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Musculoskeletal injuries in break-dancers

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ABSTRACT

Background: Since no epidemiologic studies have been reported about musculoskeletal injuries in break-dancers, there are no data on the rates and patterns of musculoskeletal injuries in this population that clinicians can use to find ways to decrease injury rate.
Hypothesis: We believe that the incidence of injuries in break-dancers is higher than assumed and that injury rates and patterns differ between professional and amateur dancers.
Study design: Descriptive epidemiologic study.
Materials and methods: Of a total of 42 study subjects, 23 were professional dancers and 19 were amateur dancers. Injury frequency, site and type, along with the presence of supervised training, the use of protective devices and warm-up exercises done were recorded.
Results: Of the 42 study subjects, excluding two amateur dancers, 40 (95.2%) had had musculoskeletal injuries at more than one site. The mean number of sites per dancer was 4.60. The frequency of injury depended on the site and was as follows: wrist (69.0%), finger (61.9%), knee (61.9%), shoulder (52.4%), lumbar spine (50.0%), elbow (42.9%), cervical spine (38.1%), ankle (38.1%), foot (28.6%) and hip (16.7%). Sprain, strain and tendinitis were the most common injuries, accounting for the most cases. Of the 42 dancers, 13 (31%) had had fractures or dislocations. Eight (19.1%) learned break-dancing under supervised instruction, 17 (40.5%) used protective devices and 28 (66.7%) performed warm-up exercises before dancing. There were significant differences in age, dance career length, amount of dance training, mean number of injury sites and the presence of supervised training between professionals and amateurs ($P < 0.05$).
Conclusion: Clinicians must inquire thoroughly into the nature of the activities that result in both unusual and common injuries in break-dancers and educate them about safety. Careful screening, instruction and supervised training of break-dancers will help to prevent injuries.

Break-dancing has been popular in adolescents and young people in their twenties worldwide for long enough that it is now a subculture rather than just a recreational activity. Accordingly, many professional dancers specialise in break-dancing, and national and international break-dancing competitions are common. Because many break-dancing moves involve extremely strenuous physical activities, such as splits, spins, handstands and tumbling, it can be inferred that there is a high possibility of damage through acute or chronic musculoskeletal injuries to break-dancers. The musculoskeletal injuries that have thus far been reported in break-dancers include sprains; strains; tendinitis; bursitis; growth plate injuries; fractures of the clavicle, radius, ulna, carpal bone, phalanx and fifth metatarsal bone; stress fractures of the femur and calcaneus; vertebral fractures; and spinal cord injuries.[1–6,8,10,12,14–16] Most of the reports, however, are from the 1980s. On the basis of the development of new dance technology since then, which has greatly increased the numbers of break-dancers, and on the basis of our having encountered scaphoid non-union at our institution in three break-dancers since 2007, it can be predicted that injuries due to break-dancing are now more prevalent and more critical than once thought. However, the risks of break-dancing have not yet been well established. No epidemiologic studies of musculoskeletal injuries in break-dancers have been reported. Therefore, we analysed musculoskeletal injuries in a group of 42 break-dancers, some professionals and some amateurs, so that we could determine the methods for reducing injury incidence.

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Materials and methods

Study subjects and examinations

After obtaining approval from our institutional review board, we enrolled 42 break-dancers who submitted written informed consent to complete a questionnaire and undergo a medical examination designed for our study. Of these, 23 were professional break-dancers who engaged in break-dancing for performance and earning and 19 were amateurs for recreation. To examine the clinical characteristics of musculoskeletal injury, our questionnaire sought information regarding the following: age, sex, height,

Sex : Male ( ) Female ( ) Age : ( )
Height : ( ) cm Weight : ( ) kg

1. When did you start doing break-dancing?
( ) years ago

2. Do you do break-dancing professionally?
① Professional
② Amateur

3. How many hours do you practice on average?
( ) hours

4. Do you have any major skills in break-dancing (such as head spin, windmill…)?
( )

5. Did you learn or are you learning break-dancing under supervised training?
① Yes ( )
② No ( )
③ Other ( )

6. Do you use protective devices during practice or performance?
① Yes ( )
② No ( )
③ Other ( )

7. Do you do warm-up exercises before practice or performance?
① Yes, I do ( )
② I seldom do ( )
③ Other ( )

8. Please place a check mark by each body areas below if you have visited the hospital and had an injury diagnosed there since you started doing break-dancing.
① Neck
② Back
③ Shoulder
④ Elbow
⑤ Wrist
⑥ Hand and finger
⑦ Hip
⑧ Knee
⑨ Ankle
⑩ Foot and toe
※ Other ( )

Fig. 1. The questionnaire completed by break-dancers in this study.

weight, dance career length, amount of dance training, major skills, the presence of supervised training, the use of protective devices, warm-up exercises and the frequency, site and type of injuries (Fig. 1). Routine radiographs of the antero-posterior and lateral or axial view were obtained for the cervical spine, lumbar spine, shoulder, elbow, wrist, hip, knee and ankle of each study participant. When participants had symptoms in other areas and physical examination raised suspicion of injury, we obtained plain radiographs of those sites. If needed, we obtained computed tomography scans or magnetic resonance imaging scans of those sites. Diagnosis was based on findings from medical histories, physical examinations and radiologic examinations, which were interpreted by an orthopaedic surgeon and a radiologist.

Statistics

Statistical analysis was done using SPSS software (version 14.0E; SPSS Inc., Chicago, IL, USA). To examine the baseline characteristics of the subjects, we analysed the frequency and descriptive statistics. To examine the difference in various parameters between the professional and the amateur break-dancers, we used methods such as the Student's *t*-test, cross-analysis and chi-square test. Statistical significance was set at $P < 0.05$.

Results

Of the 42 study subjects, 23 were professional dancers and 19 were amateur dancers. All of the subjects were Korean male. Their mean age was 22.3 years (range: 16–30 years), mean height was 171.1 cm (range: 162–185 cm) and mean weight was 62.1 kg (range: 50–79 kg). Dance career length was 5.7 years (range: 1–17 years) on average. The mean daily amount of training was 4.1 h (range: 1–8 h) (Table 1). There were significant differences in age, dance career length and the amount of training between the professional and the amateur groups (Table 2).

Frequency and site of injury

Of the 42 study subjects, excluding two amateur dancers, 40 (95.2%) had sustained musculoskeletal injuries diagnosed in hospital at more than one site since they first began break-dancing. The mean number of sites per dancer was 4.60, with 5.78 in the professional group and 3.16 in the amateur group, a difference that was statistically significant ($P = 0.001$).

Table 1
Demographic data.

	Range	Mean	SD
Age (y)	16–30	22.29	4.03.
Height (cm)	162–185	171.14	5.54
Body weight (kg)	50–79	62.07	6.33
Dance career length (y)	1–17	5.70	4.35
Amount of training (h/d)	1–8	4.10	1.86

Table 2
Demographic differences between professional and amateur groups.

	Professional group (23)		Amateur group (19)		*P* value
	Mean	SD	Mean	SD	
Age (y)	24.57	3.57	19.53	2.59	0.000
Height (cm)	170.52	5.70	171.89	5.40	0.431
Body weight (kg)	63.39	5.79	60.47	6.74	0.139
Dance career length (y)	8.22	3.98	2.66	2.44	0.000
Amount of training (h/d)	4.74	2.00	3.32	1.34	0.009

Table 3
Frequency of musculoskeletal injury depending on sites.

	Total		Professional group		Amateur group		*P* value
	No.	%	No.	%	No.	%	
Wrist	29	69.0	18	78.3	11	57.9	
Finger	26	61.9	18	78.3	8	42.1	
Knee	26	61.9	17	73.9	9	47.4	
Shoulder	22	52.4	17	73.9	5	26.3	
Lumbar spine	21	50.0	16	69.6	5	26.3	
Elbow	18	42.9	11	47.8	7	36.8	
Cervical spine	16	38.1	13	56.5	3	15.8	
Ankle	16	38.1	12	52.2	4	21.1	
Foot	12	28.6	9	39.1	3	15.8	
Hip	7	16.7	2	8.7	5	26.3	
Totals	193		133		60		
No. of injury sites (per person)			5.78				0.001

The frequency of musculoskeletal injury depended on the site and was as follows: wrist (69.0%), finger (61.9%), knee (61.9%), shoulder (52.4%), lumbar spine (50.0%), elbow (42.9%), cervical spine (38.1%), ankle (38.1%), foot (28.6%) and hip (16.7%) (Table 3 and Fig. 2).

To examine the correlations among dance career length, the amount of training and the number of injury sites, we performed a correlation analysis. The number of injury sites was significantly correlated with dance career length ($P = 0.006$) but not with the amount of training ($P = 0.919$).

Type of injury

The past and present musculoskeletal injuries of the 42 break-dancers represented a total of 193 cases. Sprain, strain and tendinitis, seen in 173 cases (89.6%), accounted for the most injuries. Fracture or dislocation was seen in 16 cases (8.3%). Osgood–Schlatter disease was seen in two cases (1.0%). Prepatellar bursitis and olecranon bursitis were seen in one each (0.5%) (Table 4).

Of the 42 study subjects, 13 (31.0%) had experienced fracture or dislocation. Of those, three had had fractures at two sites. The incidence of fracture or dislocation was 39.1% (9 of 23) in the professional group and 21.1% (4 of 19) in the amateur group, a difference that was not statistically significant ($P = 0.207$).

Supervised training, protective devices and warm-up exercises

Eight (19.1%) of the 42 break-dancers learned dancing under supervised instruction, with 7 of 23 (30.4%) doing so in the

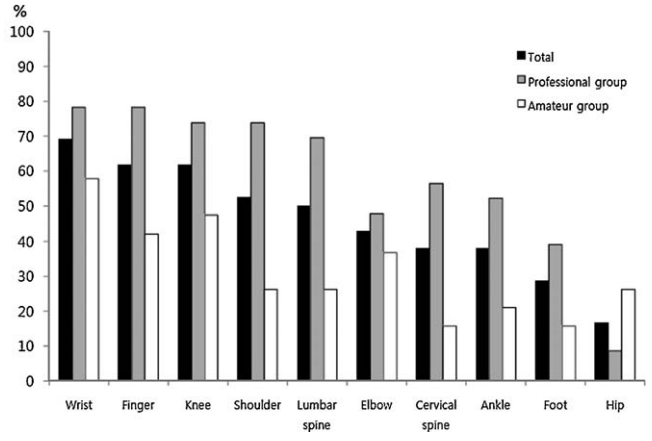

Fig. 2. Frequency of musculoskeletal injury depending on sites.

Table 4
Injury types.

	No. (%) of injures	No. of fractures
Sprain, strain, tendinitis	173 (89.6%)	
Fracture or dislocation	16 (8.3%)	
Finger fracture		4
Acromioclavicular joint dislocation		2
Ulnar styloid process fracture		2
Reccurrent shoulder dislocation		1
Scaphoid fracture		1
Distal radius fracture		1
Olecranon fracture		1
Coronoid process fracture		1
Clavicle fracture		1
Fibular shaft fracture		1
Metatarsal fracture		1
Osgood–Schlatter disease	2 (1.0%)	
Olecranon bursitis	1 (0.5%)	
Prepatellar bursitis	1 (0.5%)	
Toal	193	16

professional group and 1 of 19 (5.3%) doing so in the amateur group, a difference that was statistically significant ($P = 0.039$).

Seventeen (40.5%) of the 42 used protective devices, with 12 of 23 (52.2%) in the professional group and 5 of 19 (26.3%) in the amateur group, a difference that was not statistically significant ($P = 0.089$).

Twenty-eight (66.7%) of the 42 did warm-up exercises before dancing, with 15 of 23 (65.2%) in the professional group and 13 of 19 (68.4%) in the amateur group, which was not a significant difference ($P = 0.826$) (Table 5 and Fig. 3).

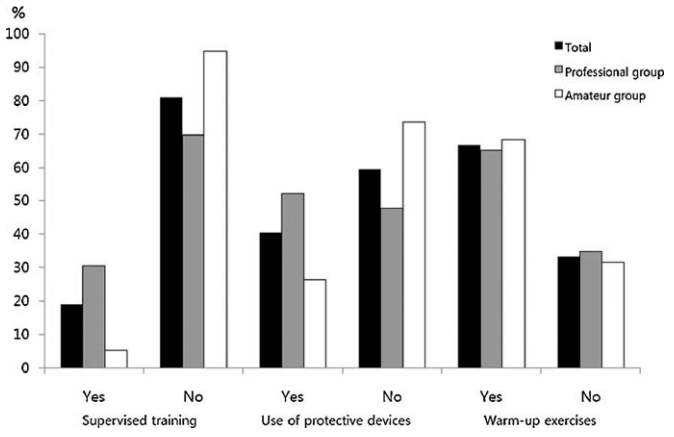

Fig. 3. Supervised training, protective devices, and warm-up exercises.

Table 5
Supervised training, protective devices, and warm-up exercises.

	Total		Professional group		Amateur group		*P* value
	No.	%	No.	%	No.	%	
Supervised training							
Yes	8	19.0	7	30.4	1	5.3	0.039
No	34	81.0	16	69.6	18	94.7	
Use of protective devices							
Yes	17	40.5	12	52.2	5	26.3	0.089
No	25	59.5	11	47.8	14	73.7	
Warm-up exercises							
Yes	28	66.7	15	65.2	13	68.4	0.826
No	14	33.3	8	34.8	6	31.6	

Table 6
Major skills.

	Total (42)		Professional group (23)		Amateur group (19)		*P* value
	No.	%	No.	%	No.	%	
Freeze	12	28.6	5	21.7	7	36.8	
Footwork	11	26.2	8	34.8	3	15.8	
Tumbling	4	9.5	2	8.7	2	10.5	
Head spin	4	9.5	3	13.0	1	5.3	
Air tracking	3	7.1	3	13.0	0	0.0	
Thomas	3	7.1	0	0.0	3	15.8	
Windmill	2	4.8	1	4.4	1	5.3	
Knee spin	1	2.4	1	4.4	0	0.0	
Cricket	1	2.4	0	0.0	1	5.3	
Top rock	1	2.4	0	0.0	1	5.3	
							0.195

Major skills

Questionnaire results regarding major skills revealed that 12 break-dancers performed the freeze, 11 did footwork, four did tumbling, four did head spin, three did air tracking, three did the Thomas, two did the windmill, and one each did knee spin, cricket and toprock. There were no significant differences in major skills between the professional group and the amateur group ($P = 0.195$) (Table 6).

Discussion

Break-dancing, a term coined in the late 1970s by a disc jockey in the South Bronx in New York City,[12] was first used to describe a style of street dance done to accompany the breakbeat, or syncopated rhythm, that disc jockeys used to set the pace for a piece of hip-hop music. The dancers are often called 'b-boys' or 'b-girls'. Break-dancing reached the height of its popularity in the early and mid-1980s, faded away for a while, and then became popular again in the 1990s. The widespread public use of the Internet starting in the late 1990s gave break-dancers a new venue for acquiring a wider audience, as young people viewed video clips of break-dancing. This helped to popularise the dance form around world, and an entire subculture has grown up around it.

Break-dancing consists of types of stylised movements including 'toprock' and 'uprock', which are done while standing up and mainly using the arms; 'downrock' involving movements while down on the ground; 'footwork' involving rapid steps; 'freeze', which involves suddenly and temporarily stopping motion; and 'power move', which involves spinning the entire body around and are violent and dynamic moves called tumbling, flair, windmill, swipe, head spin, knee spin, drill, cricket and air tracking. Break-dancing is quite competitive, so dancers often subject their bodies to extreme moves to gain notice. This poses risks for injury.

Musculoskeletal injuries reported to have occurred during break-dancing include sprains; strains; tendinitis; bursitis; growth plate injuries; fractures of the clavicle, radius, ulna, carpal bone, phalanx, and fifth metatarsal bone; stress fractures of the femur and calcaneus; vertebral fractures; and spinal cord injuries.[1–6,8,10,12,14–16] In our study, 95.2% of study subjects had experienced musculoskeletal injury at more than one site. These cases included most of the different types of musculoskeletal injury, excluding spinal cord injury, which the fracture or dislocation accounted for 31.0%. Because break-dancing techniques have constantly evolved over nearly three decades, it can be inferred that the incidence of injury among break-dancers would be higher than predicted. It must also be noted that this type of dancing carries a higher possibility of developing life-threatening conditions, including cervical cord injury, than do less extreme forms of dance.

In our study, the incidence of injury was the highest in the wrist (69.0%). Of the 16 cases of fracture or dislocation, 14 (87.5%) occurred in the upper extremity. Break-dancing moves such as flair, swipes, cricket and air tracking, all power moves, are part of dynamic, violent handsprings and spinning that put the upper extremity, including elbow, wrist and hand, at risk for injury. In addition, head spin, or drill, which involve dancers rotating their body while doing a handstand with their head on a hard surface, pose the risk cervical spine injury. All four of our study subjects who specialised in head spin had a history of treatment for cervical sprains. Although our small number of study subjects made statistical analysis difficult, we believe, in view of our findings, that it can be inferred that major skills are related to specific injury sites.

Break-dancing carries many of the risks of conventional dance and gymnastics, but unlikely those forms of activity, it is usually carried out without supervised training.[7,9,11,13] In our study, the proportion of subjects who have not received the supervised training was 80.95%, and this figure accounted for a majority of subjects. We believe that it is necessary for clinicians to inquire more thoroughly into the nature of the activities that result in both unusual and common injuries in break-dancers and to educate break-dancers about the hazards of these activities. The pleasure of break-dancing carries with it the responsibility of proper and thorough preparation. We recommend that break-dancers need to use protective devices and perform proper warm-up and cool-down exercises.

A limitation of our study was the inability to clarify the correlations between major skills, the specific motion and the injury sites, owing to the small study sample. Nevertheless, our study is of significance because it is the first epidemiologic study about injuries caused by break-dancing, a subject that has medical and social implications. Further, large-scale epidemiologic studies are warranted to examine the systemic problems, as well as the musculoskeletal injuries, caused by break-dancing.

Conclusions

We believe that clinicians must inquire more thoroughly into the nature of the activities that result in both unusual and common injuries in break-dancers and educate break-dancers about safety. The pleasure of break-dancing carries with it the responsibility of proper and thorough preparation. We recommend that break-dancers need to use protective devices and perform proper warm-up and cool-down exercises. Careful screening, instruction and supervised training of break-dancers will help to prevent injuries.

Conflict of interest statement

There are no conflicts of interest associated with the publication of this article.

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