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(RESEARCH ARTICLE)

Impact of body weight on knee joint injuries, demographic, clinical and radiological data for the period September 2019 - March 2020

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Abstract

Research Background: Overweight and obesity are defined by the World Health Organization (WHO) as abnormal or excessive accumulation of fat that poses a health risk. Obesity is the biggest risk factor that can be prevented OA. Subjects with BMI> 30 kg / m2 were 6.8 times more likely to develop knee OA than normal weight controls. Currently, about 10 percent of the population is affected and the prevalence increases with age. Osteoarthritis (OA) ranks globally among the 50 most common pathologies of functional musculoskeletal diseases and injuries, affecting over 250 million people or 4% of the world's population. Of the global disease burden for OA, knee OA accounts for 83%.

Purpose: The aim is to find the cause of the increase in body weight and articular pathologies of the knee joint in patients in Albania.

Results: In the target group taken in the study, with articular knee pathology it is noticed that the majority are women, with approximately 87% and men only 13%. The majority of patients are in the age group of 51 to 70 years, representing 64.5% of the target group. Overweight people in this study occupy 35.5% of patients, while those obese about 20% of the total. It turned out that persons at normal weight were 35.5% and those underweight 9.7%. Most of the patients do not have a concomitant pathology, referred to by 42% of the total, while in the second and third place with a significant percentage are respectively endocrine pathology with about 26% and cardiovascular pathology with 23%. As a clinical sign most patients had pronounced hypertrophic synovia, representing the graph 35.5% of the total. The pain was referred to as the most distressing sign by 29% of patients, crepitations present in 19% and morning stiffness in 16%. From the obtained data, the highest percentage is occupied by the category that represents the third grade with approximately 39% of the total value, in the second place is ranked the second grade with approximately 29%, and in the third and fourth place respectively the grade of the first and fourth degree.

Conclusions: Knee joint pathologies correlate with body weight and occur in overweight or obese patients, and the first distinguishing clinical sign is moving knee pain. Knee osteoarthritis is associated with other autoimmune pathologies influenced by immune factors, and their main treatment is glucocorticoids and methotrexate. The grade of the graph at the time of diagnosis is mainly the second and third grades. It is very important in the treatment of knee osteoarthritis patient education for weight reduction.

Keywords: Knee Joint; Obesity; BMI; Osteoarthritis

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1. Introduction

In other humans and primates, the knee joins the thigh to the foot and consists of two joints: one between the femur and tibia (tibiofemoral joint), and the other between the femur and patella (patellofemoral joint) [1]. The knee is a hinge-type joint, which allows for flexion and extension, as well as slight internal and external rotation. The knee is susceptible to mechanical, physical damage and the development of osteoarthritis [2]. Obesity is defined by the World Health Organization (WHO) as an abnormal or excessive accumulation of fat that poses a health risk. The body mass index is known as a valid measure of the absolute mass of fat mass proportional to body height, however the use of BMI may present some limitations. First, the distribution of abdominal fat has been suggested to be more closely associated with cardiovascular risk and AT effects, so anthropometric measures such as waist circumference have been shown to better reflect central or abdominal fat than BMI [3].

The growing body recognizes adipose tissue (AT) as an active endocrine organ that secretes bioactive/biological mediators involved in metabolic and inflammatory disorders, along with the global epidemic of overweight and obesity, increasing overweight as a hot topic of current research. The chronic state of low-grade inflammation present in the obese state and the multiple pleiotropic effects of adipokines on the immune system have been implicated in the pathogenesis of several inflammatory conditions, including autoimmune rheumatological and inflammatory diseases [3].

Obesity is associated with an increased risk of a group of chronic diseases. Implications for the musculoskeletal system also include degenerative and inflammatory conditions, with the greatest burden coming from osteoarthritis (OA) [4]. OA is a clinical syndrome of joint pain and dysfunction caused by joint degeneration, and affects more people than any other chronic disease. Currently, about 10 percent of the population is affected and the prevalence increases with age.

The association between overweight and OA is well described [5]. The association with OA in the knee has been consistently demonstrated, but has been less strong for the femoral head joint, which may be a result of the various effects of being overweight on these joints or due to changes in studies that have evaluated these. The impact of body mass index (BMI) on the incidence of both knee and femoral OA was assessed in the last two meta-analyzes (including both group studies and control cases) by Jiang et al. They reported a dose-dependent relationship between BMI and OA risk in both the knee and groin (both clinical and radiological). In their analyzes, a 5-unit increase in body mass index was associated with an increased risk for 35 percent of knee OAs (RR: 1.35; 95% CI: 1.21-1.51) and an 11 percent increased risk of OA hip joint (RR: 1.11; 95% CI: 1.07-1.16). Interestingly, they found that the relationship between BMI and OA in the knee was significantly stronger in women than men (men, RR: 1.22; 95% CI: 1.19-1.25; women, RR: 1.38; 95% CI: 1.23- 1.54; P = 0.04 [6].

Osteoarthritis (OA) is a progressive disease, one of the most common musculoskeletal disorders that also leaves consequences of disability in the patient affected by this pathology. OA originates as a result of the action of risk factors such as genetics, old age, female gender, overweight and mechanical damage [7]. Pathological processes occurring in the cartilage, bone membrane, and synovium lead to pain, loss of function, and consequently disability [8].

1.1. Epidemiology

Osteoarthritis (OA) ranks globally among the 50 most common pathologies of musculoskeletal diseases and functional impairments, affecting over 250 million people or 4% of the world's population. Of the global disease burden for OA, knee OA accounts for 83%. About 13% of women and 10% of men aged 60 and older have symptomatic OA of the knee. Percentages of people affected by symptomatic OA of the knee are likely to increase due to population aging and the degree of overweight in the general population. Over one year, 25% of people over 55 can demonstrate an episode of persistent knee pain, in which about one in six should consult their GP. About 10% of people over the age of 55 have functional disabilities associated with knee pain, of which a quarter are severely functional disabilities. The prevalence of knee OA in men is lower compared to women. This has been shown in a metanalysis of males and females in which the incidence of knee OA in males aged <55 years was lower than in females [9].

1.2. Etiology

Adipocytokines are bioactive proteins secreted primarily by WAT, first identified in the early 1990s. To date, the role of adipocytokines in bone tissue metabolism and their contribution to bone marrow cell differentiation has been demonstrated in osteoblasts and has an important role in the pathogenesis of the metabolic syndrome. Of all the adipocytokines, leptin was first discovered and is best characterized. It is a polypeptide with 146 amino acids, and M r 16 kDa, encoded by the obesity gene (ob) located on chromosome 7q31.3. Leptin is a highly functional protein. Has metabolic, neuroendocrine and immunomodulatory effects. In particular, in obese status, macrophages are the most

abundant cell type that infiltrates adipose tissue and they are polarized by a pattern of anti-inflammatory macrophages towards an inflammatory phenotype (M1) characterized by the secretion of pro-inflammatory cytokines and the expression of stable nitric oxide synthetase process of atherogenesis. The link between metabolism and immunity was further established at the intercellular level, with the major inflammatory signaling pathway involving nuclear factor-kB (NF-kB) and kB kinase-b inhibitor (IKKB) stimulated in overweight [10,11].

The diagnosis of OA of the knee is established with clinical signs, knee radiography, MRI and laboratory [12].

1.3. Pain

Knee pain is a not very clear clinical sign of osteoarthritis of the knee which depends in part on the extent of the pathology on radiographs. Similarly, radiographic OA of the knee is an inaccurate guide to the likelihood that knee pain or disability is present. Both associations are affected by the definition of pain used referred to as the subjective sign. Knee radiograph results should not be used in isolation from other signs when evaluating individual patients with knee pain. Many individuals with radiographic OA in the knee are asymptomatic and conversely in many patients with knee pain suggesting radiological findings of OA are lacking [12].

OA treatment begins with educating the patient about reducing body weight. Osteoarthritis is a progressive clinical pathology, but treatments can reduce pain and help the patient move better. Medications that may help relieve the symptoms of osteoarthritis, mainly pain, include: NSAIDs, glucocorticoids, physical therapy, hyaluronic acid injections, osteotomy, arthroplasty and aquapunture [13].

2. Methodology

The methodology used in this study is an observational study conducted at the Rheumatology Clinic of Mother Teresa University Hospital in Tirana. The aim is to find the causality between body weight gain and articular pathologies of the knee joint, which is illustrated in the first part of this paper, where many studies conducted in the region and the world show that there is a link between body weight and articular pathologies of the knee. The work was carried out on the logical continuation of previous studies. The study is cross-sectional where 62 patients presented at the Rheumatology clinic were selected, and presented as inpatient wards or outpatients at the Consultation Center. The selection of patients to be taken in the study is random among patients suffering from articular knee pathology, presenting in the clinic with clinical signs or restrictions of daily activity. Patient records are demographic, clinical, and clinical and radiological examinations. Weight and height measurements were performed through clinical measurements.

During the stay of the patients in the clinic, their follow-up in practice was done and then on an outpatient basis. The collected data were analyzed by SPSS. The results of the study are illustrated in the following section.

Objectives of the study

- Review of the theoretical background between body weight as a mechanical and metabolic factor, causing knee joint pathologies.
- Review the literature for previous studies showing that there is a causal link between body weight gain and knee joint pathologies.
- Review of studies on mechanical osteoarthritis with obesity and high BMI as the main cause.

Study of a target group presented at the University Hospital Center "Mother Teresa" with articular pathology of the knee, if they had as a risk factor overweight or obesity.

3. Results

In the target group taken in the study, with articular knee pathology it is noticed that the majority are women, with approximately 87% and men only 13%. It is important to study this variable because it once again highlights the superiority of the female over the male to be associated with joint pathologies in general, but also in particular against articular pathologies of the knee joint.

Most of the patients are in the age group 51 to 70 years, representing 64.5% of the target group, in second place is the age group 31 to 50 years 29% and in third place is the age group over 70 years with 6.5% of the total.

The largest distribution in the group of patients taken in the study is that grouped 151-160 cm with approximately 42% of the total, in second place ranks 161-170cm with approximately 26% and in third and fourth place 1-150 cm by 19% and 171-180 by 13% of the total. Overweight people in this study occupy 35.5% of patients, while those obese about 20% of the total. It turned out that persons at normal weight were 35.5% and those underweight 9.7%. In addition to the selection of randomized patients affecting this variable, what is worth noting is that patients presented with normal BMI are being classified as chronically ill and have been or were at the time of clinical measurements under the diet to normalize their weight.

Less than half of the total number of patients or 45% of the total are currently employed, the rest is divided between the unemployed caused to physical disability, pain or current educational status and social 29% of the total, individual status about 10 % and retired 16%. This distribution goes hand in hand with the age of onset and exacerbation of the pathology which increases with age, with the injury and pain it leaves in daily life and with the disabled categorization of patients.

The stay in the first place is ranked the distribution of patients with 7-19 days of hospital stay with approximately 42%, followed by 4-7 days of stay with 32%, 1-3 days with 16% and more than 10 days of stay with approximately 10% of the total.

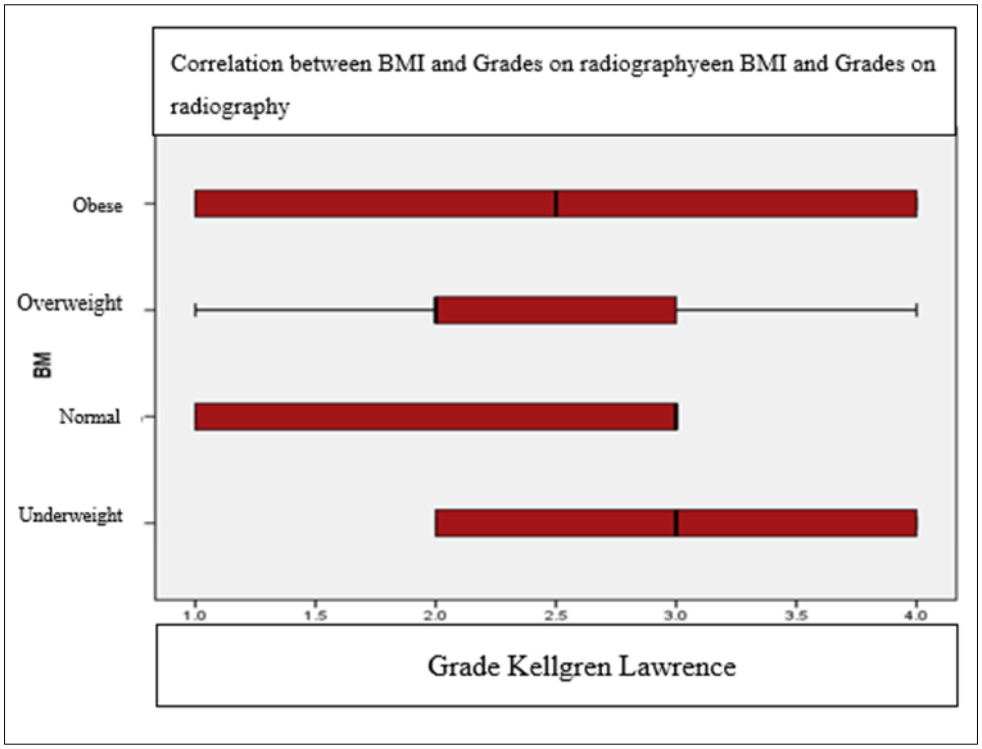

Figure 1 Correlation between BMI and Grades on radiographyeen BMI and Grades on radiography

The majority of patients do not have a concomitant pathology, referred to this with 42% of the total, while in second and third place with significant percentages are respectively endocrine pathology with about 26% and cardiovascular pathology with 23% and only 3% had concomitant neurological pathology. This association is quite well explained by the fact that the patients taken in the study were a significant percentage overweight and obese and is well known the association between high BMI and cardiovascular disease as a consequence of atherosclerotic plaques. The association with endocrinological pathologies is explained by the autoimmunity that targets the endocrine system, causing in parallel with rheumatoid arthritis endocrinological pathologies such as thyroiditis, diabetes mellitus, etc.

Excluding all the accompanying pathology treatments mentioned above, in the part of the patients receiving specific treatment for the articular pathology, at the time of the study, most of the patients were being treated with corticosteroids, mainly prednisolone being presented with 81% and 19% were treated with methotrexate.

Most of the patients taken in the study were not dieting at the time of the study, being represented in the graph as 71% of the total, were on a regular diet 16%, had dieted but discontinued 13% of the total.

The next variable is analyzed the most common clinical sign of presentation in the clinic is evaluated according to the objective examination of the doctor. It is worth noting that all patients had the full range of clinical signs of osteoarthritis, but this variable qualifies as the most pronounced sign on the first examination of hospitalization. What stands out in this variable is that most patients had pronounced hypertrophic synovia, representing in the graph 35.5% of the total. The pain was referred to as the most distressing sign by 29% of patients, crepitations present in 19% and morning stiffness in 16%.

In a very important variable for the study, the distribution of the population according to the Kellgren Lawrence grade was used, which is used to categorize overweight-related osteoarthritis.

From the obtained data, the highest percentage is occupied by the category that represents the third grade with approximately 39% of the total value, in the second place is ranked the second grade with approximately 29%, and in the third and fourth place respectively the grade of the first and fourth degree.

In this study, several correlations were made between the main clinical and imaging variables and the patient's weight or BMI. What is pointed out is that persons who have shown grade 4 on radiography are all classified as overweight and obese, while in patients who are in the first three grades there is a diverse distribution of BMI. The second and third-degree have the highest percentage of BMI overweight distribution, respectively.

4. Conclusion

As mentioned by other researchers, articular pathologies of the knee, whether or not associated with rheumatoid arthritis are more often associated with females aged 51-70 years. Knee joint pathologies correlate with body weight and occur in overweight or obese patients, and the first distinguishing clinical sign is moving knee pain.

Knee osteoarthritis is associated with other autoimmune pathologies influenced by immune factors, and their main treatment is glucocorticoids and methotrexate. The grade of the graph at the time of diagnosis is mainly the second and third grades. It is very important in the treatment of knee osteoarthritis patient education for weight reduction.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors were not part of any conflict of interest while conducting this study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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