

# Profile of dance aerobic instructors' injuries, part I

PARASKEVI MALLIOU<sup>1</sup> , STELLA ROKKA<sup>1</sup>, GEORGIOS TSIGGANOS<sup>2</sup>, SAVVAS MAVROMOUSTAKOS<sup>3</sup>, GEORGIOS GODOLIAS<sup>1</sup>

<sup>1</sup> *Laboratory of Exercise Therapy and Rehabilitation, Department of Physical Education & Sport Science, Democritus University of Thrace, 69100 Komotini, Greece*

<sup>2</sup> *Department of Physical Education & Sport Science, University of Athens, Greece*

<sup>3</sup> *Physiotherapy Department, Alexander Technological Institute of Thessaloniki, Greece*

## ABSTRACT

Malliou, P., Rokka, S.T., Tsigganos, G., Mavromoustakos, S., Godolias, G. (2013). Profile Of Dance Aerobic Instructors' Injuries, part I. *J Hum Sport Exerc.*, 8(3), pp.806-812, 2013. Dance aerobic has been increasingly popular in the last years, engaging people of all ages, improving cardiovascular system and ameliorating psychological mood. Dance aerobic instructors guide, organize and entertain all classes suffering, thus, from a number of frequently appearing injuries. The purpose of this study was to investigate the incidence of muscular-skeletal injuries in female dance aerobic instructors in Greece. The sample of the study was constituted of 273 female aerobic instructors who were educated in public and state colleges of physical education and sports in Greece and were observed over a period of three years (2006-2009). For the statistical treatment of the data, the method used was the analysis of frequencies and the non-parametric test X<sup>2</sup>. According to the results, 57.1% of the instructors were injured, most of them (19.8%) were injured once, 69.2% twice and 11% three times. The injury rate was 0.18 injuries per aerobic instructor per year. Out of all injuries, 79.5% was overuse syndromes. The most frequent site of injury was the leg (33.7%) followed by the knee (27.5%) and the back (22.9%). Tendonitis (22.1%), compartment syndrome (15.6%), low back pain (13.4%), and sprain (16.3%), were the most common diagnoses. Further research is needed to correlate the injury rate in aerobic instructors to the external risk factors, in order to prevent the high injury rate that the present study has recorded. In conclusion lowering the risk of injuries still further will benefit both female dance aerobic instructors and participants by enabling a greater enjoyment of the sport, better fitness, and less cost to the individual and the community. **Key words:** CHRONIC INJURIES, ANATOMICAL AREA, FEMALE DANCE AEROBIC INSTRUCTORS.

---

 **Corresponding author.** Paraskevi Malliou, Associate Professor Department of Physical Education & Sport Science. Democritus University of Thrace. 69100 Komotini, Greece  
E-mail: pmalliou@phyed.duth.gr  
Submitted for publication September 2012  
Accepted for publication August 2013  
JOURNAL OF HUMAN SPORT & EXERCISE ISSN 1988-5202  
© Faculty of Education. University of Alicante  
doi:10.4100/jhse.2013.83.05

## INTRODUCTION

In recent years, aerobic dance exercise has become one of the most popular types of exercise. It is a group, entertaining and non-competitive activity, with recorded effects on the cardiovascular, respiratory and muscular system (Williford et al., 1989). A prerequisite for the realization of aerobic dance exercise is the presence of the aerobic instructor who guides, trains and entertains offering a sense of euphoria to the participants (Claxton and Lacy, 1991). Aerobic instructors are likely the only trainers who are personally involved in the execution of the aerobic dance program, resulting that their physical characteristics are comparable to those of other aerobically trained athletes such as runners and joggers (Kravitz et al., 1994).

Although continuous aerobic exercise improves all the metabolic and muscular parameters, epidemiological and clinical studies have documented that instructors and participants of this activity have presented a high incidence of musculoskeletal injuries (Garnham et al., 2001; Michaund et al., 1993). Today there are many different styles of aerobics such as Dance aerobic, Step aerobic, Aqua aerobic, Kickboxing, Tae-Bo, Spinning, Body Pump added on the different types of aerobic exercise list, about which there is lack of injury data (Garnham, 2001).

One of the main goals of sports medicine is the injury prevention. Preventive medicine is best approached by analysing injury epidemiology. In the case of sports injury, the agent (immediate causative factor), the host (person sustaining the injury), and the environment (situation or conditions that may predispose to or inhibit the injury) must be analysed (Kirialanis et al., 2003; Blessing et al., 1987).

In Greece, there is a total lack of research injury data that involve aerobic dance instructors. Therefore, the aim of the present study was to investigate the profile of musculoskeletal injuries in professional female aerobic dance instructors. The knowledge and the evaluation of injuries will help to discover the most ideal solutions for restricting and avoiding these injuries among aerobic instructors.

## MATERIAL AND METHODS

A retrospective survey was conducted by interviewing dance aerobic instructors during national aerobic seminars and events in the country. Additionally, a 3-year prospective injury research was carried out (2006-2009) concerning those professional aerobic instructors who sought medical attention. Procedures were in accordance with ethical standards of the Committee on Human Experimentation and with the Helsinki Declaration of 1975.

Study population - Data collection (Retrospective research (phase I): (6 months-recording period of information with professional aerobic instructors and selection of the sample). The instructors were informed about the purposes and requirements of participating in the study during a special meeting, which took place during the seminars and congresses that the participants attended. They were invited to contact the "research team" (researchers of the study: an orthopedic surgeon, a physiotherapist, 2 athletic trainers, 2 physical education specialists) for a 15-20 minute interview at a time suitable for them, and they were informed that participation was voluntary. Two pilot studies were used in order to select the final questions. Retrospective information (phase I) was collected during an interview based on a standard form. It included questions about personal data, anthropometrical parameters, education level, new trends and information on aerobic dance programs and previous sport participation. In order to control internal injury factors, any instructors with diagnosed physical defects, or instructors who were not fit (e.g. they abstained from classes for months, they suffered from previous injuries, they were not in a good psychological mood or they were

over 35 years old) were excluded from the sample. Therefore, of the 376 female aerobic instructors who participated in the aerobic seminars and events, 316 consented to take part in the present research. Finally, 273 instructors completed the research schedule.

Data collection - Definition of injury (Prospective research (phase II)-(3 year recording period of injuries in professional aerobic instructors. The participants were observed for three years and any injury that occurred was recorded). Injury was defined as "any mishap occurring during scheduled classes that made an instructor miss 2 or more days of practice sessions and was diagnosed as such, by a health care professional". Therefore, for each injury an instructor sustained, the following information was collected: 1) type of activity that the injured instructor usually participated; 2) whether the injury was acute (with a sudden onset) or chronic (gradually onset); 3) injury type (sprain, strain, tendinopathy, dislocation, fracture, etc); and 4) accurate diagnosis (if possible). Injuries were classified into three degrees of severity: minor (absence from aerobic class for less than 1 week to 2 days), moderate (absence for 1 week to 1 month) and major (absence for more than 1 month). Lots of other studies adapted the same classification (Gioftsidou et al., 2004; Kirialanis et al., 2003). Finally, they were asked about their personal opinion, about injury risk factors.

Analysis: For the statistical analysis of the data, the method used was the analysis of frequencies and the non-parametric test  $X^2$  (Chi square distribution) from the SPSS statistical package, in order to determine whether any of the previously mentioned factors were related to the rate of injury. The level of statistical significance was set at  $p < .05$ .

## RESULTS

### Personal Data

The anthropometrical characteristics, the education level and the specialties of the participants are presented on Table 1. According to the results, 96% of the participants were college physical education teachers and students. Additionally, 91.7 % (n= 264) of them were specialised in aerobic dance and 93.5 % (n=228) were working in private gyms.

**Table 1.** Anthropometrical characteristics and education level of female aerobic instructors.

Female dance aerobic instructors (n=273)				
	Mean ( $\pm$ S.D.)	Education level	A	%
Age	28 ( $\pm$ 6.18)	P.E. Teacher	177	64.85
Weight	58.71 ( $\pm$ 4.31)	P.E. College Student	87	31.86
Height	1.67 ( $\pm$ 5.32)	P.E. College graduate	9	3.29
B.M.I.	20.80 ( $\pm$ 2.24)	None	0	0.00
Working years	4.65 ( $\pm$ 2.2)	Total	273	100.0

\*(A= absolute values, % = percentage).

During the period of the study (the participants being active aerobic instructors) the total sample (N=273) reported 307 injuries. The injury rate was 0.18 injuries per aerobic instructor per year. It is notable that, according to the results 57.1 % of the instructors were injured: most of them (19.8%) were injured once, 69.2% twice and 11 %, three times.

#### *Type of injury and anatomic location*

Table 2 reports the acute and chronic injury rate in terms of anatomical location for the injured aerobic instructors. The chronic injuries were statistically different in comparison with the acute injuries ( $X^2 = 28.17$ ;  $p < .05$ ). The most common anatomic location of acute injuries was the ankle, the knee and the back ( $X^2 = 94.14$ ;  $p < .05$ ). Also the most frequent anatomical location of chronic injuries was the leg, followed by the knee and the back ( $X^2 = 53.43$ ;  $p < .05$ ). In terms of type of injury, according to  $X^2$  analysis (Table 3) the tendonitis, sprain and compartment syndrome incidence rate in injured instructors were statistically different from other types of injuries ( $X^2 = 55.91$ ;  $p < .05$ ).

**Table 2.** Frequencies of acute and chronic injuries occurrence in terms of anatomical location.

Location	Acute injuries (n=111)		Chronic injuries (n=196)		Total injuries (n=307)	
	A	%	A	%	A	%
Knee	23**	20.7	54***	27.5	77	25.3
Ankle	50**	45.0	16	8.1	66	21.5
Shoulder	8	7.3	15	7.8	23	7.4
Back	23**	20.7	45***	22.9	68	22.1
Leg	7	6.3	66***	33.7	73	23.7
Total	111	100.0	196	100.0	307	100.0

\*(A= absolute values, % = percentage).

**Table 3.** Type of injuries.

Type of injuries	Total injuries (n=307)	
	A	%
Strain	40	13.1
Chondropahty	23	7.5
Tendonitis*	68	22.1

<b>Sprain*</b>	50	16.3
<b>Low back pain</b>	41	13.4
<b>Stress fracture</b>	20	6.5
<b>Compartment syndrome*</b>	48	15.6
<b>Other</b>	17	5.5
<b>Total</b>	307	100.0

---

\* (A= absolute values, % = percentage).

#### *Severity of injury – recurrent episodes*

The severity of injuries is shown in terms of absence from aerobic classes after the injury. The rate of minor injuries was 19.5% (n=60), of moderate injuries 62.9% (n=193), and of major injuries 17.3 % (n=53) (significant difference between them) ( $X^2 = 122.02$ ;  $p < .05$ ), missing case 1. The recurrent episodes in 300 cases were analyzed (missing cases 7). According to  $X^2$  the recurrent episodes (n=52, 17.3%) were statistically less compared to the cases with no recurrent episodes (n=218, 72.6%) ( $X^2 = 91.26$ ;  $p < .05$ ). Also, the injured instructors followed a rehabilitation program in 264 injuries (88%) while in 36 (12%) injuries they did not (missing cases 12).

## **DISCUSSION**

The participants' injury profile showed that the majority of the sample were Physical Education teachers and students, professionally certified, relatively young (28 mean age) with up to five years of experience. This is reasonable, since it is necessary for an instructor, in order to lead an aerobic class, to be qualified in physical education and acquire the appropriate physical and educational profile (Garnham et al., 2001; Blessing et al., 1987).

Also, the present study revealed a high incidence and prevalence rate of injuries among female dance aerobic instructors. The majority of the occurred injuries were chronic in comparison with the acute ones while the most common anatomical position of them was the leg, followed by the knee and the back. These findings are comparable to those of previous studies (Du Toit, and Smith, 2001; Thompson et al., 2001) which supported that the lower extremities are the most commonly injured sites in aerobic dance instructors. Additionally, only a low percentage of the injured instructors suffered just one injury, while more than 50% of them suffered two or three injuries agreeing with du Toit, Gilleard and Smith (1999). Therefore, the majority of the aerobic styles involving repeated running and jumping drills may be a disposed injury risk factor that leads to chronic lower limb injuries in aerobic instructors. Byhring and Bo (2002) showed similar results among professional ballet dancers.

The diagnosed injuries were Achilles and patellar tendonitis, ankle sprain, muscle strains, low back pain, anterior knee pain and stress fractures. Considering that aerobic dance instructors participate actively in the class exercise programs, the present results are in accordance with Thompson et al. (2001) who supported that general inflammation, muscle strain, sprain and stress fracture are the most common types

of injuries recorded in aerobic participants. Also, Hart (1994) supported that popular forms of exercise such as walking, cycling, aerobic etc have presented a high frequency of patellar and Achilles tendonitis.

The present results show that “low back pain” is another chronic injury that aerobic instructors suffer from. Although current literature supports that runners and walkers may have a lower relative risk for significant LBP, Woolf et al. (2002) recorded that the low back pain rate was 13.6%, which is similar to the present results. The above researchers, also, showed that muscular skeletal inflammation (compartment syndrome) in leg region and stress fractures (tibia and metatarsal bones) are common injuries in aerobic instructors. Iwamoto and Takeda (2003) revealed that classical ballet, aerobics, tennis, and volleyball athletes predominantly sustained stress fractures of the tibia shaft. More specifically, they showed that 6.6% of all sport injuries and 12.5% of all aerobic injuries were stress fractures (tibia, metatarsal and tarsal bones). The present results are also in accordance with Brukner et al., (1996), and Goldberg and Pecora (1994) supporting that aerobic dance activity has been one of the most common sporting activities that result in stress fractures.

Lowering the risk of injury still further will benefit both dance aerobic instructors and participants by enabling a greater enjoyment of the sport, better fitness, a healthier body image and less cost to the individual and the community. Therefore, further research is needed to correlate the injury rate in aerobic instructors to the external risk factors, in order to prevent the high injury rate that the present study has recorded.

## REFERENCES

1. Blessing, D.L., Tucker, L.A. & Williford, H.N. (1987). Training factors and physical fitness among aerobic dance instructors. *Percept Motor Skill*, 65, pp.47-52.
2. Brukner, P., Bradshaw, C., Khan, K.M., White, S. & Crossley, K. (1996). Stress fractures: a review of 180 cases. *Clin J Sports Med*, 6, pp.85-9.
3. Byhring, S. & Bo, K. (2002). Muscular skeletal injuries in the Norwegian National Ballet. *Scand J Med Sci Sports*, 12, pp.365-370.
4. Claxton, D.B. & Lacy, A.C. (1991). Pedagogy: The Missing Link in aerobic Dance. *JOPERD*, 8, pp.49- 52.
5. Du Toit, V. & Smith, R. (2001). Survey of Aerobic Dance injuries to the lower extremity in aerobic instructors. *Journal of the American Podiatry Medicine Association*, 91(10), pp.528-532.
6. Du Toit, V., Gilleard, W. & Smith, R. (1999). Lower extremity injuries in aerobic dance: Is low impact less harmful than high impact? Conference Proceedings. *Fifth 10C World Congress on Sport Sciences, Sidney, New South Wales*, pp.139.
7. Garnham, A., Finch, C. & Salmon J. (2001). An Overview of the Epidemiology of Aerobics Injuries. *Int J Sports Med*, 2(2), pp.1-11.
8. Gioftsidou, A., Ispirlidis, J., Malliou, P., Pafis, G., Beneka, A. & Godolias, G. (2004). Injuries in soccer during the championship between adult and young players. *Journal of Human Movement Studies*, 46, pp.397- 406.
9. Goldberg, B. & Pecora, C. (1994). Stress fractures: a risk of increased training in freshman. *Physician Sports Medicine*, 22, pp.68-78.
10. Hart, L.E. (1994). Exercise and soft tissue injury. *Bailliere's Clinical Rheumatology*, 8(1), 137-148.
11. Iwamoto J. & Takeda T. (2003). Stress fractures in athletes: review of 196 cases. *J Orthop Sci*, 8, pp.273-278.

12. Kirialanis, P., Malliou, P., Beneka, A. & Giannakopoulos, K. (2003). Occurrence of acute lower limb injuries in artistic gymnasts in relation to event and exercise phase. *Brit J Sport Med*, 37, pp.137-139.
13. Kravitz, L., Wilmerding, V., Stolarczyk, L. & Heyward, V. (1994). Physiological Profile of Step aerobic Instructors. *J Strength Cond Res*, 8(4), pp.255-258.
14. Michaud, T.J., Rodriguez-Zayas, J., Armstrong, C. & Hartnic, M. (1993). Ground reaction forces in high impact and low impact aerobic dance. *J Sport Med Phys Fit*, 33(4), pp.359-366.
15. Thompson, S.H, Case, A.J & Sargent, R.C. (2001). Factors influencing performance related injuries among group exercise instructors. *Women in Sport and Physical Activity Journal*, 10(1), pp.125-142.
16. Williford, H.N., Scarff-Olson, M. & Blessing, D.L. (1989). The Physiological Effects of Aerobic Dance. A Review. *Sports Med*, 8(6), pp.335-345.
17. Woolf, S.K, Barfield, W.R., Nietert, P.J, Mainous, A.G. & Glaser, J.A. (2002). The Cooper River Bridge Run Study of low back pain in runners and walkers. *Journal of the Southern Orthopaedic Association*, 11(3), pp.136-143.