The Correlation between Elbow and Parturition Bed Height with the Risk of Musculoskeletal Disorders

Hubungan Tinggi Siku dan Tinggi Bed Partus dengan Risiko Musculoskeletal Disorder

Hilfia Alifa Nurly, Mulyono

Department of Occupational Safety and Health, Faculty of Public Health, Universitas Airlangga
Campus C Mulyorejo, Surabaya, East Java 60115 Indonesia

ABSTRACT

Introduction: Ergonomics can potentially cause harms for workers. Midwives are among those workers who are susceptible to have an impaired performance by ergonomics. As health professionals whose main task are providing care during childbirth, 40.8% of midwives suffer from musculoskeletal disorders at neck and 24.5% on upper back due to poor repetitive and frequent work posture they need to do over a long time while assisting childbirth such as bending, tilting the body to the left and looking toward the birth canal. A study claimed that midwives had a very high risk to suffer from MSDs. This study aimed at analyzing the correlation between elbow and parturition bed height with the risk of musculoskeletal disorders among midwives while assisting childbirth at the hospital. **Method:** This cross-sectional design research was determined using non-probability sampling technique involving 11 midwives in the hospital delivery room. The examined variables covered age, period of working, anthropometry, parturition bed, posture, and MSDs using a measurement sheet, REBA and Nordic Body Map Questionnaire as the research instruments. The data is presented in the cross tabulation from computer analysis data program and in description. **Results:** As much as 91 % midwives were at the age of 26-45 years old with >10 years of experience that was about 72.7%; 3 midwives had BMI score > 29; 81.8% midwives had high score level of musculoskeletal disorders risk, 81.8% midwives did not set their parturition bed with appropriate elbow height; and the value of contingency coefficient from elbow and parturition bed height with musculoskeletal disorders was 0.707. **Conclusion:** There is correlation between elbow and parturition bed height with musculoskeletal disorder of midwives when assisting childbirth process at hospital.

Keywords: childbirth, ergonomics, midwife, musculoskeletal disorders

ABSTRAK

Pendahuluan: *Salah satu potensi bahaya pada pekerja adalah faktor ergonomi. Bidan merupakan salah satu pekerja yang rentan memiliki gangguan performasi akibat faktor ergonomi. Bidan adalah tenaga kesehatan yang memiliki tugas utama menolong persalinan. 40.5% bidan mengalami keluhan penyakit berhubungan dengan musculoskeletal di leher dan 24.5% di punggung. Bidan dalam menolong persalinan membungkuk, miring ke kiri dan menoleh kearah jalan lahir secara berulang dalam rentang waktu yang lama. Sebuah penelitian mengemukakan bahwa bidan di Rumah Sakit memiliki risiko sangat tinggi menderita MSDs pada saat melakukan pertolongan persalinan. Penelitian ini bertujuan untuk menganalisis hubungan tinggi siku dan tinggi bed partus dengan keluhan musculoskeletal pada bidan saat menolong persalinan di rumah sakit.* ***Metode:*** *penelitian ini memiliki rancang bangun cross sectional dengan pengambilan sample menggunakan Teknik non-probability sample yaitu seluruh populasi yaitu 11 bidan di ruang bersalin rumah sakit. Variable yang diteliti meliputi usia, lama kerja, antropometri, bed partus, postur tubuh dan keluhan musculoskeletal menggunakan instrument lembar pengukuran REBA dan Nordic Body Map Questioner dan data disajikan dalam bentuk tabulasi silang program analisis data komputer dan narasi.* ***Hasil:*** *91% bidan berusia 26-45 tahun dengan lama kerja >10 tahun sebanyak 72.7%, terdapat 3 bidan memiliki IMT > 29, 81,8% bidan memiliki risiko tinggi mengalami keluhan musculoskeletal, 81,8% bidan tidak sesuai dalam mengatur tinggi bed partus dengan tinggi sikunya, dan nilai kofisien kontingensi dari tinggi siku dan tinggi bed partus dengan risiko keluhan musculoskeletal sebesar 0.707* ***Simpulan:*** *Ada hubungan antara tinggi siku dan tinggi bed partus dengan keluhan musculoskeletal pada bidan saat menolong persalinan di rumah sakit.*

Kata kunci: *bidan, ergonomi, keluhan musculoskeletal, persalinan*

Corresponding Author:
Hilfia Alifa Nurly
Email: nhilfia@gmail.com
Telephone: +628568536535

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INTRODUCTION

One of the rights of workers according to the Law number 13 of 2013 is to receive protection for their safety and health at the workplace (Presiden, 2003). Workers and workplaces are always prone to potential danger. A potential danger to workers is ergonomics. Ergonomics is an attempt to create a balance in work demand and work capacity for high-performance work. The incongruity of workers and work facilities including work method, work position, and load weight can cause a disturbance to performance.

Midwives are among the workers who are prone to have a disturbance of performance due to ergonomic factors. Midwives are health workers whose primary duty are providing assistance during Childbirth. Childbirth support provided by health workers was targeted by the Ministry of Health in 2017 to acquire 81% service. The high work demand has a risk of causing disturbance to midwives' performance. A work demand that exceeds workers' work capacity can result in inconveniences such as exhaustion, accident, injury, illness, and productivity decrease.

The Ministry of Health in Indonesia's health problem profile explained that 40.5% of health problems and illnesses suffered by workers are related to their occupation. A study conducted in 12 Cities/Districts in Indonesia on 9,482 workers stated that in general, 16% workers complained about musculoskeletal disorders, 8% about cardiovascular diseases, 6% about nerve disorders, 3% about respiratory diseases, and 1.5% about ENT problems (Kementrian Kesehatan RI, 2013).

Safe Work Australia stated that a third of the injuries suffered by nurses and midwives were generally related to Musculoskeletal Disorders (MSDs). As much as 40.8% of midwives' MSDs or skeletal muscle injuries occurred around the neck and 24.5% on the upper back. Another study showed that midwives have quite high MSD complaints on several body parts; 84% was neck pain, 79% was shoulder pain, 74% was upper back pain, 58% was hip pain, 53% was knee pain, 47% was leg pain, 37% was lower back pain, 26% was wrist pain, and 11% was elbow pain (Safe Work Australia, 2013). These musculoskeletal disorders that the midwives experienced were caused by body postures that were not in accordance with the height of parturition beds (Wajdi and Cahyadi, 2016).

In assisting Childbirth, midwives stand beside a parturition bed while bending, slightly tilting to the left, and turning to the direction where the baby is delivered. They are all performed at once and repeatedly in a long period of time. A study revealed that the high-risk factors for MSDs include static posture and awkward posture (bending, twisting of neck, body, and wrist) (Komala and Modjo, 2013). Another study stated that body height and work period also significantly affected midwives' neck complaints (Wajdi and Cahyadi, 2016).

A Childbirth process itself is a natural occurrence with contraction opening to deliver baby through the birth canal. In the Pocket Book of Healthcare for Mothers in Primary and Referral Health Facilities, it is mentioned that Childbirth process is no longer than 18 hours. However, if there is a complication of Childbirth, the process will be more than 18 hours (Kementrian Kesehatan RI, WHO and IBI, 2013). A complication of Childbirth that is unable to be treated by an independent midwife, a community health center, or a hospital will be referred to another hospital. A referral hospital is the center of referral because it has expert health workers and professionals as well as sufficient medical equipment. A study found that midwives at hospitals have a very high risk of suffering from MSDs when they assist childbirth (Suparni, 2011).

A preliminary study showed that Bhayangkara H.S Samsoeri Mertojoso Hospital is a state hospital level II in Surabaya City that has Comprehensive Emergency Obstetric and Newborn Care (PONEK) services. PONEK is a 24-hours service that provides obstetric and newborn services which are related to pregnancy, delivery, puerperium, and newborn with complication. Childbirth facilities in Bhayangkara H.S Samsoeri Mertojoso Hospital have already used dynamic parturition beds that can be adjusted according to the height of the Childbirth assistants. This study aimed to analyze the correlation between elbow and parturition bed height with the risk of musculoskeletal disorders among midwives while assisting childbirth at the hospital.

METHOD

This study was conducted using a descriptive method through a cross-sectional design. This was an observational study since it emphasized observation of midwives while assisting Childbirth. The study was located in the delivery room of Bhayangkara H.S Samsoeri Mertojoso Hospital, Surabaya in September 2019. The population included was all midwives assigned in the delivery

room of Bhayangkara H.S Samsoeri Mertojoso Hospital. The samples used were 11 midwives, which were the total population. The samples were determined using non-probability sampling technique by taking the total population as samples in order to determine the samples based on the criteria according to the purpose of the study, which was focusing on midwives in the delivery room while assisting Childbirth.

The primary data were collected through observations, interviews, and measurements. The secondary data were obtained from literature review. The variables of this research comprised age, work period, anthropometry, workstation design, body posture, and musculoskeletal complaint. The instrument used was the Nordic Body Map questionnaire that has been modified by adding the respondents' identity or characteristics and REBA. The research results are presented in cross tabulation and coefficient contingency value of computer analysis data program and narration to describe the correlation between elbow and parturition bed height with the risk of musculoskeletal disorders among midwives while assisting childbirth at the hospital.

This research has passed an ethics test. The ethics test was conducted by the ethics committee of the Faculty of Dentistry, Universitas Airlangga. The ethics test that was conducted resulted in the ethics certificate number 338/HRECC.FODM/VI/2019.

RESULTS

The study on 11 midwives assigned in the delivery room of Bhayangkara H.S Samsoeri Mertojoso Hospital resulted in the characteristics of midwives that could be seen in Table 1. Most of the midwives assigned in the delivery room were between the age of 26-35 years old (45.5% or 5 people) and 36-45 people (45.5% or 5 people). The remaining 1 person was under 25 years old (9.1%). Table 1 also provides the work period of each respondent. As many as 8 midwives (72.7%) have been working for > 10 years, 2 midwives (18.2%) have been working for < 6 years, and 1 midwife (9.1%) has been working for 6-10 years.

Table 1. The Distribution of Respondents' Characteristics at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

Characteristic	Range	Frequency (n)	Percentage (%)
Age	≤ 25 years old	1	9.1%
	26-35 years old	5	45.5%
	36-45 years old	5	45.5%
Work Period	< 6 years	2	18.2%
	6-10 years	1	9.1%
	> 10 years	8	72.7%

Table 2. The Respondents' Body Mass Index at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

Weight	Height	Body Mass Index (BMI)
68	160	26.56
70	156	28.76
60	155	24.97
68	164	25.28
78	165	28.65
73	155	30.39
65	155	27.06
67	157	27.18
53	163	19.95
76	160	29.69
68	152	29.43

Factors Causing Musculoskeletal Disorders

Anthropometry

In this research, an anthropometric measurement was conducted on the midwives in the delivery room. The midwives' weight and height were measured to calculate BMI. BMI is shown at Table 2. The result shows that 3 midwives had more than 29 BMI.

The respondents' average height was 158.36 cm with maximum of 165 cm and minimum of 152 cm. Their average weight was 67.8 kg with the minimum of 53 kg and the maximum of 78 kg. The elbow height was also measured to determine the appropriate and ergonomic work surface. The height of the respondents' raised elbow was at least 94 cm and maximum was 102 cm with an average of 98 cm. The anthropometry measurement of elbow height was very important. The results of the measurement are presented in Table 3.

Parturition Bed

A workstation is an object or surface that is utilized to perform a job. The workstation in this research was a parturition bed or maternity bed. The

Table 3. The Respondents' Measurement Result at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

Weight	Height	Height of Raised Elbow	Height of Parturition Bed	Height of Work Surface for a Standing Position
68	160	101	86	15
70	156	102	84	18
60	155	98	80	18
68	164	99	79	20
78	165	100	73	27
73	155	95	61	34
65	155	97	64	33
67	157	94	71	23
53	163	97	82	15
76	160	97	72	25
68	152	99	71	28

Figure 1. Body Posture during Childbirth Assistance at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

Table 4. The Frequency of Musculoskeletal Disorders at Bhayangkara Samsoeri Mertojoso Hospital in 2019

Body Parts	Mild Pain	Moderate Pain	Severe Pain
Upper Neck	1		
Lower Neck	1		
Left Shoulder			
Right Shoulder			
Back		1	1
Upper Arm	1		
Hip	6		1
Buttock	1		1
Bottoms			
Left Elbow			
Right Elbow			
Lower-left Arm			
Lower-right Arm			
Left Wrist	1		
Right Wrist	2		
Left Hand			
Right Hand			
Left Thigh			
Right Thigh			
Left Knee	1		
Right Knee	2		
Left Calf	3		
Right Calf	3		
Left Ankle			
Right Ankle			
Left Foot			
Right Foot			

parturition bed's height was measured. Parturition beds are the work surface of midwives while assisting Childbirth. Bhayangkara H.S Samsoeri Mertojoso Hospital, Surabaya in providing assistance during childbirth had used dynamic parturition beds. Dynamic parturition beds were beds whose height can be adjusted. The respondents adjusted the height of the parturition beds every time they were going to assist childbirth. The height of the parturition bed was minimum 61 cm and maximum 86 cm, with an average of 74.8 cm. The height of the raised elbow subtracted by the height of the partition bed would result in the height of work surface for standing posture. The measurement results showed that 2 out of 11 respondents' workstation for standing posture had a value of 15 cm and the rest were more than 15 cm. The measurement results are mentioned in Table 3.

Body Posture

The observation was done while the respondents were assisting Childbirth. The process of Childbirth assistance is crucial for a midwife because it may result in experiencing musculoskeletal disorders. This research observed the midwife's postures from head to foot. This observation showed that during the Childbirth process, midwife supported themselves on both legs. Both legs were slightly opened to hold their body weight for a long period of time. Their back bent toward the parturition bed and leaned

to the left towards the patient. The midwife's right hand bent in the shape of letter V and functioned to hold the baby's head deflection so that the baby is realized easily from the birth canal. The midwife's left hand forms a ^ to hold the patient's perineum to prevent any tear. The midwife's head bent towards the axis of the body and twisted slightly to the left to get a better sight of the birth canal. The midwife's posture during Childbirth assistance can be seen more clearly in Figure 1.

Musculoskeletal Disorders

Midwife's musculoskeletal disorders were obtained through observation, interviews and questionnaires. The results of the interview showed that almost all midwives had musculoskeletal disorders shortly after assisting childbirth process in which they felt pain in the hip due to prolonged bending, legs aching because they had to stand for a long time, and soreness in the right hand. Musculoskeletal disorders felt by midwives subjectively after assisting childbirth were analyzed using the Nordic Body Map Questionnaire. In NBM, you could describe the complained body parts in detail.

Midwives were asked to describe their complaints with 4 levels of pain, namely 1 for no pain, 2 for mild pain, 3 for moderate pain, and 4 for severe pain. Midwives defined their musculoskeletal disorders with mild pain. The complaints were felt only right after assisting Childbirth. After assisting Childbirth and resting for the next day, the complaint was no longer felt. This made midwives categorized their complaints as a mild pain level. The frequency of complaints is illustrated in Table 4.

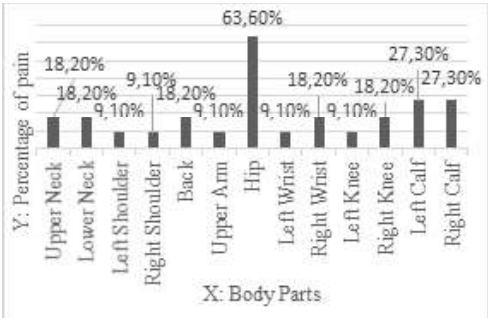

Figure 2. Midwives' MSDs Complaints at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

Table 5. The Risk of Musculoskeletal Disorders at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

Risk Level	Frequency (n)	Percentage (%)
Medium	2	18.2
High	9	81.8
Total	11	100

Table 4 shows the parts of the body that experienced musculoskeletal disorders. Most midwives had complaints on the legs, hands, back and neck. The result of the NBM fulfillment showed that the respondents had musculoskeletal disorders in the upper neck (18.2%), lower neck (18.2%), left shoulder (9.1%), right shoulder (9.1%), back (18.2%), upper arm (9.1%), hip (63.6%), left wrist (9.1%), right wrist (18.2%), left knee (9.1%), right knee (18.2%), left calf (27.3%) and right calf (27.3%).

Observation to analyze the risk of musculoskeletal disorders used Rapid Entire Body Assessment (REBA) method. The observation was done on midwives while assisting childbirth at the hospital. Step of observation was taking a picture of midwife who assisted childbirth, analyzed the photo using REBA method, then rated the risk of MSDs and classified them. The result showed that 9 midwives had high level of MSDs risk and 2 were medium.

The Correlation between Elbow and Parturition Bed Height with Musculoskeletal Disorders

The result of this research showed that 9 midwives had a high level of MSDs risk with 9 inappropriate elbow height and parturition bed height. Cross-tabulation of computer analysis data program shows chi-square and coefficient contingency table. This research samples were 11 midwives which were the total population, so the value that should be read was contingency coefficient of 0.707.

Table 6. Cross-tabulation Correlation of Elbow and Parturition Height with Musculoskeletal Disorders at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

The Risk Level of MSDs	The Appropriateness of Elbow and Parturition Height		Total
	Appropriate	Inappropriate	
Medium	2	0	2
High	0	9	9
Total	2	9	11

Table 7. The Chi-Square Test Correlation between Elbow and Parturition Bed Height with Musculoskeletal Disorders at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

	Value	df	Asymp. Sig	Exact Sig.
Pearson Chi-Square	11.000	1		
Continuity Correction	5.305	1		
Fisher's Exact Test			0.018	0.018
N	11			

Table 8. The Correlation between elbow and Parturition Bed Height with Musculoskeletal Disorders at Bhayangkara H.S Samsoeri Mertojoso Hospital in 2019

	Value
Contingency coefficient	0.707
N	11

DISCUSSION

Midwives, as women who had attended and completed a degree that have been recognized by the government and also have passed tests in accordance with applicable requirements, are given legal permission to practice in carrying out health and midwifery services in the community. Midwives are authorized by the government in accordance with the area of service provided (President, 2019). One of the midwife's authorities was to assist Childbirth. Normal Childbirth is the process of birth of a fetus in a typical gestation (term, 37-42 weeks), the fetus is elongated, the presentation of the back of the head followed by removal of the placenta. The entire birth process is a maximum of 18 hours for primigravida (first pregnancy) without action and 7-8 hours for multigravida (second or more pregnancies) without action and without complications. The childbirth process is divided into IV stages; the first stage is 1-10 dilation which lasts about 6-8 hours, the second stage is complete dilation until the baby is born within 2 hours, the third stage is after the baby fully born with his/her placenta, and finally the IV stage which includes 2 observation periods for 2 hours after the baby is born (Prawirohardjo, 2010).

Midwives in hospitals have a very high risk of developing Musculoskeletal Disorders during Childbirth assistance. The hospital is a referral center for health services, thus midwives at hospitals are required to be skilled in assisting Childbirth in both normal and emergency circumstances. This study found that out of 11 respondents, 8 of them experienced musculoskeletal disorders after Childbirth assistance. The results of the interviews found that midwives experienced complaints right after Childbirth assistance. When they were not helping Childbirth, they did not feel pain and rarely felt complaints in their bodies. Most midwives stated that after assisting more than one Childbirth, they would immediately feel pain in their lower back.

The result of the Nordic Body Map fulfillment showed that midwives mostly had pain in their hip (63.6%). The pain in the hip was caused by their job which required them to bend and slightly twist their posture. This gesture results in a very high risk of experiencing hip pain.

Figure 2 shows midwives' parts of body that experienced pain complaints. In addition to the hip, they also felt pain in the upper neck (18.2%) and lower neck (18.2%) due to the posture of bending and tilting to get a better sight of the birth canal, and on the back (18.2%) due to bending. In addition, they also felt pain on the left shoulder (9.1%), right shoulder (9.1%), upper arm (9.1%), left wrist (9.1%) and right wrist (18.2%) left knee (9.1%), right knee (18.2%), left calf (27.3%) and right calf (27.3%).

The mild pain was felt in the upper neck, lower neck, left and right shoulders, upper-right arms, hip, buttocks, left and right wrists, left and right knees, and left and right calves. As many as 6 out of 11 midwives said that a mild pain in the hip after assisting Childbirth was due to prolonged bending. A midwife felt back pain because the complaint occurred not only right after helping the Childbirth. Another respondent also complained that her back pain was very painful. NBM was a subjective musculoskeletal complaint table. Some midwives assumed pain in certain parts of the body as a normal thing and they even ignored the pain. Musculoskeletal disorders in this study depend on each perception of midwife.

Factors Causing Musculoskeletal Disorder

Age

As much as 91% of midwives at Bhayangkara H.S Samsoeri Mertojoso Hospital were aged 26-45 years old. Tarwaka, in his book, stated that in

general, a person aged 25-65 years old begins to feel skeletal complaints. The first complaint is usually felt at the age of 35 years old and the complaints will increase along with age (Tarwaka, Bakri, S.H., & Sudiajeng, 2005).

This is caused by decreased strength and endurance of the muscles so that the risk of muscle complaints increases. A study said that maximum muscle strength is at the age of 20-29 years old and the following years will undergo decrease. Decreased muscle strength causes an increased risk of muscle complaints; thus, it could be concluded that age was one of the causes of muscle complaints.

Findings of a study claimed that low back pain usually occurred at a young age, mostly at productive age (Nuryaningtyas and Martiana, 2014). Back pain usually begins to be felt at the age of 20-40 years old with the estimation of caused by degeneration factors, static load, and osteoporosis. Productive age is 15-54 years old. In this study, most of the respondents were 25-45 years old. These ages are included in the productive age group who were susceptible to complaints of low back and general back pain. Other studies stated that an age category of ≥ 30 years old will had an increased risk of complaints of MSDs by 19.8x (Devi, Purba and Lestari, 2017).

That is because as we get older, there will also be decrease in oxygen intake. The disruption of oxygen intake will cause the muscles to be tired easily and unable to contract. Oxygen plays a role in the metabolic process and regulates muscle contraction. Muscles that do not get oxygen intake will experience dysfunction, and thus musculoskeletal disorders occur.

Work Period

Work Period is the length of time the respondents had been employed, from their first day at work until the time of the data were collected. The result of the research signified that when someone worked in an organization for a long time, he became more experienced (Ardiansyah, 2017). In this research, 72.7% of the midwives at Bhayangkara H.S Samsoeri Mertojoso Hospital have been working for more than ten years. Furthermore, the age is in line with the working period of a midwife. The more midwife ages, the longer working period she has.

Working over ten years at a hospital makes a midwife to have various experiences in assisting Childbirth. The previous study showed that assisting Childbirth becomes the highest risk of getting MSDs for a midwife. This process requires the midwife to stand with the body resting on her feet, bend against parturition bed, and twist facing the birth canal with the head flexed.

The Occupational Safety and Health Administration (OSHA) classifies ergonomic risk factors of workers based on the working period, in which the type of work that requires higher energy and longer working period will increase the risk of getting MSDs (Michaels, 2016). Working over ten years at a hospital causes a midwife's frequency of assisting Childbirth increases. The longer a midwife works, the more she is exposed to the risk of MSDs. As a result, there is a greater chance of a midwife to get MSDs.

Someone is able to work for 40 to 50 hours every week. The duration of work that exceeds these hours will tend to create a risk. A similar type of work which is performed within two years or more will cause muscle disorders. Working that requires similar muscle for a long time (>2 hours) will cause complaints (Nuryaningtyas and Martiana, 2014). In addition, similar work done for years will increase the risk of complaints.

Anthropometry

In this research, the anthropometry measured body height and weight. Bodyweight, body height, and body mass are factors that can cause skeletal muscle complaints, even though the effect is relatively small. A study showed that a fat woman has the risk of getting MSDs two times higher compared to thin woman.

The midwives in this research had an average height of 158.36 cm, which includes at a normal height in Indonesia. Someone who has tall figure generally suffers back pain complaints, yet it does not cause neck, shoulder, and wrist complaints. A fat person (with Body Mass Index > 29) has a 2.5x higher risk of muscle complaints, especially on the legs compared to person with IMT < 20 (Tarwaka, Bakri, S.H.,& Sudiajeng, 2005). There were three midwives in this research who had a BMI of more than 29.

Anthropometry in this research measured three important body parts. Besides measuring body weight and height, elbow height was also measured. The measurement of elbow height was done in order to determine the height of the groundwork which is appropriate and ergonomic. Working in a standing position requires the size of a groundwork that refers to the height of the standing elbow. The

elbow height was measured from the height of the floor to the elbow with hands straight towards the floor similar to the upright position in ceremony. Midwives in assisting Childbirth use parturition bed as their groundwork of work. The elbow height becomes a recommendation for the height of the groundwork that can make work easier and does not give risk towards midwives.

The elbow height is referential data for determining the height of the groundwork for and is a central point power zone. The Regulation of Minister of Manpower no 5 (2018) said that ergonomics guidelines about the height of the groundwork for a standing position is based on the height of the elbow in standing position. A research stated that there was a relationship between anthropometry height against chair height with musculoskeletal disorders. It is in line with the last research stating that in a standing position, employment's desk must be adjusted to overcome the musculoskeletal disorders.

Parturition Bed

Workstation design is an important element in ergonomy. Workstation commonly must accommodate the height range of all workers to ensure the largest percentage of the population to be able to work optimally. One of the most important factors in designing the workstation is the height of the area or work object. The height of the groundwork for a standing work position has been regulated in the Regulation of Minister of Manpower No. 5 of 2018 concerning Safety and Health of the Work Environment (Menteri Ketenagakerjaan, 2018).

In this research, the workstation was the parturition bed. In providing health services, Bhayangkara H.S Samsoeri Mertojoso Hospital especially the Labor and Delivery room has been using dynamic parturition bed. This type of parturition bed can adjust its height to make the patients to go up and down easier. In addition, dynamic parturition bed has benefits for the midwives as birth assistance.

The process of assisting Childbirth requires energy and pressure to protect the birth canal for not being torn and hold the fetus' head in deflexed position so that it helps the delivery process. The delivery processes in the Second and Third stages are crucial since it has the risk of causing physical complaints of the midwives (Wajdi and Cahyadi, 2016). Works, which require strong emphasis, have the height of groundwork of 10-15 cm below the elbow for standing position (Menteri Ketenagakerjaan, 2018). The height of the groundwork in this research was obtained from the elbow height subtracted by the height of parturition bed.

The measurement results obtained by two midwives with appropriate height of the standing groundwork of 15 cm and nine midwives with a height of more than 15 cm. The groundwork which is more than 15 cm of the elbow height will cause the midwives tend to bend more extreme. The posture in bending position for a long time will cause midwives to get high risk of MSDs when assisting Childbirth.

Body Posture

The posture when performing work can be defined as a work attitude. A midwife at work has a static work attitude namely standing for a long time while assisting the delivery process. Assisting Childbirth starting from the complete opening to the birth of the baby, and the delivery of the placenta takes approximately 2 hours. During these 2 hours, a midwife performs a standing work position. The static posture increases the risk of musculoskeletal disorder because it increases pressure on the calf muscles and legs. Pressure in these muscles will decrease the blood flow to muscle tissue (ischemia) (Komala and Modjo, 2013). The decrease in the blood flow causes oxygen reduction in the muscles. As a result, it causes complaints of muscle pain.

Midwives in assisting Childbirth have an unnatural work attitude (odd posture). An unnatural work attitude causes the position of the body to move away from the natural position, such as the movement of the hand raised, back bent, and head raised. The farther the body position away from the center of gravity of the body, the higher the risk to get skeletal muscle complaints. The unnatural work attitudes are generally caused by the characteristics of work demands, work tools, and inappropriate workstations. Those odd postures cause inefficient muscle work. Midwives tend to feel fatigued and pain easily because of those odd postures.

The previous research signified that there was a relationship between the work position and musculoskeletal disorders (Nuryaningtyas and Martiana, 2014). The body parts that move away from their natural positions such as bending is included in non-ergonomic work attitude. Non-ergonomic work attitude increases. The MSDs tend

to occur because muscles experience fatigue due to unnatural work attitudes.

The parturition bed which is not in accordance with the elbow height causes posture to always tend to bend. Midwives who assist childbirth will rest their elbow on the pressure as a parturition bed. Parturition bed height that is too low causes midwife to have to adjust her body in the way to bend the legs and bend their body so their elbow and hand can rest on it. This posture causes discomfort and increases musculoskeletal disorders.

The correlation between elbow and parturition bed height with musculoskeletal disorders

Elbow height is one of anthropometry that is important to be measured. The measurement of elbow height was done in order to determine the height of the groundwork which is appropriate and ergonomic. Works, which require strong emphasis, had the height of groundwork of 10-15 cm below the elbow for standing position (Menteri Ketenagakerjaan, 2018). Midwives while assisting childbirth at the hospital need strong emphasis to help hold birth canal and keep head of baby deflections. So, this research analyzed the appropriate elbow and parturition height.

Midwives who have inappropriate elbow and parturition bed height (<15 cm) tend to work with odd posture. Parturition bed lower than elbow height > 15cm makes midwives to be more banding to assist the childbirth. The previous research signified that there was a relationship between the work position and musculoskeletal disorders (Nuryaningtyas and Martiana, 2014). As much as 81.9% of midwives at Bhayangkara H.S Samsoeri Mertojoso Hospital had high risk level of musculoskeletal disorders. Cross-tabulation of computer analysis data program showed the value of contingency coefficient of 0.707. Contingency coefficient value of > 0 means that there was correlation. So, there was correlation between the elbow and the parturition bed height with musculoskeletal disorders.

CONCLUSION

Midwives in the Labor and Delivery room at Bhayangkara H.S Samsoeri Mertojoso Hospital are 91% at the age of 26-45 years old and about 72.7% of them have been working for more than 10 years. Most midwives' elbow height are inappropriate with parturition bed. That causes unnatural work attitude (odd posture) which then increases musculoskeletal disorder. The result of the research shows that there is correlation between elbow and parturition bed height with the midwives' musculoskeletal disorder when assisting childbirth process at the hospital.

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