

Prevalence of Text Neck Syndrome in Children and Adolescents Using Smartphones in Erbil City

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Abstract

Background: Neck and shoulder pain is a common health issue among children and teenagers in developing countries. **Objective:** This study aimed to identify the prevalence of text neck syndrome and its associated factors in children and adolescents. **Materials and Methods:** In this cross-sectional study, children and adolescents who attended primary health centers (PHCs) along with their parents were included. Four main PHCs in Erbil city in Iraqi Kurdistan in 2022 were selected for this study. **Results:** The prevalence of text neck pain was 69.0% among children. The level of neck disability score was 17.15 out of 21 among children. Adolescents (96.05%) those who used smartphones >3 h (83.56%), those studying secondary level (94.24%), and those with psychological, social, and physical functions and children who slept less, played fewer sports, used more computers, watched more TV, and played the game more than 3 h were more likely to have text neck syndrome. The study showed that children who spent more time on smartphones, watching TV, playing games, and those with physical and social functions had a high level of neck disability. **Conclusion:** This study found a high prevalence of text neck syndrome among schoolchildren in this region. The high prevalence of text neck syndrome was associated with more using smartphones and watching TV and a high prevalence of physical, psychological, and social issues.

Keywords: Children, neck pain, text neck syndrome

INTRODUCTION

Neck and shoulder pain is a medical condition. It is a relatively mild musculoskeletal condition mostly found among children.^[1] Neck pain has become a major health issue among the general population. It has a high burden on the individuals and community.^[2-4] Based on the World Health Organization (WHO), neck pain and other musculoskeletal diseases are considered to be the 4th and 10th health issues, respectively.^[5]

"Text neck syndrome" has become an emerging public health issue of the twenty-first century. The clinical condition of text neck syndrome is degeneration of the cervical spinal. The text neck syndrome is caused by repeated stress of forwarding head flexion. This condition happens when someone watches screens of mobile devices and performs texting for a long time.^[6] This condition is more commonly observed among adolescents because they spend several hours watching mobile phones and computers.^[7] It is projected that close to 75% of the

populations across the world have hand devices and use them daily. The population flexes their heads forwards when using electronic devices.^[8]

It is estimated that the prevalence of neck pain in the general population is from 0.4% to 86.8%.^[9] Based on the Global Burden of Disease, neck pain is one of the main factors contributing to years of disability in adolescents aged between 15 and 19 years.^[10] Neck and shoulder pain are common health issues in children and teenagers in developing countries.^[11,12] The rates of neck pain are different among the general population: 3.3% in Thailand, 22.7% in Canada, 10.5% in Belgium, 22.0% in Austria, 31.8% in Spain, 66.3% in Sweden, 30.2% in Norway, and 3.5% in China.^[9]

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There are several epidemiological studies about risk factors, burden, and management of musculoskeletal pain in adult populations. But there is little information about the epidemiology of text neck syndrome among adolescents. Several studies have mentioned the lack of data about text neck syndrome among children and adolescents.^[13-15] Children and adolescents who have persistent pain have an elevated risk of chronic pain as adults.^[16,17]

The risk factors reported in the literature for neck pain are lifestyle, psychological, physical, and social factors, and inappropriate sitting.^[18-20] Neck pain in children is a risk factor for health issues during adulthood.^[21,22] Therefore, it is important to detect the prevalence of neck pain and manage it during childhood and adolescence to avoid such kinds of issues. Because this issue in childhood is associated with health profiles during adulthood, we need to identify the contributed factors to neck pain among children.^[23] This study aimed to identify the prevalence of text neck syndrome and its associated factors among children and adolescents.

MATERIALS AND METHODS

Study design and population

The children and adolescents who attended the primary health center (PHC) along with their parents were included in this cross-sectional study. Four main PHCs in Erbil city in Iraqi Kurdistan were selected for the study purpose. The children were selected from the following four PHCs; Shadi, Birayeti, Nawrooz, and Azadi between December 2021 and March 2022.

Population and sampling

The population of the study was schoolchildren studying in a primary and secondary school in Erbil city. The population had different ages and gender and socio-demographic characteristics. The sampling was performed using a non-probability technique.

The sample size was determined using the Cochran formula. The required sample size was estimated based on the estimated population made for this study. We expected that 20 children attend each PHC in a week. The total number of expected children who visited the PHC was 4160 in a year for this study. The required sample size was 352 based on the Cochran formula. But we increased the sample size to compensate for the missing information and possibly rejection. The children were included between December 2021 and March 2022.

Inclusion and exclusion criteria

The children and adolescents aged 5–15 years of both genders who attended the PHCs were included in this study. We excluded the children whose parents did not give their consent and were not included in this study.

The patients with chronic diseases were excluded from the study. The researcher documented the chronic diseases by asking the students' parents.

Data collection

The data were collected through direct interviews after obtaining verbal and written approval from the parents. A structural questionnaire was used to interview the participants. The questionnaire consists of two parts: Part 1: including sociodemographic data such as age and education and Part 2: signs and symptoms related to smartphone users such as headache, neck pain, shoulder stiffness, eyesight issues, and sleeping disturbance.

Measurement tool

The level of neck function disability was measured using the "Copenhagen Neck Functional Disability Scale." This scale is used to measure the disability experienced by patients and individuals with neck pain. The scores obtained from this scale can be used to evaluate the changes over time. The scale has 15 items rated as yes, occasionally, or no. The following numbers are given to the items 1–5 and 13–15 (0 for yes, 1 for occasionally, and 2 for no). The negative items 6–12 were rated as 2 for yes, 1 for occasionally, and 0 for no. The numbers were added together to obtain the score of neck function disability (from 0 to 30). On this scale, the higher the score means the greater the disability.^[24]

Statistical analysis

We presented the general information of children in mean (SD) or number (%). The prevalence of text neck syndrome and its effects and symptoms were determined in number and %. The association of text neck syndrome with sociodemographic characteristics was examined in a Pearson's χ^2 test. The comparisons of the level of neck disability in children with different characteristics were examined using an independent *t*-test or one-way analysis of variance (ANOVA) test. A *P*-value less than 0.05 was used to determine the significant level of difference. JMP Pro 14.3.0 was used to calculate the statistical calculations.

Ethical consideration

The research health ethics of the College of Medicine/Hawler Medical University approved the protocol of this study. In addition, we obtained approval from the Erbil Directorate of the Health. We protected the confidentiality of the personal information, according to the instruction of the Health Ethics Committee. We obtained the written consent of parents before data collection based on the Declaration of Helsinki. The study protocol and the subject information and consent form were reviewed and approved by the Research Ethics Committee of College of Medicine/Hawler Medical University, according to document number 23 (including the number and the date on 27/06/2022) to get this approval.

RESULTS

The mean age of the children is 10.79 between 6 and 15 years. The children were males (56.25%) and females (43.75%). More than half of the children (56.25%) reported that they used smartphones for more than 3 h. The children had primary (65.25%) and secondary levels of school [34.75%; Table 1].

The children reported pain in different areas and only 28.75% of them reported no pain. The children reported different effects, children's eye symptoms, psychological effects, and social effects. We found that 50.25% of children slept 6–8 h. The children used the computer for 1–3 h (79.50%), played games for 1–3 h (89.50%), and watched TV for 1–3 h (84.0%) per day. The prevalence of text neck pain was 69.0% among children [Table 2]. The level of neck disability score was 17.15 of 21 among children in this study. The frequencies of neck disability issues were reported in Table 3.

The study showed that adolescents (96.05%) who used smartphones for more than 3 h (83.56%), those studying secondary level (94.24%), and those with psychological, social, and physical dysfunctions were more likely to have text neck syndrome. The children who slept less, played fewer sports, used more computers, watched more TV, and played video games for more than 3 h were more likely to have text neck syndrome [Table 4].

The study showed that the children who spent more time on smartphones, watching TV, video games, and those with dysfunction had high levels of neck disability [Table 5].

DISCUSSION

This study found that the prevalence of text neck text syndrome is so high with a high neck disability in

this region. The study showed that the high text neck syndrome is associated with being adolescents, more using smartphones, and watching more TV and computers. In

Table 2: Prevalence, symptoms, and effects of text neck syndrome among school children

Characteristics (N=400)	Frequency distribution	
	Number	Percentage
Pain location		
No pain	115	28.75
Neck	61	15.25
Shoulder	14	3.50
Arms	4	1.00
Neck and shoulder	143	35.75
All of them	55	13.75
Neck and arm	8	2.00
Presence of eye symptoms		
No	104	26.00
Eye strain	100	25.00
Dry eyes	44	11.00
Eye strain and dry eyes	152	38.00
Psychological effect		
No	172	43.00
Irritability	140	35.00
Stress	50	12.00
Anxiety	4	1.00
Depression	6	1.50
Irritability, stress, and anxiety	28	7.00
Social effect		
No	262	65.50
Poor communication	58	14.50
Decreased school marks	66	16.50
Both of them	14	3.50
Sleeping hours		
None of them	8	2.00
Less than 6 h	24	6.00
6–8 h	201	50.25
More than 8 h	167	41.75
Playing sports/week		
1–3 h	378	94.50
More than 3 h	22	5.50
Using computer/day		
No play computer games	24	6.00
1–3 h	318	79.50
More than 3 h	58	14.50
Playing games/day		
No play games	6	1.50
1–3 h	358	89.50
More than 3 h	36	9.00
Watching TV/day		
No watching TV	4	1.00
1–3 h	336	84.00
More than 3 h	60	15.00
Diagnosis neck syndrome		
No	124	31.00
Yes	276	69.00

Table 1: Basic characteristics of schoolchildren		
General information (n=400)	Frequency distribution	
	Mean	SD
Age (6–15 years)	10.79	3.06
	Number	Percentage
Age category		
Adolescents	152	38.00
Children	248	62.00
Gender		
Male	225	56.25
Female	175	43.75
Using smartphone		
1–3 h	175	43.75
More than 3 h	225	56.25
Level of education		
Primary	261	65.25
Secondary	139	34.75

Table 3: Prevalence of neck disability issues among schoolchildren

Neck disability items (n = 400)	Frequency distribution, no (%)		
	Occasionally	No	Yes
Can you sleep at night without pain interfering?	22 (5.50)	0 (0.00)	378 (94.50)
Can you manage daily activities without neck pain reducing activity level?	22 (5.50)	0 (0.00)	378 (94.50)
Can you manage daily activities without help from others?	4 (1.00)	4 (1.00)	392 (98.00)
Can you manage putting on your clothes in the morning without taking more time than usual?	6 (1.50)	6 (1.50)	388 (97.00)
Can you bend over the washing basin in order to brush your teeth without getting neck pain?	8 (2.00)	6 (1.50)	386 (96.50)
Do you spend more time than usual at home because of neck pain?	350 (87.50)	44 (11.00)	6 (1.50)
Are you prevented from lifting objects weighing from 2 to 4 kg due to neck pain?	366 (91.50)	28 (7.00)	6 (1.50)
Have you reduced your reading activity due to neck pain?	304 (76.00)	78 (19.50)	18 (4.50)
Have you been bothered by headaches during the time that you have had neck pain?	179 (44.75)	137 (34.25)	84 (21.00)
Do you feel your ability to concentrate is reduced due to neck pain?	235 (58.75)	105 (26.25)	60 (15.00)
Are you prevented from participating in your usual leisure time activities due to neck pain?	370 (92.50)	20 (5.00)	10 (2.50)
Do you remain in bed longer than usual due to neck pain?	366 (91.50)	20 (5.00)	14 (3.50)
Do you feel that neck pain has influenced your emotional relationship with your nearest family?	22 (5.50)	362 (90.50)	16 (4.00)
Have you had to give up social contact with other people during the past 2 weeks due to neck pain?	28 (7.00)	362 (90.50)	10 (2.50)
Do you feel that neck pain will influence your future?	62 (15.50)	312 (78.00)	26 (6.50)
Neck disability (range: 11–21)	Mean 17.15	SD: 2.29	

addition, the children with text neck syndrome were more likely to have more adverse effects.

The studies conducted in other regions of the world have reported different prevalence rates of text neck syndrome. The low-income countries have reported a prevalence similar to our study. For example, one of these studies reported that the prevalence of text neck syndrome is between 35.8% and 30.9% for neck and shoulder pain, respectively, over a month. It is lower than the prevalence reported in the current study. The main difference between our study and their study is that they reported different sociodemographic factors related to neck syndrome. They reported that the factors associated with the severity of text neck syndrome were very high: desk height, backward seat pan inclination, forward seat pan inclination, difficulty in viewing the board, too much homework, and rapid upper limbs assessment.^[25] A study from Saudi Arabia reported the high prevalence as 68.1% including mild (49.5%), moderate (16.1%), and severe neck disabilities (2.6%). They reported that high neck disability among the population is highly associated with smartphone use.^[26] Similar prevalence rates of text neck have been reported in other studies as well.^[6,7,27,28]

The text neck syndrome is a common health issue among children. In agreement with the current study, Fares *et al.*^[6] reported that factors related to neck pain are

watching television and using smartphones, strong flexion of the neck during studying, sitting, and using other smart devices.

The natural course of neck pain among children aged 9–12 years was evaluated and followed up for 4 years by a study. At baseline, 1756 schoolchildren filled out the questionnaire about musculoskeletal pain symptoms, psychological symptoms, and physical activity frequency. The re-evaluation was performed following 1 and 4 years. They mentioned that 24% reported no neck pain, 71% reported fluctuating, and 5% reported persistent weekly neck pain at the following-up time. The persistent course of neck pain was observed among children with weekly musculoskeletal and/or other physical and psychological symptoms at baseline. They concluded that the neck pain among children fluctuated mostly. But accompanied with other musculoskeletal symptoms and/or markers of psychological stress increases the risk of neck pain toward the persistent course.^[29]

Further, sleeping hours has a significant impact on neck pain among children. The effects of sleep posture on neck muscle activity have been reported in other studies as well. For example, a study recruited 20 healthy persons in three different supine positions, including both hands at the sides, both hands on the chest, and the dominant hand

Table 4: Prevalence of text neck syndrome in children with different characteristics and symptoms

Characteristics	Text neck syndrome, no (%)		P-value
	No	Yes	
Age category			<0.0001
Adolescents	6 (3.95)	146 (96.05)	
Children	118 (47.58)	130 (52.42)	
Gender			0.3006
Male	65 (28.89)	160 (71.11)	
Female	59 (33.71)	116 (66.29)	
Using smartphone			<0.0001
1–3 h	87 (49.71)	88 (50.29)	
More than 3 h	37 (16.44)	188 (83.56)	
Level of education			<0.0001
Primary	116 (44.44)	145 (55.56)	
Secondary	8 (5.76)	131 (94.24)	
Pain location			<0.0001
No	111 (96.52)	4 (3.48)	
Neck	13 (21.31)	48 (78.69)	
Shoulder	0 (0.00)	14 (100)	
Arms	0 (0.00)	4 (100)	
Neck and shoulder	0 (0.00)	143 (100)	
All of them	0 (0.00)	55 (100)	
Neck and arm	0 (0.00)	8 (100)	
Presence of eye symptoms			<0.0001
No	100 (96.15)	4 (3.85)	
Eye strain	20 (20.00)	80 (80.00)	
Dry eyes	4 (9.09)	40 (90.91)	
Eye strain and dry eyes	0 (0.00)	152 (100)	
Psychological effect			<0.0001
No	102 (59.30)	70 (40.70)	
Irritability	22 (15.71)	118 (84.29)	
Stress	0 (0.00)	50 (100)	
Anxiety	0 (0.00)	4 (100)	
Depression	0 (0.00)	6 (100)	
Irritability, stress, and anxiety	0 (0.00)	28 (100)	
Social effect			<0.0001
No	98 (37.40)	164 (62.60)	
Poor communication	18 (31.03)	40 (68.97)	
Decreased school marks	4 (6.06)	62 (93.94)	
Both of them	4 (28.57)	10 (71.43)	
Sleeping hours			<0.0001
None of them	4 (50.00)	4 (50.00)	
Less than 6 h	0 (0.00)	24 (100)	
6–8 h	19 (9.45)	182 (90.55)	
More than 8 h	101 (60.48)	66 (39.52)	
Playing sports/week			0.0012
1–3 h	124 (32.80)	254 (67.20)	
More than 3 h	0 (0.00)	22 (100)	
Using computer/day			<0.0001
No play computer games	16 (66.67)	8 (33.33)	
1–3 h	108 (33.96)	210 (66.04)	
More than 3 h	0 (0.00)	58 (100)	

Table 4: Continued

Characteristics	Text neck syndrome, no (%)		P-value
	No	Yes	
Playing games/day			0.2243
No play games	0 (0.00)	6 (100)	
1–3 h	114 (31.84)	244 (68.16)	
More than 3 h	10 (27.78)	26 (72.22)	
Watching TV/day			<0.0001
No watching TV	2 (50.00)	2 (50.00)	
1–3 h	118 (35.12)	218 (64.88)	
More than 3 h	4 (6.67)	56 (93.33)	

Pearson's χ^2 test was performed for statistical analyses

and upper trapezius muscles bilaterally using surface electromyography. They reported that upper trapezius and scalene muscle activity on the right side is significantly higher in the supine position with the dominant hand in the forehead position. Therefore, sleeping posture affects neck and shoulder musculoskeletal pain.^[30] In addition, inadequate sleeping hours and low-sleep quality have been shown to act as independent risk factor for neck and low back pain.^[31]

The current study showed that text neck syndrome is a risk factor for eye symptoms. Children with neck pain had a strained eye, a common symptom in the eye during text neck syndrome. In contrast, patients with dry eyes were impacted by text neck syndrome, and they felt pain while they closed or opened their eyes. Some patients had dry and strained eyes, whereas others had neck pain. This symptom was available in children with neck pain and another musculoskeletal disease. Patients with no eye symptoms also had neck pain. But compared with other patients, their pain was minor. Most patients with eye symptoms experience more than 3 h of playing games, watching TV, and using smartphones daily. So, this affects their eyes immediately.

Other studies have reported similar health issues related to neck pain. For instance, a study reported that the children had flawed flexion of their back and neck during studying and/or using smartphones, tablets, and computers. Importantly, 21% reported eye symptoms and their parents reported the alteration in the psychological and social behavior of their children.^[6] Text neck syndrome is a common issue among teens and adolescents who spend more time on smartphones.^[32] It is projected that 75% of the world's population spends hours daily on smart devices.^[8] In our study, 56.25% of the children who participated in this study reported that they spend more than 3 h daily on smartphones. When children use smartphones, they tilt their heads over reading and texting on smartphones or handling devices estimated between 1825 and 2555 h a year. Excessive stress is found in the cervical spine area.^[33]

Table 5: Comparisons of level of neck disability in children with different characteristics

Characteristics (n=400)	Level of neck disability		P-value
	Mean	SD	
Age category			<0.001 ^a
Adolescents	15.6	2.3	
Children	18.2	1.5	
Gender			0.6686 ^a
Male	17.1	2.3	
Female	17.2	2.3	
Using smartphone			<0.001 ^a
1–3 h	17.7	1.9	
More than 3 h	16.8	2.4	
Level of education			<0.001 ^a
Primary	18.2	1.5	
Secondary	16.0	1.9	
Pain location			<0.001 ^b
No	19.0	0	
Neck	17.1	2.2	
Shoulder	15.7	2.6	
Arms	15.0	2.3	
Neck and shoulder	16.2	2.3	
All of them	17.0	1.9	
Neck and arm	14.5	1.6	
Presence of eye symptoms			<0.001 ^b
No	19	0	
Eye strain	16.7	2.3	
Dry eyes	19	0	
Eye strain and dry eyes	16.1	2.2	
Psychological effect			<0.001 ^b
No	19	0	
Irritability	16.5	2.5	
Stress	15.9	1.7	
Anxiety	15.0	2.3	
Depression	14.0	2.7	
Irritability, stress, and anxiety	16.6	2.0	
Social effect			<0.001 ^b
No	18.0	1.5	
Poor communication	16.1	3.4	
Decreased school marks	16.4	1.9	
Both of them	17.1	1.8	
Sleeping hours			<0.001 ^b
None of them	19	0	
Less than 6 h	15.4	2.5	
6–8 h	16.2	2.4	
More than 8 h	18.4	1.2	
Playing sports/week			0.1433 ^a
1–3 h	17.2	2.3	
more than 3 h	16.5	2.3	
Using computer/day			0.4062 ^b
No play computer games	17.7	3.2	
1–3 h	17.2	2.2	
More than 3 h	17.5	1.4	

Table 5: Continued

Characteristics (n=400)	Level of neck disability		P-value
	Mean	SD	
Playing games/day			0.0003 ^b
No play games	15.7	0.5	
1–3 h	17.2	2.3	
More than 3 h	19.0	0.0	
Watching TV/day			0.0174 ^b
No watching TV	15.0	4.6	
1–3 h	17.1	2.2	
More than 3 h	17.8	2.1	

^aAn independent *t*-test and ^bone-way ANOVA were performed for statistical analyses

Limitations

The findings of this study must be interpreted in the inference of the study design and sampling technique as we could not collect the sample from the school due to daily work of the researchers in PHCs. However, it can present a fraction of the population studying in school.

CONCLUSIONS

This study found a high prevalence of text neck syndrome among schoolchildren in this region. The high prevalence of text neck syndrome was associated with using more smartphones and watching TV and had a high prevalence of physical, psychological, and social issues. It is recommended that the children's use of smartphones and TV be limited to a few hours to alleviate the physical, psychological, and social-related issues.

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Conflicts of interest

The authors do not claim any conflict of interest.

REFERENCES

1. Picavet HS, Schouten JS. Musculoskeletal pain in the Netherlands: Prevalences, consequences and risk groups, the DMC(3)-study. *Pain* 2003;102:167-78.
2. Fejer R, Kyvik KO, Hartvigsen J. The prevalence of neck pain in the world population: A systematic critical review of the literature. *Eur Spine J* 2006;15:834-48.
3. Shan Z, Deng G, Li J, Li Y, Zhang Y, Zhao Q. Correlational analysis of neck/shoulder pain and low back pain with the use of digital products, physical activity and psychological status among adolescents in Shanghai. *PLoS One* 2013;8:e78109.
4. Scarabottolo CC, Pinto RZ, Oliveira CB, Zanuto EF, Cardoso JR, Christofaro DGD. Back and neck pain prevalence and their

- association with physical inactivity domains in adolescents. *Eur Spine J* 2017;26:2274-80.
5. Vos T, Barber RM, Bell B, Bertozzi-Villa A, Biryukov S, Bolliger I, *et al*. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: A systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015;386:743-800.
 6. Fares J, Fares MY, Fares Y. Musculoskeletal neck pain in children and adolescents: Risk factors and complications. *Surg Neurol Int* 2017;8:72.
 7. Neupane S, Ali U, Mathew A. Text neck syndrome—Systematic review. *Imperial J Interdisc Res* 2017;3:141-8.
 8. Hestbaek L, Leboeuf-Yde C, Kyvik KO, Manniche C. The course of low back pain from adolescence to adulthood: Eight-year follow-up of 9600 twins. *Spine (Phila Pa 1976)* 2006;31:468-72.
 9. Hoy DG, Protani M, De R, Buchbinder R. The epidemiology of neck pain. *Best Pract Res Clin Rheumatol* 2010;24:783-92.
 10. Global Burden of Disease. Institute for Health Metrics and Evaluation 2015. Available from: <http://vizhub.healthdata.org/gbd-compare/>. [Last accessed on 10 Jul 2022].
 11. Shan Z, Deng G, Li J, Li Y, Zhang Y, Zhao Q. How schooling and lifestyle factors effect neck and shoulder pain? A cross-sectional survey of adolescents in China. *Spine (Phila Pa 1976)* 2014;39:E276-83.
 12. Azabagic S, Spahic R, Pranjic N, Mulic M. Epidemiology of musculoskeletal disorders in primary school children in Bosnia and Herzegovina. *Mater Sociomed* 2016;28:164-7.
 13. Cohen E, Uleryk E, Jasuja M, Parkin PC. An absence of pediatric randomized controlled trials in general medical journals, 1985–2004. *J Clin Epidemiol* 2007;60:118-23.
 14. Michaleff ZA, Kamper SJ, Maher CG, Evans R, Broderick C, Henschke N. Low back pain in children and adolescents: A systematic review and meta-analysis evaluating the effectiveness of conservative interventions. *Eur Spine J* 2014;23:2046-58.
 15. Fares Y, Fares J. Neurosurgery in Lebanon: History, development, and future challenges. *World Neurosurg* 2017;99:524-32.
 16. Brattberg G. Do pain problems in young school children persist into early adulthood? A 13-year follow-up. *Eur J Pain* 2004;8:187-99.
 17. Jones GT, Silman AJ, Power C, Macfarlane GJ. Are common symptoms in childhood associated with chronic widespread body pain in adulthood?: Results from the 1958 British Birth Cohort Study. *Arthritis Rheumat* 2007;56:1669-75.
 18. Brink Y, Louw QA. A systematic review of the relationship between sitting and upper quadrant musculoskeletal pain in children and adolescents. *Man Ther* 2013;18:281-8.
 19. Dockrell S, Simms C, Blake C. Schoolbag carriage and schoolbag-related musculoskeletal discomfort among primary school children. *Appl Ergon* 2015;51:281-90.
 20. Wirth B, Potthoff T, Rosser S, Humphreys BK, de Bruin ED. Physical risk factors for adolescent neck and mid back pain: A systematic review. *Chiropr Man Therap* 2018;26:36.
 21. Hakala P, Rimpelä A, Salminen JJ, Virtanen SM, Rimpelä M. Back, neck, and shoulder pain in Finnish adolescents: National cross sectional surveys. *Br Med J* 2002;325:743.
 22. Siivola SM, Levoska S, Latvala K, Hoskio E, Vanharanta H, Keinänen-Kiukaanniemi S. Predictive factors for neck and shoulder pain: A longitudinal study in young adults. *Spine (Phila Pa 1976)* 2004;29:1662-9.
 23. Koh MJ, Park SY, Park EJ, Park SH, Jeon HR, Kim MG, *et al*. The effect of education on decreasing the prevalence and severity of neck and shoulder pain: A longitudinal study in Korean male adolescents. *Korean J Anesthesiol* 2014;67:198-204.
 24. Fejer R, Jordan A, Hartvigsen J. Categorising the severity of neck pain: Establishment of cut-points for use in clinical and epidemiological research. *Pain* 2005;119:176-82.
 25. Gheysvandi E, Dianat I, Heidari Moghadam R, Tapak L, Karimi-Shahanjari A, Rezapour-Shahkolai F. Neck and shoulder pain among elementary school students: Prevalence and its risk factors. *BMC Public Health* 2019;19:1299.
 26. Alsiwed KT, Alsarwani RM, Alshaikh SA, Howaidi RA, Aljahdali AJ, Bassi MM, *et al*. The prevalence of text neck syndrome and its association with smartphone use among medical students in Jeddah, Saudi Arabia. *J Musculoskelet Surg Res* 2021;5:266-72.
 27. Kalirathinam D, Manoharlal MA, Mei C, Ling CK, Sheng TW, Jerome A, *et al*. Association between the usage of smartphone as the risk factor for the prevalence of upper extremity and neck symptoms among university students: A cross-sectional survey based study. *Res J Pharm Technol* 2017;10:1184.
 28. Kazeminasab S, Nejadghaderi SA, Amiri P, Pourfathi H, Araj-Khodaei M, Sullman MJM, *et al*. Neck pain: Global epidemiology, trends and risk factors. *BMC Musculoskelet Disord* 2022;23:26.
 29. Ståhl M, Kautiainen H, El-Metwally A, Häkkinen A, Ylinen J, Salminen JJ, *et al*. Non-specific neck pain in schoolchildren: Prognosis and risk factors for occurrence and persistence. A 4-year follow-up study. *Pain* 2008;137:316-22.
 30. Lee WH, Ko MS. Effect of sleep posture on neck muscle activity. *J Phys Ther Sci* 2017;29:1021-4.
 31. Auvinen JP, Tammelin TH, Taimela SP, Zitting PJ, Järvelin MR, Taanila AM, *et al*. Is insufficient quantity and quality of sleep a risk factor for neck, shoulder and low back pain? A longitudinal study among adolescents. *Eur Spine J* 2010;19:641-9.
 32. David D, Giannini C, Chiarelli F, Mohn A. Text neck syndrome in children and adolescents. *Int J Environ Res Public Health* 2021;18:1565.
 33. Hansraj KK. Assessment of stresses in the cervical spine caused by posture and position of the head. *Surg Technol Int* 2014;25:277-9.