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Evaluation of joint function in older adults with gonarthrosis: A single-center observational study.

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Abstract

Introduction: Gonarthrosis is a chronic, degenerative, progressive knee condition. This study aimed to evaluate joint function in older adults with gonarthrosis treated at the Ambulatory Care Center of the Ecuadorian Institute of Social Security Valdivia Sur in Guayaquil, Ecuador.

Methods: The information was obtained directly from the selected patients using a data collection form designed for this purpose. This information was included in a database created with Windows 7 in Microsoft Excel software. The information was statistically analyzed using SPSS software, version 20.0; summary measures were used for qualitative variables, such as absolute frequencies and percentages, and summary measures were used for quantitative variables.

Results: Fifty-four patients were included. The average age was 74.24 years; 39 patients were female. The most common age group was 65-70 years for both sexes. Regarding the degree of Gonarthrosis, 41% were Grade IV, regardless of age group and sex; 80% had a BMI between overweight and obesity. The involvement of bilateral gonarthrosis predominates in females.

Conclusions: Female sex was the risk factor for the highest body mass index. The majority of patients presented with bilateral gonarthrosis, the degree of which is directly proportional to BMI. The relationship between BMI and joint mobility was more significant in patients with a BMI between 25.00 and 29.99.

Keywords:

MeSH: Gonarthrosis, Joint function, Older adults.

Abbreviations

BMI: Body mass index.

Supplementary information

No supplementary materials are declared.

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Author contributions

Robert Alfredo Mora Torosine: Conceptualization, data curation, formal analysis, funding acquisition, research, writing - original draft.
Carlos Alberto Gaibor Correa: Fund acquisition, research, methodology, resources, supervision, validation, visualization, writing – original draft, writing – review and editing.
All the authors have read and approved the final version of the manuscript.

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Availability of data and materials

The data sets used and analyzed during the present study are available from the corresponding author upon reasonable request.

Introduction

Worldwide, gonarthrosis is a frequent cause of functional deterioration in one's lifestyle, which generates disability beginning in the fifth decade of life. Currently, in first-world countries, one in six people suffer from gonarthrosis, so its incidence is directly linked to age [1].

Gonarthrosis is a chronic, degenerative, progressive, localized joint condition in the knee characterized by degeneration, cartilage loss, and subchondral bone alteration associated with changes in soft tissue [1]. This disease causes pain and inflammation in the joint capsule, reducing the range of movements and functional ability in approximately 10% of the population over 55 [2].

Approximately 80% of people over 65 years of age present radiographic changes with evidence of gonarthrosis, which causes some degree of disability [2]. The deformity most frequently appearing in this condition is genus varus, associated with joint lengthening [1].

Risk factors for this disease include obesity, female sex, genetic factors, and advanced age [3]. The hypothesis is that adult older people with gonarthrosis present bilateral predominance of the disease, in addition to the signs and symptoms they observe, as limitations of joint mobility and degrees of pain are more severe in further advanced cases of gonarthrosis and body mass index. The objective of the present observational study was to evaluate joint function in elderly adults with gonarthrosis who were cared for in an urban health center in Guayaquil, Ecuador.

Materials and methods

Study design

The present study is observational and cross-sectional. The source is prospective.

Scenery

The study was carried out in the outpatient clinic of the Valdivia Sur Ambulatory Care Center of the Ecuadorian Social Security Institute in Guayaquil, Ecuador, from June 1 to October 30, 2015.

Participants

Adult patients over 65 years of age with a radiographically established diagnosis of gonarthrosis were included. Patients with lower extremity amputations, patients who underwent prosthetic knee procedures, and patients who did not want to participate in the study were excluded. Patients with incomplete data were excluded from the analysis.

Variables

The variables were age, sex, body mass index, degree of gonatrosis, pain, joint mobility, and bilaterality.

Data sources/measurements

The source was direct; an electronic form was completed based on data from the clinical history and the patient's interview. To classify the degrees of gonarthrosis, the Ahlback table [4], which uses the following degrees, was used:

I. Normal joint line.

II. The narrow line represents less than 50% of the standard opposite compartment. III. The joint line is absent (opposite compartment standard).

IV. The closed line with the opposite compartment was slightly affected. The tibial spine affected the external femoral condyle, and the lateral subluxation was less than 5 mm.

V. The lateral compartment has frank involvement, and the subluxation is 0.5 to 1 cm.

SAW. Total femoro-tibial injury, femoro-patellar involvement, external subluxation greater than 1 centimeter.

Pain levels were classified as 0: absence of pain, 1: pain at rest, 2: pain at the end of walking, and 3: pain with intense activities.

Joint mobility was classified as mobility up to 90°, between 91° and 100°, or between 101° and 110°.

Bilaterality involves gonarthrosis in the left, right, or bilateral knee.

The information was confidential; no personal data were included to identify the study subjects.

Biases

To avoid interviewer, information, and memory biases, the principal investigator always maintained the data with a guide and records approved in the research protocol. Observation and selection bias were avoided by applying participant selection criteria. Two researchers independently analyzed each record in duplicate, and the variables were registered in the database once their agreement was verified.

Study size

The sample was nonprobabilistic, and all patients from the study period were included.

Quantitative variables

Descriptive statistics were used. The results are expressed as frequencies and percentages.

Statistical analysis

Noninferential and inferential statistics were used. For descriptive analysis, frequencies and percentages are presented. Statistical comparisons between proportions were performed with chi-square tests. The association coefficients between the variables were calculated with Pearson's R. The statistical package was IBM Corp. Released in 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.

Results

Participants

Fifty-four patients were analyzed.

Main characteristics of the study group

The study included 39 female patients and 15 male patients. The average age of the sample is 74.24 years, with a minimum of 65 years and a maximum of 85 years. Table 1 shows the age-sex relationships, with a considerable predominance of sex females in all the age groups, with a total of 39; the age group was 65–70 for both sexes. Thirty-three percent of the total patients were aged between 65 and 70 years, 24% of whom were sexually female. The sample predominates relatively more in the age group between 65 and 70, with 33%. In total, 33 patients (61.1%) had bilateral gonarthrosis, 12 had bilateral gonarthrosis in the left knee, and 9 had bilateral gonarthrosis in the rig.

Table 1. Cases by sex.

Age	Women N=39	Men N=15	Total
65-70 years	13 (24%)	5 (9%)	18 (33%)
71-75 years	12 (22%)	2 (4%)	14 (26%)
76-80 years	5 (9%)	4 (7%)	9 (17%)
81-85 years	9 (17%)	4 (7%)	13 (24%)

Relationship of gonarthrosis with sex and age

There was a relationship between the degree of gonarthrosis, sex, and age. In this study, 13 female patients aged between 65 and 70 years were included, six of whom had grade IV, 5 of whom had grade III, 1 of whom had grade V, and 1 of whom had grade VI (Table 2).

Table 2. Distribution of patients with degree of gonarthrosis.

Degree	Patients N=54	%	% Accumulated
I and II	0	0%	0%
III	12	22%	22%
IV	23	43%	65%
V	15	28%	93%
VI	4	7%	100%

Regarding the male sex, the age group was further affected. The patients were between 65 and 70 years of age, with five patients exhibiting grade III gonarthrosis and two patients exhibiting grade III gonarthrosis.

Furthermore, the highest incidence of grade IV gonarthrosis occurred in female sex patients aged 65-70 years, followed by female sex patients aged 81-85 years, with five patients having grade V gonarthrosis.

Furthermore, it was observed that in the age groups between 65-70 and 81-85 years of age of both sexes, there were patients with a maximum degree of gonarthrosis at assessment VI.

Degree of gonarthrosis and obesity

Regarding the degree of Gonarthrosis, Grade IV predominated, with 23 patients (43%), regardless of age group or sex (Table 3). Table 4 shows that 29 patients with a BMI of 25-29.99 kg/m2 were classified as overweight, while 13 patients with a BMI of 30-34.99 kg/m2 were classified as obesity type I.

This study highlighted obesity as a risk factor since 43 patients in the sample presented a BMI between overweight and obesity grade I and obesity grade II, which is equivalent to 80% of the patients in the study.

This study included female patients aged between 76 and 80 years with a BMI between 35.00 and 40.00 m/kg2.

A result was obtained in which of the sex patients who were female, 19 belonged to a vulnerable group with a higher incidence of BMI; 35.19% of the total study sample had a risk factor.

Degree of pain and mobility

Regarding the degree of pain and degree of gonarthrosis, 28 patients were grade 1, indicating pain at rest. A total of 16 patients did not report pain (grade 0). With radiological assessment, eight patients had grade V gonarthrosis, and one patient had grade VI. No patient was classified as pain level 3 during the study.

A total of 11 patients with grade IV gonarthrosis were evaluated, referring to grade 1 pain, which refers to pain at rest.

According to general measures, grade 1 pain, regardless of the degree of gonarthrosis present, was the most common pain experienced by most patients (28 patients); more than half experienced pain while at rest.

Regarding the degree of gonarthrosis and joint mobility, 25 patients were classified between 91-100° of joint mobility, and 15 were classified as grade IV of gonarthrosis. There were 20 patients with 90° of joint mobility.

Table 3. Distribution of patients with gonarthrosis by age and body mass index .

BMI	65-70 years		71-75 years		76-80 years		81-85 years		Total
	Man	Women	Man	Women	Man	Women	Man	Women	
18.5-24.99	1	2	2	1	0	1	1	2	10 (19%)
25.0-29.99	3	6	0	6	3	2	3	7	30 (56%)
30.0-34.99	1	5	0	5	1	1	0	0	13 (24%)
35.0-40.00	0	0	0	0	0	1	0	0	1 (2%)
>40.00	0	0	0	0	0	0	0	0	0

BMI: body mass index.

Table 4. Distribution of patients with gonarthrosis by degree of gonarthrosis .

BMI	Grade I	Grade II	Grade III	Grade IV	Grade V	Grade VI	Total
18.5-24.99 kg/m ²	0	0	2	6	2	0	
25.0-29.99 kg/m ²	0	0	7	11	10	2	10 (19%)
30.0-34.99 kg/m ²	0	0	3	5	3	2	30 (56%)
35.0-40.00 kg/m ²	0	0	0	1	0	0	13 (24%)
>40.00 kg/m ²	0	0	0	0	0	0	1 (2%)

BMI: body mass index.

Discussion

Gonarthrosis is a chronic joint condition associated with changes in soft tissue [2]. Factors that explain the predominance of gonarthrosis in female patients include obesity, menopause, and decreased joint mobility [1]. Sex females present minor muscle tone and joint mobility, factors determining joint instability, favoring repetitive microtrauma and joint damage [1].

According to studies of patients aged 65 to 85 years, chondral gonarthrosis, underdiagnosis, and injury are prevalent in 60% of sex male patients and 70% of sex female patients [3].

Although not part of the current study, the chronic lesions more frequently observed in the patients studied were arterial hypertension, obesity, and diabetes mellitus; gonarthrosis is, if possible, considered a benign disease, but it is associated with critical comorbidities.

Obesity, one of the variables taken into account within the BMI, constitutes a risk factor essential for the development of osteoarthritis of the knees. In most studies, an increase in frequency in association with other variables has been reported, a factor that affects the appearance of the disease and the progression of the degenerative joint.

It can be perceived that there is a high predisposition to suffer from bilateral knee osteoarthritis in patients with a BMI greater than 25 [5]. It is known that 33% of adults aged 53-84 years have radiological evidence of osteoarthritis in the knee, which is the second most affected joint.

Knee osteoarthritis, which causes some involvement, is expected to occur in the adult population older than 50 years, especially in women, and risk factors such as obesity and menopause are also present [3].

Studies have shown that increased BMI is the primary risk factor for developing gonarthrosis [3].

Another observation that occurred during the research was related to the exclusion criteria. Of the 69 patients willing to participate in the study, 15 were not included since 8 underwent surgical treatment with total knee prosthesis in the last four years, regardless of whether it was unilateral or bilateral. The average age of the patients not included in this study was 72.46 years, with six females and two males.

Conclusions

Females predominate, with more significant risk factors related to the body mass index. Most patients present bilateral gonarthrosis. The degree of gonarthrosis is directly proportional to BMI. The relationship between BMI and joint mobility was more significant in patients with a BMI between 25.00 and 29.99 kg/m2.

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Statements

Ethics committee approval and consent to participate

The Universidad de Católica Santiago de Guayaquil ethics committee approved the study.

Publication consent

Patient-specific images, X-rays, and studies that were not published were not needed.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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