22 - OCCURRENCE OF INJURIES IN RHYTHMIC GYMNASTS ATHLETES

RAQUEL PETRY; JONATHAN ACHE DIAS; ANGÉLICA CRISTIANE OVANDO
Universidade do Estado de Santa Catarina, Florianópolis, SC, Brasil
raqpetry@yahoo.com.br

INTRODUCTION

The Rhythmic Gymnastic is a sport that mixtures the gymnast athleticism with the grace of the classical ballet (HUTCHINSON, 1999). This sport requires that the gymnast coordinates the handling of apparatus like rope, arc, ball, club or band with the execution of exercises, which in the greatest part require a great flexibility, so that they can reach the positions never seen in any other sports (HUTCHINSON, 1999; ABRUZZINI, 2005; ROBEVA and RANKELOVA, 1991).

To reach the technical perfection and reproduce all the movements and exercises in their routines, the athletes must train and repeat these elements hundreds of times (LAFFRANCHI, 2001). This daily intensive training put the gymnasts in risk of injuries for excessively use in different structures and muscular groups (HUTCHINSON, 1999; GOULD, 1993). The risk of lesions in the athletes can increase significantly if we add factors as training intensity, physical demand for certain movements, lack of concentration, incorrect posture and insufficient or incorrect physical preparation (TORRES, 2004; OLIVEIRA, LOURENÇO, TEIXEIRA, 2004). Any high level physical activity is related to injuries. That's why it is important a special attention to certain risks and the control of the factors that can increase them. (OLIVEIRA, LOURENÇO, TEIXEIRA, 2004).

Each sport has distinctive movements, requiring different body structures. So, each sport has places and body structures that are more likely to have to injuries, according the movements executed (GOULD, 1993; KRIVICKAS, 1997). In the rhythmic gymnastic, due to extreme movements of the spine (hyperextension of the spine) and the lower limbs (flexion associated to hip extension or abduction), these regions come as the most smitten by injuries (ROBEVA e RANKELOVA, 1991; LAFFRANCHI, 2001; OLIVEIRA, LOURENÇO, TEIXEIRA, 2004). Many injuries require a special attention, because they are athletics injuries which present serious consequences (OLIVEIRA, LOURENÇO, TEIXEIRA, 2004).

The Rhythmic Gymnastic is a sport that has been developing in Brazil, within the results internationally won and in the number of practioners, and that's why it claims a scientific respect. However, the researches in this sport are very limited, and it is not studied enough (OLIVEIRA, LOURENÇO, TEIXEIRA, 2004; TAKADA, LOURENÇO, 2004; MONTEIRO, GREGO, 2003; NUNOMURA, 2002, HUTCHINSON, 1999).

So, the aim of this study was to analyze the occurrence of injuries in practitioners of Rhythmic Gymnastic, the practice time and the training volume adopted by these athletes.

METHOD

This is a descriptive study (BORG, 1989). The subjects were 266 female gymnasts, age ranging from 5 to 9 years old. They were participating on the VII National Tournament of Rhythmic Gymnastics, which has taken place from 16 to 19 November, 2006 in Florianópolis-SC. They were divided into four groups according to the age and the category they belonged to.

The groups were divided into: pre-infant (5-10 years old), infant (11-12 years old) juvenile

(13-14 years old) and adults (15-19 years old). Inclusion criteria was: practicing the Rhythmic Gymnastics and participating on the VII National Tournament of Rhythmic Gymnastics. The individuals who didn't fit this criteria were excluded. The occurrence of injuries in the gymnasts was estimated through the application of a direct questionnaire, with closed questions about: category, occurrence of muscular-skeletal injuries, time they have been practicing the GR, training quantity. It is convenient to quote, though, that this study had a limitation which was the memory of the gymnasts to correctly refer to the injuries that had occurred in the past and the existing ones in the present time, also the questionnaire reliability as an instrument to measure injuries.

All the participants have been informed the content and the objective of the questionnaires, also they were told that their identity would be preserved. They were asked to answer the questionnaires telling the truth, without omitting any information, so that the final result of the study would not be affected. The software *SPSS*® version 13.0 was used for the descriptive statistical data analyzes.

RESULTS AND DISCUSSION

The mean age was 12,05±2,3 years old. At this age, the athletes are still in the motor development stage and in musculoskeletal and sexual ripening, so it can bring consequences to their body and sportive activities (MALINA, BOUCHARD, 2002; GEORGOPOULOS, et al., 2001). Some studies (GEORGOPOULOS, et al., 2002;TANCHEV, 2000; BAXTER-JONES, HELMS, BAINES-PREECE, 1994; CLAESSENS, MALINA, LEFEVRE, 1992) show that the rhythmic gymnasts are athletes who generally present a delayed musculoskeletal development and a delayed sexual ripening, due to factors such as intense physical training and limited food consumption.

Table 1 - Descriptive variables data: age, practicing time and training volume.

Variables	Age (years)	Practicing Time (months)	Training Volume (minutes/week)
Mean	12,05	53,2	1122,2
Median	12	48	1200
Variance	5,5	815,7	178201
Standard Deviation	2,3	28,5	422,1
Minimum	5	3	300
Maximum	19	144	2160

In table 1 we can see that the gymnasts in this study have been practicing Rhythmic Gymnastic for about four years (53,2±28,5 months), with a training volume of approximately 18 hours/week (1122,2±422min/week).

Studies (TANCHEV, 2000; HUTCHINSON, 1999) show that American gymnasts train in average 34h/week and Bulgarian 28,4±12,16h/semana. Comparing to the volume of training in international gymnasts, the Brazilian ones, who participated in this study, do not have a volume of training so intense. There isn't a consensus among the studies in this field about an "ideal" volume of training to young athletes. In general, they mention a lot about it, but few results are conclusive (VIEBIG, POLPO, CORRÊA, 2006; SILVA et al, 2004). Some researchers quantify the volume of training to their athletes: in the Olympics Gymnastic, a volume of 10-12 weekly sessions is considered intense (NUNOMURA, 2002); young volleyball athletes undertake a volume of 12 weekly hours in order to have a specific strength training (SCHNEIDER, BENETTI, MEYER, 2004).

The data obtained in this study show that 136 gymnasts (51,5%) have already suffered injuries from practicing the Rhythmic Gymnastics (Table 2). We have noticed that, the older the gymnast is (category), greater is the number of injuries suffered (Table 2). Some researchers (OLIVEIRA, LOURENÇO, TEIXEIRA, 2004; NUNOMURA, 2002;) point this relation (number of injuries and age) with training volume, practicing time of the sport and the level of physical ability required for the gymnast. It's known that the exigency for the gymnasts from the adult category are proportionally larger than the exigency for children in the category pre-infant, due to the increase in the exercise and movements difficulty and the physical and motor abilities in the adults. The older the gymnast is, larger is the weekly training volume, so the physical demand is greater and the time for the recuperation is shorter. (TORRES, 2004; OLIVEIRA, LOURENÇO E TEIXEIRA, 2004; NUNOMURA, 2002).

TABLE 2 - Athletes category distribution and incidence of injuries in the categories.

Category	Injury		Total
	no	yes	
Adult	5	20 (80%)	25
uvenile	24	58 (70,7%)	82
Infant	46	37(44%)	84
Pré-infant	54	21 (28 %)	75
Total	129(48,5%)	136 (51,5%)	266

Every physical activity generates a stress at any point of the locomotor system. If this stress is within the body physiological capacity to recover, there is no pathological process. (TORRES, 2004). However, the repetitive stress associated to the lack of recovering can lead to injuries from sport practice (VIEBIG, POLPO, CORRÊA, 2006; BENETTI, SCHNEIDER, MEYER, 2005; TORRES, 2004). Studies (OLIVEIRA, LOURENÇO, TEIXEIRA, 2004; TORRES, 2004; SAFRAN, MCKEAG, CAMP, 2002; NUNOMURA, 2002) show suggestive relations between the injuries and contributing factors to the occurrence of injuries in gymnasts: dynamic stress, overuse, physical vulnerability, lack of physical ability (especially flexibility), muscular unbalance, ripening stage and growing. However, these studies highlight the difficulty to establish, by means of the literature, definitive factors and causes which lead to the installation of these injuries.

The movements executed by the gymnasts to perform the exercises have been quoted as common activities of injuries aggravation which lead to pain conditions presented by a great number of gymnast practioners. (GEORGOPOULOS, 2001; MICHELI, WOOD, 1995; TANCHEV et al, 2000). These serious injuries in young athletes can bring permanent consequences, with symptoms of pain/discomfort during the whole life of the gymnast, even after the end of her career in the sport (BAXTER-JONES, HELMS, BAINES-PREECE, 1994; GEORGOPOULOS, 2001; WEATHERLEY, MEHDIAN, VANDENBERG, 1991).

Many studies (TORRES, 2004; COHEN, ABDALA, 2003; ALINA, BOUCHARD, 2002; KRIVICKAS, 1997; GOULD, 1993) report that the lower limb is the part of the body that is most affected by injuries in sport practicing, because there is a close relation between the most practiced sports by the population in general and the sport gestures like jumping and brusque running.

In the Rhytmic Gymnastics the parts of the body that are most injured are the spine (due to the hyperextension) and lower limbs (bending associated with pip extension or abduction) OLIVEIRA, LOURENÇO, TEIXEIRA, 2004; NUNOMURA, 2002; LAFFRANCHI, 2001; HUTCHINSON, 1999; ROBEVA e RANKELOVA, 1991;). This finding was confirmed in this study, because in all the categories the largest injury incidence was in the lower limbs: adults (knee - 36%), juvenile (foot - 25%), infant (foot - 14%) e pre-infant (groin - 8%). The spine also came with a significant occurrence, mainly in the adult category (32%) and juvenile (18%). Some of these injuries can interfere in the gymnast's performance during their training/competitions (TORRES, 2004). Most of the injuries presented in the gymnasts need special attention since they are athletic injuries which can have severe consequences during the time they are actively practicing the sport and also after they finish their sport competitive career. (OLIVEIRA, LOURENÇO, TEIXEIRA, 2004).

It's necessary to give a new direction to the focus of the training during the rhythmic gymnastics practice so that there is a commitment to the injuries prevention; it's necessary a global view of the athlete, respecting her physical, ripening and chronological limitations so that we can facilitate their natural development in the sport.

Studies involving rhythmic gymnastics are little. Its necessary to expand the studies in this specific field, since it's a sport that has been developing in Brazil, requiring, thus, a larger scientific approach for the athletes and also for all the sport staff (coaches, physical education professionals, physiotherapists, dieticians) so that they reach the best results with the shorter risk that is possible.

CONCLUSIONS

The tendency to relevant injuries in the lower limbs and spine was confirmed through this study. The occurrence of injuries in these parts of the body is directly related to the extreme movements executed by the gymnasts during the sport practice. We identified that the amount of injuries was directly related to the category the gymnast belonged to: the occurrence of injuries increased gradually as the age increased (category). Through this study, we confirm the importance of preventive programs aiming the minimization of injuries in this sport.

REFERENCES

ABRUZZINI, E. **Código de Pontuação de Ginástica Rítmica**. Paris: Federação Internacional de Ginástica, 2005.

BAXTER-JONES, A.D.G.; HELMS, P.; BAINES-PREECE, J.; *et al.* Menarche in intensively trained gymnasts, swimmers and tennis players. **Ann Hum Biol**.v.21, p.407-15.1994.

BENETTI, G.; SCHNEIDER, P.; MEYER, F. Os benefícios do esporte e a importância da treinabilidade da força muscular de pré-púberes atletas de voleibol. **Revista Brasileira de Cineantropometria & Desempenho Humano**. v.7, n.2, p. 87-93. 2005.

BORG, WR. **Educacional research**. New York: Longman; 1989.

CLAESSENS, A.L.; MALINA, R.M.; LEFEVRE, J.; *et al.* Growth and menarcheal status of elite female gymnasts. Med

Sci Sports Exerc. 1992; 24:755-63.
COHEN, M.; ABDALA, R.J. **Lesões no esporte**: diagnóstico, prevenção e tratamento. Rio de Janeiro: Revinter, 2003.
GEORGOPOULOS, N.A *et al.* Growth retardation in artistic compared with rhythmic elite female gymnasts. **The Journal of Clinical Endocrinology & Metabolism.** v.87, n.7, p.3169-73.2002.
GEORGOPOULOS, N.A *et al.* Height velocity and skeletal maturation in elite female rhythmic gymnast. **The Journal of Clinical Endocrinology & Metabolism.** v.86, n.11, p.5159-64.2001.
GOULD, J. **Fisioterapia na Ortopedia e na Medicina do Esporte**. 2ª.ed. São Paulo: Manole, 1993.
HUTCHINSON, M.R. Low Back Pain in Elite Rhythmic Gymnasts. **Medicine and Science in Sports & Exercise**. v.31, n.11, p.1686-88, 1999.
KRIVICKAS, L.S. Anatomical factors associated with overuse sports injuries. **Sport Medicine.** v. 24, n. 2, p.132-46.1997.
LAFFRANCHI, B. **Treinamento Desportivo Aplicado à Ginástica Rítmica**. Londrina: UNOPAR, 2001.
MALINA, R.M.; BOUCHARD, C. **Atividade Física do Atleta Jovem: do Crescimento à Maturação**. São Paulo: Roca, 2002.
MICHELI, L.J.; WOOD, R. Back pain in young athletes. **Arch Pediatr Adolesc Med**. v.149, p.15-18.1995.
MONTEIRO, H.L., GREGO, L.G. As lesões na dança: conceitos, sintomas, causa situacional e tratamento. **Motriz.** v. 9, n.2,p. 63-71.2003
NUNOMURA, M. Lesões na ginástica artística: principais incidências e medidas preventivas. **Motriz.** v.8, n.1, p. 21-29.2002.
OLIVEIRA, M. M. M.; LOURENÇO, M. R. A.; TEIXEIRA, D. C. Incidências de Lesões nas Equipes de Ginástica Rítmica da UNOPAR. **Ciênc. Biol Saúde** v.5/6 (1), p. 29-40.2004.
ROBEVA, N.; RANKELOVA, M. **Escola de Campeãs**. São Paulo: Ícone, 1991.
SAFRAN, M. R., MCKEAG, D. B.; CAMP, S. P. Van. **Manual de medicina esportiva**. Barueri: Manole, 2002.
SCHNEIDER, P.; BENETTI, G.; MEYER,F. Força muscular de atletas de voleibol de 9 a 18 anos através da dinamometria computadorizada. **Rev Bras Med Esporte**. v.10, n.2, p. 85-91. 2004.
TAKADA, S. R.; LOURENÇO, M. R. A. Menarca tardia e osteopenia em atletas de Ginástica Rítmica: uma revisão de literatura. **Ciênc. Biol. Saúde.** v. 5/6 (1), p. 41-47.2004.
TANCHEV, P. *et al.* Scoliosis in rhythmic gymnasts. **Spine.** v.25 (11), p.1367-72.2000.
TORRES, S.F. Perfil Epidemiológico de Lesões no Esporte. 2004. 96f. Dissertação (Programa de Pós-Graduação em Engenharia de Produção - Área de Concentração em Ergonomia)- Universidade Federal de Santa Catarina, 2004.
VIEBIG, R.F.; POLPO, A.N.; CORRÊA, A.H. A Ginástica Rítmica na infância e adolescência: características e necessidades nutricionais. **EFDeportes.** v.10, n.94, p.1-7. 2006.
WEATHERLEY, D.R.; MEHDIAN, H.; VANDENBERGHE, L. Low back pain with fracture of the pedicle and contralateral spondylolysis. **J Bone Joint Surg.** v.73, p. 990-93.1991.

Rodovia Amaro Antônio Vieira, 2797 / apto 605 / bloco C
Bairro Itacorubi, CEP 88034-102, Florianópolis-SC-Brasil
Fone (48) 3028-0842 / (48) 8428-2200
raqpetry@yahoo.com.br

OCCURRENCE OF INJURIES IN RHYTHMIC GYMNASTS ATHLETES

ABSTRACT

In the Rhythm Gymnastic (RG), to reach the technical perfection and reproduce all the movements and exercises in their routines, the athletes must train and repeat these elements hundreds of times, and this can put the gymnasts in risk of injuries for excessively use in different structures and muscular groups. The aim of this study was to analyze the occurrence of injuries in practitioners of Rhythmic Gymnastic, the practice time and the volume of training in these athletes. The subjects were 266 female gymnasts, age ranging from 5 to 9 years old. They were participating on the VII National Tournament of Rhythmic Gymnastics, which has taken place from 16 to 19 November, 2006 in Florianópolis/Brazil. They were divided into four groups according to the age and the category they belonged to. Information was collected through the application of a direct questionnaire. Descriptive statistic was used for data analyzes. The mean age was 12,05 + 2,3 years. The athletes have been practicing the RG for about four years (53,2±28,5 months), with a training volume of approximately 18 weekly hours (1122,2±422min/weed). The occurrence of injuries was: adult (80%); juvenile (70,7%); infant (44%) e pre-infant (28 %). For all the categories the largest incidence of injuries occurred in the lower limbs: adult (knee - 36%); juvenile (foot - 25%); infant (foot - 14%) e pre-infant (groin - 8%). The spine was significantly smitten, especially within the adult (32%) and juvenile (18%) category. We confirmed the tendency of relevant injuries in the lower limbs due to the extreme movements executed with them during the RG practice. Through this study, we confirm the importance of preventive programs aiming the minimization of injuries in this sport.

KEY-WORDS: Rhythmic Gymnast, Injuries, Training Volume

PRÉSENCE DE LÉSION DANS DES ATHLÈTES DE GYMNASTIQUE RYTHMIQUE

RÉSUMÉ

Dans la Gymnastique Rythmique (GR), pour atteindre la perfection technique, les athlètes doivent s'entraîner et répéter les éléments techniques des milliers de fois. Cet quotidien intense de entraînement place les gymnastes en danger de lésion par surcharge et la fatigue dans de différentes structures et les groupes musculaires. L'objectif de cette étude a été analyser la présence de lésion musculaires, le temps de pratique et le volume d'entraînement d'athlètes de GR. Ont participé de cette étude 266 gymnastes du sexe féminin entre 5 et 19 ans d'âge, participants du VII Tournoi National de Gymnastique Rítimica, présence entre les jours 16 le 19 novembre 2006, dans la ville de Florianópolis/Brasil, divisées dans 4 groupes, d'accord la catégorie. Les informations ont été rassemblées à travers l'application de questionnement direct. Pour l'analyse des données a été utilisée la statistique descriptive. La moyenne d'âge des participantes de l'étude a été de 12.05 + 2.3 ans, pratiquent GR ont approximativement quatre ans (53.2+28.5 mois), avec un volume d'entraînement approximativement de 18 heures/semaine (1122,2+422min/semana). La présence de lésion rapportées par catégorie a été: adulte (80%); juvénile (70.7%); infantile (44%) et pré-infantil (28 %). Dans toutes les catégories la plus grande incidence de lésion a été nous membres inférieurs : adulte (genou - 36%) ; juvénile (pied - 25%) ; infantile (pied - 14%) et pré-infantil (aine - 8%). La colonne vertébrale est

aussi apparue avec une présence significative, principalement dans les catégories adulte (32%) et juvénile (18%). Dû aux mouvements extrêmes avec les membres inférieurs réalisés pendant la pratique de GR, la tendance peut être confirmée de lésion importantes nous membres inférieurs et dans la colonne vertébrale. À travers cette constatation, se confirme l'importance de l'insertion de programmes préventifs en objectivant la réduction au minimum d'incidence de lésion dans ce sport.

MOT-CLEF: Gymnastique Rythmique, Lésion, Volume d'entraînement

OCURRENCIA DE LESIÓNES EN ATLETAS DE GIMNASIA RÍTMICA

RESUMEN

En la Gimnasia Rítmica (GR), para alcanzar la perfección técnica y reproducir todos los movimientos y ejercicios de las rutinas, las atletas deben entrenar y repetir los elementos técnicos millares de veces. Este cotidiano intenso de entrenamiento puede ocasionar lesiónes en las gimnastas debido a sobrecarga y fatiga en diferentes estructuras musculares. El objetivo de este trabajo fue analizar la ocurrencia de lesiones, tiempo de pratica y volumen del entrenamiento de atletas de GR. Participaron del estúdio 266 gimnastas del sexo femenino entre 5 y 19 años de edad, participantes del VII Torneo Nacional de Gimnasia Rítmica, ocurrido entre los dias 16 y 19 de noviembre de 2006, en la ciudad de Florianópolis/Brasil, separados en 4 grupos, conforme la categoria. Las informaciones fueram colectadas utilizando um cuestionario directo. Para análisis de las informaciónesa fue utilizada la estadística descriptiva. La média de edad de las participantes fue 12,05 + 2,3 años. Las gimnastas pratican GR ha aproximadamente quatro años (53,2±28,5 meses), com un volumen del entremamiento de aproximadamente 18 horas/semana (1122,2±422min/semana). La ocurrencia de lesiónes referidas por la categoria fue: adulta (80%); juvenil (70,7%); infantil (44%) e pré-infantil (28 %). En todas las categorias la mayor ocurrencia de lesiónes fue en los miembros inferiores: adulta (rodilla - 36%); juvenil (pie - 25%); infantil (pie - 14%) e pré-infantil (ingle - 8%). La columna vertebral también tuve ocurrencia significativa, principalmente en las categorias adulto (32%) e juvenil (18%). Debido a los movimientos extremos con los miembros inferiores realizados durante la práctica de la GR, puédese confirmar la tendencia de lesiónes en los miembros inferiores y en la columna vertebral. Con esta constatacion confirmase la importancia de haver programas preventivos con el objetivo de minimizar la ocurrencia de lesiónes en este desporte.

PALABRAS-LLAVE: Gimnasia Rítmica, Lesión, Volumen del Entrenamiento

OCORRÊNCIA DE LESÕES EM ATLETAS DE GINASTICA RÍTMICA

RESUMO

Na Ginástica Rítmica Desportiva (GR), para atingir a perfeição técnica e reproduzir todos os movimentos e exercícios de suas rotinas, as atletas devem treinar e repetir os elementos técnicos milhares de vezes. Este cotidiano intenso de treinamentos coloca as ginastas em risco de lesão por sobrecarga e fadiga em diferentes estruturas e grupos musculares. O objetivo deste estudo foi analisar a ocorrência de lesões músculo-esqueléticas, o tempo de prática e o volume de treinamento de atletas de GR. Participaram deste estudo 266 ginastas do sexo feminino entre 5 e 19 anos de idade, participantes do VII Torneio Nacional de Ginástica Rítmica, ocorrido entre os dias 16 a 19 de novembro de 2006, na cidade de Florianópolis-SC, divididas em 4 grupos, de acordo a categoria. As informações foram coletadas através da aplicação de questionamento direto. Para a análise dos dados foi utilizada a estatística descritiva. A média de idade das participantes do estudo foi de 12,05 + 2,3 anos. As ginastas praticam GR há aproximadamente quatro anos (53,2±28,5 meses), com um volume de treinamento de aproximadamente 18 horas/semana (1122,2±422min/semana). A ocorrência de lesões referidas por categoria foi: adulta (80%); juvenil (70,7%); infantil (44%) e pré-infantil (28 %). Em todas as categorias a maior incidência de lesões foi nos membros inferiores: adulta (joelho - 36%); juvenil (pé - 25%); infantil (pé - 14%) e pré-infantil (virilha - 8%). A coluna vertebral também apareceu com uma ocorrência significativa, principalmente nas categorias adulto (32%) e juvenil (18%). Devido aos movimentos extremos com os membros inferiores realizados durante a prática de GR, pode-se confirmar a tendência de lesões relevantes nos membros inferiores e na coluna vertebral. Através desta constatação, confirma-se a importância da inserção de programas preventivos objetivando a minimização de incidência de lesões neste esporte.

PALAVRAS-CHAVE: Ginástica Rítmica, Lesões, Volume de Treinamento.