MINIMIZING THE RISK FACTORS FOR LOW BACK PAIN IN THE CREATIVE INDUSTRY WORKERS

Yamtana[1], Heru Subaris Kasjono[2], Adib Suyanto[3]
Politeknik Kesehatan Kementerian Kesehatan Yogyakarta [123]
yamtanakesmas@yahoo.co.id[1], heru.subarisk@poltekkesjogja.ac.id[2], adibsuyanto@yahoo.com[3]

ABSTRACT

Low back pain (LBP) felt in the anatomical area of a person's body is affected by a load or pressure outside the tolerance limit, with various variations in the length of time the pain complaint process occurs. This pain is felt in the lumbar or lumbo-sacral area. Workers in the batik industry may be at risk of LBP caused by work activities, such as bending, repetitive or monotonous movements, using work equipment and a non-ergonomic work environment. This study aims to minimize the risk factors for LBP in batik creative industry workers. The population of this study were all batik artisans in the written batik industry in Wukirsari Village, Imogiri District, Bantul Regency, Yogyakarta Special Region, totaling 1,021 people. The sample of this study was obtained by random sampling, to determine the sample using a lottery number and the name of the batik maker, totaling 60 batik people. The inclusion criteria for the sample of this study included female gender, writing batik work, working sitting using a chair. The sample consisted of a treatment group and a control group, each consisting of 30 batik makers, hereinafter referred to as respondents. The research instruments include: meter, microthoice, scales, chair, batik hurdle, and NBM questionnaire. Ergonomic work chair design for batik size: height of seat holder = 30 cm; length of seat holder = 40 cm; seat width = 37 cm; high back of chair = 43 cm; seat back width = 37 cm. Modification of batik gawangan is to redesign batik gawangan, material from bamboo diameter of about 3 cm, with size: height = 88 cm, width = 158 cm, 4-legged pieces, equipped with 3 watt LED lights. The results of the NBM in the treatment group decreased skeletal muscle complaints into criteria: low 96.7% and moderate 3.3%. The control group had skeletal muscle disorders criteria: low 23.3%, moderate 46.7%, high 20% and very high 10%. While the results of the t-test from the NBM data each of the 30 respondents between the treatment group and the control group, the value of p = 0.000 means that there are significant differences between respondents who use chairs and ergonomic modification modifications with respondents who use dingklik and gawangan which is old. The conclusion is that the use of chairs and modifications of the ergonomic batik wrestling can minimize the risk factors for LBP in the workers of the written batik creative industry

Keywords: creative industries, low back pain, risk factors, workers, written batik

INTRODUCTION

Based on the Law of the Republic of Indonesia Number 13 of 2003 concerning Manpower, states that manpower development must be regulated in such a way that basic rights and protections for workers or laborers are fulfilled and at the same time can create conditions conducive to the development of the business world.

Batik work is a monotonous job. So that the physical, physiological and psychological workload become more dominantly felt by batik. Batik workers work using a short seat called *dingklik* (Javanese), so that the work attitude is sitting. Dingklik is a short seat that is not equipped with a backrest, armrest, and hard seat, made of wood, bamboo, or plastic. Ergonomically, the low sitting posture of the body is always lowered, the back is bent, and the legs are folded, making it uncomfortable to work, easy to fatigue and can cause health problems.

Saputra, et al. (2014) regarding the proposed repair of the mencanting work station with an analysis of musculoskeletal complaints at Griya Batik Gres Tenan, stated that there were several complaints felt by workers in the body parts: waist, hip, left elbow, right wrist, right hand, right and left thighs, left knee, right and left calves, right ankle and left foot, right foot. While research Sumardiyono, et al. (2012) regarding the effect of risk factors on risk factors for low back pain in female batik workers in Sragen Regency, with the results showing a significant difference in risk factors for low back pain between before and after using an ergonomic chair. Furthermore, the body mass index factor was statistically influential, in addition to stating the importance of an ergonomic chair to reduce the level of risk factors for low back pain. Research by Livandy and Setiadi (2016) that, from 81 workers in the convection sewing section in Pademangan District, North Jakarta, it was found that 78 workers or 96.3% had complaints of musculoskeletal disorders in the last 12 months, 47 workers or 58% had problems in the last seven days. A total of 36 workers or 44.4% complained of musculoskeletal disorders (MSDs) that prevented them from doing housework or outside the home in the last 12 months. Most complaints of MSDs are felt in the neck, waist and back.

Low back pain is pain that is felt in the anatomical area of a person's body that is exposed to a load or pressure beyond the tolerance limit, with various variations in the length of time the pain complaint occurs. This pain is felt in the lumbar or lumbo-sacral area. Workers in the written batik industry can be at risk of LBP caused by activities at work, such as bending positions, repetitive or monotonous movements, using work equipment and a work environment that is not ergonomic. A poor sitting work attitude can be seen from the use of an inappropriate chair, so that the legs are hanging or folded.

Discomfort at work will cause fatigue, even pain. The body parts that feel pain include: shoulders, upper arms, upper back, lower back, forearms, wrists, buttocks, thighs, knees and feet. The incidence of LBP is closely related to the way of work, work attitude, and work position. Likewise, workers in the batik industry can work more than 8 hours a day. To minimize the risk factor for LBP in batik, it is necessary to design an ergonomic work chair and modification of the batik railing. The aim of the study was to minimize the risk factors for LBP of workers in the written batik industry.

RESEARCH METHOD

This type of research is a quasi-experimental, with a one group pre and posttest design approach.

RESULTS AND DISCUSSION

This research was conducted at 12 locations of the household batik industry in Wukirsasi Village, Imogiri District, Bantul, Yogyakarta Special Region, namely 30 respondents as the treatment group, and 30 respondents as the control group. Respondents work for approximately 8 hours per day, starting at 08.00 - 16.00 WIB. The results showed that all workers in the written batik industry were female, presented in the form of a table as follows.

Table 1.
Characteristics of respondents in the creative batik industry in Wukirsasi Village Imogiri District Bantul Regency Special Region of Yogyakarta

Variables	Control		Treatment	
	Frequency	Percentage	Frequency	Percentage
Gender				
Woman	30	100	30	100

Amount	30	100	30	100
Level of Education				
No School	1	3.3	0	0
Primary School (PS)	2	6.7	4	13.3
Junior High School (JHS)	17	56.7	8	26.7
Senior High School (SHS)	9	30	14	46.7
College	1	3.3	4	13.3
Amount	30	100	30	100
Age (years)				
21-30	3	10	4	13.3
31-40	5	16.7	5	16.7
41-50	9	30	6	20
51-60	9	30	9	30
>60	4	13.3	6	20
Amount	30	100	30	100
Average age (years)	41.8		46.6	
Variables	Control		Treatment	
	Frequency	Percentage	Frequency	Percentage
Working period (years)				
0-10	4	13.3	7	23.3
11-20	4	13.3	4	13.3
21-30	6	20	6	20
31-40	7	23.3	8	
41-50	6	20	4	13.3
>50	3	100	1	3.3
Amount	30	100	30	100

Table 1 shows the characteristics of the respondents based on the gender of the batik makers in Wukirsasi Village. Imogiri District. Bantul Regency. Yogyakarta Special Region. all 100% female. This is because at first batik work was a job that had to be done carefully and additional work after taking care of routine household work. The education level of the respondents varied ranging from not attending school to tertiary level.

The education of respondents in the control group was dominated by junior high school as much as 56.7% while in the treatment group high school was 46.7%. Characteristics of respondents based on age varied from less than 24 years to more than 78 years. The age of respondents in the control group was dominated by between 41-60 years as much as 60%. the treatment group at the age of 51-60 years as much as 30%. The working period of the respondents varied from 4 months to 68 years.

The results of the anthropometric measurement survey of 60 respondents in the treatment group and control group obtained the average body dimensions of the batik makers including: sitting shoulder height/sitting height (TD) = 83 cm; sitting elbow height (TSd) = 25.5 cm; sitting hip height (TPd) = 20 cm; sitting knee height (TLd) = 47.5 cm; sitting hip width (LPd) = 37 cm; popliteal length/upper limb length (PTa)= 51 cm; and popliteal height/lower leg height (PTb) = 39 cm.

Based on the anthropometric data of the respondent's body an ergonomic batik work chair design can be made measuring: seat height = 30 cm; seat seat length = 40 cm; seat seat width = 37 cm; seat back height = 43 cm; seat back width = 37 cm. Modification of the batik wicket is a redesign of the batik wicket made of bamboo framework with the size: height = 88 cm. width =

158 cm. with 4 supporting legs. In addition it is equipped with an artificial light source using a Light Emitting Diode (LED) lamp with a power of 3 watts. The difference between posttest and pretest results from the NBM survey of respondents in the control group. was zero. While the treatment group experienced a decrease in detail the results are as follows.

Table 2.
The difference in the number of respondents experiencing musculoskeletal disorders in the batik industry in Wukirsasi Village Imogiri District Bantul Regency Special Region of Yogyakarta

Pain full body part	Number of respondents with musculoskeletal disorders					
	Control Group			Treatment Group		
	Pre	Post	Difference	Pre	Post	Difference
Upper neck	30	30	0	29	7	22
Neck down	30	30	0	29	5	24
Left shoulder	30	30	0	30	4	26
Right shoulder	30	30	0	30	10	20
Left upper arm	13	13	0	7	5	2
Back	30	30	0	30	3	27
Right upper arm	18	18	0	11	11	0
Waist	30	30	0	29	4	25
left ass	29	29	0	30	0	30
Right ass	29	29	0	29	0	29
Left elbow	28	28	0	28	5	23
Right elbow	29	29	0	28	13	15
Left lower arm	9	9	0	6	2	3
Right fore arm	12	12	0	6	10	-4
Left wrist	25	25	0	26	5	21
Right wrist	28	27	1	29	8	21
Left hand	9	9	0	9	2	7
Right hand	18	18	0	20	11	9
Left thigh	1	1	0	4	2	2
Right thigh	1	1	0	5	3	2
Left knee	28	28	0	29	0	29
Right knee	29	29	0	29	0	29
Left calf	17	17	0	17	1	16
Right calf	16	16	0	17	0	17
Left ankle	3	3	0	4	0	4
Right ankle	3	3	0	5	2	3
Left Foot	0	0	0	3	0	3
Right foot	0	0	0	3	1	2

The results of the nordic body map (NBM) measurement of respondents in the written batik industry the difference between pretest and posttest is mostly on the left buttocks as much as 30 items. The left buttock at the time of making batik is in a static position, because it adjusts the position of the cloth and batik tools as the object of work. So that the left buttocks. relatively rarely move dynamically. While the difference between pretest and posttest is at least on the right forearm as much as -4 items. This body part is the center that is often used for work movements in the batik process. There fore the right forearm the batik maker works dynamically so that there are relatively few or no pain complaints.

Table 3.
Results of the pretest posttest nordic body map of respondents in the batik industry in Wukirsasi Village Imogiri District Bantul Regency Special Region of Yogyakarta

Kriteria NBM	Control Group				Treatment Group			
	Pre		Post		Pre		Post	
	Amount	%	Amount	%	Amount	%	Amount	%
Low	6	20	7	23.3	6	20	29	96.7
Currently	19	63.3	14	46.7	13	39	1	3.3
Tall	5	16.7	6	20	9	30	0	0
Very high	0	100	3	100	2	100	0	100
MSDs history			Amount	%			Amount	%
Once			7	23.3			10	33.3
Never			23	76.7			20	66.7

The results of the pretest NBM survey of respondents in the control group, who have criteria for moderate musculoskeletal disorders are 19 respondents or 63.3%, high levels are 5 respondents or 16.7%. The results of the posttest NBM survey of respondents in the control group who had moderate musculoskeletal disorders criteria were 14 respondents or 46.7%. While the results of the posttest NBM survey of respondents in the treatment group who had criteria for low-grade musculoskeletal disorders were 29 respondents or 96.7%.

The results of the t-test with the value of p = 0.000 means that there are differences in skeletal muscle disorders between the control group and the treatment group. So that the use of ergonomic batik chairs and bars has a significant effect on reducing the level of skeletal muscle disorders in respondents in the written batik industry in Wukirsasi Village, Imogiri District, Bantul Regency, Special Region of Yogyakarta.

The results of this study are the same as those of Harwanti, et al. (2018), which shows that the factors that are proven to have an effect on LBP are age with a p value of 0.046 exercise habits with a p value of 0.000 and years of service with a p value of 0.000 for workers in the home batik industry Sokaraja Banyumas District.

The results of this study also strengthen the research of Natosba and Jaji (2016) which states that there is a significant difference between LBP in workers before and after being given an ergonomic work position namely a back seat in songket weaving in Kampung BNI 46 Palembang South Sumatra Meanwhile the results of Koesyanto's research (2013). Stated that back pain was related to age length of service and work attitude of sarong weaving workers in North Wanarejan Village Pemalang Central Java. So that the complaints felt by respondents are the same as in this study.

The main factor in the occurrence of disorders of the skeletal muscle system is the pressure caused by the working position. In addition factors that affect occupational health are related to ergonomic aspects or work attitudes such as repetitive work and non-ergonomic work positions that will cause fatigue such as the onset of muscle pain (Suma'mur. 2009). This is in line with the results of Asmari's research that the use of ergonomic chairs significantly affects the level of fatigue and productivity of workers in the false eyelash industry in Gading Village Playen Gunung Kidul (Asmari. 2014).

Similar research states that there is a relationship between tenure and complaints of LBP in workers in the production division of PT. Surya Besindo Sakti, Serang Regency and there is a relationship between work attitude and complaints of LBP on workers in the production division

of PT. Surya Besindo Sakti, Serang Regency, Banten Province (Rohmawan and Hariyono. 2017).

CONCLUSION

Ergonomic work chair design for batik sized: seat height = 30 cm; seat seat length = 40 cm; seat seat width = 37 cm; seat back height = 43 cm; seat back width = 37 cm. Modification of the batik pole made of bamboo with the size: height = 88 cm. width = 158 cm. with 4 support legs, equipped with 3watt Light Emitting Diode (LED) lamps.

Nordic body map survey data after treatment of respondents in the control group who have mild criteria as many as 7 respondents or 23.3% moderate criteria as many as 14 respondents or 46.7% high criteria as many as 6 respondents or 20% and very high criteria as many as 3 respondents or 10%. While in the treatment group that has mild criteria as many as 29 respondents or 96.7% moderate criteria obtained 1 respondent or 3.3%.

There is a significant difference between respondents who use chairs and respondents who use chairs and modifications of ergonomic batik railings

REFERENCES

Asmari. T. N. 2014. The Effect of Ergonomic Chair Usage on Fatigue Levels and Work Productivity in the False Eyelash Manufacturing Industry in Gading. Playen Gunung Kidul. Thesis is not published.

Astutik S. and Sugiharto. 2014. The relationship between work chair design and complaints of low back pain in weaving workers at CV. Pirsa Art Pekalongan. Journal of Public Health 4 (1) (2015). Jurusan Ilmu Kesehatan Masyarakat. Fakultas Ilmu Keolahragaan. Universitas Negeri Semarang. Indonesia.

Bruno. R. 2010. Risk Factors for Work-related Musculoskeletal Disorders: a Systematic Review of Recent Longitudinal Studies. American Journal of Industrial Medicine. 53(3):285-323.

Cris Purwandari. 2012. Working Period. Work Attitude and Incidence of Carpal Syndrome in Batik. Jurnal Kesmas. 7(2): 170-176.

Dewi. K. A. C.. Tirtayasa. K.. dan Handari. L. M. I. S.. 2019. Sikap Kerja Lebih Ergonomis Menurunkan Gaya Kompresi Tulang Belakang dan Keluhan Muskuloskeletal serta Meningkatkan Produktivitas. Jurnal Ergonomi Indonesia Vol.05. No.02 : Juli-Desember 2019 (The Indonesian Journal of Ergonomics) ISSN Print : 1411 –951 X. ISSN Online: 2503-1716. e-mail korespondensi:wicintya@gmail.comdoi:https://doi.org/10.24843/JEI.2019.v05.i02.p06

Grandjean. E. 1988. Fitting The Task to the Man: A Textbook of Occupational Ergonomics. 4th Edition. Taylor & Francis. New York.

Grandjean. E. 1993. Fitting the Task to the Man. 4th ed. London: Taylor & Francis Ltd.

Hanneke. W. 2006. Prevalence of Musculoskeletal Disorders Is Systematically Higher in Women Than in Men. Clinical Journal of Pain. 22(8): 717-724.

Harahap. P.S. Marisdayana. R. Hudri. M. A. 2018. Factors related to complaints of low back pain in hand-drawn batik artisans in the District of Pelawangan. Jambi City. Health Information Research Vol. 7 No. 2. Public Health Study Program. STIKES Harapan Ibu Jambi.

Hendrarini. L. 2016. The use of ergonomic chairs for non-machine striated weavers (ATBM) to reduce muscle pain disorders in the lurik industry Cawas Klaten. Health Polytechnic. Ministry of Health Yogyakarta.

Harwanti. S.. Ulfah. N.. Nurcahyo. P. J.. 2018. Factors that influence of low back pain (LBP) on workers in home industry district batik Sokaraja Banyumas. Jurnal Kesmas Indonesia. Volume 10 Nomor 2 Juli 2018. Hal 109-123 Jurusan Kesehatan Masyarakat Fakultas Ilmu-Ilmu Kesehatan Universitas Jenderal Soedirman

I Ketut Widana. Ni Wayan Sumetri. I Ketut Sutapa. dan Gusti Ayu Oka Cahya Dewi. 2020. Antisipasi Pada Keluhan Low Back Pain Dapat Mengurangi Kelelahan dan Meningkatkan Motivasi Kerja. Jurnal Ergonomi Indonesia Vol.06 No.01 Juni 2020 (The Indonesian Journal of Ergonomic) ISSN Print : 1411-951X. ISSN Online : 2503-1716. e-mail korespondensi: widketut@yahoo.comdoi: https://doi.org/10.24843/JEI.2020.v06.i01.p09

Koesyanto. H. 2013. Working Period and Sitting Attitude Against Back Pain. Jurnal Kesehatan Masyarakat 9 (1) (2013) 9-14. http://journal.unnes.ac.id/nju/index.php/kemas Jurusan Ilmu Kesehatan Masyarakat. Fakultas Ilmu Keolahragaan Universitas Negeri Semarang. Indonesia.

Livandy. V. Setiadi. T. H. 2018. The prevalence of musculoskeletal disorders in sewing convection workers in Pedemangan District. North Jakarta for the period January 2016. Tarumanagara Medical Juornal Vol. 1. No. 1. 183-191. Oktober 2018. Jakarta. Fakultas Kedokteran Tarumanagara. E-mail: tjies@fk.untar.ac.id

Loisel. P. 2005. Prevention of Work Disability Due to Musculoskeletal Disorders: The Challenge of Implementing Evidence. Journal of Occupational Rehabilitation. 15(4): 507-524.

Natosba. J. and Jaji. 2016. Effect of ergonomic position on the incidence of low back pain in songket weavers in BNI 46 village. Sriwijaya Nursing Journal. Volume 3 Number 2. July 2016. ISSN No 23555459 E-mail: jumnatosba_bayd@yahoo.co. en. jaji.unsri@gmail.com Nursing Science Study Program. Faculty of Medicine Sriwijaya University

Ningsih. D. S. Herawati. L. Suwarni. A. 2016. The use of ergonomic chairs to reduce complaints of skeletal muscle pain (Musculoskeletal Disorders) in laundry workers in the Yogyakarta City area. Sanitation Journal of Environmental Health. Yogyakarta.

Nurmianto. E. 2004. Ergonomics Basic Concepts and Applications. Ten November Institute of Technology. Surabaya.

Pheasant. S. 1987. Bodyspace: Anthropometry. Ergonomics and Design. London: Taylor & Francis.

Pheasant. S. 1991. Bodyspace: Anthropometry. Ergonomics and Design. London: Taylor & Francis.

Ramdan. I. M. Laksmono. T. B. 2012. Determinants of musculoskeletal complaints in female workers. Public Health. National Journal of Public Health Vol. 7 No. 4. November 2012. Occupational Health and Safety Department. Faculty of Public Health. Mulawarman University. Gd. Lt. Library 3 Jl. Quaro Campus Mt. Kelua. Samarinda. E-mail: i_oneramdan@yahoo.co.id

Rofiatun. 2018. Low back pain in home base worker batik: work duration and chair height.

Rohmawan. E.A., Hariyono. W. 2017. Working Period. Work Attitude and Complaints of Low Back Pain (Lbp) in Production Division Workers of PT. Surya Besindo Sakti Serang. Proceedings of the IKAKESMADA National Seminar "The Role of Health Workers in the Implementation of SDGs" Science Study Program Public Health. Faculty of Public Health. Ahmad Dahlan University. Yogyakarta City. DIY. E-mail: ekoarma36@gmail.com. widodohariyono@gmail.com Program Studi Ilmu Kesehatan Masyarakat. Fakultas Kesehatan Masyarakat. Universitas Ahmad Dahlan. Kota Yogyakarta. DIY. E-mail : ekoarma36@gmail.com. widodohariyono@gmail.com

Santosa. A. Ariska. D. K. 2018. Factors related to the incidence of musculoskeletal disorders in batik workers in Sokaraja Banyumas District. MEDISAINS: Jurnal Ilmiah Ilmu-ilmu

Kesehatan Vo. 16 No. 1. April 2018. Departemen Keperawatan Medikal Bedah. Fakultas Ilmu Kesehatan. Universitas Muhammadiyah Purwokerto. Jawa Tengah. E-mail: agussantosa@ump.ac.id

Sigar. A. J. G. Suoth. L. F. Rattu. J. A. M. 2019. The relationship between sitting position and body mass index with musculoskeletal complaints in employees at Bank SulutGo Manado Main Branch. KESMAS Journal. Vol. 8. No. 7. November 2019. Faculty of Public Health. University of Sam Ratulangi Manado.

Siswiyanti. 2013. Design of Ergonomic Chair Tables for Batik Writing in Kalinyamat Wetan Village. Tegal City. Jurnal Ilmiah Teknik Industri. Volume 12. Nomor 2. Desember 2013. Jurusan Teknik Industri. Universitas Pancasakti. Tegal.

Sulaeman. YA and Kunaefi. TD. 2015. Low back pain (lbp) in Workers in the Traditional Beverage Division (Case Study CV. Cihanjuang Inti Teknik) Low Back Pain (Lbp) On Workers in Traditional Beverage Division (Case Study CV. Cihanjuang Inti Technique). Journal of Environmental Engineering Volume 21 Number 2. October 2015 (Page 201-211) Environmental Engineering Study Program. Faculty of Civil and Environmental Engineering. Bandung Institute of Technology.

Sumardiyono. Yeremia. R. A. 2014. Differences in Musculoskeletal Disorders of Women Batik with Ergonomic Chairs and Chairs. PACK 9(2) 144-149.

Suma'mur. 2009. Hiperkes Occupational Safety and Ergonomics. Jakarta: Sagung Seto.

Tarwaka. 2010. Basic Knowledge of Ergonomics and Workplace Applications. Solo. Harapan Press.

Widodo. Tri. Heli Sasmita. 2016. The Design of a Work Chair Based on Ergonomics Principles in the Packaging Department at PT. Propan Raya ICC Tangerang. Journal of Industrial Manufacturing Volume 1 Number 2. 10 July 2016. Industrial Engineering Study Program. Faculty of Engineering. Universitas Muhammadiyah Tangerang.

Wignjosoebroto. S. 2006. Ergonomics of Motion and Time Studies. First Edition. Second Printing. Bandung.

Yamtana. 2018. Mitigating Musculoskeletal Disorder Using Occupational Chair among Batik Workers. Proceedings The 4th International Conference on Public Health 2018. Universitas Sebelas Maret. Jl. Ir Sutami 36A. Surakarta 57126. Central Java. Indonesia.