

Letter to the Editor

‘Saving the neck’ during smartphone use: Fad or future

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To the Editor,

We have read the article by Udomboonyanupap et al. [1] with much interest. Our point of concern is two-fold; first, we believe that neck comfort should be the top priority while evaluating the use of smartphones and their effects on body postures. Second, we recommend some strategies to protect neck, and keep it in comfortable position - e.g. the use of cervical collars, preference of lying posture and the use of app reminders.

This particular study recommended using a bed which enables trunk angle of around 120° to 140° for smartphone users. For the legs; this may be comfortable, however, for the neck and upper back, the problem of discomfort still needs attention. Neck pain is the leading cause of musculoskeletal problems in smartphone users, hence neck discipline becomes the top priority [2]. A systematic review revealed that the prevalence of musculoskeletal complaints among mobile device users ranged from 1.0% to 67.8%, with neck complaints showing the highest prevalence rates, ranging from 17.3% to 67.8% [2]. Hence, neck pain has to be the main focus of correct posture for smartphone users.

It is pertinent to mention that with the advance of modern technology, the use of handheld electronic devices has become indispensable in daily life [3].

Their excessive use and subsequent effects on neck posture are an emerging public health problem in this decade, not only affecting children and young adults but also causing significant morbidity and exacerbation of chronic neck pain secondary to underlying cervical degenerative diseases in older age groups. Excessive smartphone use is a risk factor for cervical disc degeneration, whereby prolonged cervical spine flexion possibly leads to cervical muscle fatigue and increases the load on the cervical intervertebral discs, and then accelerates the degeneration of the cervical intervertebral discs. It was found that subjects maintained head flexion of 33–45° (50th percentile angle) when using the smartphone, and that text messaging while sitting caused the largest head flexion when compared with that of other task conditions including web browsing and video watching [4]. In other words, prolonged and/or frequent smartphone overuse with the head and neck in a hyperflexed posture might be an independent and important risk factor for the prevalence of neck pain, cervical disc degeneration and spondylosis [4, 5]. Moreover, the use of two hands (simultaneously) causes greater neck flexion, while the use of one hand only results in asymmetric cervical posture [2].

Functionally, cervical spine has the largest range of motion in the spinal column, and it is also unique in its kinematics with about 90° of flexion, 70° of extension, 45° of lateral flexion, and 90° of rotation [6]. Various checklists for occupational and ergonomic risk factors have listed neck flexion angles higher

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than 20° as being high risk for neck disorders, and higher than 45° being harmful [7]. Therefore, it is of great importance to prevent excessive neck flexion posture when using smartphones, and it should always be kept less than 20°.

Now the point of concern is how to restrict excessive neck flexion in smartphone users. Cervical collars might be recommended to prevent prolonged neck flexion, thus protecting the cervical spine. As it is well-known, soft cervical collars are used as reminders (postural cue/biofeedback) that the subject should not flex the neck too much [8]. It immobilizes the neck movements poorly but neck flexion beyond 45° - which is the worst posture leading to neck pain/stiffness and degenerative cascade - cannot be possible. Prevention is always an easier, cheaper and better option than treatment (i.e. medical treatment, physical therapy and surgical options for long-term consequences). Selecting the type of cervical collar (prefabricated or custom made) to prevent neck hyperflexion during prolonged smartphone use needs further research. Although its use may not be risk-free (i.e. prolonged usage leading to muscle weakness), the profit of an orthosis reminding, protecting and saving the neck will be more beneficial than its possible negative effects. As the marketable products may cause discomfort due to inappropriate fit; designing a custom-built, lightweight and aesthetic collar may be useful. In this regard, a customized cervical collar has been exhibited to significantly reduce the neck angle during smartphone use [3]. Needless to say, it is noteworthy that the first caution should actually be to decrease the unnecessary use of smart phones. However, if, for any reason, it cannot be possible due to professional reasons, head and neck posture should be kept at a near neutral position by placing the top of the display (i.e. smartphone) at or slightly below eye level [9]. Otherwise, the aforementioned suggestions would be considered.

There could also be a role for posture reminding apps [10] and reminders, or use of eyeglasses with a 90° prism [11] or smart cervical collars while upright and better to lay down when possible. There are no studies to show the effects of lying posture and neck pain, but if the neck angle is kept between 10–15° (using a pillow), then it can support neck muscles and help to reduce neck flexion and prevent upper trapezius fatigue, which is a common cause of the neck pain cascade.

The most commonly affected body regions identified/studied as regards the interaction with smartphones are the neck, upper back and upper limbs

(in different regions). As for the upper limbs, all of their divisions are practically/somehow affected - i.e. shoulder, arm, forearm, wrist, hand and fingers; the thumb being the most common [12].

In conclusion, we see a critical need to promote healthy ways of smartphone use to prevent axial and appendicular dysfunction, which might lead to musculoskeletal overuse syndromes or cervical disc degeneration especially in younger adults. Hence, we need to develop some strategies to maintain healthy neck positioning to reduce neck pain and consecutive degenerative cascade, which may reach alarmingly high levels in the decades to come. There is emerging need to develop guidelines for safe use of smart phones, in which ergonomists and musculoskeletal physicians need to be involved. Needless to say, further longitudinal studies (e.g. on the influence of cervical soft collars or neck reminders to prevent neck hyperflexion) on the whole body (especially neck, shoulder, wrist and hands) ergonomics and their long-term implications on musculoskeletal disorders in smart phone users are awaited.

Conflict of interest

None to report.

References

- [1] Udombonyanupap S, Boess S, Ribeiro Monteiro L, Vink P. Comfort and discomfort during smartphone use on a bed. *Work*. 2021;68(s1):S245-S249.
- [2] Xie Y, Szeto G, Dai J. Prevalence and risk factors associated with musculoskeletal complaints among users of mobile handheld devices: a systematic review. *Appl Ergon*. 2017;59(PtA):132-42.
- [3] Kuo YR, Fang JJ, Wu CT, Lin RM, Su PF, Lin CL. Analysis of a customized cervical collar to improve neck posture during smartphone usage: a comparative study in healthy subjects. *Eur Spine J*. 2019;28(8):1793-803.
- [4] Lee S, Kang H, Shin G. Head flexion angle while using a smartphone. *Ergonomics*. 2015;58(2):220-6.
- [5] Zhuang L, Wang L, Xu D, Wang Z, Liang R. Association between excessive smartphone use and cervical disc degeneration in young patients suffering from chronic neck pain. *J Orthop Sci*. 2021;26(1):110-5.
- [6] Swartz EE, Floyd RT, Cendoma M. Cervical spine functional anatomy and the biomechanics of injury due to compressive loading. *J Athl Train*. 2005;40(3):155-61.
- [7] Yoo IG, Lee J, Jung MY, Yang NY. Neck and shoulder muscle activation in farm workers performing simulated orchard work with and without neck support. *Work*. 2011;40(4):385-91.
- [8] Pomerantz F, Durand E. Spinal orthotics. In: Frontera WR, Delisa JA (eds). *Physical Medicine & Rehabilitation Principles*.

- ples and Practice. Wolters Kluwer/Lippincott Williams and Wilkins, PA. 2012.
- [9] ANSI/HFES. ANSI/HFES 100-2007 Human factors engineering of computer workstation. Santa Monica, CA: Human Factors and Ergonomics Society, 2007.
- [10] Abadiyan F, Hadadnezhad M, Khosrokiani, Letafatkar A, Akhshik H. Adding a smartphone app to global postural re-education to improve neck pain, posture, quality of life, and endurance in people with nonspecific neck pain: a randomized controlled trial. *Trials*. 2021;22(1):274.
- [11] Tang M, Sommerich CM, Lavender SA. An investigation of an ergonomics intervention to affect neck biomechanics and pain associated with smartphone use. *Work*. 2021;69(1):127-39.
- [12] Vitorino DF, Correia WFM, Marçal MA. Musculoskeletal ergonomic implications in smartphone users: A systematic review. In: Black NL, Neumann WP, Noy I. (eds) *Proceedings of the 21st Congress of the International Ergonomics Association (IEA 2021)*. IEA 2021. *Lecture Notes in Networks and Systems*, 2021. Vol 222. Springer, Cham.