggest a neck programme embedded in general resistance training may do more for skin than neck exercise alone.

6.2 Local blood flow

No study found here measured neck skin or muscle perfusion after neck exercise. Contracting muscle raises local flow, and exercise in general raises skin blood flow and temperature. Any contribution of local flow to neck appearance remains a hypothesis.

6.3 The platysma: strengthen with care

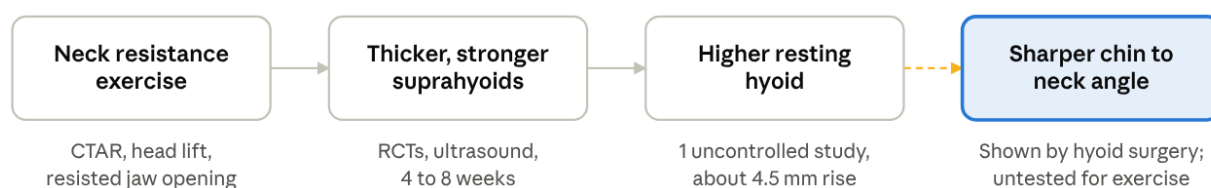
Platysma bands are attributed to fascial weakening that lets the medial platysma borders bulge, and are treated by relaxing the muscle with neurotoxin [36]. The platysma also acts to depress and gather neck skin toward the hyoid [11].

Exercises that strongly recruit the platysma — grimacing, pulling the mouth corners down — could plausibly accentuate existing bands. This is inferred from how bands are treated, not tested. Chin-tuck and jaw-opening exercises target the deeper suprahyoids instead [15–17, 20]. Kim et al. also found the neck skin over the platysma was the one region whose re-deformation did not improve [27].

7. Discussion

The evidence supports a specific, testable chain: resistance exercise thickens the suprahyoid muscles, which can raise the resting hyoid, which — through its ligamentous tether to the skin — should sharpen the cervicomental angle. The first two links are measured; the last has only been shown with surgery.

The first two links are measured; the last, to appearance, is not



Dashed link: plausible through the hyoplatysmal ligament, not yet measured after exercise

proposed causal chain · evidence per link

Each arrow is backed by different kinds of evidence. Muscle thickening has randomised trials [19, 22–24]. Hyoid elevation rests on one uncontrolled study [20]. The link from hyoid height to contour comes from surgical series and a controlled cohort [8, 9, 12], plus anatomy [10, 11].

7.1 Is the effect big enough to see?

Exercise raised the hyoid about 4.5 mm in older adults [20]. Hyoid surgery moves it further and changed the CMA by about 11° versus controls [9]. Age-related descent in older men is of the order of 10 mm on cephalometry [4]. So exercise may recover a meaningful fraction of age-related descent, but probably less than surgery. Whether 4–5 mm translates into a visible angle change is the central unknown.

7.2 Why skin and fat still limit the result

Where submental fat is large or skin excess marked, a higher hyoid will tension skin less effectively. Langsdon's poor responders had exactly this combination [8]. Exercise is therefore most plausible for mild laxity with a low hyoid, and least for heavy fat pads or deep skin folds.

7.3 Limitations of the evidence

The only direct hyoid-position result is uncontrolled, $n = 21$, 4 weeks [20].

Muscle-thickness trials are mainly in older adults or clinical rehabilitation cohorts rather than people seeking cosmetic change [22–24].

Cosmetic studies are small, mostly uncontrolled, and one has a conflict of interest [28].

No study measures neck appearance after neck exercise.

Radiographic hyoid measures are posture-sensitive; head position must be standardised.

7.4 Proposed study

A randomised, assessor-blinded trial would close the gap:

Participants: adults 45–70 with mild–moderate submental laxity, stratified by BMI.

Arms: CTAR plus rapid jaw opening versus sham (e.g. neck stretching), 12 weeks.

Primary outcome: CMA on standardised lateral photographs in natural head position.

Mechanism outcomes: submental ultrasound (digastric and mylohyoid thickness; resting hyoid–mandible distance), sEMG activation.

Secondary outcomes: FACE-Q Neck and Area Under the Chin [12], Cutometer over the submental skin [27].

Follow-up: 12 weeks after training stops, to test durability.

Ultrasound can measure hyoid–mandible distance without radiation, making repeated measures practical.

8. Conclusion

Neck resistance exercise is a biologically plausible, low-cost approach for improving muscular support beneath the jaw, but its cosmetic effect on submental sagging has not been measured directly. The case rests on three connected observations: resistance exercise can strengthen and thicken the suprahyoid muscles; a lower hyoid is associated with a more obtuse neck angle; and the skin is anatomically tethered to hyoid-linked structures. One small study shows exercise can raise the resting hyoid.

Practically, direct ball-assisted chin compression and resisted or rapid jaw opening have the strongest mechanistic rationale for the submental region. The lateral ball-supported and rotated chin-on-ball positions proposed here are reasonable adjuncts for a broader neck-resistance programme, but they require product-specific validation. Platysma-dominant grimacing exercises are less well supported. General resistance training may add skin benefits through systemic pathways. A controlled trial measuring the cervicomental angle alongside ultrasound of muscle and hyoid position would settle the central cosmetic question.

Product-specific note. The evidence cited below supports the underlying anatomy, muscle activation and training mechanisms. It should not be read as direct clinical validation of ToneBall or of the two new exercise positions shown in Figures 1–2.

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