Intersection of Tradition and Well-Being: The Impacts of Tilted Pottery Wheel Design on Women's Sitting Posture and Musculoskeletal Issues in Pagerjurang, Indonesia

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ABSTRACT

The intricate interconnection between tradition, economic necessity, and physical well-being among women potters in Pagerjurang, Indonesia, who utilize a distinctive tilted pottery wheel technique underscores the significance of this study. A mixed-methods approach, including ethnographic and the Nordic Body Map questionnaire, was employed in order to investigate the impact of this traditional practice on the sitting posture and musculoskeletal issue of the potters. The findings reveal that long-standing social norms have influenced the evolution of pottery-making techniques, resulting in the design of *perbot miring* (tilted pottery wheel) a key element of the community's cultural identity and economic stability. Despite the reported physical discomfort, practice persists due to its cultural significance and economic importance. While initial observations suggested potential correlations between age, years of work, and physical complaints, statistical analysis showed weak, non-significant relationships. This research makes a novel contribution by examining the intersection of traditional practice, economic constraints, and health outcomes, emphasizing the crucial role women play in preserving cultural heritage while facing physical health challenges. This research lays the groundwork for future studies on ergonomic interventions that could preserve cultural practices while addressing physical health concerns in traditional industries worldwide.

Keywords: Tilted pottery wheel, Women potters, Sitting Posture, Musculoskeletal issue, Cultural preservation

ABSTRAK

Hubungan yang rumit antara tradisi, kebutuhan ekonomi, dan kesehatan fisik di antara para perajin gerabah wanita di Pagerjurang, Indonesia yang menggunakan teknik putaran miring yang khas menjadi pentingnya penelitian ini dilakukan. Pendekatan yang digunakan adalah metode campuran, yaitu etnografi dan kuesioner *Nordic Body Map*, digunakan untuk mengeksplorasi dampak dari praktik tradisional ini terhadap postur duduk dan keluhan muskuloskeletal para perajin gerabah. Temuan ini mengungkapkan bahwa norma-norma sosial yang mengakar kuat telah membentuk evolusi teknik pembuatan gerabah, yang menghasilkan desain *perbot* miring, (meja putar dengan permukaan miring), yang menjadi elemen kunci identitas budaya dan stabilitas ekonomi masyarakat. Terlepas dari ketidaknyamanan fisik yang dilaporkan, praktik ini tetap ada karena signifikansi budaya dan kepentingan ekonominya. Meskipun pengamatan awal menunjukkan adanya potensi korelasi antara usia, masa kerja, dan keluhan fisik, analisis statistik menunjukkan hubungan yang lemah dan tidak signifikan. Penelitian ini memberikan kontribusi baru dengan menguji keterkaitan antara praktik tradisional, kendala ekonomi, dan dampak kesehatan, yang menekankan peran penting wanita dalam melestarikan warisan budaya sembari menghadapi tantangan kesehatan fisik. Penelitian ini memberikan dasar untuk penelitian selanjutnya mengenai intervensi ergonomi yang dapat

melestarikan praktik-praktik budaya sekaligus mengatasi masalah kesehatan fisik dalam industri tradisional di penjuru dunia.

Kata Kunci: Perbot miring, Perajin gerabah wanita, Postur duduk, Keluhan musculoskeletal, Pelestarian budaya

INTRODUCTION

As a cultural artifact, pottery plays an important role in fulfilling household equipment needs during the kingdom period in Central Java. Potters from diverse geographical regions within Indonesia have devised an array of pottery vessels and containers tailored to the preparation, cooking, and storage of foodstuffs [1]. This is due to the mobility of potters and the availability of raw materials in the vicinity of their place of production [2]. Pagerjurang is administratively divided between Melikan Village in the Wedi District and Paseban Village in the Bayat District. Of the potters in the area, 10 are affiliated with Paseban Village, while the remaining 250 are located in Melikan Village [3]. This is a significant aspect of the economy of the women potters' community in Pagerjurang [4]. In the pottery-making tradition, women potters utilize a tool known as a pottery wheel, also referred to as a *perbot miring*, which features a tilted surface. Similarly, they assume a tilted seated posture.

(a) (b)

Figure 1. (a) The tilted surface of pottery wheel, (b) The woman potter sits in a tilted posture

Professor Chitaru Kawasaki of Seika University in Japan underscored that the tradition of the tilted pottery wheel technique in Pagerjurang is unparalleled globally, serving as a source of immense pride for the local community [5]. The distinctive nature of this practice frequently serves as an attraction for tourists in Pagerjurang

Historical roots of traditional practices

The origin of the traditional pottery wheel and tilted sitting posture can be traced back to a folk tale surrounding Ki Ageng Pandanaran. This tale serves as a means of preserving the traditional pottery making of Pagerjurang [6]:

> "In the beginning, Ki Ageng Pandanaran established a mosque that served as a hub for Islamic missionary activities. Upon the completion of the mosque, Ki Ageng Pandanaran promptly directed his wife, Nyai Krakitan, to craft a *padasan*[1]. At that time, Nyai Krakitan was attired in garments known as *kain jarik*[2] and *kuthungan*[3]. It is evident that Ki Ageng Pandhanaran's wife had trouble working with the lathe placed in the middle of her legs due to her attire. In response to her husband's instructions, a rotating tool (pottery wheel) with a tilted position was

constructed. The tilted pottery wheel was positioned in proximity to the pottery producer, enabling the production of only small-scale pottery products."

Sitting posture and the muscles involved

Optimal sitting posture during work is of immense importance for the maintenance of appropriate body posture, the support of the spine, and the prevention of injuries [7], [8], [9], [10], [11]. This entails the implementation of suitable furniture design elements that facilitate optimal eye-to-work distance, hip joint flexibility, and postural adjustments [12]. The implementation of well-designed chairs and work surfaces is an effective method for the reduction of injury risks and discomfort [13], [14]. Prolonged sitting, especially among women, is associated with increased activation of muscles susceptible to musculoskeletal disorders (MSDs), including the *levator scapulae*, *upper trapezius*, *anterior deltoid*, and *erector spinae* in the upper limbs and lower back [15]. A hunched posture can result in increased activity of the neck and shoulder muscles, which may lead to the development of musculoskeletal discomfort and potential long-term injury [9]. The angles of the hips and knees, particularly the flexion of the hips, exert a significant influence on spinal posture [16]. The implementation of ergonomic principles, which aim to enhance productivity by aligning work environments with fundamental human needs for ease, relief, and transcendence, is of vital importance for effective worker performance [17]. Such considerations are of significant importance in the context of ergonomic assessments, wherein the adoption of tilted working postures may be perceived as somewhat unconventional.

Musculoskeletal complaints

Abnormal posture and repetitive activities in the workplace, particularly in industries such as pottery, can result in mechanical stress and musculoskeletal disorders (MSDs), which affect muscles, tendons, and ligaments [11]. These issues frequently present as discomfort or pain in the neck, shoulders, and lower back [18]. The risk factors can be classified as non-modifiable (e.g., genetic predisposition) [19] or modifiable (e.g., body posture, task duration) [20]. The pottery industry has a particularly high prevalence of MSDs, which can be attributed to accelerated work rhythms, repetitive tasks, and fixed positions [21]. Although age is identified as a primary risk factor for MSDs complaints among pottery workers, with initial complaints typically occurring around age 35, the relationship between gender and work posture remains inconclusive [22]. Nevertheless, no prior study has addressed this particular technique, namely the use of a tilted potter's wheel. In order to mitigate the risks associated with MSDs, it is recommended that workers engage in muscle stretching exercises, ensure that they have adequate rest periods, and maintain proper ergonomic work movements [23]. The Nordic Body Map (NBM) questionnaire is a valuable tool for identifying MSDs complaints [24]. It features a series of questions and a diagram of the human body to assist in identifying areas of discomfort [25].

Research Objectives

This research makes a novel contribution by examining the intersection of traditional pottery-making techniques, economic constraints, and the health consequences for women potters in Pagerjurang. While the tradition of the tilted pottery wheel technique is a source of immense pride for the Pagerjurang community, it also presents significant physical challenges that frequently result in physical discomfort and long-term health issues for the potters. Elderly women potters frequently present with a range of health challenges, including spinal deformities, alterations in gait, and muscle weakness in the lower extremities. Such conditions can significantly impair the capacity of the potters

to perform routine activities. The situation is further complicated by the potters' reliance on this traditional pottery-making technique as their primary source of income, based on the statements of Mr. Suharno, a community leader in Pagerjurang, in an interview conducted in August 2023.

This research project aims to elucidate the complex interrelationship between traditional practice, economic necessity, and physical health among the women potters in Pagerjurang. By emphasizing these interconnected factors, the study seeks to highlight the critical role of women in preserving cultural heritage while addressing the physical health challenges they confront. The advantages of this research include raising awareness of the health risks associated with traditional pottery-making practices and providing valuable insights to inform interventions that enhance the physical well-being of women potters.

METHODS

This study employs a mixed-methods approach, integrating qualitative and quantitative research methodologies. Thirty women potters from Pagerjurang, all familiar with the *perbot miring*, were recruited through snowball sampling, a method chosen for its effectiveness in reaching marginalized or hard-to-reach populations. This sampling technique is particularly relevant in this study, as the women potters of Pagerjurang represent a unique and specialized group. This sample size of 30 aligns with Kerlinger and Lee's (2000) in [26], was determined based on established guidelines for quantitative research, ensuring statistical validity while acknowledging the limitations of a small-scale study. The visual overview of the research method flow is presented in Figure 2, illustrating the integration of qualitative and quantitative components. This diagram outlines the sequential steps of the study, from participant recruitment through data collection and analysis, demonstrating the comprehensive approach taken to gather insights into the experiences of women potters in Pagerjurang.

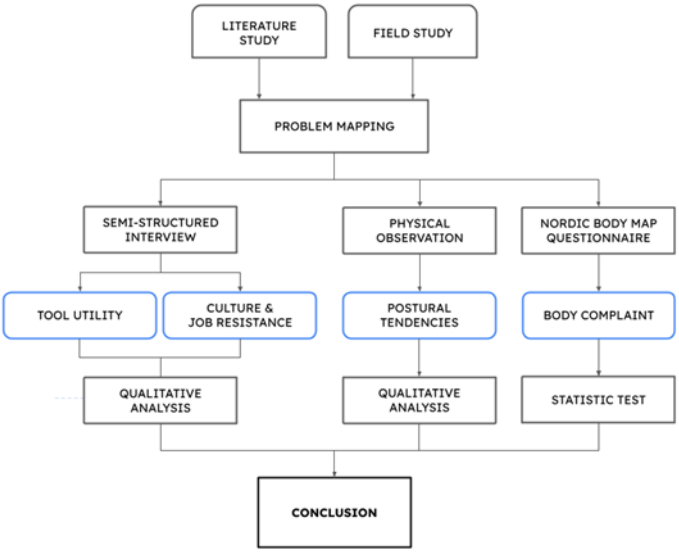


Figure 2. Research method flow

Qualitative data collection involved semi-structured interviews conducted within an ethnographic framework in Javanese. The interview guide included questions about informants' experiences with the *perbot miring*, its impact on their health and well-being, cultural beliefs and practices related to pottery making, and economic circumstances. This phase is designed to provide insights into the utility of traditional tools, the cultural context in which they are used, and the ways in which individuals may

resist the demands of their work. The interviews, conducted in December 2023, included two senior potters, Sri and Giyati, and two young potters, Ambar and Endang. This inclusive approach aimed to capture the diversity of experiences among women potters in the community. Interviews were conducted in informants' homes or workplaces, audio-recorded, transcribed verbatim, and analyzed thematically. Physical observations were conducted to identify potential postural tendencies associated with prolonged use of *perbot miring*. It also seeks to understand the strategies employed by women potters to address physical discomfort in their daily lives, and to identify the impact of postural tendencies on their work.

Quantitative data was collected using the Nordic Body Map (NBM) questionnaire, a widely used and validated tool for assessing musculoskeletal discomfort [27]. The NBM, known for its good test-retest reliability and internal consistency in various populations, provides a comprehensive methodology for assessing physical discomfort experienced by participants [24], [25]. In this study, the NBM was used to collect quantitative data on the location and severity of pain experienced by the participants. Thirty women potters were trained to respond to the questionnaire by understanding the scoring levels of discomfort experienced during work. The NBM categorizes discomfort levels into four tiers with the following definitions: no pain (1-point), low pain (2-points), pain (3-points), and very painful (4-points). The data were analyzed using descriptive statistics to determine the prevalence and distribution of pain, and Pearson correlation tests were conducted to examine potential relationships between pain, age, and years of work. Nine out of thirty participants reported alterations in their body posture. Participant demographics are summarized in Table 1, categorizing participants by age and years worked, with corresponding posture change data.

Table 1. Demographic data of 30 participants

Participants	Categories	Ranges	Number of People	Posture Changes
30 Women Potters	Age (years old)	< 40	4	-
		41 – 50	6	-
		51 – 60	10	3
		61 – 70	9	5
		> 71	1	1
		Total	30	9
		Percentage	100%	30%
	Years Worked	< 20	3	-
		21 – 30	4	-
		31 – 40	9	-
		41 – 50	9	5
		> 51	5	4
		Total	30	9
		Percentage	100%	30%

FINDINGS AND DISCUSSION

Inter-generational knowledge transfer

The design of the *perbot miring* in Pagerjurang, Klaten, is comprised of two distinct forms: a portable iteration that incorporates a rotary table on a wooden bench, and a permanent variant that is anchored to the floor. The portable model offers the advantage of mobility, while the permanent one provides stability but requires a larger workspace. Both designs require the women potters to assume a tilted sitting posture, which has become an integral aspect of the pottery-making tradition. The equipment is relatively simple in design, comprising wooden planks, rotary tables, bamboo blades,

ropes, and a pedal system operated by leg movements. These features serve to emphasize the tool's utility and ensure its continued use across generations, thereby preserving the community's pottery-making heritage. Key aspects facilitating intergenerational knowledge transfer include the wheel's ease of use, simple operation and maintenance, and production efficiency.

(a) (b)

Figure 3. (a) Permanent tilted pottery wheel, (b) Portable tilted pottery wheel [6]

The traditional tilted pottery wheel was consistently described by the interviewees as a user-friendly tool. Endang stated, *"Ngagem perbot niki gampang kok, tinggal mancal mawon"* (The tool is designed for ease of use, requiring only pedaling to operate). The design of *perbot miring* necessitates minimal training, which contributes to its durability and longevity. Sri observed that the tool is relatively simple and reliable, *"Perbote yo ngenten-ngenten mawon, mboten nate rusak, paling ganti tali, nambah oli, kayune nggih awet niki"* (This tool is a relatively simple and reliable piece of machinery. In order to maintain optimal functionality, it is necessary to replace the string and add lubricant to the rotating table. Similarly, the wood is highly durable). The tool's efficiency enables high productivity, with potters producing up to hundreds of pieces per day. Giyati articulated this efficiency, "*Nggih seneng mawon ngagem niki saget ngasilken katah, mergo wonten target mbak yo sisan ngono nek mbakar kan kudu akeh mbak, sedinten nggih saget atusan niki*" (Indeed, the potters are pleased to employ this tool, which is capable of producing a substantial quantity of work in a relatively short time. This output aligns with sales targets and reduces the costs associated with firing).

The straightforward design of the tilted pottery wheel makes it an accessible tool for novice learners, allowing for the transfer of skills across generations with minimal training. The durability, ease of maintenance, and satisfactory output of this pottery wheel make it a practical choice for daily use and commercial demands. The wheel's consistent design, rooted in cultural heritage, reflects the enduring importance of traditional pottery-making techniques. The tilted sitting posture, naturally formed by the tool's design and derived from the ancestral figure Nyai Krakitan, remains fundamental among contemporary women potters in Pagerjurang. While modern attire has largely replaced the traditional jarik, some older potters still incorporate elements of this historical practice, thereby bridging past and present traditions.

(a) (b)

Figure 4. (a) Elderly potter wore jarik [6], (b) Young potter wore pants

The distinctive design of the tilted pottery wheel and the persistence of the associated posture exemplify the deeply entrenched nature of traditional pottery-making practices in Pagerjurang. This enduring adherence to ancestral techniques, despite the evolution of clothing, reflects a profound commitment to cultural norms. The reliability and familiarity of the wheel are identified by women potters as crucial factors facilitating the seamless adoption and continuation of pottery making across generations. The historical origin of the posture, coupled with its adaptation to modern attire, underscores the cultural significance of maintaining these practices. This continuity ensures the tool's indispensable role in pottery production and guarantees its continued use through verbal and cognitive processes [28]. Furthermore, these insights demonstrate that women's central role in pottery making extends beyond their skills and dedication, embodying a living cultural heritage [29], [30], [31].

Pagerjurang's working culture

The women potters of Pagerjurang typically work independently, either in their homes or in dedicated pottery workshops. They engage in daily discourse as they work, which allows them to maintain a sense of community and support throughout the workday. The workday of these women is analogous to that of employees in the formal sector, encompassing a duration of 7-8 hours per day for 5-6 days per week. Their schedule typically commences at 8:00 a.m. and concludes at 5:00 p.m., with an allotted rest period of one hour. These women frequently work overtime and observe only Muslim and Christian holidays. In addition to their role as homemakers, they rely heavily on traditional pottery-making and market their products through distributors.

In their daily lives, the husbands of the potters assist their wives in the processing of clay by dividing the soil according to the requirements of the product prior to molding. Typically, the clay is coagulated into rounds and stored in large plastic bags to maintain its moisture content and ensure readiness for daily production. In addition to assisting with the processing of clay, the husbands are also responsible for maintaining the tools used in the production process. This may involve tasks such as replacing ropes, adding lubricants, and installing spare parts under certain conditions. Additionally, they are involved in the firing process. Potters who lack access to a kiln typically engage the services of a neighbor who possesses one, and then leave their products with that neighbor. This collaborative endeavor serves to illustrate the pivotal role of women in the perpetuation of traditional pottery-making techniques.

A concept that has its roots in folk traditions has been developed and applied as a guideline for sitting postures while making pottery. This concept entails a tilted sitting posture that adheres to the norms of decency for women at that time. In order to align with this conceptualization of sitting, traditional work tools were also developed to facilitate daily tasks. These intangible elements play a formative role in shaping identity, upholding cultural traditions, and fostering a sense of belonging within communities [32]. The intangible concept that later gave rise to tangible concepts such as cultural artifacts is often referred to as cultural legacy. The cultural legacy represents the diverse array of customs, beliefs, and activities that shape the identity and heritage of a community, connecting the past, present, and future generations [33]. Women are not only essential for the production process but also play a strategic role in preserving a cultural legacy that has been passed down through generations.

There is a collective sense of responsibility to uphold these ancestral artifacts, as Ambar and Endang emphasized that *perbot miring* is regarded as a legacy inherited from the ancestors (Ki Ageng Pandanaran), instilling a sense of responsibility to safeguard its legacy. The potters exhibit a complex emotional response to their work, encompassing a range of sentiments, including ambivalence, frustration, and discomfort. Some of the potters expressed pride in their unique pottery-making technique, as evidenced by Endang, Giyati, and Sri. Nevertheless, this pride is tempered by the physical toll their work takes on their bodies, resulting in a complex emotional response that balances cultural pride with physical discomfort.

In addition, the nature of pottery-making necessitates considerable physical strength, particularly given the manual operation of the traditional tilted pottery wheel. As Ambar and Endang emphasize, the physical resilience required to sustain their traditional work over long periods of time often comes at the expense of personal comfort and health. To cope with the physical discomfort associated with their work, the potters take breaks and manage their working hours, demonstrating a pragmatic approach to their demanding work. Nevertheless, Ambar and Endang expressed concern about the potential for long-term postural changes and physical deterioration, underscoring the community's challenge in reconciling cultural preservation with physical well-being.

Collective well-being and community resilience

The women potters who are still actively engaged in pottery making today have typically been working for 20 to 60 years. They typically began working at an average age of ten, a time when girls in Pagerjurang were accustomed to assisting their mothers in pottery production. It is therefore unsurprising that they have a keen sense of ownership and responsibility in maintaining this traditional practice. Nevertheless, despite this sense of proprietorship, the potters are compelled to engage in productive activity. The work culture of the Pagerjurang community has normalized the involvement of women in pottery production, regardless of whether they were born, grew up, or simply settled in Pagerjurang. Economic factors play a significant role in motivating women potters to engage in pottery making. The income earned by the potters is often used for daily needs and children's school fees. It is not uncommon for potters to become indebted to the local village cooperative. Given the limitations of traditional work practices and the relatively low income generated, the women potters persist in their production of pottery, despite the risk of musculoskeletal disorders due to their prolonged sitting postures. The community has an agreement regarding the division of produced pottery. To ensure fairness and minimize competition, certain blocks specialize in producing teapots, while other blocks produce jugs, pots, plates, bowls, and so on.

This cooperative system exemplifies the intricate balance that the community maintains between the preservation of cultural heritage and the addressing of economic needs. Despite the pride they feel in their cultural identity, many women potters grapple with being locked out of alternative sources of income, as evidenced by the interviews with Ambar and Endang. They express a pervasive concern about the potential extinction of traditional practices, coupled with the reality that these traditions pose significant health risks, particularly to the physical well-being of future generations. This equilibrium is reflected in the women potters' enjoyment of their work, despite the physical discomfort associated with the use of *perbot miring*. The potters' capacity to adapt to these tools, despite the discomfort, exemplifies their resilience and dedication to their work. As Ambar and Endang articulated, the dilemma between cultural pride and physical well-being is a constant challenge, reflecting the community's ongoing struggle to maintain its heritage while ensuring the health and sustainability of its members. A reflection of their resilience and commitment to preserving their cultural heritage despite significant physical challenges. The traditional working culture's impact on sitting posture may lead to spinal deformities, alterations in gait, and muscle weakness in the lower extremities [34], as reported by elderly women potters. Furthermore, the cultural and economic factors identified in this study add a unique dimension to the understanding of musculoskeletal health in traditional occupations.

Postural tendencies

Physical observations were conducted on six of the nine potters who reported postural changes, as these individuals were willing to be photographed. The process involved examining physical characteristics depicted in images capturing the reported body postures in table 2, focusing on symptoms typically used to identify scoliosis [35], [36]. It's important to note that these observations were indicative only, not intended to be diagnostic of type or severity, but rather to provide preliminary insights into the potential musculoskeletal impact of this traditional practice.

Table 2. A physical observation of the subject's postural tendencies

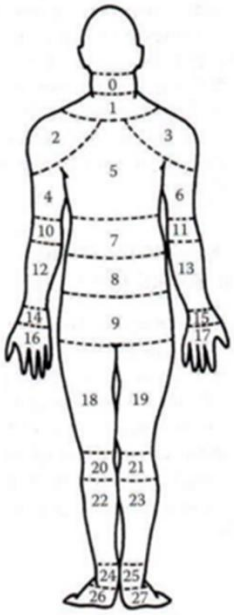
Indications	Posture tendency		
1. Head is not centered over the pelvis 2. Asymmetrical shoulders 3. Waist misalignment (one side higher) 4. Hip or pelvic imbalances 5. One leg appears longer than the other			
			

The observation in question does not permit the determination of the onset time of the symptoms. The observed postural trends may be the consequence of long-term work habits, genetic factors, or a combination of both. The absence of longitudinal data or a complete medical history makes it challenging to ascertain whether these postural changes are indicative of developing scoliosis or adaptation of the body to work demands.

Body parts complaint

To ascertain the distribution of body parts, the complaint can be drawn from 28 body mapping locations, with a range of scores from 1 to 4, as previously mentioned. The following illustration depicts this distribution:

No.	Location of Pain
0	Pain/ stiff in the upper neck
1	Pain in the lower neck
2	Pain in the left shoulder
3	Pain in the right shoulder
4	Pain in the left upper arm
5	Pain in the back
6	Pain in the right upper arm
7	Pain in the waist
8	Pain in the buttocks
9	Pain in the bottom
10	Pain in the left elbow
11	Pain in the right elbow
12	Pain in the left forearm
13	Pain in the right forearm
14	Pain in the left wrist
15	Pain in the right wrist
16	Pain in the left hand
17	Pain in the right hand
18	Pain in the left thigh
19	Pain in the right thigh
20	Pain in the left knee
21	Pain in the right knee
22	Pain in the left calf
23	Pain in the right calf
24	Pain in the left ankle
25	Pain in the right ankle
26	Pain in the left foot
27	Pain in the right foot



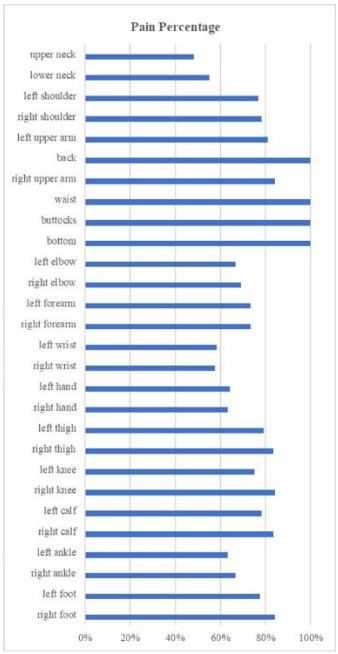


Figure 5. Pain level percentage of body parts of 30 participants

The results of the body mapping conducted at 28 complaint location points indicate that the highest percentage of pain is found in the back, waist, buttocks, and bottom, with 100% of individuals reporting pain in these areas. Moreover, high levels of pain are also observed in the right upper arm (84%), right thigh (83%), right knee (84%), right calf (83%), and right foot (84%). The NBM results indicate that women potters in Pagerjurang experience a high prevalence of musculoskeletal discomfort, particularly in the back, waist, buttocks, and thigh. This is consistent with previous research on the health effects of prolonged sitting and repetitive movements. The high prevalence of pain in the right thigh may be specifically attributed to the asymmetrical posture required when using the *perbot miring,* or tilted pottery wheel.

The high prevalence of musculoskeletal discomfort among the women potters in Pagerjurang aligns with previous research on the health effects of prolonged sitting and repetitive movements in various occupational settings [37], [38]. The specific concentration of pain in the back, waist, buttocks, and thighs is consistent with the physical demands of using the *perbot miring*, which requires a tilted sitting posture and repetitive thigh movements. The higher prevalence of pain in the right leg may be attributed to the right leg remaining in a stationary position [39], [40]. This finding echoes studies that have linked specific work postures and tasks to localized musculoskeletal pain. It naturally leads to the

topic of the dominant use of certain body parts during work [41]. The issue also includes twisting and bending motions that load the spine [42]. Additionally, holding weights in front of the body with extended arms can act as passive vibration absorbers. These actions may interfere with the acceleration-muscle feedback system [43].

Full Body complaint

The results of the NBM distribution are employed to ascertain the perspectives of the research subjects and to gain insights pertaining to full body complaints and complaints specific to individual body parts. The total score of complaints reported by each woman potter across various body locations was used to obtain full-body complaints. From these total scores, a relationship between age and years of work experience can be observed.

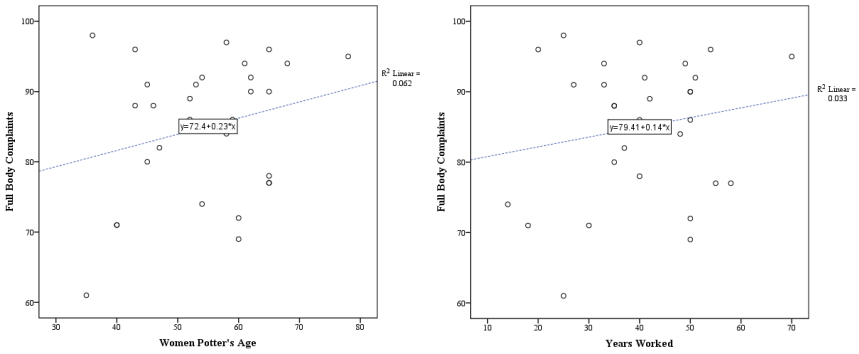


Figure 6. Relationship between full-body complaints, age, and work years of women potters (n=30)

The distributions of points along the linear line suggest a potential relationship between full body complaints and the age of women potters, as well as the number of years they have worked. Prior to conducting correlation tests, a normality test was conducted on the data distribution. The results indicated that the distributions of full body complaints, women potters' age, and years worked were normal. Accordingly, correlation tests were conducted using the statistical test presented below.

Table 3. The correlations test using IBM SPSS Statistic 24

Relation to Full Body Complaints		Test Score
Women potter's Age	Pearson Correlation	0.249
	Significance Value	0.184
Years Worked	Pearson Correlation	0.183
	Significance Value	0.334

The Pearson correlation coefficient between full body complaints and women potters' age is 0.249, with a significance value (p-value) of 0.184. This suggests a weak positive relation, though it is not statistically significant at the 0.05 level (α). Similarly, the correlation between full body complaints and years worked is 0.183 with a significance value of 0.334, indicating a weak positive relation but lacking statistical significance. However, in contrast to some previous research [22], this study did not find a statistically significant relationship between age and years of work. This discrepancy could be attributed to the relatively small sample size in this study, which may have limited the statistical power to detect subtle correlations. Additionally, the qualitative findings suggest that age and experience

may influence how potters perceive and cope with discomfort, potentially masking any direct relationship between these factors in quantitative analysis.

CONCLUSION

The profound cultural identity and economic reliance on pottery among women potters, despite the considerable physical toll, illuminate the intricate interconnection between tradition, occupational pursuits, and well-being. This perspective is frequently overlooked in studies that narrowly focus on musculoskeletal disorders. This study underscores the necessity of incorporating cultural and socioeconomic factors into the analysis of occupational health, in addition to ergonomic considerations. The findings challenge the assumption that traditional practices are unchanging, demonstrating their capacity for adaptation and responsiveness to socioeconomic influences. The findings of this study offer insights that can be used to enhance the working conditions and health of women potters in Pagerjurang and similar communities.

The identification of musculoskeletal discomfort in areas such as the back, waist, buttocks, and thighs can inform future improvements in work systems and tool design. Interventions may entail the redesign of the *perbot miring* to facilitate a neutral posture, the incorporation of regular rest periods and stretching exercises, and the provision of education on proper body mechanics. The ergonomic challenges faced by women potters can be addressed in a manner that simultaneously improves their health and well-being, supports sustainable pottery making, and preserves their cultural heritage.

This study has several limitations that should be acknowledged. First, the sample size was relatively small (n=30), which may have limited the statistical power to detect subtle correlations between age, years of work, and body complaints. Second, the cross-sectional nature of the study did not allow for the assessment of long-term health outcomes or the progression of musculoskeletal issues over time. Third, the study focused on a specific cultural context (Pagerjurang, Indonesia), and the findings may not be generalizable to other populations of potters who use different techniques or work in different environments. Future research should address these limitations by:

- Conducting studies with larger sample sizes to increase statistical power and detect subtle relationships between variables.
- Employing longitudinal designs to track the long-term health effects of traditional pottery making and assess the effectiveness of ergonomic interventions over time.
- Expanding the research to include potters from diverse cultural backgrounds and geographic locations to examine the generalizability of the findings and identify potential cultural variations in the experience of musculoskeletal discomfort.
- Exploring the use of more comprehensive measures of musculoskeletal health, such as physical examinations and objective assessments of muscle function, in addition to self-reported questionnaires.
- Investigating the effectiveness of specific ergonomic interventions, such as modified pottery wheels, adjustable work surfaces, and training programs on proper posture and body mechanics, in reducing musculoskeletal discomfort and improving the well-being of women potters.

By addressing these limitations and pursuing further research, we can gain a deeper understanding of the complex relationship between traditional practices, occupational health, and cultural preservation, and develop evidence-based interventions to support the well-being of potters and artisans in traditional industries worldwide.

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[1] Padasan is a pot with a spout, which serves as a conduit for ablution water, that is used to cleanse the body prior to prayer.
[2] Kain jarik is a long batik cloth that is typically utilized as a skirt.
[3] Kuthungan is a garment similar to the kebaya, with a central sash worn by women.

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