RINGKASAN

Posisi kerja merupakan aktor penting yang harus diperhatikan dalam melakukan suatu aktivitas kerja. Posisi yang tidak ergonomis dapat mengakibatkan terjadinya kelelahan pada sistem *musculoskeletal* yang pada akhirnya akan mengurangi aktivitas dan menurunnya produktivitas seseorang. Penelitian ini mempelajari pengaruh posisi kerja terhadap terjadinya kelelahan pada otot lengan operator komputer.

Tujuan khusus dalam penelitian adalah menganalisis pengaruh berbagai posisi sudut abduksi sendi bahu sebelum dan sesudah mengetik terhadap terjadinya kelelahan pada otot lengan operator jasa pengetikan komputer dan untuk mendapatkan rentang sudut optimal yang tidak menimbulkan kelelahan pada otot lengan operator komputer. Sedangkan tujuan umum adalah mempelajari pengaruh berbagai posisi sudut abduksi sendi bahu terhadap terjadinya kelelahan pada otot lengan operator jasa pengetikan komputer.

Penelitan ini adalah penelitian eksperimenal dengan desain penelitian *pre-post test control group design*, yakni mengukur kemampuan kontraksi statis dan dinamis otot lengan sebelum dan sesudah mengetik selama 30 menit pada tiga posisi yang berbeda. Ketiga posisi antara lain: $0 - 20^0$, $20 - 40^0$ dan $40 - 60^0$. Pengukuran kemampuan kontraksi otot secara statis dan dinamis dilakukan sebanyak 2 kali, yaitu sebelum dan sesudah melakukan pengetikan selama 30 menit, dengan menggunakan *hand dynamometer* untuk mengukur kontraksi statis dan *handgrip* untuk mengukur kontraksi dinamis. Populasi adalah operator jasa pengetikan komputer sebanyak 31

orang. Dilakukan *screening* dengan kriteria sampel umur 25 – 40 tahun, laki-laki, masa kerja minimal 1 tahun, berat badan 50 – 70 kg, panjang lengan antara 65 – 75 cm, tinggi tubuh 50 – 70 cm, kemampuan kontraksi otot lengan sebelum diberikan perlakuan dalam range yang sama (statis: 30 – 40 kg, dinamis: 30 – 45 detik), fitness baik, lama tidur pada malam hari lebih dari 6 jam dan tidak sedang menderita suatu penyakit yang dapat mengganggu jalannya penelitian. Sampel sebanyak 21 orang diambil dengan *simple random sampling*, kemudian dilakukan alokasi random atas tiga kelompok perlakuan yang berbeda dan 7 sampel sama. Hasil pengukuran kemampuan kontraksi statis dan dinamis otot lengan diuji dengan menggunakan uji t sampel berpasangan (*paired sample*) untuk sampel sama dan uji anova satu arah (*anova one way*).

Hasil penelitian selisih kemampuan kontraksi statis dan dinamis sebelum dan sesudah mengetik selama 30 menit antar kelompok dengan uji t sampel berpasangan menunjukkan bahwa ada perbedaan yang bermakna ($p < 0,05$) pada posisi 0 - 20^0, statis 36,29 kg (SD = 1,11 kg), dinamis 33,86 detik (SD = 0, 69 detik) dan posisi 40 - 60^0, statis: 36,14 kg (SD = 0,90 kg), dinamis: 33,86 detik (SD = 0,90 detik). Tidak ada perbedaan yang bermakna ($p > 0,05$) pada posisi 20 - 40^0, statis: 36,86 kg (SD = 0,90 kg), dinamis: 35,00 detik (SD = 1,15 detik). Pada sampel berbeda antar kelompok dengan uji anova satu arah menunjukkan tidak ada perbedaan yang bermakna ($p > 0,05$) setelah mengetik pada posisi 0 - 20^0, statis: 36,71 kg (SD = 1,41 kg), dinamis: 33,57 detik (SD = 1,62 detik), posisi 20 - 40^0, statis: 36,29 kg (SD = 1,70 kg), dinamis 34,57 detik (SD = 1,27 detik) dan posisi 40 - 60^0, statis: 35,57 kg (SD = 0,79 kg), dinamis: 34,43 detik (SD =1,57 detik). Selisih

rata-rata kemampuan kontraksi setiap posisi, baik pada kontraksi statis maupun dinamis pada sampel sama dan sampel berbeda, menunjukkan adanya penurunan kemampuan kontraksi otot lengan operator jasa pengetikan komputer, di mana penurunan terbesar pada posisi 0 - 20^0 dan 40 - 60^0 dibanding pada posisi 20 - 40^0.

Berdasarkan hasil analisis data dapat ditarik kesimpulan bahwa: (1) ada pengaruh posisi kerja terhadap terjadinya kelelahan otot lengan operator jasa pengetikan komputer, (2) karena pada rentang sudut 20 - 40^0 abduksi sendi bahu yang paling optimal kurang menimbulkan kelelahan pada otot len gan, maka operator komputer disarankan seyogyanya pada saat mengetik dapat memperhatikan posisi kerja tersebut guna mencegah terjadinya kelelahan atau keluhan yang sifatnya berulang.

SUMMARY

Working position is an important factor that should be taken into account in accomplishing a working activity. An unergonomic position may result in fatigue at musculoskeletal system that finally decreases the activity and reduces one's productivity. This study investigated the effect of working position on the occurrence of brachial muscles in computer operator.

The particular objective of this study was to analyze the effect of various positions of abduction angle of shoulder joint before and after typing on the occurrence of fatigue in brachial muscles of computer operator and to determine the optimal angular range that may not produce muscular fatigue in computer operator. The general objective was to study the effect of various positions of abduction angle of shoulder joint on the occurrence of fatigue in brachial muscles of computer operator.

This was an experimental study using pre- and post test control group design for different samples and one group pre- and post test design for similar samples, in which the author measured static and dynamic contraction capability before and after typing for 30 minutes at three different positions. These positions were 0 - 20°, 20 - 40°, and 40 - 60°. The measurement of static and dynamic muscular contraction was carried out twice, before and after typing for 30 minutes, using hand dynamometer for measuring static contraction, and handgrip for dynamic contraction. Population consisted of 31 computing service operators. Screening was undertaken to the population, with the criteria as follows: age 25 - 40 years, male, minimum working period of 1 year, body weight 50 - 70 kg, arm length 65 - 75 cm, body height 50 - 70 cm, the capability of muscular contraction before treatment was at the same range (static 30 - 40 kg, dynamic 30 - 45 seconds), good fitness, night sleeping time of more than 6 hours, and had no disease that may confuse observation. Samples were recruited using simple random sampling, and subjected to random allocation into three different treatment groups consisting of 7 individuals each. The measurement of muscular static and dynamic contraction capacity was carried out by means of paired sample t test for similar samples and one way anova and anacova test.

Results of the observation to the difference of static and dynamic contraction before and after typing for 30 minutes between groups using paired sample t test revealed significant difference ($p < 0.05$) in position 0 - 20°, static 36.29 kg (SD = 1.11 kg), dynamic 33.86 seconds (SD = 0.69 seconds), and position 40 - 60°, static 36.14 kg (SD = 0.90 kg), dynamic 33.86 seconds (SD = 0.90 seconds). However, significant difference was not found ($p > 0.05$) in position 20 - 40°, static 36.86 kg (SD = 0.90 kg), dynamic 35.00 seconds (SD = 1.15 seconds). One way anova test between different samples revealed no significant difference ($p > 0.05$) after typing in positions 0 - 20°, static 36.71 kg (SD = 1.41 kg), dynamic 33.57 (SD = 1.62 seconds), position 20 - 40°, static 36.29 kg (SD = 1.70 kg), dynamic 34.57 seconds (SD = 1.27 seconds), and position 40 - 60°, static 35.57 kg (SD = 0.79 kg), dynamic 34.43 seconds (SD = 1.57 seconds). The difference of average contraction capability in each position,

either in static or dynamic contraction in similar as well as different samples, indicated the reduction of brachial muscle contraction capability in the operators of computing service, in which the highest reduction was found in positions 0 - 20° and 40 - 60°, as compared to position 20 - 40°.

It can be concluded that (1) working position has effect on the occurrence of brachial muscle fatigue in the operators of computing service, (2) since at the range of 20 - 40° the optimal abduction of shoulder joint produce the least fatigue in brachial muscle, it is recommended for the computer operators to maintain that position during typing to prevent fatigue or recurrent complaints.

ABSTRACT

The Effect of Work Position on Fatigue on the Arm Muscles of Computer Operator

Hendrik

This research is intended to find out the effect of work position on fatigue on the arm muscles of computer operator. This is an experimental research using *pre-post test control design* for different samples and one group *pre-post test design* for the same samples. The population were 31 operators of computer services at Tamalanrea district, in Makassar. The criteria of the samples were 25-40 years old, male, 1 year work experience, weight 50-70 kgs, length of arms 65-75 cms, height 50-70 cms, muscle contraction capacity was within the same range (statistic 30-40 kgs, dynamic 30-45 second), good physical fitness, duration of night sleep was more then 6 hours and not suffering from any disease which might hinder the research. 21 Samples were taken through *simple random sampling* and then random allocation was done into three different group treatments and 7 samples of the same kind. The result of static contraction capacity measurement and dynamic arm muscles were tested using *anova* and *anacova* test for different samples and paired sample t test for the same sample.

The findings of the research are that there was a significant difference ($p<0,05$) between static and dynamic contraction capacity before and after 30 minute-typing in the group construe of t test paired sample, after typing at the position of 0-20°, static 36,29 kgs (SD=1,11 kg), dynamics 33,86 seconds (SD=0,69 seconds), 40-60°, static 36,14 kgs (SD=0,90 kg), dynamic 33,86 seconds (SD=0,90 second). However there is no significant difference at the position 20-40°, static 36,86 kgs (SD=0,90 kg), dynamics 35,00 seconds (SD=1,15 seconds). In different samples among the group with *anova* and *anacova* tests there was no significant difference ($p>0,05$) after typing at the position 0-20°, static 36,71 kgs (SD=1,70 kgs), dynamic 34,57 seconds (SD=1,27 second) and at the position 40-60°, static 35,37 kgs (SD=0,79 kg), dynamic 34,43 seconds (SD=1,57 second).

Based on the result of the analysis it is concluded that: (1) there is an influence of work position on the fatigue of arm muscles of a computer operator, (2) due to the fact that at the angle range 20-40°,the maximal shoulder joint abduction caused less fatigue on the arm muscles, so a computer operator should take care of work position to prevent any repeated fatigue.

Key words : *Work position, fatigue.*