CORRELATION OF POTENTIAL FACTOR THAT AFFECT THE QUALITY OF LIFE OF OSTEOARTHRITIS PATIENT IN RSUD DR. SOETOMO, SURABAYA BASED ON TRANSLATED AND TRANSADAPTED OF THE KNEE OSTEOARTHRITIS OUTCOME SCORE (KOOS) QUESTIONNAIRE

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Abstract. Background: Osteoarthritis is a degenerative process disease and is a leading cause of pain and disability. It is also ranked as 11th highest contributor to disability worldwide. Many risk factors have been known that can speed the progression of osteoarthritis.

Purpose: To study the correlation between age, gender, BMI, physical activities and history of trauma with quality of life in clinically diagnosed osteoarthritis patients in Orthopaedic and Traumatology Outpatient Clinic between January 2015 until December 2016.

Method: This research is a hospital-based cross-sectional analytic study. The samples are clinically diagnosed osteoarthritis patients in Orthopaedic and Traumatology Outpatient Clinic in RSUD Dr. Soetomo between January 2015 until December 2016.

Results: There were 43 patients that can be reach in Orthopaedic and Traumatology Outpatient Clinic in RSUD Dr. Soetomo between January 2015 until December 2016. The mean age is 54.35 ± 5.32 years old and the most gender in the subjects are female (72.1%). The mean BMI of the subjects are 26.20 ± 3.75 and most of them are overweight (60.5%). Most of the subjects never have history of trauma (76.7%) and also have an inactive physical activities (65.1%). The quality of life of the research subjects have a mean score of 42.86 ± 12.54. After that, the correlation between the age, gender, BMI, physical activities, history of trauma and quality of life is tested. It is found that there is a significant correlation between gender, BMI and physical activities with quality of life but no significant correlation between age and history of trauma with quality of life.

Conclusion: Gender still a main role in osteoarthritis development with women have a higher risk. Also patients with higher BMI and inactive patients will have a decrease quality of life. Most of the patients have an moderate quality of life.

Keywords: osteoarthritis, quality of life, age, gender, physical activities, BMI, history of trauma

Introduction
Osteoarthritis, a degenerative process disease as a result of breakdown of joint cartilage and underlying bone.1 It is one of the most chronic health problems and a leading cause of pain and disability among adults.2 This degenerative disease can occurs at any joints, but it usually happens at knee and hip.3 Based on the Global Burden of Disease 2010 study, the global age-standardized prevalence of knee and hip osteoarthritis was 3.8% and 0.85% respectively with osteoarthritis also positioned as 11th highest contributor to disability worldwide Data from World Health Organization (WHO) stated that in Indonesia, the prevalence of joint disorder reached up to 81% of the population with only 24% seek for doctor’s help and other 71% tend to only consume pain reliever drugs. This data make Indonesia as the most joint disorder suffering country compared to other ASEAN country.

The estimate risk of someone to develop a symptomatic knee OA was up to 40% and 47% in men and women respectively and this estimated risk will increase up to 60.5% in an obese person. As the aging process of the population and increasing weight in the community, the prevalence of OA will be expected to increase. Based on Framingham
cohort study, it is noted that in the past 20 years, the prevalence of symptomatic knee OA have been increase by 4.1% and 6% among women and men, respectively. With the increase of these factors, the diagnosed of knee OA patients will be many in the future, thus it will affect their quality of life. This also will increase the budget of health service to overcome this problems.

The knee osteoarthritis patient always come with the complaint of pain and stiffness that causing limitation to their daily activities. There are various choices to treat these symptoms, and mostly doctors will trying to choose non-surgical treatments. In a recent study, they most effective choices are the injections of corticosteroids and hyaluronic acid into the intraarticular joint. Researchers at Tufts Medical Center found that most common used of over-the-counter medicine that helped ease people’s pain the most are ibuprofen, naproxen and acetaminophen. Besides injections and oral medicine, lifestyle changing are important aspects of controlling knee OA pain. Experts say, losing weight and exercising that incorporates with medication works better than any treatment on its own.

In this research, we found that the demographic is changing. More overweight patients and the age shift also occur which younger people having knee osteoarthritis. In order to prevent this, the education about early diagnosis to adult’s with age above 50 years old especially woman have to be more encouraged and supported by government and health workers to improve the adult’s quality of life. Knee OA patients also first should try to change their lifestyle by losing weight and exercising. But due to the pain on their knee, most of them have a difficulty to move. A specific exercise program should be make and educated to the patients. This exercise program is focusing on how to exercise without bear weight to the knee, examples are swimming and cycling so that they still can exercise and at the same time do not hurt their knee.

**Method**

This research is an observational analytic study, adopting cross-sectional strategy. Research is retrospective from collecting data in medical records about gender, age and history of trauma which done at Outpatient Clinic Medical Records Centre Dr. Soetomo Hospital, Surabaya. Collected data used to interview subjects by using KOOS questionnaire. The sample is choose by total sampling from January 2015 to December 2016 with the inclusion criteria of age of 35 until 65 years old patients with at least 1 years of diagnosis. For exclusion criteria, being uncooperative, has a history of cognitive impairment and mental disorder and resigned from research. The hypothesis of this research is There will be a significant correlation between adult’s age and quality of life, a significant correlation between adult’s gender and quality of life, a significant correlation between adult’s BMI and quality of life, a significant correlation between adult’s physical activities and quality of life, a significant correlation between adult’s history of trauma and quality of life.

**Result**

Total subjects after included and excluded are 68 subjects but the data found in Medical Record Centre were 53 subjects. After the process of interview, only 43 subjects can be reached.

**Demographic Data**

| Characteristics                     | n (%)  |
|-------------------------------------|--------|
| **Gender**                          |        |
| • Man                               | 12 (27.9) |
| • Woman                             | 31 (72.1) |
| **Subject’s Age in years (Mean ± SD)** | 54.35 ± 5.32 |
| **Education level**                 |        |
| • No education                      | 4 (9.3)  |
| • SD                                | 15 (34.9) |
| • SMP                               | 7 (16.3)  |
| • SMA                               | 17 (39.5) |
| • D3/S1                             | 0 (0)    |
| **Occupation**                      |        |
| • Not working                       | 21 (48.8) |
| • Government employee               | 3 (6.9)   |
| • Private employee                  | 0 (0)    |
| • Merchant / Employer / Entrepreneur | 12 (27.9) |
| • Farmer                            | 1 (2.3)   |
| • Labor / Craftsman / Maid          | 6 (14.0)  |
| • Others                            | 0 (0)    |
| **BMI (Mean ± SD)**                 |        |
| • Underweight (<18.5)               | 0 (0)    |
Based on table 1, we can observe that the mean age of the subjects involved in the study is 54.35 years old with an SD of ± 5.322. The number of male subjects are 12 and female subjects is 31. Most of the education level of the subjects is SMA (17 subjects) followed by SD (15 subjects). Most of the subjects are not working (21 subjects). The mean BMI of the subjects are 26.202 ± 3.75 and most of the subjects are overweight (26 subjects). 10 subjects had history of trauma on their knees but mostly the subjects had no history of knee trauma (23 subjects). Most of the subjects are inactive in their physical activities (28 subjects).

Physical Health Status Based On Knee Condition

Table 2: Overall Scores of KOOS Subgroups Dimension

| Physical Health Status | Mean ± SD | Minimum | Maximum |
|------------------------|-----------|---------|---------|
| Pain (P)               | 44.02 ± 13.59 | 27.00   | 69.00   |
| Other Symptoms (Sy)    | 45.81 ± 16.01 | 20.00   | 74.00   |
| Function in Daily Living (A) | 50.02 ± 11.90 | 33.00   | 71.00   |
| Function in Sport and Recreation (Sp) | 22.88 ± 15.00 | 0.00    | 44.00   |
| Knee-related Quality of Life (Q) | 28.72 ± 14.96 | 10.00   | 60.00   |

* Score range from 0 to 100 with higher scores indicates better knee conditions

Based on table 2, a wide range of scores were reported for all subgroups. Function in daily living has the highest mean score (50.02) with standard deviation of 11.90. For pain and other symptoms subgroups, the score are 44.02 ± 13.59 and 45.81 ± 16.01 respectively. For knee-related quality of life and function in sport and recreation have a low mean score which are 28.72 ± 14.96 and 22.88 ± 15.00 respectively.

Research Subject’s Quality of Life

Table 3: Quality of Life of Adults with Osteoarthritis

| Quality of Life | Mean | Standard Deviation |
|----------------|------|--------------------|
| 42.86          | 12.54|

* Score range from 0 to 100 with higher scores indicates better quality

Based on table 5.3, the mean quality of life of adults with osteoarthritis is 42.86 ± 12.54 with the minimum value of 26 and maximum value is 64. In this research, the quality of life of knee OA patients can be considered as moderate.

Correlation between Adult’s Gender and Quality of Life

Table 4: Correlation of Gender and Quality of Life

| Gender | Score | Chi-Square Test (p) |
|--------|-------|---------------------|
| Male   | 2.0   | 4.0                 | 6.0   | 12  | 0.045 |
| Female | 14.0  | 9.0                 | 4.0   | 4.0 | 31   |

Based on table 4, P-value (0.045) is lesser than alpha value (0.05), the interpretation of H1 is accepted. There is a significant correlation between adult’s gender and quality of life.

Correlation between Adult’s Age and Quality of Life

Table 5: Correlation of Age and Quality of Life

| Age | Score | Pearson Cor. (p) |
|-----|-------|-----------------|
| 26-35 | 36-45 | 46-55 | 56-66 | Total |
| 35-40 | 0     | 0     | 0     | 1     | 1     | 0.151 |
Correlation of Adult’s Gender and Quality of Life

This research found a significant correlation of adult’s gender and quality of life. A research conducted by Hyung found a significant correlation of the gender of adults and the severity of symptoms. A research conducted by Elboim-Gabyzon revealed a significant correlation in gender differences with the pain perception and functional disability which stated women have a higher level of knee pain and greater stiffness in comparison to the male. (Elboim-Gabyzon et al, 2012).

For gender, women has higher prevalence and severity of hand, hip and knee OA than men. The increase incidence of OA after menopause has led to a hypothesis of the role of estrogen in OA. In this research and research by Mehmet are using KOOS questionnaire to assess the subjects. But research by Zainal F used SF-36 to assess the physical health status. Other than that, this research have only
subjects with no other comorbidities. Research by Mehmet, the total subjects used are 105 also with no comorbidities. But research by Zainal F are using 151 subjects with other medical conditions like diabetes mellitus, hypertension, gouty arthritis, bronchial asthma and others.

Overall, this research and other researches shown that people with OA of the knee had a poor or low quality of life based on the physical activities and overall health.

**Correlation of Adult’s Age and Quality of Life**

This research does not found any significant correlation between adult’s age and the quality of life. According to this research, the mean age of the subjects are 54.35 ± 5.32 years and most of them are having a bad quality of life. Research by Fernandez-Cuadroz (2016), is stated that age of the patient play a role in the knee osteoarthritis and affect in the health-related quality of life of the patients.

Age, although in some culture belief it’s just a number, but in OA age is one of the most and strongest risk factors discovered. However, the exact mechanism on how age increased the prevalence and incidence of OA still not known, but theoretically a combination of changes such as adaptation of joint tissues capacity toward biomechanical damage, biological changes as the effect of cellular senescence and also the joint ability to survive biomechanical challenge as a consequences of age-related sarcopenia.

The differences between this research and other researches are in this research, the mean age of the subjects are 54.35 ± 5.32 years old and the total subjects are 43 patients. Research by Fernandez-Cuadroz used a total subjects of 125 patients with the mean age of 70 years old. The assessment tool for quality of life in this research are Knee Osteoarthritis Outcome Score (KOOS) questionnaire. Research by Fernandez-Cuadros used Medical Outcome Study Short Form 36 (SF-36) for the assessment tool of the dependent variable.

Overall, the differences between this research and other may be a factor of getting a different result. Ideally, other than age of an adults, other comorbidities should be evaluate to assess the quality of life in the patients with knee OA.

**Correlation of Adult’s BMI and Quality of Life**

This research found a significant correlation between adult’s BMI and the quality of life. The BMI of the subjects has an effect to their quality of life. This is supported by a research conducted by Sutbeyaz suggested that obesity with knee osteoarthritis will lead to further decrease in the quality of life. However, a research conducted by Gomes-Neto stated that there is no significant correlation between osteoarthritis obese patient and reduced quality of life scores. A research conducted by Rosemann concluded that obese osteoarthritis patients have an increase burden in their quality of life.

Obesity has already become a worldwide problem and identified as a risk factor in OA specifically the major cause of knee OA. Knee OA incidence increase in people with high BMI, and this problem will affect more people in the future as more and more people are practicing sedentary lifestyle. In one meta-analysis been done, being obesity increased the probability of getting knee OA 3 times higher than being in normal weight and a person who is overweight will be 2 times higher chances of getting knee OA than normal weight person. High BMI will increased the load towards knee related to overall body weight, also may be differential systemic effects dependent upon degree of fat versus lean mass. Other than that, being overweight or obesity also increase the risk of radiographic progression. Jiang L et al found a dose-relationship between high BMI and risk of knee OA for every 5-unit increased in BMI will increased 35% of OA incidence.

This research divided the category of the adult’s BMI into underweight (<18.5), normal (18.5-24.9), overweight (25.0-29.9), obese 1 (30.0-34.9), obese 2 (35.0-39.9) and extreme obese (>40.0). In research by Gomes-Neto, it was only categorized into obese and non-obese subjects. In research by Sutbeyaz, it was only categorized into 2 groups, OA patient with BMI above or equal 28 kg/m² and non-OA people with BMI over 28 kg/m². In research by Rosemann, the subjects is categorized into normal (<24.9), overweight (25.0-29.9) and obese (>30).

This research used Knee Osteoarthritis Outcome Score as assessment tool for the dependent variable. Research by Gomes-Neto used WOMAC and SF-36
as the assessment tool. Research by Sutbeyaz used WOMAC and SF-36 as the assessment tool and research by Rooseman used GERMAN-AIMS2-SF as the assessment tool for the dependent variable.

Overall, obesity is already known as one of the biggest risk factor risk factor of knee OA and it can increased the severity thus causing a decrease in quality of life. Beside adult’s BMI, ideally the evaluation of body weight should also use waist-hip ratio and skinfold thickness so that the percentage of body fat can be determined.9

Correlation of Adult’s Physical Activities and Quality of Life

This research found a significant correlation between adult’s physical activities and the quality of life. According to this research, most subjects are having inactive physical activities thus having negative influence towards their quality of life. This is supported from a research by Mesci stated that an increase in physical activity has a beneficial effect to quality of life.12

Physical daily activity also an issue of repetitive joint use. This risk factor may be potentially caused the progression of OA if the load on the joint is high although there is an observation that physical activity has benefits by strengthening periarticular muscles that help stabilizing the joint.13 A review by Hansen et al concluded that low and moderate physical activity (running) do not have relationship with OA and heavy physical activity will not developed OA development if no history of joint injury.14 In other studies, OA progression will be increased if athletes appeared to have history of knee injury than due to repetitive training loads.15

The differences between this research and other researches are found in the criteria of the sample, the category of physical activity as independent variable and the tool used to assess the dependent variable. This research used 43 subjects which been interviewed to know their level of physical activity and been categorized to inactive, moderate and active physical activity. In research by Mesci, there are 55 subjects and divided into two category, Insufficient Activity Group and Physically Active Group based on their response toward International Physical Activity Questionnaire. This research used Knee Osteoarthritis Outcome Score (KOOS) to assess the quality of life of the subjects. Research by Mesci used SF-36 as assessment tool for the quality of life.

Overall, physical activity plays an important role in increasing the quality of life of knee OApaitents. However, some patients are having difficulty to do physical activity due to pain and stiffness of the knee joint. Thus, a specific exercise program that focusing on restoring impaired body functions such as muscle strength and joint range of motion (ROM) has shown effectiveness in increase the functional activity level.14

Correlation of Adult’s History of Trauma and Quality of Life

This research does not found any significant correlation between adult’s history of trauma and quality of life. According to this research, most of the subjects never have a history of trauma in their life but they still have a bad quality of life. However, research byVennu V, it stated that patients experiencing knee OA that have a trauma on their knees, in this research is fall, are having a lower quality of life.15

Knee is one of the most common site injury in joint. Injury in OA are those resulting in anterior cruciate ligament (ACL) rupture and accompanied with damage of articular cartilage, subchondral bone and collateral ligaments. The most important thing is approximately 65-75% of ACL-injured knees is an injured towards menisci.16 ACL rupture and others trauma are strongly linked to the development of OA as early as 10 years after the initial injury.16 Matrix disruption, chondrocyte necrosis and proteoglycan loss are the effect of direct damage of articular cartilage and may not be reversible thus with these injuries, individuals are at a higher risked of OA onset.17 However, the exact relation on how ACL rupture and other injuries will increased risk of developing OA is still unknown.

The differences between this study and other research are the criteria of sample the category of history of trauma as independent variable and the assessment tool for the dependent variable. This research has a subjects of 43, 12 male and 31 female with the mean age of 54.35 ± 5.32. The characteristic of this subjects are education level, occupation and BMI. The subjects is categorized
after interviewing them into two groups which are having history of trauma and not having history of trauma. Research by Vennu V has a total of 4484 subjects, 1848 male and 2636 female, with mean age of 61.0 ± 9.1. It also has a characteristic as this research with addition of ethnicity (White or Non-White), marital status, annual income, household composition, smoking status and weekly alcoholic consumption. The subjects were asked by their doctors and then been categorized into neither fall nor knee OA, either fall or knee OA and fall and knee OA. This research used Knee Osteoarthritis Outcome Score (KOOS) to assess the quality of life of the subjects. Research by Vennu V also used KOOS with addition of SF-12 as generic measure in assessing the dependent variable.

Overall, the differences in this research and other researches may be one of the factor a different result is achieved. A study shows that the presence of knee OA had become a risk factor for falling because of the pain and stiffness of the joint.18

Conclusion

The conclusion from this research is there were a significant correlation between adult’s gender and quality of life, no significant correlation between adult’s age and quality of life, no significant correlation between adult’s BMI and the quality of life, a significant correlation between adult’s physical activities and the quality of life, and no significant correlation between adult’s history of trauma and the quality of life.

Suggestion

This research needs further research with a larger sample size. Other than that, a better history taking is needed in the medical record so that the collected data can be more complete. Lastly, the education about early diagnosis to adult’s with age above 50 years old especially woman have to be more encouraged and supported by government and health workers to improve the adult’s quality of life.

References

1. Lawrence, R. C., Felson, D. T., Helmick, C. G., Arnold, L. M., Choi, H., …Deyo, R. A. (2007). Estimates of the prevalence of arthritis and other rheumatic conditions in the United States: Part II. Arthritis & Rheumatism, 58(1), 26–35. doi:10.1002/art.23176
2. Neogi, T., & Zhang, Y. (2013). Epidemiology of Osteoarthritis. Rheumatic Disease Clinics of North America, 39(1), 1–19. doi:10.1016/j.rdc.2012.10.004
3. Guccione, A. A., Felson, D. T., Anderson, J. J., Anthony, J. M., Zhang, Y., Wilson, P. W., … Kannel, W. B. (1994). The effects of specific medical conditions on the functional limitations of elders in the Framingham Study. American Journal of Public Health, 84(3), 351–358. doi:10.2105/ajph.84.3.351
4. Cho, H. J., Chang, C. B., Yoo, J. H., Kim, S. J., & Kim, T. K. (2010). Gender Differences in the Correlation between Symptom and Radiographic Severity in Patients with Knee Osteoarthritis. Clinical Orthopaedics and Related Research®, 468(7), 1749–1758. doi:10.1007/s11999-010-1282-z
5. Elboim-Gabyzon, M., Rozen, N., &Laufer, Y. (2012). Gender Differences in Pain Perception and Functional Ability in Subjects with Knee Osteoarthritis. ISRN Orthopedics, 2012, 1–4. doi:10.5402/2012/413105
6. Fernandez-Cuadros, M. E., Perez-Moro, O. S., &Miron-Canelo, J. A. (2016). Age and Comorbidities Affect Quality of Life in Patients With Osteoarthritis and Knee Replacement. Middle East Journal of Rehabilitation and Health, 3(4). doi:10.17795/mejrh-40247
7. Sutbeyaz, S. T., Sezer, N., Koseoglu, B. F., Ibrahimoglu, F., &Tekin, D. (2007). Influence of Knee Osteoarthritis on Exercise Capacity and Quality of Life in Obese Adults. Obesity, 15(8), 2071–2076. doi:10.1038/oby.2007.246
8. Gomes-Neto, M., Araujo, A. D., Junqueira, I. D. A., Oliveira, D., Brasileiro, A., &Arcanjo, F. L. (2016). Comparative study of functional capacity and quality of life among obese and non-obese elderly people with knee osteoarthritis. Revista Brasileira de Reumatologia (English Edition), 56(2), 126–130. doi:10.1016/j.rbre.2015.08.014
9. Rosemann, T., Grol, R., Herman, K., Wensing, M., &Szecsenyi, J. (2008). Association between obesity, quality of life, physical activity and health service utilization in primary care patients with osteoarthritis. International Journal of Behavioral Nutrition and Physical Activity, 5(1), 4. doi:10.1186/1479-5868-5-4
10. Blagojevic, M., Jinks, C., Jeffery, A., & Jordan, K. P. (2010). Risk factors for onset of
osteoarthritis of the knee in older adults: a systematic review and meta-analysis. Osteoarthritis and Cartilage, 18(1), 24–33. doi:10.1016/j.joca.2009.08.010

11. Jiang, L., Tian, W., Wang, Y., Rong, J., Bao, C., Liu, Y., … Wang, C. (2012). Body mass index and susceptibility to knee osteoarthritis: A systematic review and meta-analysis. Joint Bone Spine, 79(3), 291–297. doi:10.1016/j.jbspin.2011.05.015

12. Mesci, E. (2016). Relation of physical activity level with quality of life, sleep and depression in patients with knee osteoarthritis. Northern Clinics of Istanbul. doi:10.14744/nci.2015.95867

13. WANG, Y., SIMPSON, J. A., WLUKA, A. E., TEICHTAHL, A. J., ENGLISH, D. R., GILES, G. G., … CICUTTINI, F. M. (2010). Is Physical Activity a Risk Factor for Primary Knee or Hip Replacement Due to Osteoarthritis? A Prospective Cohort Study. The Journal of Rheumatology, 38(2), 350–357. doi:10.3899/jrheum.091138

14. Thomas, K. S. (2002). Home based exercise programme for knee pain and knee osteoarthritis: randomised controlled trial. BMJ, 325(7367), 752–752. doi:10.1136/bmj.325.7367.752

15. Vennu, V., & Bindawas, S. (2014). Relationship between falls, knee osteoarthritis, and health-related quality of life: data from the Osteoarthritis Initiative study. Clinical Interventions in Aging, 793. doi:10.2147/cia.s62207

16. Felson, D. T. (2000). Osteoarthritis: New Insights. Part 1: The Disease and Its Risk Factors. Annals of Internal Medicine, 133(8), 635. doi:10.7326/0003-4819-133-8-200010170-00016

17. Allen, K. D., & Golightly, Y. M. (2015). State of the evidence. Current Opinion in Rheumatology, 27(3), 276–283. doi:10.1097/bor.0000000000000161

18. Johnson, V. L., & Hunter, D. J. (2014). The epidemiology of osteoarthritis. Best Practice & Research Clinical Rheumatology, 28(1), 5–15. doi:10.1016/j.berh.2014.01.004