Body posture knowledge and habits during the pandemic in productive age webinar participant

Putu Astiswari Permata Kurniawan[a], Zaki Adi Kurnia[a], Lila Amila[a], Dewi Ratna Sari[b*]

[a]dewi-r-s@fk.unair.ac.id
[a]Medical Programme, Faculty of Medicine, Universitas Airlangga, Surabaya 60131, Indonesia
[b]Department of Anatomy, Histology, and Pharmacology, Faculty of Medicine, Universitas Airlangga, Surabaya 60131, Indonesia

Abstract

Restrictions on community activities caused by the COVID-19 pandemic have caused people in developing countries to work, study, shop, and socialize from home. This policy result in increasing the use of devices such as cell phones, laptops, computers, or other electronic devices. Increased of gadgets utilization for a long time is likely affect body posture. The objectives of this study are to determine the knowledge level of productive age society related to the body posture while using gadgets before (pre-test) and after (post-test) education were given and to find out the relationship between habits when using gadgets and musculoskeletal complaints. This analytical observational study using primary data from pre-test and post-test questionnaires about body posture health. Data collection was carried out before and after the delivery of education regarding the health of body posture when using devices during the COVID-19 pandemic. The data were analyzed statistically with the Wilcoxon Signed Rank Test, Chi-Square and Contingency Coefficients with the results in the form of percentage, mean, frequency and inferential statistics. The average score of pre-test and post-test were 7.06±2.39 and 7.14±2.57 for knowledge of body posture, respectively. There was no significant increase in knowledge of body posture 1.2% (p=0.777). Meanwhile, there were relationship between the upper arm and neck positions when using a device and complaints of shoulder (p = 0.026, C = 0.342) and neck pains (p=0.000, C=0.448), respectively. Approaching the community with education about posture is expected to increase knowledge so that it can change people's behavior to prevent fatigue when using gadget and decrease incidence of musculoskeletal complaints also promote healthy lifestyle.

Keywords: COVID-19; body posture ;developing countries; healthy lifestyle

1. Introduction

Globally, Indonesia is currently the fifth largest internet user with 143.26 million users in 2019 [1]. The number of Indonesian internet users in 2020 reached 175.4 million people, which was more than half of the Indonesian population [2]. New practices such as working and online distance learning are being implemented as an effort to put a stop to the increase in COVID-19 cases [3]. Previous study from Dampati, et al. (2020) reported that there were as many as 82.47% of the users experienced neck pain and 56.61% experienced shoulder pain due to bad posture during gadgets utilization in the COVID-19 pandemic [4]. The education with the goal of increasing knowledge related to the correct posture in using gadgets when Working from Home (WFH) and School from Home (SFH) during COVID-19 pandemic is pivotal to maintain body posture, therefore can increase the productivity rate of productive age group. Online lecture or webinar for public service program with the theme of "Maintaining Posture and Sitting Position During Work from Home*"* was done to increase the knowledge of maintaining good posture and sitting position when WFH and SFH. This study was conducted to determine the habitual postures of the Indonesian society while using gadgets, to compare the public's knowledge before and after the education and to determine the relationship between position of upper arms, lower arms, shoulder, wrist, body and neck when using gadgets and musculoskeletal complaints.

2. Materials and Methods

This analytical observational method was carried out through primary data from pre-test and post-test questionnaires about body posture health and collected before and after one hour webinar session. The posture habits and complaints questionnaire were adapted from the Rapid Upper Limb Assessment (RULA) by assessing the positions of the upper arm, forearm, neck, and body and also musculoskeletal complaints which includes neck, back, shoulder, arm and wrist pains [5]. The criteria for the good upper arm position are from 20° backward to 20° forward, the good forearm position is flexion between 0° to 60°, good wrist position is in line with the hand and the good neck and body position is an upright position. The questionnaire was comprised of 13 multiple-choice questions that have passed the validity test. The inclusion criteria were the productive age group who attended the webinar and filled out the pre-test and post-test completely. The participants beyond the productive age and did not fill out the pre-test and post-test questionnaires completely were excluded from this study. The education regarding the body posture was delivered by webinar using zoom platform in July 2021.

The comparison of the knowledge level regarding posture before and after webinar was assessed by the Wilcoxon Signed Rank Test which is suitable for performing parametric tests on data with abnormal distribution and ratio scale. The relationship between posture habits and musculoskeletal complaints were analysed by Chi-Square and Contingency Coefficient Tests for nominal data scales to determine the correlation among the variables and the strength of the correlation. The result was significance if $p<0.05$. There are 13 questions that are deemed suitable based on Pearson Moment Product Test which were used to amplify the validity and suitability of questions as measurement for knowledge or competency utilised in this study.

3. Result

A total of 112 participants filled out the questionnaire regarding body posture during WFH and 84 participants met the inclusion criteria which are categorized in a productive age group ranging from 18-35 years old and currently conducting work or school from home.

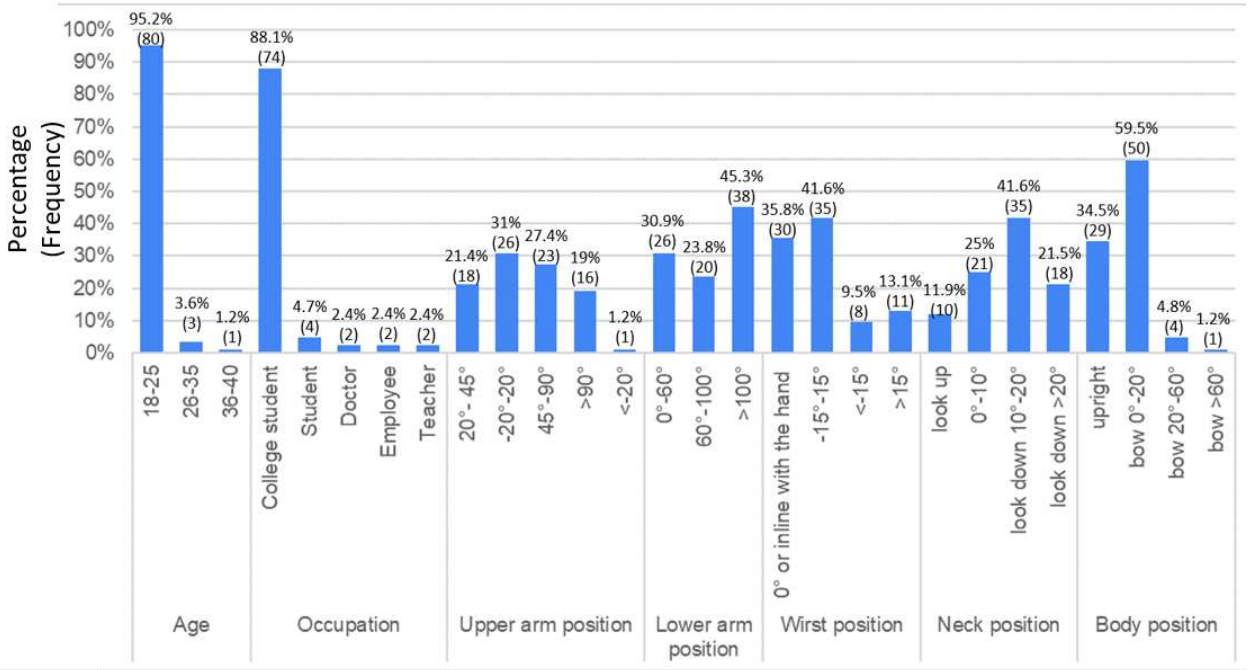

Fig 1. Distribution of the participants based on age, occupation, and postural habits during WFH and SFH in COVD-19 pandemic (n=84).

Figure 1 showed that most of the participants were included in the age range of 18-25 years (95.2%). Most of the participants (31%) applied the correct position of the upper arms, and those who applied the correct position of the forearms and wrists were 30.9% and 35.8%, respectively. As many as 25% of the participants applied the correct neck position and 34.5% applied the correct body position.

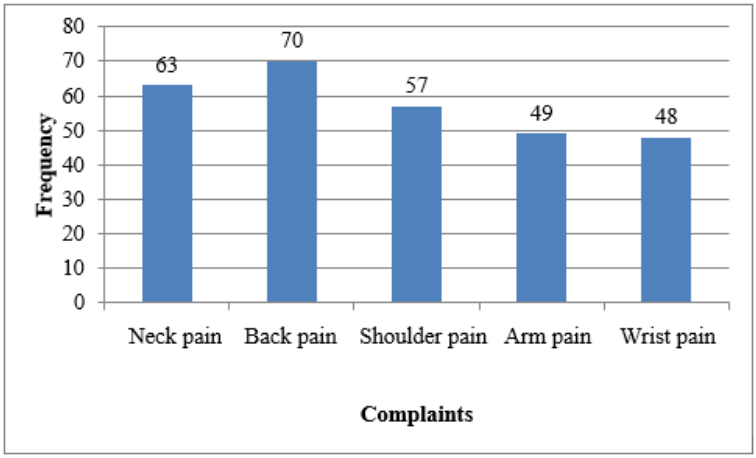

Fig 2. Distribution of the participants' musculoskeletal complaints during WFH and SFH in COVID-19 pandemic (n=84).

Based on the Figure 2, the most common musculoskeletal complaints during WFH and SFH in COVID-19 pandemic were back pain at 83.33%, followed by neck pain at 75%. The least common complaint was wrist pain at 57.14%.

Table 1. Posture habits and musculoskeletal complaints of the participants during WFH and SFH in COVID-19 pandemic (n=84).

Upper arms position	Shoulder pain	
	Yes (%)	No (%)
-20° - 20°	12 (14.3%)	14 (16.7%)
< -20°	1(1.2%)	0 (0%)
20° - 45°	16(19%)	2 (2.4%)
45° - 90°	18 (21.4%)	5 (6%)
>90°	10 (11.9%)	6 (7.1%)
Upper arms position	Arm pain	
	Yes (%)	No (%)
-20° - 20°	10 (11.9%)	16 (19.1%)
< -20°	1 (1.2%)	0 (0%)

20° - 45°	11(13.1%)	7 (8.3%)
45° - 90°	18(21.4%)	5 (6%)
>90°	9(10.7%)	7 (8.3%)
Lower arms position	Arm pain	
	Yes (%)	No (%)
0° - 60°	14 (16.6%)	12 (14.3%)
60° - 100°	8 (9.5%)	12 (14.3%)
> 100°	23 (27.4%)	15 (17.9%)
Wrist position	Wrist pain	
	Yes (%)	No (%)
0°	15 (17.9%)	15 (17.9%)
15° above or below	19 (22.6%)	16 (19%)
> 15° above	7 (8.3%)	4 (4.8%)
> 15° below	7 (8.3%)	1 (1.2%)
Neck position	Neck pain	
	Yes (%)	No (%)
Upright 0° - 10°	15 (17.9%)	6 (7.1%)
Looking down 10° - 20°	29 (34.5%)	6 (7.1%)
Looking down >20°	17 (20.3%)	1 (1.2%)
Looking up	2 (2.4%)	8 (9.5%)
Body position	Back pain	
	Yes (%)	No (%)
Upright 0° - 10°	23 (27.4%)	6 (7.1%)
Bowing 0° - 20°	42 (50%)	8 (9.5%)
Bowing 20° - 60°	4 (4.8%)	0 (0%)

Bowing > 60°	1 (1.2%)	0 (0%)

Table 1 presented the posture habits and musculoskeletal complaints that were experienced by the participants. The participants with the upper arms of 45-90° angle were the most participants who got experienced shoulder and arm pains, both at 21.4% and followed by the 20-45° angle at 19% for shoulder pain and 13.1% for arm pain. The position of less than -20° angle had exactly 1 complaint of both shoulder and arm pains.

The position which had the most complaints for wrist pain was the 15° angle above or below the work surface, while the 0° angle comprised of half total number of complaints. Both the angle of >15° above or >15° below the work surface had wrist pain complaints of 8.3% of total participants. Participants who looked down at 10°-20° angle while using their electronic devices or gadgets had the most complaints of neck pain at 34.5%, followed by those who looked down at more than 20° angle and the upright position (0°-10° angle) at 20.3% and 17.9% respectively. A significant number of participants complained of back pain and used the bowing at 0° to 20° angle while working, making up exactly half of the total number of participants. The participants who sit upright while working also complained of back pain at 27.4%, and those with working position of bowing 20° or more had complaints of back pain, set up 6% of the total number of participants.

The participants who had bad habitual position of upper arm and got shoulder pain and arm pain comprised of 53.5% and 46.4%, respectively. About 36.9% of the total participants habitually apply the bad position of the lower arm and experienced arm pain. About 39.2% of the participants usually apply the wrong wrist position and experienced wrist pain. Participants who experienced neck pain and have the wrong neck position while using gadgets comprise of 57.2%. Likewise, as many as 56% of the participants did not apply the good body position and experienced back pain. All musculoskeletal complaints were felt more in participants who applied inappropriate upper arm, forearm, wrist, neck and body positions.

Table 2. The correlation analysis of the participants' postural habits and musculoskeletal complaints during WFH and SFH in COVID-19 pandemic (n=84).

Variables	p value	C value
Upper arms position and shoulder pain	0.026*	0.342
Upper arms position and arm pain	0.067	-
Lower arms position and arm pain	0.855	-
Wrist position and wrist pain	0.268	-
Neck position and neck pain	0.000*	0.448
Body position and back pain	0.716	-

*Significant if p<0.05, Chi Square and Contingency Coefficient Tests

Table 2 reported the correlation analysis of the participants' postural habits and musculoskeletal complaints during WFH and SFH in COVID-19 pandemic. Based on the analysis, it was found that there was a weak correlation between the participants' upper arm position and the pain or discomfort in the shoulder area (p= 0.026; C= 0.342). Additionally, there was a moderate correlation between neck position and the complained of pain / discomfort in the neck area (p= 0.000; C=0.448). Those results indicated that the incorrect position was associated to the increased of musculoskeletal complaints.

The number of participants who took part in pre-test and post-test regarding body posture are 112 and 89, respectively. Among the participants, only 47 participants met the inclusion criteria which completely answered both pre-test and post-test and included in productive age group.

Table 3. Percentage of the correct answer during the pre-test and post-test about postural health (n = 47)

No.	Questions	Correct answer	
		Pre-test	Post-test
1.	The most often pain that occur due to postural problems is …	49%	45%
2.	The incorrect statement regarding the spine is …	60%	70%
3.	The most common cause of low back pain is …	81%	79%

4.	The correct statement regarding good sitting posture when working is …	36%	43%
5.	Low back pain is categorized as chronic if it occurs during …	47%	44%
6.	The principle(s) of muscle strengthening exercise for low back pain is/are …	51%	45%
7.	The purpose of the "finger to toe" muscle strengthening exercise is …	45%	57%
8.	The picture below that shows the correct posture is …	89%	85%
9	The incorrect sitting position when working is ….	45%	43%
10	The component(s) which have play role in the regulation of posture is/are …	45%	40%
11	The muscle(s) that need to be trained for the strength and postural stability is/are …	55%	55%
12	The inappropriate position regarding exercise for knowing good posture and correcting bad posture, is…	32%	40%
13	The factor(s) that need to be concerned after muscle strengthening exercises is/are …	72%	70%

The highest percentage of the correct answers during the pre-test and post-test were the question number 8, at 89% and 85% respectively. Meanwhile, the lowest percentage of the correct answers for both the pre-test and the post-test were the question number 12, at 32% and 40% respectively, suggested that many participants were unaware on how to check their own body posture as both questions are about checking appropriate body posture. Unpredictably, the percentages of the correct answers for the post-test were lower than the pre-test can be found in 8 from 13 questions, which were more than half of the total number of questions. In addition, only 1 question had the same percentage for both pre-test and post-test at 55%, which was question number 11 (Table 3). Those results indicated that participants' knowledge regarding proper postures were less elevated after the materials were given and the pre-test and post-test questions might not be easy to understand although having good validity.

Table 4. The knowledge of the participants about postural health (n=47).

Knowledge	Mean ±SD	P-value
Pre-test	7.06±2.39	0.777
Post-test	7.14±2.57	

*Significant if $p<0.05$, Wilcoxon Signed Rank Test

Based on the analysis in table 4, it can be inferred that there was no significant difference between the pre-test and post-test scores ($p > 0.05$) with an increase in value by 1.2%. There were 40.4% participants whose score increased, 38.3% participants whose score decreased and 21.3% participants whose score did not change after the education. The highest score for the pre-test and post-test were 13 and 12 points, respectively. The lowest score for pre and post-test were both 2 points.

4. Discussion

This study aimed to measure knowledge of participants about the correct body posture while working and using electronic gadgets and complaints that may arise in the musculoskeletal area such as shoulder pain, arm pain, wrist pain, neck pain and back pain while WFH and SFH due to COVID-19 pandemic. A literature review in musculoskeletal complaints in college students during COVID-19 by Selvija (2021) reported that Indonesian people has a habit of sitting or lying on the floor, especially when watching television. This habit might influence postural tendencies during online lecture. High report of complaints in musculoskeletal area such as neck, shoulder and back might be caused by inconsideration of ergonomic standard during online lecture. Leaning position of the neck and position that cause heavy pedestal on the elbow also contribute to neck and back musculoskeletal complaints.

Prolonged musculoskeletal discomfort will cause pain and account to sleep disorder, more sick days, and disability [6].

This study found moderate complaints of neck pain or discomfort caused by neck position and in relation in using electronic device to a study in Bali which stated that the most common complaints were back and neck pain among computer user [7]. A study in Tehran also stated that people that uses computer had the most frequently found musculoskeletal complaints of the neck, shoulder, waist and back pain as a discomfort [8]. Another recent study also found worsening in neck pain of those who worked from home, possibly due to the use of non-ergonomic equipment or bad positions which may increase musculoskeletal disorders [9]. Back pain was the most common complaint found in this study, possibly due to incorrect position while working, the lack of ergonomic working station, and the long duration of work. This is supported by a previous study which found that the increase of working from home was associated with low back pain in desk workers [10]. Pain caused by prolonged sitting time, poor working posture and other environmental factors in the office or workplace were suspected [11]. In contrary, study by Minoura et al., did not found any major associations between the duration or length of work and low back pain [10].

In this study, 70 out of 84 participants reported complaints of back pain. In relation to this finding, a study conducted by Shaikh, et al. in 2021 shows 36% out of 52 participants complained of back pain in their study [12]. The results may vary due to different working cultures, including the work duration and space used to WFH. A survey done by Shah & Desai in November 2020 reported that 42.9% of those who had to WFH during the pandemic had experienced pain in the neck and upper back region, 36.3% in the lower back regions and legs, and 16.5% felt pain in both regions [13].

Complaints in wrist pain found this study was also in relation with a study about impact of ergonomics from Choudhary et al., (2020) which conclude ill-fitting mouse and keyboard used in repetitive motion of clicking during work or study and the use of touchscreen may cause wrist and hand pain and in full bloom might develop into carpal tunnel syndrome [14].

Although working from home might offer a more flexible working context in terms of time and location, suggested that the clinical risk factors of neck pain remain similar to those who works from the office [15]. Those who have to study or work from home also needs to prepare the proper work or study space setups that is ergonomic and comfortable, as non-ergonomic positions during working from home may increase the problems of musculoskeletal systems. Commonly problems found include back, shoulder, neck and wrist pain [4]. One study also concluded that posture and duration of laptop use affect the onset of musculoskeletal complaints where wrong postures and long duration of laptop usage increase the risk of musculoskeletal pain [16].

Bad posture can increase stress in muscles, spinal discs and joints. For example, bad trunk posture it may affect abdominal muscle and back become strained and feel painful. Bad trunk posture also decreases blood flow and increase stiffness of the lower back [17]. Seating position also affecting the low back pain incidence. A better chair that can support the back may help decrease the incidence of low back pain [18].

A study about workspace and postural changes during WFH in India also reported that even though the study sample group were equipped with decent table and chair designated for studying or working purposes, the group still have complaints of back and neck pain. Though the participants are educated in insights of proper working condition, the comprehension regarding ergonomic standard of working height ratio was still lacking. The study group were also conscious with workspace related musculoskeletal disorders but the implication of such consciousness is still inadequate [19].

Our results also showed that less than half of the participants understood the given webinar material in body posture education based on the evident low score increase of 1.2% in the final post-test. This may be related to the use of medical terms during education and pre and post-test questions, showed by the decrease in the number of correct answers for 8 out of 13 post-test questions compared to the pre-test, while the participants of this study came from various background namely school students, non-medical college students, and general people. Similar results in study by Hadlow & Pitts (1991) stated that there were obvious differences of common medical term comprehension between patients and other health workers. In the context of health, health terms have clinical and lay meaning. Misunderstandings of those terms could lead to dissatisfaction and failure to comply with given advice [20].

Based on a study in analysis of online learning effectiveness during COVID-19 pandemic, the effectiveness of online learning are influenced by many factors such as economic factor by means online learning requires maximum internet access and internet data plan, social factor in regards of obstacles in communication thus creating miscommunication or misconception, health factor such as tired eyes from increased usage of electronic devices, body soreness and pain caused by lack of physical activity and decrease in social ability thus affecting personality [21].

As of posture comprehension, in contrary, a study from Iskandar et al. (2020) reported about 54% of their respondents understand the proper posture and sitting position in order to avoid back pain after given education [22]. In the ergonomic aspect, the pandemic situation has changed multiple approaches in awareness in musculoskeletal health, therefore the realization of proper space to work or study at home is important [19].

5. Conclusion

Providing education on the proper body posture can increase public knowledge although it might not be significant. In addition, there is a correlation between incorrect position of the upper arms and the neck while using gadgets or electronic devices with complaints of shoulder and neck pain. The habit of using electronic devices and improper body positions can increase musculoskeletal complaints. By having adequate knowledge of the good and proper posture, the public are expected to be able to avoid injuries, disabilities as well as musculoskeletal fatigue when using electronic devices during WFH or SFH sessions.

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References

[1]Jayani H. Pengguna Internet Terbesar di Dunia Pada Maret 2019. [Internet]. 2020. Available from: https://databoks.katadata.co.id/dat apublish/2019/09/11/indonesia-peringkat-kelima-dunia-dalam-jumlah-pengguna-internet

[2]Haryanto AT. Pengguna Internet di Indonesia. [Internet]. 2020. Available from: https://inet.detik.com/cyberlife/d4907674/riset-ada-1752-juta-pengguna-internet-di-indonesia

[3]Handarini OI, Wulandari SS. Pembelajaran daring sebagai upaya study from home (SFH) selama pandemi covid 19. Jurnal Pendidikan Administrasi Perkantoran (JPAP). 2020 Jul 17;8(3):496-503.

[4]Dampati PS, Veronica E, Chrismayanti NK. Pengaruh Penggunaan Smartphone Dan Laptop Terhadap Muskuloskeletal Penduduk Indonesia Pada Pandemi Covid-19. Gema Kesehatan. 2020 Dec 2;12(2):57-67.

[5]McAtamney L, Corlett N. Rapid upper limb assessment (RULA). InHandbook of human factors and ergonomics methods 2004 Aug 30 (pp. 86-96). CRC Press.

[6]Selvija MS. Keluhan Musculoskeletal Pada Mahasiswa Selama Pandemi Covid-19: Literatur Review. Journal of Engineering, Technology, and Applied Science. 2021 Dec 21;3(3):96-101.

[7]Kumalapatni NW, Muliarta IM, Dinata IM. Gambaran Keluhan Muskuloskeletal dan Analisis Postur Tubuh pada Siswa Pengguna Komputer di SMK "G", Denpasar, Bali. Jurnal Medika Udayana. 2020;9(1):22-7.

[8]Solhi M, Khalili Z, Zakerian SA, Eshraghian MR. Prevalence of symptom of musculoskeletal disorders and predictors of proper posture among computer users based on stages of change model in computer users in central Headquarter, Tehran University of Medical Sciences. Iran occupational health. 2014 Dec 10;11(5):43-52.

[9]Moretti A, Menna F, Aulicino M, Paoletta M, Liguori S, Iolascon G. Characterization of home working population during COVID-19 emergency: a cross-sectional analysis. International journal of environmental research and public health. 2020 Jan;17(17):6284.

[10]Minoura A, Ishimaru T, Kokaze A, Tabuchi T. Increased Work from Home and Low Back Pain among Japanese Desk Workers during the Coronavirus Disease 2019 Pandemic: A Cross-Sectional Study. International Journal of Environmental Research and Public Health. 2021 Jan;18(23):12363.

[11]Yue P, Liu F, Li L. Neck/shoulder pain and low back pain among school teachers in China, prevalence and risk factors. BMC public health. 2012 Dec;12(1):1-8.

[12]Shaikh A, Devi O, Patil A. To Study the Impact of Work from Home on Back and Neck Pain among Employees during Covid-19 Pandemic. Journal of Research in Business and Management. 2021 Feb 25; 9(2):29-32.

[13]Shah M, Desai R. Prevalence of Neck Pain and Back Pain in Computer Users Working from Home during COVID-19 Pandemic: A Web-based Survey. International Journal of Health Sciences and Research. 2021 Feb;11(2):26-31
[14]Choudhary MS, Choudary AB, Jamal S, Kumar R, Jamal S. The impact of ergonomics on children studying online during COVID-19 lockdown. J. Adv. Sports Phys. Educ. 2020.
[15]Houle M, Lessard A, Marineau-Bélanger É, Lardon A, Marchand AA, Descarreaux M, Abboud J. Factors associated with headache and neck pain among telecommuters–a five days follow-up. BMC Public Health. 2021 Dec;21(1):1-0.
[16]Wicaksono RE, Suroto S, Widjasena B. Hubungan Postur, Durasi Dan Frekuensi Kerja Dengan Keluhan Muskuloskeletal Akibat Penggunaan Laptop Pada Mahasiswa Fakultas Teknik Jurusan Arsitektur Universitas Diponegoro. Jurnal Kesehatan Masyarakat (Undip). 2016 Aug 5;4(3):568-80.
[17]Wong KC, Lee RY, Yeung SS. The association between back pain and trunk posture of workers in a special school for the severe handicaps. BMC musculoskeletal disorders. 2009 Dec;10(1):1-8.
[18]Natosba J, Jaji J. Pengaruh Posisi Ergonomis terhadap Kejadian Low Back Pain Pada Penenun Songket di Kampung BNI 46. Jurnal Keperawatan Sriwijaya. 2016 Jan 22;3(2):8-16.
[19]Suresh G. Workspace and postural challenges in Work from Home (WFH) Scenario. International Journal of Grid and Distributed Computing. 2020;13(2):12-20.
[20]Hadlow J, Pitts M. The understanding of common health terms by doctors, nurses and patients. Social science & medicine. 1991 Jan 1;32(2):193-6.
[21]Baety DN, Munandar DR. Analisis efektifitas pembelajaran daring dalam menghadapi wabah pandemi covid-19. EDUKATIF: Jurnal Ilmu Pendidikan. 2021 May 5;3(3):880-989.
[22]Iskandar MM, Quzwain F, Gading PW, Tarawifa S. Penyuluhan Posisi Duduk Yang Benar Untuk Kesehatan Punggung Bagi Masyarakat Awam. Jurnal MEDIC (Medical Dedication). 2020;3(2).