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RESEARCH ARTICLE

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ANALYSIS OF KNEE ANGULATION IN BODYBUILDERS

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ABSTRACT

The dynamic valgus is a biomechanical change in the excessive postural pattern of the knee joint, this change can be caused by excessive rotations of the hip and knee joint, and may be linked to a paresis of the muscles of the pelvis and thigh. The knee joint will move medially in relation to the foot due to the weakness of the posterolateral hip stabilizers, the knee makes an excessive abduction and hyperpronation of the foot due to the foot fixed on the ground. The objective of this research is to analyze the dynamic valgus of the knee in individuals who practice weight training. This is a descriptive, analytical study with a cross-sectional design and quantitative approach. Participants answered a sociodemographic questionnaire and about bodybuilding. The test was done by video, the participants were positioned in orthostasis, on top of the step, where they were instructed to descend from a step and immediately after landing perform a maximum vertical jump. The results showed that 12.5% (n = 1) presented this posture and 87.5 did not present the valgus. From the results of the present study, it is evident that bodybuilding practitioners do not necessarily have dynamic valgus.

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INTRODUCTION

One of the body segments most affected during weight training is the knee, it occurs due to its little intrinsic stability, as it depends on muscular and ligament structures for its stabilization. One of the factors that predisposes the lesions in this joint is the dynamic valgus, where the lower limb misalignment occurs in the frontal plane, caused by medial hip adduction and rotation, being influenced by the body structure and the inability to stabilize the external rotator muscles of the hip., especially the middle gluteus, in the performance of functional movement patterns (CAVALCANTI et al., 2019). The dynamic valgus is a biomechanical change in the excessive postural pattern of the knee joint, this change can be caused by excessive rotations of the hip and knee joint, and may be linked to a paresis of the pelvis and thigh muscles (JUNIOR; SEHNEM, 2018). According to Almeida (2013) the knee joint will move medially in relation to the foot due to the weakness of the posterolateral hip stabilizers, the knee makes an excessive abduction and hyperpronation of the foot due to the foot fixed on the ground. This biomechanical change occurs due to a weakness in the abductor and external rotator muscles of the hip. It may progress to knee osteoarthritis, causing cartilage damage, as well as leading to the development of lower limb injuries, which may

progress to patellofemoral pain syndrome and anterior cruciate ligament injury, especially in athletes, due to a greater predisposition to injury mechanisms during physical activity (OLIVEIRA, 2019). Thus, it is considered relevant that studies are carried out that analyze the dynamic valgus in bodybuilding practitioners, so that actions with the objective of avoiding, delaying or raising awareness of these individuals are carried out with more specificity, thus generating long-term results. Thus, the present study aims to analyze the dynamic valgus of the knee in individuals who practice weight training.

MATERIALS AND METHODS

This is a descriptive, analytical study with a cross-sectional design and quantitative approach. The study was carried out after approval by the Ethics and Research Committee of Faculdade Independente do Nordeste (FAINOR), it was carried out in a private physiotherapy clinic located in the city in southwest Bahia, with a sample population of 10 participants. The inclusion criteria were bodybuilding practitioners who were between 18 and 60 years of age, of both sexes, who performed at least three weekly exercises of thirty minutes or more per day. Practitioners who did not perform the test, who had walking difficulties and who used drugs were excluded. Those with degenerative pathologies in the knee, pain and previous injuries were

also excluded. Participants answered a sociodemographic questionnaire to collect data on age, sex, race, marital status and income. It was also asked about the individual's bodybuilding time, if he practiced another sports activity, the frequency of training and if he felt any recurring pain during training. The test analysis was made by video, from the camera capture of an Apple smartphone, in slow motion mode for better viewing, with a distance of 2 meters from the step that will jump, in addition to being framed below the shoulder for guarantee the confidentiality of the participant's identity. The test was carried out with the participants positioned in orthostasis, on top of the step, keeping the arms positioned in shoulder abduction at 45°, elbow flexion at 90° in order to contain the movements in the arms. The participant was instructed to descend from a step and immediately after landing make a maximum vertical jump. Three vertical jumps were performed, and the best execution was chosen, each jump had an interval of 10 seconds of rest between them to avoid fatigue. The analysis was made at the time of landing on the ground, observing the relationship between the patella and the hallux, if the patella was more medial than the hallux, the participant would be with dynamic valgism. The data were tabulated and processed by the Software Statistical Package for the Social Sciences - SPSS 22.0 for windows.

RESULTS

The research was applied to 10 individuals, where 2 were disqualified following the inclusion and exclusion criteria, with that, the sample was composed of 8 participants (n = 8).

Table 1. Sociodemographic characteristics of weight training practitioners. Vitória da Conquista, Bahia, 2020

Variable	N	%
Sex		
Male	2	25
Feminine	6	75
Color/Ethnicity		
White	2	25
Parda	6	75
Marital status		
Notmarried	8	100
Education		
High school	1	12,5
University education	7	87,5
Income		
Low	1	12,5
Average	6	75
Did not answer	1	12,5

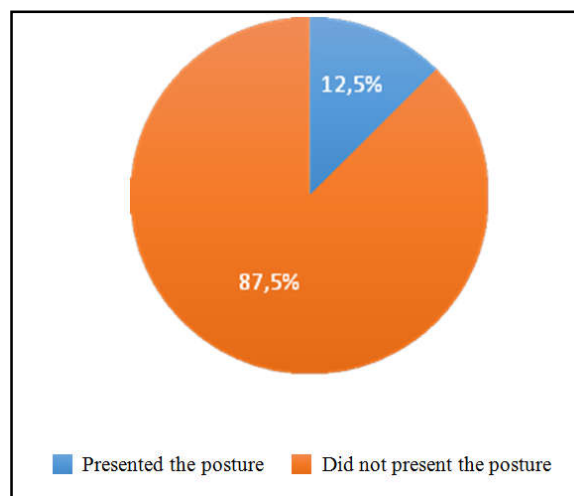
Source: Research data (2020).

Table 2. Information on bodybuilding practice. Vitória da Conquista, Bahia, 2020

Variable	N	%
Do you do any other physical activity?		
Yes	5	62,5
Not	3	37,5
What physical activities?		
Walking	1	20
Dance	1	20
Crossfit	2	40
Running	1	20
How long is the training?		
30 minutes	1	12,5
One hour	6	70
More than 1 hour	1	12,5
Do you feel any pain during training?		
Not	8	100
Do you have any knee pathology?		
Not	8	100
Do you have a history of previous knee injuries?		
Yes	1	12,5
Not	7	87,5

Source: Research data (2020).

The female gender was predominant with 75% (n = 6), the male being 25% (n = 2), where 75% (n = 6) were brown and 25% (n = 2) white, the average age of 27.63 ± 8.22 years, with a minimum age of 19 years and a maximum age of 42 years (Table 1). Regarding bodybuilding practice, respondents answer that in addition to weight training, 62.5% (n = 5) practiced other physical activity, as the amount of training per week on average 4 ± 0.75 times per week, 3 times the minimum and 5 times the maximum, lasting one hour of training for 75% (n = 6) of the participants. None of the interviewees said they felt any pain during training and did not show any pathology in the knee. Regarding the history of previous knee injuries, 12.5% (n = 1) said they had, but did not specify the type of injury and 12.5% (n = 1) used drugs (contraceptive and omega 3) (Table 2). As for the dynamic valgus test, the participants performed 3 jumps, and the best execution was chosen, thus, it was noted that 12.5% (n = 1) presented this posture and 87.5 did not present the valgus (Figure 1).



Source: Research data (2020).

Figure A. Analysis of the dynamic valgus. Vitória da Conquista, Bahia, 2020

DISCURSION

The study looked at knee angulation in bodybuilding individuals who were between 18 and 60 years old. Valgus analysis showed that only 12.5% of participants had this biomechanical change. This result may have been influenced by the number of participants and by the sex of the participants, because in studies with a larger sample, bodybuilding practitioners have dynamic valgus, especially women. Some studies have been found in the literature that evaluated the dynamic valgus mainly in women. The vertical jump test was used to evaluate the dynamic knee valgus in 22 healthy women with a mean age of 31.5 ± 11.9, dynamic valgism was recorded in 66% of the participants (MELICK et al., 2015). In a similar study carried out with athletes, dynamic valgism was evaluated using the vertical jump test in 325 female volunteers with an average of 14.1 ± 1.7 years, 62% of them presented dynamic valgism (NOYES et al., 2005). In the study, the dynamic knee valgus was evaluated based on the 3D movement analysis during the landing of the vertical jump task and counted on the participation of 60 female soccer players with an average of 23 ± 5 years, 48.3% of the participants presented dynamic knee valgism (NILSTAD et al., 2005). Women have a higher number of knee injuries, which can be traumatic or atraumatic when compared to men, so some causes favor a high incidence of knee injury in women, such as narrowing of the intercondylar fossa, greater Q angle, loosening of the ligaments knee and hyperpronation of the subtalar joint. As for the biomechanical aspects, women have a lower angle of knee flexion at initial contact, greater electromyographic activation in the quadriceps and less electromyographic amplitude of the hamstrings during the deceleration of sports movements. In addition, during the landing phase, women use the quadriceps and gastrocnemius muscles to

dissipate a large amount of generated energy, while men use the extensor muscles of the hip and perform movements with lower amplitudes in the hip in the frontal plane (SILVA; FERREIRA, 2019). One study looked at the weakness of the middle gluteal, maximum gluteal muscles, tensor fascia lata and lateral hip rotators, in addition to anatomical, hormonal and biomechanical differences that are predisposing factors for dynamic knee valgus. This is because women have decreased hip flexion angles and increased adduction angles and medial rotation of the knee joint during dynamic activities, a posture that, associated with weakness of the abductor and lateral rotator muscles of the hip, can induce an increase in the dynamic knee valgus (SCUCIATO et al., 2017). There are some biomechanical changes that increase the dynamic valgus and favor joint impact and stress during landing on the ground, making it necessary to change the landing movement strategy for the knee joint (TAMURA et al., 2017). Wang and Zhang (2016) state that for the analysis of the dynamic valgus, the countermovement jump with landing on the crate was used to verify the behavior of the knee in the frontal plane, this jump is used to assess the explosive power and performance of the lower limbs, in this movement, the knees are responsible for greater energy production during execution. The main limitations of the present study were the small sample size and the short period of data collection. These limitations were due to the Covid-19 pandemic, as many people are still afraid to attend a gym.

CONCLUSION

From the results of the present study, it is evident that bodybuilding practitioners do not necessarily have dynamic valgus. This result becomes important to point out that knee injuries in bodybuilding practitioners are not always related to this biomechanical alteration, so it is important for health professionals to evaluate and treat their patients, thinking that dynamic valgus is not always related to injuries of the knee.

REFERENCES

ALMEIDA, G. P. L. Relationship of the Dynamic Valgus of the knee with the muscular strength of the hip and trunk in individuals with patellofemoral syndrome. Faculty of Medicine at the University of São Paulo, 2013.

- CAVALCANTI, R. R. ; ARAÚJO, V. R. Q. ; VASCONCELOS, D. A. ; JÚNIOR, W. R. S. Functional evaluation of movement: incidence of dynamic knee valgus in women who practice weight training and sedentary. *Physiotherapy and research*, São Paulo, vol. 26, n. 2, 2019.
- JUNIOR, G. C. ; SEHNEM, E. Assessment of Dynamic Valgus in Women During Functional Jumping Exercise. University of Vale do Taquari, Lajeado, 2017.
- MELICK, N. E. et al. Functional performance 2–9 years after ACL reconstruction: cross-sectional comparison between athletes with bone-tendon-patellar bone, semitendinosus / gracilis and healthy controls. *Knee Surgery, Sports Traumatology, Arthroscopy*, 2015.
- NILSTAD, A. et al. Physiotherapists can identify female football players with high knee valgus angles during vertical drop jumps using real-time observational screening. *Journal of Orthopedic & Sports Physical Therapy*, v.4, n.5, 2014.
- NOYES, F. R. et al. The drop-jump screening test difference in lower limb control by gender and effect of neuromuscular training in female athletes. *The American Journal of Sports Medicine*, vol. 33, n. 2, 2005.
- OLIVEIRA, V. The effectiveness of strengthening the gluteus medius muscle in correcting dynamic knee valgus in non-athlete women. 2019. (Course Conclusion Paper) - Escola Superior de Saúde Atlântica, Barcarena, 2019.
- SCUCIATO, H. N. et al. Evaluation of dynamic knee valgus in women. *FAM Academic Works Magazine*, V.2, N.1 - NOV, 2017.
- SILVA, M.A. ; FERREIRA, T. E. Relationship between dynamic knee valgism and the strength of the posterolateral muscular compartment of the hip. 2019. (Course Conclusion Paper) - Federal University of Juiz de Fora, 2019.
- TAMURA, A. et al. Fatigue influences lower extremity angular velocities during a single-leg drop vertical jump. *J. Phys. The R. Sci.* 29: 498–504, 2017.
- WANG, Y.C, ZHANG, N. Effects of plyometric training on soccer players. Received January 19, 2016; Accepted June 3, 2016.
