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Effects of Smartphone Use on Craniovertebral Angle and Cranial Rotation Angle

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Objective
Time to spend smartphones is increasing especially for young population who handles various kinds of tasks with smartphones. As increasing the convenience, side effects are considered with the prolonged smartphone use. The aim of this study is to find out the effects of smartphone use on posture of cervical spine and upper trunk in university students and to arouse their attention.

Methods
99 students (mean age 24.7± 1.6 years) who attend medical college and do not have any present illness or past history of musculoskeletal diseases were enrolled. They participated in a survey to get information about the current pattern of smartphone use. For the posture, craniovertebral angle (CVA) and cranial rotation angle (CRA) were measured in standing position (Figure 1). Pearson correlation analysis was done for the relation between time of smartphone use and posture. Participants are divided into two groups according to the hours of smartphone use (Group A, < 4 hours a day; Group B, ≥ 4 hours a day), and independent T-test was done to analyze the difference between two groups.

Results
Average hours of smartphone use was 4.23 ± 2.28 hours a day. 16% of the participants were concluded into a category of low risk and 9 % of high risk by the self diagnose scale of smartphone dependency. Hours of smartophone use had a negative correlation with CVA, on the other hand, no statistically significant correlation with CRA (Table 1). Between two groups, Group B had smaller angle of CVA than Group A with statistical significance. CRA tends to be larger in Group B, but had no significance (Table 2).

Conclusion
72.4% of the university students are using smartphones more than 4 hours a day, which is larger population compared with 54.8% in general population. It is needed to control the smartphone use because prolonged use of smartphone can lead the forward head posture, especially increase the flexion of lower cervical spine observed as decreased CVA.

Table 1. Correlation between hours of smartphone use and posture

		CVA	CRA
Hours of Smartphone use	Pearson correlation	-0.223	0.187
	p-value	0.027	0.065

CVA, Craniovertebral angle; CRA, cranial rotation angle

Table 2. Difference of Posture between Two Groups

Independent T-test	Group A (N=28))	Group B (N=70)	p-value
CVA	55.51	52.48	0.038
CRA	141.73	144.07	0.139

Group A, <4 hours a day; Group B, ≥ 4 hours a day; CVA, craniovertebral angle; CRA, cranial rotation angle

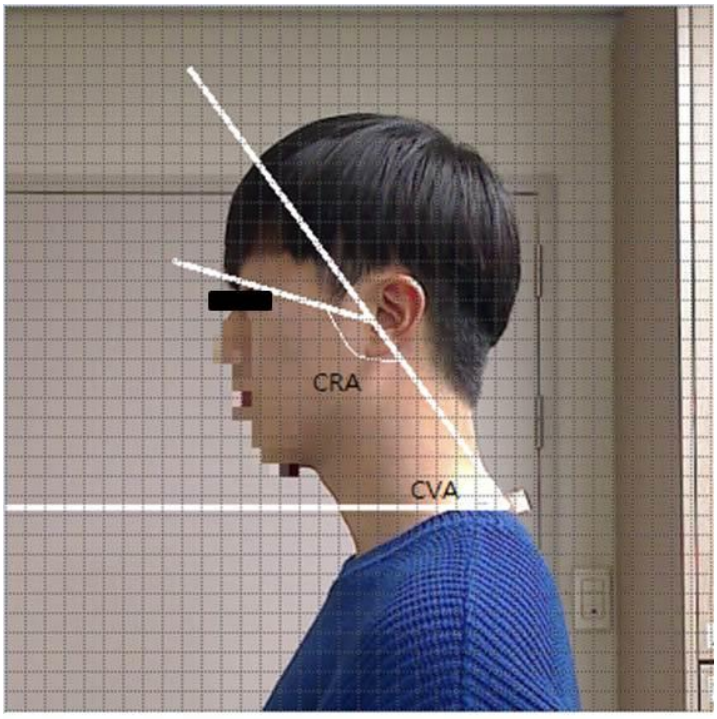

Fig 1. Craniovertebral angle (CVA) and Cranial rotation angle (CRA)