

Prevalence of Risk Factors in Osteoarthritis, Urban-Rural Differences

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Abstract

Introduction: Osteoarthritis, the most common form of arthritis, is a disabling chronic disease with significant clinical and economic implications. The most important risk factors for osteoarthritis include age, sex, obesity, and trauma. With aging and obesity trends, the incidence and prevalence of osteoarthritis is expected to rise in the world, increasing the demand for health resources.

The pain caused by this pathology is the main complaint of most patients, prompting them to seek medical attention. Although osteoarthritis is considered a non-inflammatory arthritis, where mechanical causes play a major role, inflammatory mechanisms may be present.

Aim of the study: Our goal is to analyze rural-urban differences, in patients with Osteoarthritis.

Methodology: The study included all consecutive patients diagnosed with osteoarthritis, hospitalized in the Rheumatology Service at QSUT "Mother Teresa", in the period of January 2015-December 2018.

Results. We analyzed 589 cases, where 79% (n = 464) were female and 20% (n = 118) lived in rural areas. The average age of patients in rural areas is significantly younger than the average age of patients in urban areas (respectively 53.41 ± 10.53 and 56.01 ± 10.13 years, $p = 0.013$). The most commonly affected joint in the rural population is the knee (52.3 vs 39.4% in urban areas, $p = 0.044$), followed by the hip (19.8vs 18.6%, $p = 0.238$) and the least affected is the hand joint (18.6 % vs 33.3%, $p = 0.052$). Obesity was found more in the urban population (32.1% urban vs29.7% rural, $p=0.011$).

Conclusions: Lifestyle is an important factor, which contributes to OA. Putting in the movements of the joints of the hands significantly reduces the presence of pain.

KEYWORDS:osteoarthritis, risk factors, urban,rural, BMI

Introduction:

Osteoarthritis (OA) is the most common joint disorder affecting millions of people worldwide (Vos Th., et al. and Cross M. et al.). The main complaint of patients with OA is pain (Neogi T.). Because of pain, patients seek health care. Severe pain causes limitation of movements and impairment of quality of life (Dominicl KI, et al. and, Ayis S, Dieppe P.). Osteoarthritis is now known to be the leading cause of disability in the over 65 population (Felson DT). Also, it is known that the risk factors of osteoarthritis are age, gender, genetic factors, obesity, especially identified as risk factors for knee Osteoarthritis (Spector TD et al, Felson DT. et al, and, Allen PRet al.) as well as trauma or heavy work, which are known as other risk factors for Osteoarthritis in general.

Many developing countries, with an agricultural profile, experienced rapid urbanization. Urbanization caused a change in lifestyle in these countries, which led to a change in the burden of diseases. One of the most serious consequences of urbanization is the decrease in physical activity, which is known as a protective factor against cardiovascular diseases or diabetes. In addition to this, there is another theory, according to which urbanization increases the risk of knee osteoarthritis due to dietary changes that increase fat accumulation. The dietary changes of urbanization promote inflammation by releasing adipokines from excess adipose tissue (Matthew Bomkamp).

The purpose of this study was to analyze urban-rural differences in the prevalence of risk factors for osteoarthritis, in the Albanian adult population.

Material and Methods:

The clinical records of patients admitted to the rheumatology service at QSUT "Mother Teresa" and diagnosed with osteoarthritis for the period January 1, 2015-December 31, 2018 were used for the collection of information. Statistical analyses: Student's t test for two independent samples was used to analyze the differences between the means in two groups. The Chi-square test was used to assess the relationship (association) between independent variables. P values ≤ 0.05 is considered statistically significant. All statistical analysis was performed using SPSS, version 25.0 (SPSS – Statistical Package for Social Sciences, 25).

Results:

589 patients diagnosed with OA, who were treated at the QSUT Rheumatology Service, during the 2015-2018 study periods, were included in the study. Of those, almost 79% (78.8%) are female and 21% (125 patients) are male (tab.1).

The distribution of cases by gender is almost the same in both rural and urban areas, without any significant difference between them ($p=0.144$) (tab.2).

Patients living in rural areas are significantly ($p=0.006$) younger than those who report living in urban areas (respectively 53.41 ± 10.53 years vs 56.20 ± 9.60 years).

Regarding employment, despite the fact that a higher percentage of the rural population is employed (79% vs 69% in the urban area), there is no statistically significant difference ($p=0.085$) according to residence. It should be noted that patients living in rural area, in over 96% of them (90 patients), refers to being engaged in agriculture, that is, heavy work with extended hours.

The highest percentage of HTA and DM are encountered in the urban population suffering from OA, but without any significant difference (tab.2)

Interesting are the findings related to the affected joints, where we find that the most affected joints are the knee and the hand. The knee joint is significantly ($p=0.01$) more affected in the rural population (52.5%) compared to the urban population (39.4%). The situation is reversed when talking about the hand joint, which is significantly affected ($p=0.002$) less (18.6%) in the rural population, compared to the urban population (33.3%) (tab. 2)

Regarding family histories, all patients reported to have a family history of rheumatic diseases.

Discussion:

Age: We found that the mean age of our population was 55.63 ± 9.84 years. It is also known that with age the likelihood of developing OA increases, making age rightly considered a risk factor (Theo Vos, et al., MaritaCross et al., and Neogi T.). Expectations are that, in the Albanian population, the prevalence of OA will increase considering the fact that the Albanian population is aging (INSTAT,2022) and the prevalence of obesity is increasing (from 39% in 2008-2009 to 45% in 2017-18)(ADHS,2017-18). This is reported by studies conducted in large populations.

Very important is the fact that patients suffering from OA naturally have a higher prevalence of comorbidities because they are usually older patients and have reduced mobility (Liu, X et al.)

Overweight: According to ADHS 2017-18, the prevalence of overweight or obese men (of the population aged 15-59) is reported to be 53%, while that of women in the same age group is reported to be 45%. Meanwhile, we found that about 70% of the study population, OA patients, were overweight or obese. Increased BMI is considered a risk factor in OA. This fact is also supported by many other authors (C. Cooper, et al.; Carman W.J et al.; Oliveria S.A., et al.; Hochberg M.C et al, and, Hart D.J.,et al).

In our study we found more overweight and obese patients in the urban population. This, in fact, goes parallel to the hypothesis suggested by Graeme Jones according to which there is an increased risk of osteoarthritis (Jones G. et al) in those who live in urban areas, due to dietary changes and increased fat accumulation. This theory states that the dietary changes of urbanization promote low-grade inflammation by releasing adipokines from excess adipose tissue. Adipokines, such as leptin, are cell signaling proteins secreted by

adipose tissue and can promote inflammation throughout the body. However, as mentioned in the results of our study, there were no differences between the rural and urban population in terms of BMI.

Urbanization is also associated with a decrease in physical activity (Shrestha S. et al). The Framingham Osteoarthritis study (Felson DT et al.) and Bland (Bland JH. et al) have shown that lack of physical activity promotes cartilage loss, potentially due to metabolic changes in chondrocytes, thus becoming a potentiating factor for OA installation.

Obesity has long been identified as a risk factor for OA, especially for knee OA (Atukorala I, et al, Johnson VL. Et al, Allen KD, et al, Neogi T and, Lane NE, et al) . Jiang L and colleagues in a meta-analysis found that increasing BMI moderately increases susceptibility to hand joint OA confirmed by radiographic changes and/or the presence of clinical signs. Johnson et al. and Allen et al. showed that there is a not very strong association between obesity and OA, but Reyers et al. in a cohort study conducted in the Spanish population and Ohfujie et al. (2016) published the finding that there was an independent association between the increase in weight and OA in coxo-femoral joint.

Comorbidity: The IMIA study (MMM 2018), carried out in the population of Tirana (2016) in the age group of 69-79 years, found the prevalence of HTA to be 57%.

We found that DM is encountered in 56.4% of the patients, a figure higher than that reported in the country as a whole. According to the analysis of Gjonçaj A. and colleagues in 2012, the prevalence of diabetes was 28.7%, while in 2016 it was 30.8%.

Hard work: Most of the patients in the rural area say that they are unemployed, while when asked what they do during the day, they state that they are engaged in agricultural work, work every day in their garden, or have a shop selling goods, lifting weights, or they stood for a long time (over six hours). We did not find references for Albania that show differences according to residence regarding the prevalence of OA, but the literature supports the fact that there are differences in favor of the rural population, (Liu, X.; et al, Mitura, V. et al, . and, Marshall, D.A, et al).

Conclusion: The prevalence of risk factors in OA is the same in the population regardless of the place of residence. Lifestyle is an important factor, which contributes to OA.

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References:

1. Allen KD, Golightly YM. State of the evidence. *Curr Opin Rheumatol*. 2015;27:276–283.
2. Atukorala I, Makovey J, Lawler L, et al. Is There a Dose-Response Relationship Between Weight Loss and Symptom Improvement in Persons With Knee Osteoarthritis? *Arthritis Care Res (Hoboken)* 2016;68:1106–1114.

3. Ayis S, Dieppe P. The natural history of disability and its determinants in adults with lower limb musculoskeletal pain. *J rheumatol* 2009, 6:583-91
4. Bland J.H., Cooper S.M. Osteoarthritis: a review of the cell biology involved and evidence for reversibility. Management rationally related to known genesis and pathophysiology. *Seminars in Arthritis and Rheumatism*, 14 (2) (1984), pp. 106-133
5. Carman W.J., Sowers M., Hawthorne V.M, L. Weissfeld Obesity as a risk factor for osteoarthritis of the hand and wrist: a prospective study *American Journal of Epidemiology*, 139 (1994), pp. 119-129,
6. Cooper C., Inskip H., Croft P., *et al.* Individual risk factors for hip osteoarthritis: obesity, hip injury, and physical activity *American Journal of Epidemiology*, 147 (6) (1998), pp. 516-522
7. Cross M., Smith E., Hoy D. *et al* The global burden of hip and knee osteoarthritis: estimates from the Global Burden of Disease 2010 study. *Annals of the rheumatic diseases*, vol 73, issue 7, <http://dx.doi.org/10.1136/annrheumdis-2013-204763>
8. Dominici KL, Ahern FM, Gold CH, *et al.* Health-related quality of life and health services use among older adults with osteoarthritis. *Arthritis Rheum* 24. 51:326-31
9. Felson DT, Anderson JJ, Naimark A, Walker AM, Meenan RF 1988 Obesity and knee osteoarthritis. The Framingham study. *Ann Intern Med* 109:18 –24
10. Felson DT, Naimark A, Anderson JJ, Kazis L, Castelli W, Meenan RF 1987 The prevalence of knee osteoarthritis in the elderly: The Framingham Osteoarthritis Study. *Arthritis Rheum* 30:914 –918
11. Gjonçaj A. *et al* DEMOGRAPHIC AND HEALTH CHALLENGES FACING ALBANIA IN THE 21ST CENTURY, 2020, ISBN 978-9928-149-91-6
12. Graeme J., Ding Ch., Glisson M., Hynes K. , Ma De., and Cicuttini F.: Knee Articular Cartilage Development in Children: A Longitudinal Study of the Effect of Sex, Growth, Body Composition, and Physical Activity, *Pediatric research* 2003 Activity <https://www.nature.com/articles/pr2003389>
13. Hart D.J., Doyle D.V., Spector T.D.; Association between metabolic factors and knee osteoarthritis in women: the Chingford study *The Journal of Rheumatology*, 22 (1995), pp. 1118-11
14. Hochberg M.C., Lethbridge-Cejku M., Scott W.W.J., *et al.* Obesity and osteoarthritis of the hands in women, *Osteoarthritis and Cartilage*, 1 (1993), pp. 129-135 Article Download PDF
15. <https://doi.org/10.1016/j.apgeog.2019.01.004>.
16. INSTAT, 2022 <http://www.instat.gov.al/al/statistikat-n%C3%AB-shkolla/popullsia-e-shqip%C3%ABris%C3%AB/>
17. Institute of Statistics, Institute of Public Health, and ICF. 2018. *Albania Demographic and Health Survey 2017-18*. Tirana, Albania: Institute of Statistics, Institute of Public Health, and ICF, pp178
18. Jiang L, Xie X, Wang Y, *et al.* Body mass index and hand osteoarthritis susceptibility: an updated meta-analysis. *Int J Rheum Dis*. 2016;19:1244–1254.
19. Johnson VL, Hunter DJ. The epidemiology of osteoarthritis. *Best Pract Res Clin Rheumatol*. 2014;28:5–15.
20. Lane NE, Shidara K, Wise BL. Osteoarthritis year in review 2016: clinical. *Osteoarthritis Cartilage*. Jiang L, Xie X, Wang Y, *et al.* Body mass index and hand osteoarthritis susceptibility: an updated meta-analysis. *Int J Rheum Dis*. 2016;19:1244–1254
21. Liu, X.; Seidel, J.E.; McDonald, T.; Waters, N.; Patel, A.B.; Shahid, R.; Bertazzon,

- S.;Marshall, D.A. Rural–UrbanDifferences in Non-Local PrimaryCare Utilization among People with Osteoarthritis: The Role ofArea-Level Factors. *Int. J. Environ.Res. Public Health* 2022, 19, 6392.<https://doi.org/10.3390/ijerph19116392>
22. Liu, X.; Seidel, J.E.;McDonald, T.; Waters, N.; Patel,A.B.; Shahid, R.; Bertazzon, S.;Marshall, D.A. Rural–UrbanDifferences in Non-Local PrimaryCare Utilization among People with Osteoarthritis: The Role ofArea-Level Factors. *Int. J. Environ.Res. Public Health* 2022, 19, 6392.<https://doi.org/10.3390/ijerph19116392>
23. MMM 2018, measured, general population sample (≥ 18 years)
24. Marshall, D.A.; Liu, X.; Shahid, R.; Bertazzon, S.; Seidel, J.E.; Patel, A.B.; Nasr, M.; Barber, C.E.H.; McDonald, T.; Sharma, R.; et al. Geographic variation in osteoarthritis prevalence in Alberta: A spatial analysis approach. *Appl. Geogr.* 2019, 103, 112–121.
25. Matthew Bomkamp, Urbanization increases risk for knee osteoarthritis, even in young children, 2021 <https://massivesci.com/articles/urbanization-rural-agriculture-knee-osteoarthritis/>
26. Mitura, V.; Bollman, R.D.; Canada, S. The Health of Rural Canadians: A Rural-Urban Comparison of Health Indicators. 2003; Volume 4. Available online: <http://www.statcan.ca/cgi-bin/downpub/freepub.cgi> (accessed on 19 June 2019).
27. Neogi T, Zhang Y. Epidemiology of osteoarthritis. *Rheum Dis Clin North Am.* 2013;39:1–19.
28. Neogi T.. The epidemiology and impact of pasin in osatoarthritis. 2013 Osteoarthritis Research Society International. <http://dx.doi.org/10.1016/j.joca.2013.03.018>
29. Ohfuji S, Jingushi S, Kondo K, et al. Factors associated with diagnostic stage of hip osteoarthritis due to acetabular dysplasia among Japanese female patients: a cross-sectional study. *BMC MusculoskeletDisord.* 2016;17:320.
30. Oliveria S.A., Felson D.T., Cirillo P.A., et al. Body weight, body mass index, and incident symptomatic osteoarthritis of the hand, hip, and knee *Epidemiology*, 10 (1999), pp. 161–166,
31. Reyes C, Leyland KM, Peat G, et al. Association Between Overweight and Obesity and Risk of Clinically Diagnosed Knee, Hip, and Hand Osteoarthritis: A Population-Based Cohort Study. *Arthritis R*
32. Shrestha S, Dave AJ, Losina E, Katz JN (2016) Comparison of self-report and objective measures of physical activity in US adults with osteoarthritis. *RheumatolInt* 36: 1355-1364
33. Spector TD, Cicuttini F, Baker J, Loughlin J, Hart D 1996 Genetic influences onosteoarthritis in women: a twin study. *BMJ* 312:940 –944
34. Vos Th., DFlaxman A. et al. :Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010, the *Lancet*, Volume 380, Issue 9859, 15 December 2012–4 January 2013, Pages 2163-2196.

Tables

Table No. 1 General characteristics of the patients

Variables	Nr of cases	%
Gender		
<i>female</i>	464	78.78
<i>male</i>	125	21.22
Age (in years) *		
(mesan±SD)	55.63±9.84	[16.4-84.8]
Residence		
<i>urban</i>	471	79.97
<i>rural</i>	118	20.03
employment		
employed	419	71.14
unemployed	97	16.47
retiree	73	12.39
BMI		
<25kg/m ²	186	31.58
25 -30 kg/m ²	343	58.23
>30kg/m ²	60	10.19
Family history for osteoarthritis		
	589	100.00
Comorbidity		
<i>HTA</i>	254	43.12
<i>DM</i>	350	59.42
Affected joints		
<i>knee</i>	248	42.11
<i>coxofemoral</i>	110	18.68
<i>hand</i>	179	30.39
<i>other</i>	52	8.83

Total 589 100.00

*mean \pm SD, [range]

Table No. 2 General characteristics by residence

General characteristics	Residence		Vlera p*
	Rural (%)	Urban, n=471 (%)	
sex(f)	89 (74.8)	375 (79.8)	0.144
age (years)			
(mean \pm SD)	53.41 \pm 10.53	56.20 \pm 9.60	0.006**
Occupation			
<i>employed</i>	94 (79.0)	325 (69.1)	0.085
<i>unemployed</i>	16 (13.4)	81 (17.2)	
<i>retiree</i>	9 (7.6)	64 (13.6)	
BMI			
<i><25kg/m²</i>	35 (29.7)	151 (32.1)	0.443
<i>25 -30 kg/m²</i>	74 (62.7)	269 (57.1)	
<i>>30kg/m²</i>	9 (7.6)	51 (10.8)	
Comorbidity			
<i>HTA</i>	43 (36.4)	211 (44.8)	0.658
<i>DM</i>	67 (56.8)	283 (60.1)	0.719
Affected joints			
<i>knee</i>	62 (52.5)	186 (39.4)	0.01
<i>coxofemoral</i>	23 (19.4)	87 (18.5)	0.799
<i>hand</i>	22 (18.6)	157 (33.3)	0.002
<i>other</i>	11 (9.3)	41 (8.7)	0.406

*Hi-square test, **t-test