# Correlation Between Age and Waist Functional Ability in Batik Workers Community

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## Abstract

**Purpose:** Functional ability used to explain something that's seen from a functional perspective, for example the functional ability of the waist or lower back. The functions as a load support when the body moves, supports body weight, and is one of the supporting structures for the body and head. Changes in the functional ability of the waist can be caused by many factors, an example is age can affect muscle strength and bone structure. This can certainly hinder activities and reduce the quality of life, especially for workers in unergonomic positions for long periods, one of which is batik making. This study aims to determine whether there is a relationship between age and changes in waist functional ability in batik makers in the Surakarta area, especially in Kampung Batik Laweyan and Kauman.
**Methods:** This research uses an observational research method with a cross sectional study approach and a sample size of 60 people with inclusion criteria being >30 years old. The measurement instrument used was a modification Indonesian version of the Owestry Disability Index (ODI) questionnaire.
**Result:** From statistical tests it was found that there was no relationship between age and waist functional ability in the batik worker community in Laweyan and Kauman batik villages with a p *value* of 0.342. It can be concluded based on the results of the study, there is no correlation between age and waist functional ability in the batik worker community.
***Keywords:*** age, batik, functional ability, ODI, lower back complaints.

## Introduction

Batik has been recognized as one of the values of cultural heritage and wealth, as well as the identity of the Indonesian Nation by UNESCO. Surakarta is known as one of the largest batik-producing cities in Indonesia. It is known as a historical and cultural city with the title "Spirit of Java". The Laweyan and Kauman areas are the largest batik industry villages in the city of Surakarta, as many as 80% of Laweyan people have almost the same business, namely as batik craftsmen. So that Laweyan village is the driving force of the local economy. Kauman is a village known as one of the cultural and assets of the Surakarta palace, because batik craftsmen there are specialized in making batik for the Surakarta palace family [3].

In the manufacturing process, batik is grouped into two, namely printed batik and written batik. Written batik workers will spend more time in a sitting position which makes the loading on the vertebrae three times greater, while printed batik workers will experience more standing, bending, and repetition which will cause physical workload. This results in batik workers during their activities not being in a normal position of the body, and away from the center of motion which will pose a risk of muscle complaints or

muscle fatigue [24].

The position of batik makers who often sit for a long time causes musculoskeletal problems, which can increase tension in the muscles of the back and hips and cause tension in the joints in a static position for a long time. The back muscles experience excessive contraction, then to hold and maintain a sitting position, the muscles become spasm or tightness so that they are at risk of functional impairment [7].

Problems with the waist are one of the most common muscle complaints and are most often found in all people, especially in workers, and are one of the largest contributors to global disability [21]. Complaints to the waist can cause limited worker activity and even result in work absence, complaints to the waist are not the cause of death but can interfere with a person's productivity in doing their job, so that it can cause an individual or family economic burden [14].

According to WHO 2023, back disorders affected 619 million people worldwide in 2020 and are expected to increase to 843 million cases by 2050, largely due to aging and population expansion. Lumbar complaints will increase at the peak of 35-55 years of age, because when a person is 30 years old, the body will begin to degenerate in the form of tissue replacement into scar tissue, fluid reduction, and destruction of some tissues. The degeneration that occurs can cause decreased stability in muscles and bones. As a person gets older, the higher the risk of reducing bone elasticity, which is a triggering factor for complaints at the waist to arise [1].

Complaints that will often be found in people with lumbar disorders are discomfort, pain, and even stiffness localized in the back to buttock area [14]. Complaints about the waist can also be caused by several factors, namely from individual factors (age, length of service, gender, smoking habits, increased Body Mass Index / BMI) and environmental factors (work activities, work attitudes, workplace facilities, repetition, body movement factors) [11]. Decreased lumbar flexibility, stiffness in the lumbar muscle area and decreased strength and endurance of the lumbar muscles are the main factors that can affect changes in the functional ability of the waist [1][6][19].

This decline can be in the form of degeneration changes in the lumbar joint. Changes that occur in old age include changes in synovial fluid in the joints, decreased bone mass and muscle mass. Loss of muscle size and strength can be related to metabolic, physiological, and functional disorders [18][8][20][12].

According to the description above, the researcher is interested in conducting research on the correlation of waist functional ability with age in batik makers. This is also because there are still many previous studies that discuss the relationship of low back pain to certain factors, so there is a lack of research that discusses changes in the functional ability of the waist in workers, especially to the age factor. This study also discusses the community of batik workers according to the types of stamp, write, and differentiated in the batik work division. The purpose of this study is to determine whether there is a correlation between changes in waist functional ability and age in the batik worker community in Kampung Batik Laweyan and Kauman.

## Methods

This type of research is quantitative observational with a cross sectional study survey approach. The total research subjects were 60 people consisting of a group of printed and written batik workers in the lorod, coloring, nyolet, ngiseni, and mola work divisions with waist complaints aged >30 years, in Kauman and Laweyan Batik Villages in Surakarta. The samples were taken using purposive sampling technique, with the inclusion criteria

of batik workers willing to fill out informed consent, willing to fill out research questionnaires, aged> 30 years, and batik workers experiencing low back complaints during their working period with exclusion criteria of batik workers having physical limitations or a history of trauma, and not cooperating during the study.

Data collection was carried out through direct observation and interviews with respondents using a modified Indonesian version of the Owestry Disability Index (ODI) questionnaire to measure impaired functional ability of the waist and included 10 validated points with a validity value of 0.722 and a reliability value of 0, 890 [22][25]. The study involved batik makers and workers of both printed and written batik. Filling in the questionnaire was carried out by the enumerator after informed consent, which had previously been explained to respondents about the purpose and benefits of the study. This research already has an Ethical Clearance permit or ethical feasibility with Number 870/EC/IV/2024 from research ethics committee of RST dr. Soedjono Magelang.

This study used ordinal scale data on the age variable and ratio scale data on the waist functional ability variable, so the bivariate analysis test used the Spearman Rho test, to see the significance, strength and direction of the relationship between variables. The data normality test used Kolmogorov Smirnov because the research sample amounted to 60 people, and for the ordinal data scale was normally distributed, while for the ratio data scale was not normally distributed.

## Results

### a) Characteristics of respondents

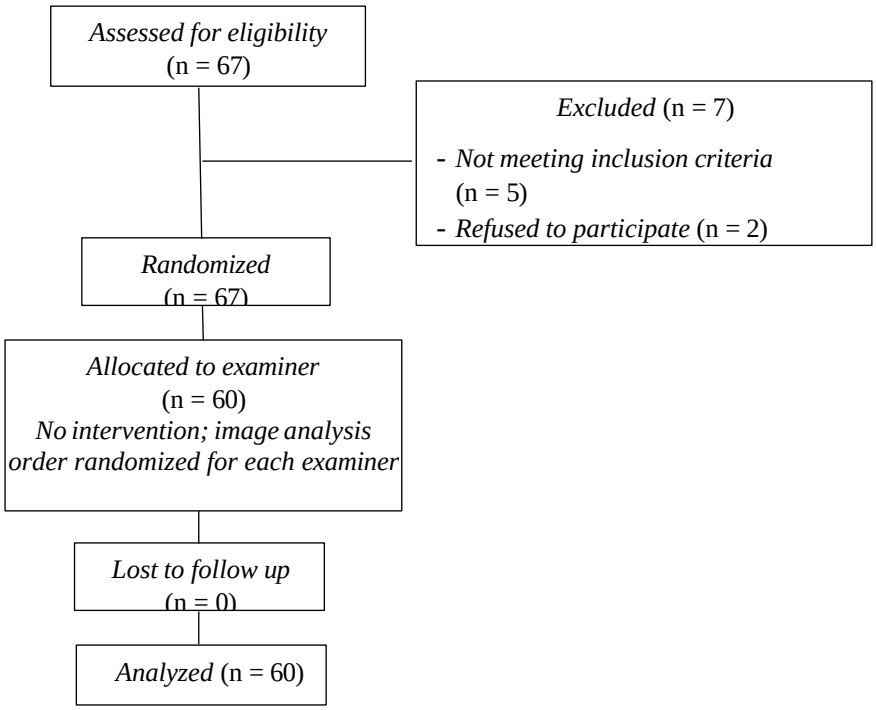


Figure 1. Observational study flowchart

The number of subjects participating in this study was 60 people consisting of 32 men (53.3%) and 28 women (46.7%) with a written batik group of 34 people (56.7%) and printed batik 26 people (43.3%). The age variable is categorized into 3 groups according to WHO, namely the adult group (30-44 years) as much as 36.7%, middle age (45-59

years) as much as 38.3%, and elderly (60-74 years) as much as 38.3%. elderly (60-74 years) as much as 25%, and it is known that 54 people (90%) fall into the mild disability category in the ODI score group.

Table.1 Univariate analysis of sample characteristics

| Variable | n | Mean ± STDEV | Range | Median | Variant | Modus |
|---|---|---|---|---|---|---|
| **Age** | 60 | 49.08 ± 12.152 | 43.00 | 50.00 | 147.671 | 50.00 |
| **ODI Score** | 60 | 11.50 ± 7.773 | 34.00 | 10.00 | 60.424 | 8.00 |
| **Age Group** | 60 | 1.88 ± 0.783 | 2.00 | 2.00 | 0.613 | 2.00 |
| **Score Group ODI** | 60 | 1.10 ± 0.303 | 1.00 | 1.00 | 0.092 | 1.00 |
| | **Characteristics** | | | ***f*** | | **%** |
| **Age** | *Adult* | | | 22 | | 36,7% |
| | *Middle Age* | | | 23 | | 38,3% |
| | *Elderly* | | | 15 | | 25% |
| | **Total (n)** | | | **60** | | **100%** |
| **Gender** | Man | | | 32 | | 53,3% |
| | Woman | | | 28 | | 46,7% |
| | **Total (n)** | | | **60** | | **100%** |
| **Type of Batik Makers** | Stamp | | | 26 | | 43,3% |
| | Write | | | 34 | | 56,7% |
| | **Total (n)** | | | **60** | | **100%** |
| ***Job description*** **Batik Makers** | | | | | | |
| **Stamp** | Ngiseni | | | 18 | | 30% |
| | Mola | | | 0 | | 0% |
| | Nyolet | | | 0 | | 0% |
| | Pewarnaan | | | 6 | | 10% |
| | Lorod | | | 2 | | 3,3% |
| | **Total (n)** | | | **26** | | **43,3%** |
| **Write** | Ngiseni | | | 28 | | 46,7% |
| | Mola | | | 1 | | 1,7% |
| | Nyolet | | | 3 | | 5% |
| | Pewarnaan | | | 1 | | 1,7% |
| | Lorod | | | 1 | | 1,7% |
| | **Total (n)** | | | **34** | | **56,7%** |
| **Group Score ODI** | Mild Disability | | | 54 | | 90% |
| | Medium Disability | | | 6 | | 10% |
| | **Total (n)** | | | **60** | | **100%** |

Source: Primary Data

**b) Correlation of Waist Functional Ability with Age in the Batik Worker Community**

In the data normality test using Kolmogorov Smirnov, the results of the age variable with a sig value. 0.2 (>0.05) means that the data is normally distributed, and the waist functional ability variable (ODI score) with a sig value. <0.01 (<0.05) means that the data is not normally distributed.

Table 2. Data normality test

| *Kolmogorov-Smirnov* | **Statistic** | **df** | **Sig.** |
|---|---|---|---|
| **Age** | 0.093 | 60 | 0.200 |
| **ODI Score** | 0.177 | 60 | 0.000 |

Source: Primary Data

From the Spearman test, the p value is 0.342 (p> 0.05) so it can be said that Ho is accepted and Ha is rejected. This shows that there is no relationship between age and waist functional ability among batik makers in Kauman and Laweyan Batik Villages. The level of correlation strength is 0.125, meaning that the correlation is very weak and the direction of the relationship is positive (unidirectional).

Table 3. Bivariate Analysis of Age Group Variables with ODI Category

| | | | **Age** | **ODI Score** |
|---|---|---|---|---|
| *Spearman's rho* | **Age** | *Correlation* | 1.000 | 0.125 |
| | | *Sig. (2-tailed)* | . | 0.342 |
| | | N | 60 | 60 |
| | **ODI Score** | *Correlation* | 0.125 | 1.000 |
| | | *Sig. (2-tailed)* | 0.342 | . |
| | | N | 60 | 60 |

Source: Primary Data

**Discussion**

The absence of a relationship can be indicated because this study only focuses on one of the causal factors, namely age. Without paying attention to other causal factors that can affect changes in waist functional ability such as good physical activity, length of service, duration of work, and working position of the batik maker.

This study is in line with research conducted by Riningrum & Widowati (2016), which states that there is no relationship between age and low back complaints in workers with a p value of 0.554 (p> 0.05), while the study states that there is a relationship between ergonomic factors and low back complaints with a p value of 0.002 and 0.040 (p < 0.05).

Increasing age in a person can indeed cause a decrease in stability and strength of the waist muscles, but when the batik is in an ergonomic position during work, has sufficient rest time, endurance and has good nutritional intake and physical activity, fatigue in the waist muscles can be minimized [24][10]. Aging is a natural process that cannot be avoided, according to Sari *et al*. (2017) the decrease in muscle strength in a person will look more significant at the age of 60 years, with an average decrease of up to 20% which will trigger the onset of low back complaints.

Factors that affect the aging process in each individual are not the same, resulting in a person's health status being different from one another (Ekasari *et al*., 2018). This statement is supported by research conducted by Rohmah *et al*. (2012) on the elderly at Panti Werdha Hargo Dedali, which states that the quality of life of the elderly can be influenced by physical, psychological, social, and environmental factors.

Increasing age is not the only factor causing changes in a person's waist functional ability. According to research conducted by Chaidir *et al*. (2017) states that the physiological health of the elderly is also one of the factors that can affect their physical functional abilities, the better the physiological health, the better the functional abilities in the elderly, and vice versa (Chaidir *et al*., 2017). To achieve good physiological health, one of them is obtained from good physical activity as well, because it can increase the flexibility of muscle tone in the elderly, so that the level of complaints in the muscles will decrease [4].

Based on the explanation above, the probability of changes in waist functional ability can decrease, so the majority of batik makers in this study for ODI values are in the low category. In batik makers with mild disability category, it means that batik makers can still do most of their life activities, without any indication of drug consumption, and are more focused on being given education related to how to sit or lift things correctly so as not to aggravate the level of disability.

However, the researcher realizes that this research is still not perfect, there are several limitations in the course of this research. One of them is an interview when filling out the questionnaire, so that the data can be subjective. We recommend that during the ODI questionnaire filling, the research sample fills in the questions independently to avoid the risk of subjective data.

## Conclusion

Based on the results of statistical tests and the presentation of the material above, it can be concluded that age is not related to the cause of changes in waist functional ability, with p value = 0.342. The next research is expected to discuss more about other factors that influence changes in the functional ability of the waist in workers, and conduct generalization tests based on the batik work division.

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## Author Contributions

Arif Pristianto: research and data collection.
Azizah Shalsa Billa: data collection and article writing.
Samiyem: article writing and translation.
Adnan Faris Naufal: data collection.
Mahendra Wahyu Dewangga: Data analysis.

## References

[1] Andini, F. (2015). Risk Factors of Low Back Pain in Workers. *Medical Journal of Lampung University*, *4*, 12.

https://juke.kedokteran.unila.ac.id/index.php/majority/article/view/495.

[2] Andri, J., Karmila, R., Padila, P., Harsismanto, J., & Sartika, A. (2019). Terapi Aktivitas Aenam Ergonomis terhadap Peningkatan Kemampuan Fungsional Lansia. *Journal of Telenursing*, *1*(2), 304–313. https://doi.org/https://doi.org/10.31539/joting.v1i2.933.

[3] Anisah, S. S., & Tohjiwa, A. D. (2016). Pusat Batik Surakarta Hadiningrat di Laweyan, Surakarta. *Jurnal Ilmiah Desain & Konstruksi*, *15*(1), 60–68. https://ejournal.gunadarma.ac.id/index.php/dekons/article/view/1587.

[4] Arwinno, L. D. (2018). Keluhan Nyeri Punggung Bawah pada Penjahit Garmen. *Higeia Journal of Public Health Research And Development*, *2*(3), 406–416.

[5] Chaidir, R., Amelia, D., & Syafril, E. (2017). Hubungan Faktor-Faktor Dengan Kemampuan Fungsional Fisik Lansia Wanita. *Jurnal Ilmu Kesehatan 'Afiyah, 4(2).* https://ejournal.umnyarsi.ac.id/index.php/JAV1N1/article/view/108. Ekasari, M. F., Riasmini, N. M., & Hartini. T. (2018). *Meningkatkan kualitas hidup lansia konsep dan berbagai intervensi.* Malang: Wineka Media.

[6] Hasmar, W., & Faridah. (2022). E-Book Core Stability Exercise on Myogenic Low Back Pain. *Indonesian Journal of Sport Management and Physical Education*, *1*(1), 1–10. https://doi.org/10.55927/ijsmpe.v1i1.2113

[7] Junita, R. G., Pristianto, A., Supriyadi, A., & Susilo, T. E. (2021). Hubungan Aktivitas Duduk Lama Dengan Keluhan Musculoskeletal Pada Punggung Bawah: Critical Review. *FISIO MU: Physiotherapy Evidences*, *2*(3), 150–161. https://doi.org/10.23917/fisiomu.v2i3.15199

[8] Lintin, G. B., & Miranti. (2019). Hubungan Penurunan Kekuatan Otot dan Massa Otot dengan Proses Penuaan pada Individu. *Jurnal Kesehatan Tadulako*, *5*(1), 1–62. http://jurnal.untad.ac.id/jurnal/index.php/HealthyTadulako/article/view/12618

[9] Nugroho, A. J. (2021). Tinjauan Produktivitas dari Sudut Pandang Ergonomi. Sumatera Barat: PACE.

[10] Pandjukang, A. P., Hutasoit, R. M., & Damanik, E. M. B. (2020). Hubungan Usia Dan Jenis Kelamin Pada Penderita Nyeri Punggung Bawah (Low Back Pain) Dengan Komorbid Diabetes Melitus Di Rsud. *Cendana Medical Journal*, *19*(1), 9–15. https://ejurnal.undana.ac.id/CMJ/article/view/3332.

[11] Mardatillah, S., Putra, E. P., & Nova, R. (2022). Gambaran Radiografi Vertebrae Lumbal pada Pasien Lansia dengan Low Back Pain di Rumah Sakit dr. Reksodiwiryo Padang Tahun 2021. *Scientific Journal*, *1*(6), 434–445. https://doi.org/10.56260/sciena.v1i6.76.

[12] Pristianto, A., Ramadhan, K. K., & Widodo, A. (2022). *Jurnal Kesehatan*, *15*(1), 93–100. https://doi.org/10.23917/jk.v15i1.17603.

[13] Pristianto, A., Wijianto, W., Susilo, T. E., Naufal, A. F., Rahman, F., & Addiningsih, Y. (2021). Edukasi Program Aquatic Exercise dalam Mengurangi Keluhan serta Meningkatkan Kemampuan Fungsional Pasien Nyeri Pinggang Kronik. *Jurnal Pengabdian Masyarakat Multidisiplin*, *4*(3), 190–193. https://doi.org/10.36341/jpm.v4i3.1880.

[14] Riningrum, H., & Widowati, E. (2016). Pengaruh Sikap Kerja, Usia, dan Masa Kerja Terhadap Keluhan Low Back Pain. *Jurnal Pena Medika, 6(2), 91-102.* https://jurnal.unikal.ac.id/index.php/medika/article/view/394/352.

[15] Rohmah, A. I. N., Purwaningsih., & Bariyah, K. (2012). Kualitas Hidup Lanjut

Usia. *Jurnal Keperawatan, 3(2), 120-132.* https://doi.org/10.22219/jk.v3i2.2589

[16] Saputra, A. (2020). Sikap Kerja, Masa Kerja, dan Usia terhadap Keluhan Low Back Pain pada Pengrajin Batik. *Higeia Journal of Public Health Research and Development*, *1*(3), 625–634. http://journal.unnes.ac.id/sju/index.php/higeia.

[17] Scanlon, T. C., Fragala, M. S., Stout, J. R., Emerson, N. S., Beyer, K. S., Oliveira, L. P., & Hoffman, J. R. (2014). Muscle Architecture and Strength: Adaptations to Short Term Resistance Training. *Muscle & Nerve*, *49*(4), 1–34. https://doi.org/10.1002/mus.23969.

[18] Setiorini, A. (2021). Kekuatan otot pada lansia. *JK Unila*, *5*(3), 69–74. https://doi.org/https://doi.org/10.23960/jkunila5169-74.

[19] Tamtomo, D. G. (2016). Perubahan anatomik organ tubuh pada penuaan. Diakses dari *https://library. uns. ac. id/perubahan-anatomik-organ-tubuh-pada-penuaan*.

[20] Triwulandari, N., & Zaidah, L. (2019). Hubungan Usia Dan Durasi Lama Duduk Dengan Keluhan Nyeri Punggung Bawah Pada Pembatik Di Kampung Batik Giriliyo. *Ilmiah Fisioterapi*, *2*(2), 81–92. http://jurnal.univrab.ac.id/index.php/jif/article/view/990.

[21] Wahyuddin, Hanun, A., & Ivanali, K. (2016). Abstrak Adaptasi Lintas Budaya Modifikasi Kuesioner Disabilitas Untuk Nyeri Punggung Bawah (Modified Oswestry Low Back Pain Disability Questionnaire / Odi) Versi Indonesia. *Fisioterapi*.https://digilib.esaunggul.ac.id/public/UEU-Research-7825-WAHYUDDIN_Sst.Ft_M.Sc.pdf.

[22] World Health Organization. (2023). *Low Back Pain*. Diakses pada 9 September 2023, dari https://www-whoint.translate.goog/news room/fact-sheets/detail/low-backpain?_x_tr_sl=en&_x_tr_tl=id&_x_tr_hl=id&_x_tr_pto=tc.

[23] Wulan, M., Hilal, S., & Entianopa. (2020). Perbandingan Keluhan Low Back Pain pada Pekerja Batik Tulis dan Cap di Kecamatan Danau Teluk Kota Jambi Tahun 2020. *Indonesian Journal of Health Community*, *1*(1), 1–5. https://e-journal.ivet.ac.id/index.php/ijheco/article/view/1391.

[24] Yates, M., & Shastri-Hurst, N. (2017). The oswestry disability index. *Occupational Medicine*, *67*(3), 241–242. https://doi.org/10.1093/occmed/kqw051.