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Research

# Relationship between Cardiorespiratory Fitness and Quality of Life in the Elderly

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## ABSTRACT

**Background:** The aging process occurs so fast, therefore the quality of life of the elderly needs to be very concerned. Cardiorespiratory fitness is one of the predictor factors to improve the quality of life in the elderly. The study aims to find out whether there is a relationship between cardiorespiratory fitness and the quality of life of the elderly.
**Subjects and Method:** This was a cross-sectional study conducted in Dukuh Pepe, Kwarasan, Juwiring, Klaten, Central Java. A sample of 31 elderly (aged 50-70 years) was selected using the purposive sampling method. The dependent variable was quality of life. The independent variable was cardiorespiratory fitness. Quality of life was measured by Ina's whoqol-breff questionnaire. Cardiorespiratory fitness was measured by a six-minute walking test. The data were analyzed with the spearman correlation test and the simple linear regression test.
**Results:** Cardiorespiratory fitness improved the quality of life in the elderly in the physical health domain (OR= 44.55; 95% CI= 20.49 to 68.62), psychological domain (OR= 51. 14; 95% CI= 26.10 to 76.19), personal relationship domain, (OR= 76.94; 95% CI= 52.57 to 101.30), environmental domain (OR= 78.92; 95% CI= 49.51 to 108.33) although it was statistically insignificant.
**Conclusion:** There was no relationship between cardiorespiratory fitness and the quality of life of the elderly in rural areas in the aspects of the physical health domain, the psychological domain, the personal relationship domain, and the environmental domain.

**Keywords:** cardiorespiratory fitness, quality of life, elderly, six-minute walking test, whoqol-breff.

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## BACKGROUND

The number of elderly people in 2019 is 25.6 million, there are more men than women and most lived in rural areas. A total of 52. 86% work in the agricultural sector and 80. 76% of them are self-employed farmers, either assisted or non-assisted (Saat et al., 2019). Based on population growth data in Indonesia, there is an increase in the number of the elderly population, in 2017 there are 23.66 million people or 9. 03%. Meanwhile, in 2020 there are 27.08 million people with elderly women were 9. 53% while men were 8. 54%, thus indicating that the life expectancy of elderly women is greater than that of men. Based on the age of the Indonesian population, DI Yogyakarta is the province with the largest elderly percentage with 13. 81%, followed by Central Java with 12. 59%, and

then East Java with 12. 25%. The provinces with the smallest percentage of elderly people among others are Papua at 3.20%, West Papua at 4.33%, and Riau Islands at 4.35%. This aging process is influenced by several factors, including improved nutriation, health services, educational advancement, and also better socio-economic (Ministry of Health of the Republic of Indonesia, 2017).

Aging is a process that is subjected to internal and external influences by individual aspects including life stage, cooperative life, education, health, and general care (Federal et al., 2018). Research conducted by (Baernholdt et al., 2020) reveals that the number of elderly people in rural areas is higher than in urban areas, this is due to the large population in rural areas as well as changes in quality of life over time. Therefore, the elderly who live in rural areas feel that their quality of life is better.

The aging process is so fast, so the quality of life of the elderly needs to be very concerned. There are differences in the quality of life between the elderly living in rural areas and the elderly living in urban areas, as explained in a study (Bolina, 2014) the elderly population living in rural areas has a better score in the physical and psychological domains than the elderly living in urban areas. Meanwhile, the elderly who live in urban areas have a higher score in social and environmental relations than the elderly who live in rural areas. The issue is due to differences in sociodemographic characteristics, lifestyle, and financial resources. Another study conducted by (Nugraha and Aprillia, 2020) states that the quality of life of the elderly living in the community is better than the quality of life of the elderly living in nursing homes. This is because the elderly living in the community have self-care skills, mobility, and ability in daily activities, as well as lower depressive symptoms compared to the elderly living in nursing homes. The quality of life of the elderly is also influenced by health, demographic factors, intrusive thoughts, and social relationships (Ghosh and Dinda, 2020)

According to (Hidayati et al., 2018) out of 88 respondents having the Quality of Life (QOL) domains of physical, psychological, social relationship, and environmental showed a low score (<60). The results of the study determined that 100% of respondents have a low physical domain score, 98. 9% of respondents low psychological domain score, 96. 6% of respondents have a low social relationship domain score, 89. 8% of respondents have a low physical domain score. Based on research conducted by (Ulfah and Wismaningsih, 2018) 58. 33% of the elderly in Malang have a moderate quality of life, respondents often experience sleeping difficulty, drug addiction, and have personal and social relationship problems. Another study conducted by (Wong et al., 2018) stated that Hong Kong residents had a relatively higher average physical health score (Mean= 70.83; SD= 12. 69) than the environmental score (Mean= 61.98; SD= 13. 76). Environmental satisfaction results indicate a moderate score as a result, there was a significant association with QOL in the psychological domain ($\beta$ = 0.170; p= 0. 006).

Cardiorespiratory fitness is the ability of the circulatory and respiratory systems to supply oxygen to skeletal muscles, and the ability of skeletal muscles to utilize oxygen during exercise (Hakola, 2015). According to (Kohler et al., 2016) that elderly women who practice physical exercise regularly will reduce the risk of decreased cardiorespiratory fitness compared to those who do not practice physical exercise regularly. It is also explained that physical

exercise performed by the elderly will reduce the effects of aging and avoid negative health consequences. Cardiorespiratory fitness has a relationship with quality of life in the physical health domain, by increasing cardiorespiratory fitness and increasing physical activity it will improve the quality of life (Eddolls et al., 2018). The study aims to find out whether there is a relationship between cardiorespiratory fitness and quality of life in the elderly.

## SUBJECTS AND METHOD

### 1. Study Design

The study used the Cross-sectional study method. The study was conducted in Pepe Village,Kwarasan, Juwiring, Klaten, Central Java, Indonesia.

### 2. Population and Sample

The population for this study was residents in Dukuh Pepe, Kwarasan Village, Juwiring Sub-District, Klaten Regency, aged 50-70 years. Based on the results of observations conducted by the researchers, the size of the sample that met the inclusion criteria was 31 people.

The study used the purposive sampling method. the selection of samples according to the criteria to be studied, therefore the author set certain criteria so that the sample could be completed for this study.

### 3. Study Variables

The dependent variable was cardiorespiratory fitness. The independent variable was quality of life.

### 4. Operational definition of variables

**Cardiorespiratory fitness is** defined as the respiratory and circulatory capacity that delivers oxygen to the skeletal muscles for energy production during physical activity (Kim, 2022). The assessment instrument used was the Six Minute Walking Test. The assessment score was in percent**.**

**Quality of life** is defined as the individual's perception of life and its relationship with goals, expectations, standards, attention, and conditions with different values. The quality of life was assessed using the Whoqol-Breff Ina questionnaire which consisted of four domains, namely physical, psychological, social relationship, and environmental health. The options of answer used Likert scale with a score of 1-5 for each question. The measurement scale was continuous data.

### 5. Study Instruments

Cardiorespiratory fitness was measured by a six-minute walking test. Quality of life was measured using the Whoqol-Breff Ina questionnaire.

### 6. Data analysis

The data analysis method carried out in this study uses the Spearman correlation test to determine the correlation between cardiorespiratory fitness and quality of life and a simple linear regression test to discover whether there is an effect of cardiorespiratory fitness on the quality of life of the elderly.

### 7. Research Ethics

Ethical clearance was obtained from the Health Research Ethics Commission (KEPK) Faculty of Medicine UMS, No. 4535/-B.2/KEPK-FKUMS/X/2022, 15 October 2022.

## RESULTS

### 1. Sample Characteristics

The average subjects in this study aged 58 years (Mean=58.45; SD=6.33). The youngest age was 50 years old, and the oldest age was 76 years old. The majority of respondents worked as laborers with a total of 13 persons (N=41.9%) and farmers with a total of 8 persons (N=25.8%). The average of the oxygen saturation test results was 97 percent (Mean=97.38; SD=1.72), with the lowest was 92 percent and the highest was

99 percent. The average result of the systolic blood pressure examination was 125 mmHg (Mean=125.16; SD=15.88) the lowest systolic blood pressure was 90 mmHg and the highest was 160 mmHg. While the average diastolic blood pressure was 91 mmHg (Mean=91.29; SD=12.31-MmHg), the lowest diastolic blood pressure was 60 mmHg and the highest was 120 mmHg. The average result of the Fasting Plasma Glucose test was 136 (Mean-=136.03; SD=48.24) with the lowest result was 83 and the highest result was 237. The average result of the Uric Acid examination was 7 (Mean = 7.06; SD=3.08) the lowest result was 3.70 and the highest result was 17.30. Based on BMI value, most elderly in the study were of normal weight with a total of 19 persons. The average cardiorespiratory fitness score assessed using a six minutes walking test was 32 (Mean=32.57; SD-=4.49), the average value physical health domain with a 59 (Mean= 59.96; SD= 8.92), The average score of the psychological domain was 64 (Mean= 64.87; SD= 9.22), personal relationships domain was 74 (Mean= 74.6; SD=8.78), and the environmental domain was 81 (Mean= 81.16; SD=10.60).

**2. Bivariate Analysis**

Table 3 shows that cardiorespiratory fitness improved the quality of life of the elderly in aspects of the physical health domain, however, it was statistically insignificant (r-=0.05; p=0.785). Cardiorespiratory fitness also improved the quality of life of the elderly on the aspect of the psychological domain, however, it was statistically insignificant (r=0.07; p=0.671). Cardiorespiratory fitness decreased the quality of life of the elderly in the aspect of personal relationships domain, however, it was statistically insignificant (r=-0.16; p=0.386). Cardiorespiratory fitness improved the quality of life of the elderly in the aspect of the environmental domain, however, it was statistically insignificant (r= 0.02; p= 0.877).

**3. Multivariate Analysis**

A simple linear regression test was used to determine whether there was an effect of cardiorespiratory fitness on the quality of life of the elderly. Table 3 shows the result of the coefficient of determination value of 0.057 which means that the effect of cardiorespiratory fitness on the quality of life of the elderly in the physical health domain was 5.7% and there were 94.3% other factors that affected the quality of life of the elderly in the physical health domain. The effect of cardiorespiratory fitness on the quality of life of the elderly in the psychological domain was 4.2% while other factors affecting it were 95.8%. The effect of cardiorespiratory fitness on the quality of life of the elderly in the personal relationship domain and the environmental domain was 0.1% and other factors affecting it were 99.9%. The p-value of each quality-of-life domain was the physical health domain p= 0.197, the psychological domain p= 0.267, the personal relationship domain p= 0.845, the environmental domain p=0.877 which means there was no relationship between cardiorespiratory fitness to the quality of life of the elderly. In the physical health domain, the value of OR = 44.55 and 95% CI = 20.49 – 68.62 which means that each 1 unit increase in cardiorespiratory fitness, would increase the quality of life in the physical health domain by 44.55. In the psychological domain, the value of OR = 51.14 and 95% CI = 26.10 – 76.19 which means each 1 unit increase in cardiorespiratory fitness rises would increase the quality of life of the psychological domain by 51.14. Personal relationship domain OR value = 76.94 and 95% CI = 52.57 – 101.30 which means each 1 unit increase of cardiorespiratory fitness would increase the

quality of life of the personal relationship domain by 76.94. The Environmental domain OR value = 78.92 and 95% CI = 49.51 – 108.33 which means each 1 unit increase of cardiorespiratory fitness would increase the quality of life in the Environmental domain by 78.92.

**Table 1. Characteristics of the Respondents for Continuous Data**

| Variables | n | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|---|
| Age (years) | 31 | 58.45 | 6.33 | 50 | 76 |
| SPO2 | 31 | 97.38 | 1.72 | 92 | 99 |
| Systolic blood pressure (mmHg) | 31 | 125.16 | 15.88 | 90 | 160 |
| Diastolic blood pressure (mmHg) | 31 | 91.29 | 12.31 | 60 | 120 |
| FPG | 31 | 136.03 | 48.24 | 83 | 237 |
| Uric Acid Level | 31 | 7.06 | 3.08 | 3.7 | 17.3 |
| 6-MWT score | 31 | 32.57 | 4.49 | 22.2 | 45.6 |
| Quality of life Domains | | | | | |
| Physical health | 31 | 59.96 | 8.92 | 31 | 75 |
| Psychological health | 31 | 64.87 | 9.22 | 44 | 81 |
| Personal relationship | 31 | 74.61 | 8.78 | 50 | 94 |
| Environmental | 31 | 81.16 | 10.60 | 56 | 100 |

**Table 2. Characteristics of the Respondents for Categorical Data**

| Variables | n | % |
|---|---|---|
| **Sex** | | |
| Female | 22 | 71.0% |
| Male | 9 | 29.0% |
| **Occupation** | | |
| Housewife | 4 | 12.9% |
| Farmer | 8 | 25.8% |
| Laborer | 13 | 41.9%. |
| Merchant | 2 | 6.5% |
| Civil servant | 2 | 6.5% |
| Unemployed | 2 | 6.5% |
| **BMI** | | |
| Underweight | 4 | 12.9% |
| Normal | 19 | 61.3% |
| Overweight | 3 | 9.7% |
| Obese | 5 | 16.1% |

**Table 3. Table of Spearman Correlation Test on the relationship of cardiorespiratory and quality of life domain in the elderly**

| Variables | r | p |
|---|---|---|
| Quality of life (total score) | | |
| Physical health domain | 0.05 | 0.785 |
| Psychological domain | 0.07 | 0.671 |
| Personal relationship domain | -0.16 | 0.386 |
| Environmental domain | 0.02 | 0.877 |

**Table 4. Simple Linear Regression Test**

| variable | Quality of Life Domains | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Physical Health Domain | | | Psychological Domain | | | Personal Relationship Domain | | | Environmental Domain | | |
| | OR | CI 95% | p | OR | CI 95% | p | OR | CI 95% | p | OR | CI 95% | p |
| Cardiorespiratory Fitness | 44.55 | 20.49 to 68.62 | 0.190 | 51.14 | 26.10 to 76.19 | 0.260 | 76.94 | 52.57 to 101.30 | 0.840 | 78.92 | 49.51 to 108.33 | 0.870 |

## DISCUSSION

The results of the characteristics of respondents were at the average age of 50-55 years there were more women than men because according to research (Seangpraw et al., 2019) the quality of life is strongly influenced by relationships between families, self-esteem, and support of family and relatives. The majority Body Masa Index category in this study was elderly with a normal weight category. The elderly with normal weight have a good quality of life compared to those with obesity because obesity decreases the quality of life in the physical domain (Apple et al., 2018).

The results of the correlation test and the simple regression test showed that there was no relationship between cardiorespiratory fitness and the quality of life of the elderly. According to (Azzahro and Rosyid, 2016) depression is one of the factors that can affect the quality of life. Another study conducted (Farajzadegan et al., 2013) shows that there is a relationship between family support and the quality of life of the elderly, good family support leads to a better quality of life of the elderly. Family support includes affection, information exchange with each other, making home conditions comfortable and pleasant, and listening to each other's stories.

According to (Acharya Samadarshi et al., 2022) in Nepal that the quality of life is very strongly related to social support, affordable health services, and sufficient income. Feasible methods include regular health checks, psychological counseling, establishing skill groups for the elderly, and building up a recreation center. An increase in physical activity will affect the improvement of one's quality of life (Ativie and Onah, 2019).

The quality of life of the elderly is related to environmental factors (Gobbens and Van Assen, 2018). The study carried out (Clennin et al., 2015) states that there was a relationship between cardiorespiratory fitness and the quality of life, and it is different between women and men. For women, it is on the dimensions of physical function, physical role, and vitality. While for men is on the physical health dimension. The quality of life of the elderly is strongly influenced by social factors such as the condition of residence, participation in social activities, and social support (Kim et al., 2015).

## AUTHOR CONTRIBUTIONS

Qomariyah as the main character of the research who chooses the topic, conducts searches and collects data in this study. Farid Rahman played a role in conducting data analysis and reviewing research documents

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**CONFLICT OF INTEREST**

There was no conflict of Interest

## REFERENCE

Samadarshi SCA, Taechaboonsermsak P, Tipayamongkholgul M, Yodmai K (2022). Quality of life and associated factors amongst older adults in a remote community Nepal. J. Health Res. 36(1): 56–67. Doi: 10.1108/JHR-01-2020-0023.

Apple R, Samuels LR, Fonnesbeck C, Schlundt D, Mulvaney S, Hargreaves M, Crenshaw D, et al. (2018). Body mass index and health-related quality of life. Obes. Sci. Pract. 4(5): 417–426. Doi: 10.1002/osp4.292.

Ativie RN, Onah UE (2019). Relationship between selected risk factors for cardiovascular diseases and the quality of life. Open j. ther. rehabil. 07(03): 106–119. Doi: 10.4236/ojtr.-2019.73007.

Baernholdt M, Yan G, Hinton I, Rose K, Mattos M (2020). Quality of Life in rural and urban adults 65 years and older: findings from the national health and nutrition examination survey. 1–9. Doi: 10.1111/j.1748-0361.-2011.00403.x.

Bolina AF (2014). Quality of life of elderly. comparison between urban and rural areas. Invest Educ Enferm. 32(3): 401-13. Doi: 10.17533/udea.iee.v32n-3a05.

Clennin MN, Payne JPW, Rienzi EG, Lavie CJ, Blair SN, Pate RR, Sui X (2015). Association between cardiorespiratory fitness and health-related quality of life among patients at risk for cardiovascular disease in Uruguay. PLoS ONE. 10(4): 1–14. Doi: 10.1371/journal.pone.0123989.

Diena Azzahro, Fahma, Fahrun Nur Rosyid (2016). Hubungan antara tingkat depresi dengan kualitas hidup lanjut usia di panti wredha darma bhakti pajang surakarta.

Eddolls WTB, McNarry MA, Lester L, Winn CON, Stratton G, Mackintosh KA (2018). The association between physical activity, fitness and body mass index on mental well-being and quality of life in adolescents. Qual. Life Res. 27(9): 2313–2320. Doi: 10.1007/s111-36-018-1915-3.

Evaristo OS, Moreira C, Lopes L, Abreu S, Agostinis-Sobrinho C, Oliveira-Santos J, Oliveira A, et al. (2019). Cardiorespiratory fitness and health-related quality of life in adolescents: A longitudinal analysis from the Lab-Med Physical Activity Study. Am. J. Hum. Biol. 31(6). Doi: 10.1002/ajhb.-23304.

Farajzadegan Z, Koosha P, Sufi GJ, Keshvari M (2013). The relationship between family function and women's well-being. Iran J Nurs Midwifery Res. 18(1): 9–13. https://pubmed.ncbi.nlm.nih.gov/23983721.

Garbaccio JL, Tonaco LAB, Estêvão WG, Barcelos BJ (2018). Aging and quality of life of elderly people in rural areas. Rev Bras Enferm. 71(2): 724–732. Doi: 10.1590/0034-7167-2017-0149.

Ghosh D, Dinda S (2020). Determinants of the quality of life among elderly: comparison between china and india. international journal of community and social development. 2(1): 71–98. Doi: 10.1177/2516602620911835.

Gobbens RJJ, Van Assen MALM (2018). Associations of lingkunganal factors with quality of life in older adults. gerontologist. 58(1): 101–110. Doi: 10.1093/geront/gnx051.

Hakola L (2015). Cardiorespiratory fitness and physical activity. Thesis. University of Eastern Finland.

Hidayati AR, Gondodiputro S, Rahmiati L (2018). Elderly profile of quality of life using whoqol-bref indonesian version: a community-dwelling. Althea Med. J. 5(2): 105–110. Doi: 10.15850-/amj.v5n2.1417.

Kakkar R, Aggarwal P, Semwal J (2017). Quality of Life (QOL) among the elderly in rural dehradun. Indian J. Community Health. 29(01). Doi: 10.47203/IJCH.2017.v29i01.007.

Kementerian Kesehatan RI. (2017). Situasi lansia di Indonesia tahun 2017: Gambar struktur umur penduduk indonesia tahun 2017. Pusat Data Dan Informasi, 1--9.

Kim H, Kim H, Byun B (2015). Predictors of pain, perceived health status, nutriational risk, social support and self-transcendence on depression among lower income senior citizens. Indian J Sci Technol. 8: 178–188. Doi: 10.-17485/ijst/2015/v8iS1/59099.

Kim S (2022). Association between cardiorespiratory fitness and metabolic syndrome in korean older adults. Int. J. Environ. Res. Public Health. 19(6). Doi: 10.3390/ijerph19063671.

Kohler R, Rorato P, Braga ALF, Velho RB, Krause MP (2016). Effects of aging and exercise on the cardiorespiratory fitness of older women. Rev Esp Geriatr Gerontol. 19(4): 603–612. Doi: 10.1590/1809-98232016019.150-092.

Nugraha S, Aprillia YT (2020). Health-related quality of life among the elderly living in the community and nursing home. J. Kesmas. 15(3): 419–425. Doi: 10.15294/kemas.v15i3.2128-2.

Cicih LHM (2019). Lansia di era bonus demografi. J. kependudukan Indones. 17(1).

Seangpraw K, Ratanasiripong NT, Ratanasiripong P (2019). Predictors of quality of life of the rural older adults in Northern Thailand. J. Health Res. 33(6): 450–459. Doi: 10.1108/JHR-11-2018-0142.

Soósová MS (2016). Determinants of quality of life in the elderly. Cent. Eur. J. Nurs. 7(3): 484–493. Doi: 10.1545-2/CEJNM.2016¬.07.0019.

Ulfah NH, Wismaningsih ER (2018). The Description of quality of life of the elderly using WHOQOL-BREF. Isoph. 133–140. Doi: 10.5220/0007510-301330140

Wong FY, Yang L, Yuen JWM, Chang KKP, Wong FKY (2018). Assessing quality of life using WHOQOL-BREF: A cross-sectional study on the association between quality of life and neighborhood environmental satisfaction, and the mediating effect of health-related behaviors. BMC Public Health. 18(1): 1–14. Doi: 10.1186/s12-889-018-5942-3.