

# Cervical Spine Symptoms due to Smartphone Use at University

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## Abstract

**Introduction:** The use of smartphones has increased dramatically in the world. In Togo, users are estimated at nearly 7 million (89%) of the population in 2019. Globally, users are spending at least 4 hours per day on smartphones. Smartphone usage forces neck-bending postures, causing musculoskeletal disorders. The objective of this study was to evaluate knowledge and also adverse effects of bad postures on the cervical spine of smartphone users in young people. **Materials and methods:** This is a prospective analytic study realized on students (18 - 45 years old) from Lomé and Kara universities over a period of 3 months (May 1 to July 30, 2021). They filled out a form directly or electronically through the social networks (WhatsApp) of the targeted universities. To be included participants must have used smartphone at least 6 months ago. The main parameters self-reported were age, duration of smartphone use, daily time of use, and occurrence of cervical spinal symptoms. We used Pearson's coefficient ( $r$ ) for correlations. **Results:** A total of 431 participants with an average age 23.6 years were enrolled. Almost all (98.8%) had a smartphone for an average of 3.6 years. Most of participants (55%) reported that their cervical postures were bad during smartphone use (66.8%). The main symptoms reported were neck pain (48.7%) and cervical radiculopathy (27.8%). The frequency of neck pain was correlated with the daily use time of smartphones. These disorders motivated medical consultation in 18% (7% specialized). All the patients who consulted for neck pain were using smartphones for more than 8 hours per day. Imaging found degenerative lesions in 23.7%. **Conclusion:** The smartphones, although essential, are responsible for spinal degenerative pathologies caused by bad postures. The daily usage time is the main factor on which action should be taken to minimize the harmful effects on the spine, as the adoption of correct positions seems difficult to apply.

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## Keywords

Smartphones, Postures, Musculoskeletal Disorders, Togo

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### 1. Introduction

The technology has significantly changed human life. The advent of smartphones is the perfect illustration and has become almost essential for all daily tasks. Over the past decade, the use of smartphones has increased dramatically. According to a survey carried out in January 2020, there were approximately 5.19 billion mobile phone users, representing 67% of the world's population [1]. In Togo, users are estimated at nearly 7 million (89%) of the population in 2019 [2]. Globally, users are spending at least 4 hours per day on smartphones [3]. Smartphone usage forces neck-bending postures, which causes stress to neck structures [4] [5]. This chronic anti-physiological posture has adverse effects, such as musculoskeletal disorders [6]. While the adverse effects of smartphones on the mental health of users are well known [7], data are missing in Africa. The objective of this study was to evaluate knowledge and also adverse effects of bad postures on the cervical spine of smartphone users in young people.

### 2. Materials and Methods

This is a prospective analytic study conducted on students (18 - 45 years old) from Lomé and Kara universities over a period of 3 months (May 1 to July 30, 2021). They filled out a form directly or electronically through the social networks (WhatsApp) of the targeted universities. To be included participants must have used smartphone at least 6 months ago. The main parameters self-reported were age, duration of smartphone use, daily time of use, and occurrence of cervical spinal symptoms. We used Pearson's coefficient ( $r$ ) for correlations.

### 3. Results

A total of 431 people agreed to participate in the study. The rate of form reception was respectively 31% for physical and 22.4% for electronic. The average age of the participants was 23.6 years. There was a male predominance (70.1%). Students represented 80.7% of respondents. Almost all (98.8%) had a smartphone and 28.3% of them also had a laptop. The complementary use of a computer for at least one hour per day was 90.7%. They have been using smartphones for an average of 3.6 years. The number of participants was increasing gradually as increase in daily use time (**Table 1**). This use of smartphones had increased during COVID 19 pandemic as remote teaching was mandatory (85.8%). Learning online (50%) and personal research (68.6%) were secondary reasons for using smartphones compared to communication and social networks (100%). Most of respondents (63.8%) declared themselves incapable of living without the telephone. The financial cost of smartphone use was exorbitant (**Figure 1**). Most of participants (55%) reported

that their cervical postures were bad during smartphone use and can generate musculoskeletal symptoms (66.8%). The main symptoms reported are summarized in **Table 2**. The frequency of neck pain was correlated with the daily use time of smartphones (**Figure 2**). These disorders motivated medical consultation in 18% (7% specialized). All the patients who consulted for neck pain were using smartphones for more than 8 hours per day. Imaging had been prescribed in 5.3% of cases: X-ray (82.7%), CT (4.6%), and MRI (0.7%). The main results were cervical kyphosis (14.2%), degenerative lesions (23.7%), and disc herniation (0.9%). No patient was operated. Regarding the prevention of these disorders, only 9.7% declared being able to reduce the time of daily use of the telephone.

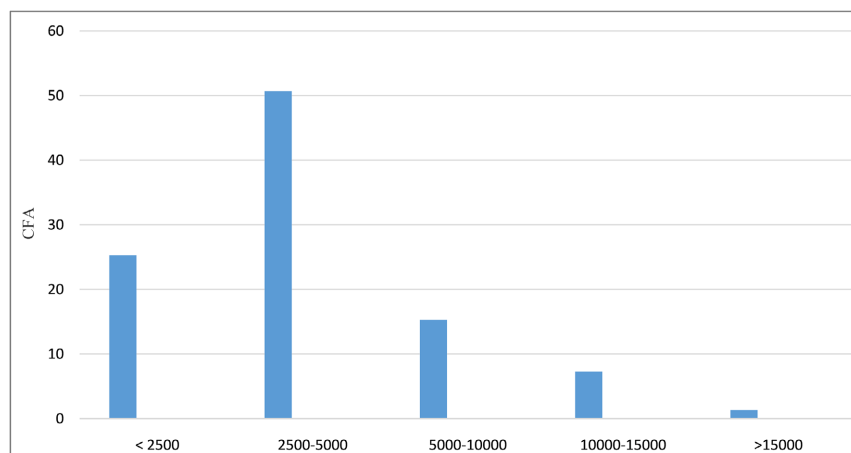
**Table 1.** Daily smartphone use time by respondents.

	Numbers	Percentages (%)
1 - 2 h	32	7.4
3 - 4h	107	24.8
5 - 8 h	118	27.4
More than 8 h	174	40.4
Total	431	100

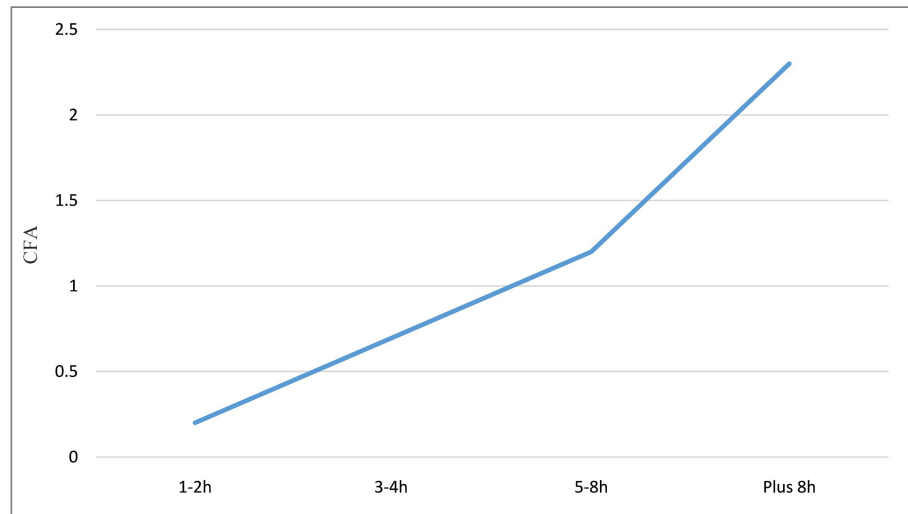
**Table 2.** Symptoms reported by respondents.

	Numbers	Percentages (%)
Neck pain*	210	48.7
Cervical radiculopathy**	120	27.8
Neuralgia***	76	17.6
No complains	25	5.8
Back pain	83	19.2
Lombosciatica	13	3

\*pain in or around spine beneath head; \*\*pain radiates from the neck into the shoulder, arm, and hand. According to at least one cervical root territory; \*\*\*pain along the course of a nerve, especially in the head or face.



**Figure 1.** Monthly spending on smartphones.



**Figure 2.** Annual episode of neck pain according to smartphone time use.

#### 4. Discussion

The importance of postures in the genesis of spinal pathologies is widely documented [8] [9]. According to biomechanics, the load in cervical spine is rising from 5 kg in the neutral position to 27 kg at 60° flexion [10]. When using a smartphone, the posture often adopted is head down, chin pointing towards the chest and the neck in flexion increases the constraints on the cervical spine with the consequence of musculoskeletal disorders such as neck pain, headaches and stress [6] [8] [11]-[13]. The smartphone has become an inseparable tool for social life and also educational technology, allowing access to all kinds of information. Its use is surging among all social categories. Togo is not exempt as almost all students have phones with a significant daily use time. This increased use like an addiction had adverse effects on health. If the telephones are not incriminated in the occurrence of pathologies such as brain tumours, it's proven with a high level of evidence that they play roles in spinal pathologies. The incrimination of smartphones is reinforced, in our view, by the fact that despite a high percentage of cervical symptoms reported in our study, very few of the respondents complained of low back pain, whereas generally the frequency of low back pain is higher [14]-[16]. In addition, the frequency and intensity of spinal symptoms are correlated with the daily use time of smartphones. This correlation is largely found by several authors [6] [17] [18]. The same signs can appear with intensive computer use, but in our study, very few students had laptops.

The imaging of symptoms noted early degenerative lesions regarding their youngness (23.7%). This testifies objectively that poor postures using telephones have adverse repercussions on the spine. In addition, the use of smartphones had high cost compared to student income. But according to the respondents, it is a necessary evil. Indeed, because of online teaching, digitization of documents has made much knowledge available online, and the smartphone remains the easiest way to access knowledge compared to computers which are more expensive especially for

student in Africa. This need increased during COVID pandemic with mandatory online teaching, even communication and social networks remain the main reasons for phone use. It is possible therefore, regarding the reasons, to reduce daily time spent on phones by using them usefully. Indeed, to prevent these musculoskeletal disorders, it is important to use phone properly and allow the spinal structures to rest. The users must find the right balance between necessity and harmfulness. For example, do not “cradle” a telephone between the shoulder and ear when using it.

## 5. Limitations

Some limitations must be acknowledged. The sample is likely biased because individuals who chose to participate may differ significantly from those who did not, affecting the generalizability of the findings to the broader population. Data was collected through self-report, which can be inaccurate due to factors such as social desirability bias. The three-month observation period may be insufficient to observe long-term effects, changes, or the full scope of any observed phenomena.

## 6. Conclusion

The smartphones, although essential, are responsible for spinal degenerative pathologies caused by bad postures. The daily usage time is the main factor on which action should be taken to minimize the harmful effects on the spine, as adoption of correct positions seems difficult to apply.

## Authors' Contributions

**Essossinam Kpélao:** substantial contributions to conception and design, acquisition of data, drafting the article and revising it critically for important intellectual content; final approval of the version to be published. **Thierry Alihonou:** substantial contributions to conception and design, acquisition of data, and final approval of the version to be published. **Ab El Kader Moumouni:** drafting the article and revising it critically for important intellectual content; final approval of the version to be published. **Agbéko K. Doléagbéno:** drafting the article and revising it critically for important intellectual content; final approval of the version to be published. **Kodjo H. M. Ahanogbé:** final approval of the version to be published. **Komi Egu:** final approval of the version to be published. **Adjagbebou Yawovi Michel:** drafting the article and revising it critically for important intellectual content; final approval of the version to be published. **Kossi K. Ségbédji:** final approval of the version to be published. **Solim Bakondé:** final approval of the version to be published. **Dzidoula Lawson:** substantial contributions to conception and design, acquisition of data, and final approval of the version to be published. **Abdoulaye Hima-Maïga:** drafting the article and revising it critically for important intellectual content; final approval of the version to be published. **Anthony K. Békéti:** drafting the article and revising it critically for important intellectual con-

tent; final approval of the version to be published. All authors read and agreed to the final version of this manuscript and equally contributed to its content and management.

### Ethical Considerations

The Bioethics Committee approved this study for Health Research from the Togo Ministry of Health (“Comité de Bioéthique pour la Recherche en Santé (CBRS)”, Ref No: 0101/2016/MS/CAB/DGS/DPLET/CBRS). Data were anonymized to ensure confidentiality. Written informed consent was obtained from all participants before enrollment.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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