Mother chair reparation to decrease subjective disorders in exclusive breast-feeding period

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Abstract. Exclusive breastfeeding is the responsibility of the mother after childbirth. A specific constraint arise for the mother when during the breastfeeding process, the place is not in accordance with the physiological condition of the mother's body. A not physiologically corrected lactation place will cause subjective disorders for breastfeeding mothers. Complaints that arise include quick tiredness, with certain muscles sore and pain, which will ultimately decrease the motivation of the mothers to perform exclusive breastfeeding especially in the first six months of the baby's birth. An improved ergonomic designed chair, this research used experimental method with group within treatment (treatment by subject) to solve the problem. The study took place in Maternity Clinic "CB" Badung regency, Bali. Subjective disorders are measured based on general fatigue and musculoskeletal disorders mothers breastfeeding. Fatigue is predicted using 30 items of questionnaires while musculoskeletal complaints are predicted from the Nordic Body Map questionnaire. Data were analyzed descriptively and inferentially in an experiment condition using using t-pair test. The results showed that there were significant differences in fatigue in general and skeletal musculoskeletal disorders between treatment 1 (using old chair) with treatment 2 (using repaired seats) in breastfeeding mothers. Fatigue in general decreased by 35.6% and skeletal musculoskeletal disorders decreased by 26.8%. It was concluded that improved breastfeeding mothers' seats may decrease subjective disorders during exclusive breastfeeding. It is therefore advisable for breastfeeding mothers to use seats that match their anthropometry.

1. Introduction
Exclusive breastfeeding is period when infants aged 0-6 months are fed fully on breast milk without additional complementary foods except vitamins, minerals or medicine in the form of drops or syrup [1] until 4-6 months of age. WHO (World Health Organization) recommended the period of exclusive breastfeeding to up to 6 months [2]. Exclusive breastfeeding baby until the age of 6 months have less likelihood of having gastrointestinal disease, and any chance of growth disorders [2].

The success of exclusive breastfeeding depends on the sincerity of the mother to provide breastfeeding for at least 6 months with all its benefit to the baby. Breastfeeding can be continued for up to 2 years. In a mother who has the willingness to give exclusive breastfeeding will strive to meet
her baby's need for nutritional fulfillment by exclusive breastfeeding. Some of the obstacles that occur in exclusive breastfeeding is the emergence of subjective disorders such as muscle pain and fatigue in the whole body to the mother.

Fatigue to the mothers can be caused by several factors during breastfeeding. Unnatural body position caused by chairs or seats that do not match the anthropometry of the user can result is severe muscle disorders [3,4]. It even can be the sole reason for the mother to have lesser willingness in breastfeeding process that the place for a mother to breastfed the baby does not suit the physiological condition of the mothers’ body. A not-physiologically-adjusted posture of any activities cause complaints for the users that include fatigue, pain and sore in certain muscles [5,6] which would be severe to the long-term capability of doing a repeated activity in the next cycle. In addition, it even more severe for mothers who work and breastfeed after work in the first six months period of childbirth due to even more subjective complaint factors such as muscle pain and fatigue in the body. Complaints in breastfeeding mothers is usually pain in certain muscle parts of the body after breastfeeding, such as neck, waist, and calf muscle disorders. One of the causes of maternal complaints is that unfamiliar breastfeeding positions (incompatibility if breastfeeding position with anthropometry), so apparently the fatigue will also decrease the mother's motivation for exclusive breastfeeding.

On the other hand, the Indonesian government has issued a policy (Law No. 36/2009) stating that the regional government and the community should provide special facilities for lactating mothers at public facilities (such as airports, stations, terminals, and workplaces). Even in developed countries, on public buses have provided a place for breastfeeding mothers. In a special room for breastfeeding mothers are usually also given a seat for the mother to breastfeed her baby. However, if the seat is not in accordance with the anthropometry of the mother, it will cause complaints and inconvenience in its use. The solution to this is to have an anthropometrically adjusted chair to the users [4]. Subjective disorders are an indication of inconvenience at work, if not given a solution, it will be bad for the body of the users [7].

One attempt to reduce subjective disorders in giving exclusive breastfeeding is to provide comfort in breastfeeding. This can be created by designing chairs that match the anthropometry of the mother. Therefore, it is necessary to have an ergonomic chair design for the needs of breastfeeding mothers.

2. Research Methods

This research was conducted in Maternity Clinic "CB", Kuta Sub-District, Badung Regency, Bali. The study was conducted experimentally with group within-treatment design. The number of samples is calculated based on the Colton Formula [8]. Subjective disorders is predicted based on musculoskeletal disorders and fatigue in general. Musculoskeletal disorders from the breastfeeding mothers is calculated based on Nordic Body Map questionnaire whereas fatigue is generally predicted based on a thirty-items fatigue questionnaire. Data were analyzed descriptively and inferentially. To know the difference of treatment, muscle complaint and motivation data were analyzed using t test [8].

3. Results And Discussion

3.1 Field and Laboratory Test Results

The mean average age of the sample is 30.14 years, this age is quite productive and a prime age for childbirth and breastfeeding. The body condition of the samples was considered normal and healthy with a mean body mass index of 22.02. Choobineh, et al [9] states that a person who has an abnormal body mass index risks experiencing pain in the body parts such as in the lower back area two times higher than in people with normal body mass index. In Indonesia there are four categories of body mass index (BMI), i.e. Thin (<17.0), Normal (18.0 - 25.0), Grease (25.1 - 27.0), and Obese (>30.0). While some other things that can affect BMI, among others, age, sex, genetic and physical activity [10].
Table 1. Research Subjects’ Characteristics

| No | Variables       | n | Ave  | SD  |
|----|-----------------|---|------|-----|
| 1  | Age (year)      | 9 | 30.14| 2.06|
| 2  | Weight (kg)     | 9 | 61.17| 3.19|
| 3  | Height (kg)     | 9 | 160.24| 3.01|
| 4  | Body Mass Index | 9 | 22.02| 1.73|

The subject's anthropometry is measured as the basis of the seat design for lactating mothers. This design is customized body shape and anthropometric size of the research sample. The results of anthropometric measurements of breastfeeding mothers are presented in Table 2.

Table 2. Research Samples’ Anthropometry

| No | Variables                  | Ave (cm) | SD  (cm) | Range (cm) | Percentile 5 | Percentile 50 |
|----|---------------------------|----------|----------|------------|--------------|---------------|
| 1  | Height                    | 160.24   | 3.01     | 157 – 169  | 159.0        | 160.32        |
| 2  | Sitting Height            | 118.14   | 1.71     | 110 - 124  | 114.1        | 118.22        |
| 3  | Sitting Elbow Height      | 52.71    | 2.33     | 50 – 59    | 51.0         | 53.0          |
| 4  | Popliteal Height          | 43.51    | 1.13     | 41 – 47    | 42.0         | 43.7          |
| 5  | Shoulder Width            | 42.11    | 2.03     | 40 – 45    | 40.0         | 42.2          |
| 6  | Butt to Popliteal Dist.   | 49.92    | 3.18     | 46 – 54    | 48.2         | 50.0          |
| 7  | Butt Width                | 59.32    | 2.16     | 58 – 64    | 59.0         | 60.3          |

SD: Standard Deviation

Based on this anthropometric data the seat size for breastfeeding mothers is as follows.

a. The height of the chair used is in accordance with the high poplitea of breastfeeding mothers at the 50th percentile, in this study obtained 43.7 cm. This height can be adjustable according to the high span of popliteal samples.
b. The depth of the chair is 50 cm. This is adjusted by the 50th percentile of the popliteal pop spacing with a range of 46- 54 cm.
c. The width of the chair is 59.32 cm. This is adjusted to the 50th percentile of the butt width.
d. Seat height adjusted to the 50 percent of the height of the sitting body is 118.22 cm
e. The height of the armrest is adjusted to the height of the sitting elbow at the 50th percentile that is 53 cm

The height of the chair and the seat of the chair made adjustable or can be adjusted according to the needs and comfort of the mother when breastfeeding. Adjustment of seat dimensions with anthropometry is absolutely necessary. Working facilities need to be adjusted to user conditions, the dimensions of the means are adjusted to the user's anthropometric size, so that the user can work comfortably and productively [5, 6, 11].

3.2 Working Environment Condition

Working environment conditions in this research is the condition of the room of the experiment where the users either were using the old seats or using newly designed seats. The measurement undertaken in this experiment includes room temperature, relative humidity, light intensity, and noise (sound intensity). The results of the analysis of the environmental conditions of the sample are presented in Table 3.
Table 3. Working Environment Condition Measurement

| No | Variables                        | Treatment 1              | Treatment 2              | t    | p    |
|----|----------------------------------|--------------------------|--------------------------|------|------|
|    |                                 | Ave  | SD   | Ave  | SD   |      |      |
| 1  | Air Temperature (°C)             | 23.35| 2.18 | 23.77| 2.49 | 2.132| 0.447|
| 3  | Relative Humidity (%)            | 70.19| 3.08 | 71.32| 2.94 | 4.319| 0.216|
| 4  | Light Intensity (Lux)            | 374.81| 38.04 | 370.26| 41.25 | -31.219| 0.287|
| 5  | Sound Intensity (dBA)            | 54.29| 4.18 | 55.13| 3.92 | 3.412| 0.507|

SD = Standard Deviation

Working environment conditions ought to influence the user’s subjective disorders while on breastfeeding position. In this study, however, after measuring the environmental conditions of the room where breastfeeding mothers found, there was no significant difference between treatment 1 (using an old chair) and treatment 2 (using a newly designed chair) with p > 0.05 on all environmental components as measured. This suggests that environmental conditions is controlled and would not give any new impact to the experiment as the focus would be on seat-design based complaints.

Environmental conditions in the room where breastfeeding mothers as listed in Table 3 are still normal and comfortable. Any less comfortable environment where the users are will provide an additional burden and might affect the experiment [11]. That the threshold value of air temperature for work within comfortable limits is 33 °C and relative humidity for relatively comfortable Indonesians is between 70% - 80% [12] is achieved. While the noise threshold is 85 dB is also controlled [13]. Noise (sound intensity) will increase the human subjective inconvenience if it exceeds its threshold.

3.3 Subjective Disorders

Subjective disorders are predicted from the appearance of musculoskeletal disorders and general fatigue. Musculoskeletal disorders were measured using a Nordic Body Map questionnaire whereas fatigue was generally measured using 30 items of questionnaires with 5 Likert Scales. This subjective complaint is measured on both when the users use the old chair and the newly designed chair. The results of the analysis of the difference in subjective disorders of the experiment is presented in Table 4.

Table 4. Subjective Disorders Analysis

| Variabel                              | Treatment 1              | Treatment 2              | t    | p    |
|---------------------------------------|--------------------------|--------------------------|------|------|
| M. Disorders (pre)                    | Ave  | SD   | Ave  | SD   |      |      |
| General Fatigue (pre)                 | 36.71| 2.91 | 38.02| 3.11 | 12.732| 0.319|
| Musculoskeletal Disorders (post)      | 83.9 | 3.37 | 61.4 | 2.91 | 34.931| 0.000|
| General Fatigue (post)                | 92.1 | 3.44 | 59.3 | 2.86 | 37.814| 0.000|

SD = Standard Deviation

In pre-experiment condition, our samples’ body conditions were measured on musculoskeletal disorders and general fatigue. The result of the analysis shows that p > 0.05, which means that the initial conditions of musculoskeletal disorders and fatigue in general can be considered the same, so it does not provide additional influence on the course of when the experiment then was conducted.

In the post-treatment using a new chair, there were significant differences in subjective disorders, both in musculoskeletal disorders and in general fatigue (p <0.05) which indicates that seat differences have an effect on subjective complaint differences as well. Judging from the average score of the subjective complaint, treatment 1 (using the old chair) gives a higher score than the treatment 2 (using a new chair), or a subjective complaint score decreases. In musculoskeletal disorders there was a
decrease in scores from 83.9 to 61.4 or decreased by 26.8%, while in general fatigue decreased from score 92.1 to 59.3 or decreased by 35.6%.

The decrease in subjective complaint scores is predicted to occur because the shape of the seat in treatment 2 is in accordance with the anthropometry of the users (breastfeeding mother) and posture so as to provide comfort during breastfeeding activities, where muscle disorders are reduced, and fatigue has then decreased. Sitting postures for long periods of time and static muscle loading due to forced unnatural body position cause venous blood dams, fluid accumulation and venous varices in the legs and are often perceived as muscular fatigue [14]. Ergonomic interventions are needed to provide solutions to work problems and lower subjective disorders [7,15]. By using an ergonomic chair with a shape that suits the user needs it will reduce muscle fatigue. Static work attitude such as sitting longer will cause complaints, whether subjective disorders or objective disorders that occur in skeletal muscles [11, 16, 17]. If the seat used is not in accordance with the anthropometry of the user as proven in this experiment, that complaints and fatigue occurred quicker than it is possible.

4. Conclusions and Suggestions

4.1 Conclusions

From the results and discussion of this study, it was concluded that ergonomic chair design can reduce subjective disorders in nursing mothers both on musculoskeletal disorders and fatigue in general.

4.2. Suggestions

The use of ergonomic chairs in nursing mothers especially during the exclusive breastfeeding period may decrease subjective disorders, therefore it is advisable for breastfeeding mothers to use ergonomic chairs when breastfeeding babies especially since the first 6 months of birth.

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