(RESEARCH ARTICLE)

Q-angle assessment in older adult patients with Gonarthrosis

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Abstract

Gonarthrosis is one of the most prevalent pathologies in the world. It affects more than 23% of people belonging to the age group between 60 and 64 years old and 40% of the population over 70 years old and more frequently in the female sex. Joint misalignment is one of the most important factors for its development. Therefore, it is important to determine the Q angle in people since it is a predictive agent of this condition.

Objective: To describe the Q angle presented by patients with gonarthrosis at the health center in the city of Cuenca during the period September 2022 - February 2023.

Methods: Quantitative study of descriptive scope, cross-sectional type, applied to 22 older adults of the Health Center in the city of Cuenca. Data were collected by means of semiology data and Q-angle measurement using imaging software (Kinovea version 0.9.5). The tabulation and analysis of the results was performed with SPSS statistics 21 and the graphs with Excel.

Results: The sample consisted of 22 persons, 50% of whom were female and 50% male. The age range with the highest prevalence was 65 to 75 years, representing 86% of the total population. The average right Q angle in patients with gonarthrosis was 14° and on the left side it was 13°.

Conclusions: After finalizing the data collection and analysis, it was established that there is no significant difference in relation to the with the Q angle of older adults with gonarthrosis in the health center of the city of Cuenca.

Keywords: Older Adult; Gonarthrosis; Genu Valgum; Genu Varum; Q Angle

1. Introduction

Gonarthrosis is one of the most common pathologies belonging to the top 10 diseases worldwide that cause pain and disability, this disease is degenerative and chronic in nature causing limitations in basic activities of daily living and functional activities leading to a poor quality of life of people who suffer from it1 . Felson et al. mention that about one third of adults present signs of osteoarthritis with significant clinical features of osteoarthritis, while Andrianakis et al. in their study found more important findings of osteoarthrosis in the knee, with gonarthrosis being the most common type in the adult population (2,3). This pathology manifests itself in 18% of the general population, 23% in people between 60 and 64 years of age and 40% in people over 70 years of age, which is why it is considered a common pathology in older adults 1.

Gonalgia is one of the most frequent consultations in clinical practice, with gonarthrosis being the main cause of this pain. Among the main factors in the development of this pathology are: heredity, overweight and longevity and, seen

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from the medical perspective, in addition to pain, it also causes functional restriction and deformity, characteristics which, the longer they last in the individual, lead to temporary or definitive incapacity for work 4.

The measurement of the Q angle is an indicator of patellofemoral dysfunction, and an increasing value represents that there is greater lateralization of the patella, thus increasing the retropatellar pressure, leading to pain and degeneration of the articular cartilage. The alteration in the alignment of the knee joint causes a bad distribution of the load axis thus causing mechanical disorders that favor the appearance of gonarthrosis, being the Q angle, genu varum and genu valgum the main alterations of the alignment and that with the passing of time become difficult to correct 5.

According to data from the National Institute of Statistics and Census (INEC) in 2018 in Ecuador there were 2614 new cases of gonarthrosis, of which 1649 cases were in the age group belonging to the population over 65 years of age.

According to statistical data of the population of Ecuador, in the year 2050 there will be more older adults than people under 18 years of age, of which more than 40% are expected to have gonarthrosis, this percentage being a concern for health authorities, since the direct and indirect costs of the same are high, so it is important to study the predictive factors of this disease and thus prevent them in the future, within the predisposing factors is joint misalignment 6. People with this pathology present increased wear in the cartilage of the compartment undergoing a greater load and among the most important factors is joint misalignment, being the change in joint mechanics an important factor to be considered as a risk factor for gonarthrosis7.

Amaratunga H. et al. mention that the goniometric alignment of the knee in the anterior plane is an important predictor of articular cartilage damage, they also mention that age and BMI predicted 54% of damage 8, on the other hand, Thienpont et al. on the other hand, Thienpont et al. were dedicated to know the bone morphotypes in both varus and valgus in patients with gonarthrosis and compare them with people without this disease, they found that there are marked differences between both population groups, especially in the alignment of the same, giving indications that a misalignment of the angles of the knee can lead to cause greater friction or friction of the joints that cause gonarthrosis 9. On the contrary, Almeida G et al. in the article entitled "Q-angle in patellofemoral pain: relationship with dynamic knee valgus, hip abductor torque, pain and function", found that there is no relationship as such between normal quadriceps angle misalignment with knee gonarthrosis, since after applying the measurement of this angle and comparing it with people without gonarthrosis, they found no significant differences in both groups, giving a different result to that of other bibliographies, opening a debate between the feasibility and veracity of the evidence that has been presented to date 10.

Finally, an article entitled "Association between Q angle and predisposition to gonarthrosis", after conducting a comparative study with 205 people, concluded that the measurement of the Q angle is an effective way to diagnose and treat lower limb misalignments and knee-related pathologies, more specifically, gonarthrosis11.

Being a disease that affects the vast majority of older adults and (taking into account) considering that a predisposing factor for its development is joint misalignment, the purpose of this study is to describe the degree of Q angle alteration in older adults with gonarthrosis who attended the health center in the city of Cuenca.

2. Methodology

A quantitative, descriptive and transversal study, the universe of our study was determined by means of a non-probabilistic sampling by criteria, it was carried out in a total of 22 elderly people with gonarthrosis who attended the health center belonging to the city of Cuenca, during a period of 3 months and who were in full use of their mental faculties, those with a history of knee or hip surgery, with serious infectious processes, neoplastic processes and hemodynamically unstable people were excluded. The study variables were considered as Q angle, age, sex, height and body mass index, data that were collected by means of a form for subsequent analysis, the Q angle was measured by means of the Kinovea image analyzer version 0.9.5.

Prior to data collection, each participant was informed about the study to be carried out and was given informed consent with the corresponding research data, which was signed in order to continue with the process. The results obtained were tabulated and analyzed in the SPSS V21 program, using measures of central tendency.

3. Results

Femenino 50.00% Masculino 50.00%
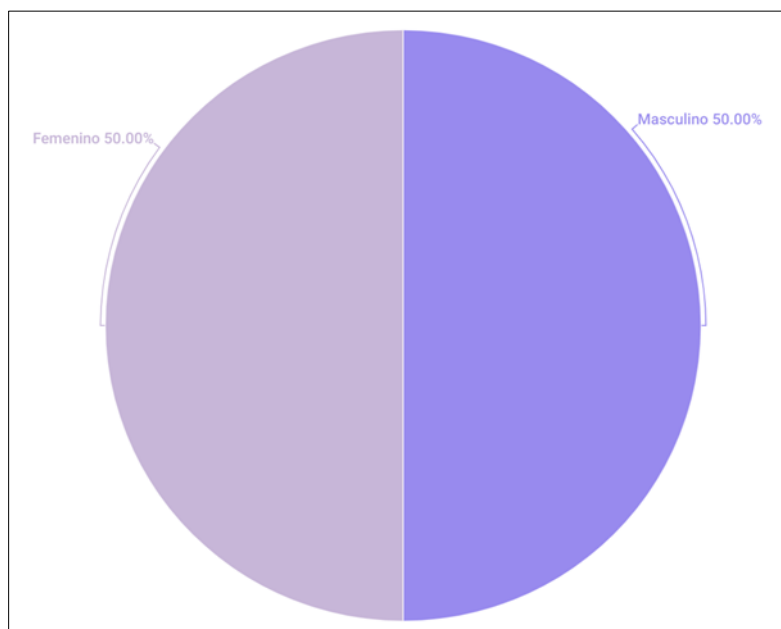
Source: Database; Prepared by: Kasandra González; Juan Pablo Matute; Viviana Méndez

Figure 1 Distribution of the study population (n=22) according to sex characteristics of users with gonarthrosis evaluated at the Health Center. Period September - February 2022.

Analysis: it is observed that, of the total of 22 users with a diagnosis of gonarthrosis, there is an equal percentage between the female sex with a percentage of 50% and the male sex with a percentage of 50%.

Table 1 Distribution of the study population (n=22), according to height, weight and body mass index (BMI). Period September 2022 - February 2023

	Size ($\bar{X}$)	Weight ($\bar{X}$)	BMI ($\bar{X}$)
Female	1,49 cm	74 kg	27 (Overweight)
Male	1,59 cm	75 kg	26 (Overweight)

Source: Database; Prepared by: Kasandra González; Juan Pablo Matute; Viviana Méndez

Analysis: The results show that there is a difference of 10 cm in height; however, weight and BMI are similar, with overweight in both sexes.

Table 2 Distribution of the study population (n=22), according to right Q angle of users with gonarthrosis. Period September 2022 - February 2023

Q Angle Right	Frequency	Percent (%)	Average
Varus	8	36 %	
Valgus	5	23%	14°
Normal	9	41%	

Source: Database; Prepared by: Kasandra González; Juan Pablo Matute; Viviana Méndez

Analysis: Of the total population studied, 41% of the people presented normal alignment, followed by varus with 36%, presenting an average of 14°, which is within the values established as normal in the measurement of the Q angle.

Table 3 Distribution of the study population (n=22), according to left Q angle of users with gonarthrosis. Period September 2022 - February 2023

Q angle left	Frequency	Percent (%)	Average
Varus	7	32 %	
Valgus	6	27 %	13°
Normal	9	41%	

Source: Database; Prepared by: Kasandra González; Juan Pablo Matute; Viviana Méndez

Analysis: 41% of the population has an established normal Q-angle alignment, and 32% of the population has varus. The average measurement is found to be 13° within the normal range.

4. Discussion

Older adults from a health center in the city of Cuenca were analyzed, due to the high prevalence of gonarthrosis in this population, for which the Kinovea 0.9.5 software was used to analyze the photographs and determine if there are articular misalignments in the knees, such as genu valgum and genu varum.

In the present investigation, the average Q angle measurement in the female sex (n=11) was 15º in the right leg and 17º in the left leg, while in the male sex (n=11), the average was 13º in the right leg and 10º in the left leg, values that corroborate the data presented by Silva D.O et al, who state that in women the average is 15.8º (± 4.5°), while in men it is 11.2º (±3º)12. As for the cases presenting a deviation in both varus or valgus, they are 7 and 6 respectively, being varus 32% of the total sample (n=22), varus 27%, while the cases of people with a normal alignment was a total of 9, representing 41% of the sample; data that contradict those shown by Wei J. et al, who determined the prevalence of cases with joint deviation in the knee, resulting in 40% of cases with varus deviation and 19% with valgus deviation; while the population with normal alignment coincides with that presented by these authors, who estimate that 42% of cases with gonarthrosis do not have deviation13.

On the other hand, in the female population, what Dillon CF determined is also true, where he states that there is normally a valgus deviation of the knees, which was evidenced in our research since there are 5 women with this condition, while 4 have a varus knee and only 2 are those with normal values14; However, and contrary to what is stated by this author and others such as Joern W., who affirms that this disease occurs in a minority in the male sex compared to the female sex, where there is a ratio of 1/2; in our data, this ratio was 1/115.

With regard to body mass index, according to Rodriguez V et al, most people who present gonarthrosis have a BMI between 25 and 29.9, coinciding with our sample, since in the present study there were a total of 9 overweight people, 41% of the total sample (n=22)16.

Finally, with regard to the Q angle, both right and left, according to Díez Ulloa S.A and Couceiro J, people with gonarthrosis have an average of between 15 and 20º, data that were not compatible with the study, since in both the left and right knee the average is between 13º and 14º, these values being somewhat lower than those proposed by these authors, demonstrating that there is no alteration of the Q angle in people with gonarthrosis, where the sample presented mostly normal degrees 17.

5. Conclusions

Based on the data of the study, there is no significant alteration in the Q angle in older adults with gonarthrosis in a health center in the city of Cuenca. Most of the population is in the range of 65 to 75 years, with an equivalent group in sex, with 11 cases each, both in the female and male population. Finally, the average Q angle measurement of the entire population studied was 14º in the right leg and 13º in the left leg, resulting in the alteration of the angle not being related to gonarthrosis.

Bioethical aspects

- To conduct the research, authorization was requested from the district director, Dr. Pablo Armijos, in addition to COBIAS approval.
- Informed consent: Informed consent was obtained from the study participants, which was duly explained before being signed.
- Confidentiality: the data obtained were handled with absolute confidentiality, guaranteeing their privacy. All information obtained from the research will be used exclusively for academic purposes, in addition, measures were taken to guarantee the anonymity of their identity.
- Declaration of conflict of interest: it was subject to the will of the participant; therefore, each participant had the right to withdraw from the study when deemed appropriate.
- Risk-benefit balance: the research did not represent any health risk nor did it intervene in the participant's treatment; its semiological data were simply considered to meet the research objectives.
- Biosafety measures were considered to protect the health of the participants.

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