

106 - EVALUATION OF BALLET DANCERS' ARTICULAR AMPLENESS OF CITY OF MANAUS

ANDREY FERREIRA ARAÚJO
RAÍSSA CAROLINE BRITO COSTA
JOSIENE DE LIMA MASCARENHAS
JANSEN ATIER ESTRAZULAS

Universidade do Estado do Amazonas – Manaus – Amazonas – Brasil
andrey_ferreira_araujo@hotmail.com

INTRODUCTION

Flexibility is one of the component of Physical Fitness Related to Health and to Performance and, therefore is associated to execution of sports and daily activities without wasting too energy and, consequently, without excessive fatigue (BARBANTI, 1990).

Moreover, flexibility can be defined in an operational way, as a “body quality that depends on muscular elasticity and articular mobility, represented by maximum physical ampleness, without appearance of anatomic-pathological injuries” (PAVEL; ARAÚJO, 1980 citado por ARAÚJO, 1983). Dantas (1989) citing Hollmann and Hettinger (1983) defines flexibility as a physical quality related to the execution, in a voluntary way, of one articular movement in its maximum ampleness within involved structures limits, without injuries risky.

According to Araújo (1987) citing Corbin e Noble (1980), for a long time studies about flexibility had cachet merely descriptive about pathologies. Only then that, from 20th century flexibility started to be studied through a systematic way as a component of Physical Fitness (FARINATTI; MONTEIRO, 1992). American College of Sport Medicine (1998), proposed as fundamental flexibility exercises associated to wellness improvement and health gains.

Farinatti (2000) proposes that, to sports that requires execution of movements in its maximum ampleness, flexibility acquire bigger relevance, since it is related to performance through technically effective movements. HOLLMANN and HETTINGER (1989) say that athletes presenting high levels of flexibility, consequently perform movements above average.

However, recently searches of Araújo et al (1998) point the fact of that the most of professional athletes have general flexibility barely median. This is justified by the fact that high levels of flexibility are directly linked to specific performance of sporting movements.

To assess the level of flexibility it is proposed that the classification considers units of measurement used to represent values. Thus, methods are classified into three categories: linear, whose metric scale is used to represent indirectly the mobility of a set of joints required simultaneously; angle, which make use of scales of the angle of motion on individual basis with the aid of goniometers and fleximetry; dimensionless, whose measurement method does not use conventional values, such as angles or centimeters, but assign points or dichotomize an answer in “yes” or “no”, or even in “positive” or “negative” (Araújo, 1999).

However, the same way that high levels of flexibility provide better technical performance in sports, there is requirement of satisfactory values of this physical quality to the maintenance of posture and performance of specific movements in the various modalities related to dance because the movements of the joint hip are essential for successful implementation of the essential steps of ballet (CIGARRO et al, 2006).

Therefore, due to the importance of flexibility component in the context of various forms of dance in order to maintain posture and execution of steps technically acceptable and yet due to lack of scientific studies involving this aspect was proposed actual studied with the objective of analyzing the flexibility of the lower members of ballet dancers in the city of Manaus.

MATERIAL AND METHODS

Ten ballet dancers participated of this descriptive study, with ages between 20 and 26 years (21.56 ± 1.94), all practitioners of the dance modalities at least for four years, academic at the Amazonas State University - ASU and who had no diseases osteomioarticular. The survey was conducted in the dependencies of the ASU. All study participants reported only hold dance classes such as exercise.

All participants consented to participation by signing the Term of Consent (including: objective of the study, assessments procedures, voluntary character of the subject's participation), meeting the norms of conducting studies involving humans, according to the resolution 196/96.

For assessing the breadth of the hip and knee joint ampleness of the dancers, was used a 360° universal fleximeter, in total circle, Sanny, made in Brazil.

The degree of flexibility were measured in the following movements: active hip flexion with knee in flexion, active hip flexion with knees in extension, passive hip flexion with knee in extension, hip extension, hip abduction, hip lateral rotation, hip medial rotation and knee flexion. All movements were evaluated following the procedures proposed by fleximeter guide, according to Monteiro (2005).

The procedure for measuring the movement of active hip flexion with the knee in flexion was: assessed positioned supine in the anatomical position. The fleximeter was placed in the lateral thigh (facing out) with the dial turned to the evaluator. In the non-assessed member the knee remained extended and the entire segment should keep contact with surface during the whole movement, because the opposite would indicate a possible shortening of iliopsoas. Stabilized the pelvis, preventing the rotation or sway back, and then were asked to the rated to perform the movement in its maximum ampleness.

For the movement of hip flexion with knee in extension was measured in: assessed positioned supine in the anatomical position. Stood knee of the non-assessed member (extended). The segment should not lose contact with the surface during the movement. The fleximeter was placed in the lateral thigh to avoid changes in movement angulations due to knee motion. The display should be facing outward (to the evaluator). Stabilized the pelvis, preventing the rise of hip and lumbar spine removed from the surface and then were asked to the rated perform the individual movement in its maximum ampleness. The realization of the variant of the movement in its passive form was chose.

The procedure for measuring the movement of hip extension was: assessed in the prone position with the head turned sideways. Fleximeter was positioned in lateral thigh to avoid influence of some knee motion in articular angulation. The display was turned outward (to the evaluator). Knee joint was extended, because if in flexion, anterior thigh muscle tension could restrict movement. Pelvis was stabilized, preventing its rotation or swinging, which would cause an accentuation of lumbar lordosis. The iliac crest should remain in contact with the surface during the course of the movement.

Hip abduction was measured as follows: the subject was positioned in standing position with legs together and extended. A table was used to support the hand, helping to stabilize the posture. The fleximeter was positioned in the heel of the assessed with the display facing to the evaluator. Requested then that the subject move away legs laterally sliding them in order to open a splits. The knee should remain extended and the feet remain parallel, and maintenance of alignment of the trunk to prevent the projection of the hips back.

To measure the movements of the lateral and medial rotation of the hip was: evaluated positioned supine, with the assessed segment in extension. The non-evaluated should be flexed for more freedom of movement. The fleximeter was positioned at the foot sole of evaluated member with the display turned to the evaluator.

The measurement of motion of knee flexion was: assessed in the prone position, so that there was alignment between the lateral malleolus of the evaluated segment and the lateral condyle of the same segment. The fleximeter was then positioned with its display turned to the lateral ankle face, for the evaluator. Pelvis was stabilized in order to not perform projection of the hip doing lombar spine hiperlordosis. Then were asked to subject to perform the movement in its maximum amplitude.

All scores were recorded in degrees. For each participant were performed three trials of each movement described, then average was calculated to establish only one score in order to present each movement angulation. To analyze the data collected was used the calculation of the average, standard deviation, coefficient of variation, beyond the identification of the maximum and minimum value for each measured motion.

RESULTS AND DISCUSSION

Table 1 shows the results of the values found in the samples, based on the average values of each movement of the subjects evaluated.

TABLE 1. Evaluation results from the flexibility of hip and knee

VARIABLE	X	S	CV%	MAX	MIN
AHF W/ KF	119,18	9,60	8,06	145	104
AHF W/ FE	105,82	13,23	12,50	130	80
PHF W/ KE	134,40	13,65	10,16	159	106
HE	44,85	11,58	25,81	75	24
HÁ	78,50	11,62	14,81	105	62
HLR	53,03	11,85	22,34	80	35
HMR	35,92	15,37	42,78	75	17
KF	133,23	12,32	9,25	167	115

Legend: Active hip flexion with knee in flexion (AHF W/ KF), Active hip flexion with knees in extension (AHF W/ KE), Passive hip flexion with knee in extension (PHF W/ KE), Hip extension (HE), Hip abduction (HA), Hip lateral rotation (HLR), Hip medial rotation (HMR) and Knee flexion (KF)

In a study developed by Soares and Santos (2005), involving martial arts athletes, average levels of flexibility of the hip joint in active flexion with the knee extended motion was equal to 31 °, for judo players and 42 °, for judo players. Accordingly, the average presented by the results of the collection was better, being equal to 105, which may be related to the work of stretching the muscles involved in this movement in a more intense way.

However, the range of active hip flexion motion, both with the knee in flexion (119.18 °) and with the knee in extension (105.82 °) are lower than those demonstrated in a study conducted by Cigarro (2006), in which scores presented were 149.6 ° and 131.0 °, respectively. But it is important to note that these values are relative to the study group underwent training flexibility program. So it can be said that the scores presented in this study can be improved if tied to similar training programs.

Another significant aspect was the difference between the passive hip flexion with knee extended, whose average value presented was 134.40 °, while on the movement of active hip flexion with knee extended, the observed value was 105.82 °. Thus, it is interesting to note that is attributed to the important work of strengthening exercises to the difference between these values because, as proposes Monteiro (2005), the difference between active and passive flexibility, called flexibility reserve, indicates the possibility of improvement scores achieved through the strengthening of agonist muscles responsible for movement execution, since the antagonist muscles to the movement has the capacity to stretch that provides this improvement.

About the movement of hip extension, the average score achieved was not too different from sedentary subjects as it is presented in the study of Cyrino and Oliveira (2004). Therefore, it is possible to postulate that despite the practice in the various forms of dance, the study subjects did not acquire significant gains with respect to this motion.

Furthermore, by study by Soares (2008), as well as movement of hip extension, the movement of the hip abduction showed no major differences when compared with the levels achieved by sedentary individuals.

It was also observed that, with the exception of the movement of internal rotation and knee flexion, all other values are elevated compared to baseline levels recommended for your health according to The American Academy of Orthopaedic Surgeons (1965) and the American College of Sports Medicine (1998).

It is also claimed that the practice of constant physical activity, anthropometry of the constituent members of the involved joints, maturational factors and also the time of day are factors that directly influence levels of flexibility (Dantas, 1989). These characteristics are relevant when analyzing the data presented by the sample.

But, the study by Rebelatto and others (2005), shows that the effectiveness of the application of flexibility training is inversely proportional to age of individuals, and from the age of 60, regardless of gender, training acquire the function of maintaining flexibility rates only. For this reason, we can relate the scores in the study and stretching activities performed by dancers to their practicing time and ages.

However, it is proposed that the main method of flexibility training, stretching, appears as a counterpart to decreased muscle strength which can affect the performance of the dancers in modalities that require more steeply this capability. But it was not possible to establish the same relationship between the use of stretching before activities and muscular endurance, in other words due to the supposed dissipation of the effects of stretching on muscle, there is no impairment of muscle endurance (SIMÃO et al, 2003; GREGO NETO; MANFFRA, 2009). This statement must be taken into consideration given the fact that the stretching done before the measurements by the subjects, as proposed in the parameter of measurement used, may have effected directly the scores submitted, especially those related to active movements, as these require muscle strength to perform it.

According to a study by Thacker (2004), extremely high or low levels of flexibility are related to reports of pain and injury, although there are indications of the lesions in patients whose levels of flexibility are considered in average. Moreover, due to the fact that most injuries occur in ranges considered normal, in joints involved, is not clear the contribution of the range of

motion through specific work for the occurrence of injuries. However, it is said that some injuries are related to tissue compliance of the structures involved in movement, justified by works of stretching, and consequently, there is a decrease in the absorption capacity of the charges which are exposed. In the same study also states that the qualitative flexibility, it is indispensable in the dance, but it cannot be made claims about its influence on performance due to the influence of genetic factors in the variability of individual levels of flexibility.

CONCLUSION

By observing the data presented and discussions with studies by other authors it was noticeable that the individuals had values above those recommended for health. Moreover, from comparisons with some sports, especially those that require more intense the lower limbs it was possible to notice that the scores achieved were even higher in all cases when analyzing the overall flexibility.

However, when done the comparison with the study group underwent training flexibility programs, some values, especially of active hip flexion and knee flexion, the results of this study showed lower values. This may denote that the levels of flexibility shown by the research subjects can be improved, despite having been declared the occurrence of sporadic training sessions for flexibility.

Therefore, the implementation of systematic programs of flexibility training can become interesting tool for practitioners of the modalities of dance, not only in the context of this study, but also in situations where the activity of dance is developed, in general.

It is worth noting that, as proposed in the literature, increased levels of flexibility, especially as regards the flexibility reserve, is linked to the strengthening of the muscles involved. This is another important aspect in order to develop physical fitness centers for dancers, because this way actions to practitioners of the modalities of dance in its specifications could take.

It should be emphasized that this study still needs greater breadth and depth regarding the number of individual dancers. Moreover, it proposes the implementation of training programs for flexibility in future studies to compare the studies already conducted with this methodology and the context in which this test was performed.

Finally, it can be considered indispensable greater involvement of practitioners of the modalities of dance in the promotion of scientific knowledge focused on aspects related to health and performance, given the scarcity of work for this purpose.

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St 05, n. 03, Lírio do Vale II

Manaus – AM – Brazil

CEP: 69038-275

e-mail: andrey_ferreira_araujo@hotmail.com

EVALUATION OF BALLET DANCERS' ARTICULAR AMPLENESS OF CITY OF MANAUS**ABSTRACT**

Due to the importance of flexibility in the context of various dance types and due to the lack of scientific studies involving this aspect, the present study aimed to analyze the flexibility in women ballet dancers' lower members. Ten individuals with ages ranging from 20 and 26 years ($21,56 \pm 1,94$), all of them practicing some kind of dance at least 4 years and with no bones, muscles or joints injuries participated in this study. To value ampleness of hip joint and knee joint it has been used a 360° universal fleximeter, in total circle, Sanny®, made in Brazil. Flexibility degrees has been assessed in the following movements: active hip flexion with knee in flexion, active hip flexion with knees in extension, passive hip flexion with knee in extension, hip extension, hip abduction, hip lateral rotation, hip medial rotation and knee flexion. Three tries have been made in each movement to each volunteer assessed, calculating the average of the tries to be possible establish only one score to each movement. It was observed in results the, excepted in hip medial rotation and knee flexion movements, all the scores could be considered above the ones recommended to health. However, comparing with group used in study submitted to flexibility training program, some scores, mainly about active hip flexion and knee flexion, were considered low. This could evidence flexibility value presented by volunteers might be improved, because they have related to participate occasionally in flexibility trainings.

KEYWORDS: Flexibility, dance, fleximeter.

EVALUATION DE L'AMPLITUDE DES MOUVEMENTS DES DANSEURS DE LA VILLE MANAUS**RÉSUMÉ**

Compte tenu de l'importance de la flexibilité composante dans le cadre de diverses formes de la danse et à cause de la rareté des études scientifiques portant sur cet aspect de la présente étude visait à analyser la flexibilité des membres inférieurs de danseurs. Participé à cette étude, dix danseurs, âgés entre 20 et 26 ans ($21,56 \pm 1,94$), tous les praticiens de la danse au moins quatre ans et qui n'avaient pas de troubles musculo-squelettiques de l'ordre. Pour évaluer l'ampleur de l'articulation de la hanche et du genou du danseur, nous avons utilisé un Fleximeter universelle cercle de 360 ° au total, Sanny, fabriqué au Brésil. Nous avons mesuré le degré de souplesse dans les mouvements suivants: flexion active avec le genou fléchi, avec flexion active du genou étendu, la flexion passive, extension, abduction, rotation interne et externe de la hanche et la flexion du genou. Pour chaque participant ont été réalisées trois essais de chaque mouvement décrit par le calcul de la moyenne des chiffres afin qu'ils puissent apporter une valeur unique pour chaque mouvement. Il a été observé que les résultats, sauf pour les mouvements de rotation interne et la flexion du genou, toutes les autres valeurs sont élevées par rapport aux niveaux de référence recommandés pour la santé. Toutefois, lorsque vous avez terminé la comparaison avec le groupe d'étude ont subi des programmes de formation pour la flexibilité, certaines valeurs, en particulier de la flexion active de la hanche et du genou, a montré des valeurs inférieures. Cela peut indiquer que les niveaux de souplesse manifestée par les sujets de recherche pourrait être amélioré, parce que les sujets de l'échantillon ont déclaré avoir des séances occasionnelles d'entraînement de la flexibilité.

MOTS-CLÉS: flexibilité, danse, fleximeter.

EVALUACIÓN DE LA AMPLITUD ARTICULAR DE BAILARINAS DE LA CIUDAD DE MANAUS**RESUMEN**

Debido la importancia de componente flexibilidad en el contexto de las diversas modalidades de danza y debido la escasez de estudios científicos que envuelvan ese aspecto el presente estudio tiene el objetivo de analizar la flexibilidad de los miembros inferiores de bailarinas. Participaran del estudio diez bailarinas, con edad entre 20 y 26 años ($21,56 \pm 1,94$), todas practicantes de modalidades de danza a pelo menos 4 años e que no presentaban patologías de orden ósea, muscular o articular. Para la evaluación del grado de amplitud de la articulación del cuadril y del la rodilla de las bailarinas, fue utilizado un flexímetro universal de 360°, en círculo total, de la marca Sanny, de fabricación brasilera. Fueran medidos el grado de la flexibilidad en los siguientes movimientos: flexión activa con la rodilla flexionada, flexión activa con la rodilla extendida, flexión pasiva, extensión, abducción, rotación medial y rotación lateral del cuadril, y flexión de la rodilla. Para cada sujeto evaluado fueran realizadas tres tentativas de cada movimiento descrito, calculándose el promedio de los valores presentados para que fuese posible establecer un valor único para cada movimiento. Fue observado en los resultados que, con excepción de los movimientos de rotación externa del cuadril y flexión de la rodilla, todos los otros valores presentaron se elevados cuando comparados a los niveles básicos recomendados para la salud. Sin embargo, cuando hecha la comparación con grupo de estudio presentado a programas de adiestramiento de flexibilidad, algunos valores, principalmente de flexión activa de lo cuadril y de la rodilla, presentaron valores bajos. Eso puede significar que los niveles de flexibilidad presentados pelos sujetos del estudio pudrían ser mejorados, pues los sujetos de la muestra relataran tener secciones esporádicas de programas de adiestramiento de flexibilidad.

PALABRAS-CLAVE: flexibilidad, danza, flexímetro.

AVALIAÇÃO DA AMPLITUDE ARTICULAR DE BAILARINAS DA CIDADE DE MANAUS**RESUMO**

Dada a importância do componente flexibilidade no contexto das diversas modalidades da dança e devido à escassez de estudos científicos que envolvam este aspecto o presente estudo teve como objetivo analisar a flexibilidade de membros inferiores de bailarinas. Participaram desse estudo dez bailarinas, com idade entre 20 e 26 anos ($21,56 \pm 1,94$), todas praticantes de modalidades de dança a pelo menos 4 anos e que não apresentavam patologias de ordem osteomioarticular. Para a avaliação do grau de amplitude da articulação do quadril e do joelho das bailarinas, foi utilizado um flexímetro universal de 360°, em círculo total, da marca Sanny, de fabricação brasileira. Foram aferidos o grau de flexibilidade nos seguintes movimentos: flexão ativa com o joelho flexionado, flexão ativa com o joelho estendido, flexão passiva, extensão, abdução, rotação medial e rotação lateral do quadril, e flexão do joelho. Para cada avaliado foram realizadas três tentativas de cada movimento descrito, calculando-se a média dos valores apresentados para que fosse possível estabelecer valor único para cada movimento. Observou-se nos resultados que, com exceção dos movimentos de rotação interna do quadril e flexão do joelho, todos os outros valores se apresentaram elevados quando comparados aos níveis básicos recomendados para a saúde. Contudo, quando feita a comparação com grupo de estudo submetido a programas de treinamento de flexibilidade, alguns valores, principalmente de flexão ativa de quadril e de joelho, apresentaram valores inferiores. Isto pode denotar que os níveis de flexibilidade apresentados pelos sujeitos da pesquisa poderiam ser melhorados, pois os sujeitos da amostra relataram ter sessões esporádicas de treinamento de flexibilidade.

PALAVRAS-CHAVES: flexibilidade, dança, flexímetro.