PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Accidents and injuries related to powered paragliding: a cross sectional study
AUTHORS	Feletti, Francesco; Goin, Jeff

VERSION 1 - REVIEW

REVIEWER	Prof. Aristomenis Exadaktylos Department of Emergency Medicine University Hospital Inselspital Bern Switzerland
REVIEW RETURNED	11-May-2014

GENERAL COMMENTS	The manuscript "Powered paragliding accidents and injuries: a cross- sectional study to investigate this extreme sport's risks" seems to be an adequate study about a quiet new topic. Nevertheless further studies are necessary to confirm the findings of the study.

REVIEWER	Rekand, Tiina Dept of Neurology Haukeland University Hospital Norway
REVIEW RETURNED	20-May-2014

GENERAL COMMENTS	The topic is interesting and necessary because traumas due to extreme sport are probably increasing and it is necessary that medical community has knowledge of profile of injuries. My comments to this manuscript are as follows: The title is too long, it should be shortened: Accidents and injuries related to powered paragliding: a cross sectional study Abstract: Background and aim should be shortened, Results should be primarily about findings after injuries and mechanisms of injury, strength and limitations should be shortened Results – average age should be 44.,5 and SD should be given 9.54 Table 2 should be erased, use text (too many tables in this manuscript), Table 4 and 5 should be erased (use text, this is not main finding).. Table 6 – should be grouped to fewer groups- take-off-cruise-landing. Table 7 is difficult to read_ again too many categories, many subgroups with pilot errors + something else. It should shortened and just one , main course of accident shown Table 9 is very difficult to read- what is difference between multiple trauma and arm, elbow, calf ankle? This table should be erased,

	show types of injury in table 10. Table 11 and Table 12 should be erased, the main findings should be shown in text. Figures: too many figures,Figure 1 and one of figure 2-6 may be kept as the illustrations In the Discussion . Tables are not nessesary, usually Tables are not used in the Discussion; the findings from tables can be discussed in the text.

VERSION 1 – AUTHOR RESPONSE

I'm really honored that my manuscript was reviewed by Experts of the highest level.
I tried to follow as closely as possible all of their claims, and I believe that now the work is substantially improved.

Can you provide a link to the database (you say it's public) in the paper?

Yes.
We analysed the 384 incident reports of the accidents occurred between 1995 and the end of 2012, that the US Powered Paragliding Association (USPPA) collected using a specific form published on its website [4].

[4] USPPA- United States Powered Paragliding Association. http://www.usppamembers.org/incidents/incident_new.cfm.[Oct 2013].

Please also provide any information about:
o how comprehensive it is;

The form included: drop-down menu lists, checklists and text fields and consisted of five sections:
1-General information (date, time and place of the accident);
2-Pilot information, including demographic information and details of the pilot's PPG experience;
3-Details of the accident, including a description of the type of accident, the main cause, weather conditions at the time, characteristics of the takeoff and landing area, and details of the pilot's clothing and equipment;
4-Injury information: including the body parts affected, the seriousness of the injury, any medical assistance and possible collateral damage to people or things.
5-Narrative: an extended description of the event and its consequences.

o how long it's been going;

The collection of the data started in 1995:

o how widely known and publicised it is among this community; you say it's international

The collection of data was primarily thought for accidents in the U.S. but since USPPA is very popular among powered paragliders worldwide, also accidents from other countries were reported.

o were there any missing data?

In the form, a specific question on the quality of injuries was missing, but a careful reading of the narrative section allowed to obtain these informations from almost all the forms.
When these data were missing they were named as 'unknown' in the results.

o why did you choose 1995-2012?

we decided to use all the data available between 1995 and 2012 (the starting date of the present study).

1. The 'headline' part of the title - 'this extreme sport's risks' - can be removed, as suggested by reviewer 2.

Title: Accidents and injuries related to powered paragliding: a cross sectional study.

2. In the results section of the abstract, please edit 'Finally, contrary to the belief held up to now by experts of this sport, the number of fatal accidents is not lower than those which occur in paragliding and in hang-gliding.' to stick to the results and not comment on them ('contrary to...').

OK:
Results - The most affected body areas in PPG were the upper limbs (44.5%) followed by the lower limbs (32 %), the back (9,8,%), the head (7%), the pelvis (3,1), the chest (2,7%) and the abdomen (0,7%) ($p < 0,001$).
The engine caused 43 accidents (11.22%) in our study and was responsible for the majority of injuries to the upper limbs.
The number of fatal accidents is not lower than those which occur in paragliding and in hang-gliding.

3. 'Furthermore, to prevent certain injuries specific to powered paragliding, various types of safety gear and equipment should be recommended or made obligatory for those practising this sport.' This is not very specific. I suggest something along the lines of 'To help prevent injuries specific to powered paragliding the most appropriate safety equipment should be identified.'

Conclusions - To help to prevent the specific injuries of powered paragliding, the most appropriate equipment should be identified.
The results of this study also suggest that in future this sport should be studied using studies and case reports distinct from those of paragliding.

4. The abstract is rather verbose and might benefit from a proofread.
ABSTRACT
Objectives - Powered paragliding is a clearly distinct sport from paragliding, mainly because of the use of an engine. We supposed that the differences between these two sports result in different types of injuries.
Setting - To test this hypothesis, we analysed 384 incident reports gathered by the United States Powered Paragliding Association from 1995 to 2012.
The majority of the incidents described occurred in the US, while 26 incidents occurred elsewhere: Canada (8), Mexico (5), Panama (1), China (1), Japan (1), Malaysia (1), Indonesia (Java)(1), Europe (8): of which Spain (1), Belgium (1), United Kingdom (3), Italy (1), Romania (1), Unknown (1).
Outcome: to identify he most affected body area and the most common type of injury sustained in PPG, and to highlight any differences with respect to paragliding.
Results - The most affected body areas in PPG were the upper limbs (44.5%) followed by the lower limbs (32 %), the back (9,8,%), the head (7%), the pelvis (3,1), the chest (2,7%) and the abdomen (0,7%) ($p < 0,001$).
The engine caused 43 accidents (11.22%) in our study and was responsible for the majority of injuries to the upper limbs.
The number of fatal accidents is not lower than those which occur in paragliding and in hang-gliding.
Conclusions - To help to prevent the specific injuries of powered paragliding, the most appropriate equipment should be identified.

The results of this study also suggest that in future this sport should be studied using studies and case reports distinct from those of paragliding.

5. Strengths and limitations section: 'A large amount of data (384 incident reports) collected prospectively from 1995 to 2012' in research papers, 'prospectively collected data' is usually data collected after the research study was established (e.g. in a trial). I don't think that's the case here.

Ok.
Strengths and limitations of this study
(…)
We analyzed a large amount of data (384 incident reports) collected from 1995 to 2012.
(…)

6. Please remove the new findings section from here

Removed

7. There are no limitations included in the strengths and limitations section

Under reporting-bias due to the voluntary nature of our data collection can be hardly estimated since there is no way of finding exactly how many people knew the existence of the database.

8. Is P really a standard abbreviation for paragliding? I think it would be better written in full, at least in the text. PPG could perhaps remain as an abbreviation for powered paragliding.

P has been changed in paragliding

9. Is the wing 'inflated'? (Apologies if this is PPG terminology.)

Since paragliding are constructed using layers of fabric assembled into a structure communicating cells (foil structure), inflated by the wind which enters through special inlets, it is inflated by air that's forced into the leading edge openings.
"Inflated" is the commonly used terminology in powered paragliding.
However, I refer to your final decision.

10. New results and data about PPG are introduced in the Discussion. This is the wrong place to start explaining what PPG is and who does it. The discussion needs to be revisited to match what would usually appear in the discussion of a research paper.

These data has been moved to the introduction and the discussion revisited.

11. I would steer clear of terms like 'enormous influence'.

ok
Nevertheless, our study clearly shows that use of a engine has an influence on accident dynamics.

12. 'In our study, the weather conditions were a main or contributing cause of accidents in 9.6% of cases: weather conditions alone were the cause in 5.7% of cases, while the weather conditions contributed to the accident together with pilot error in 4.4% of accidents.' - 5.7 + 4.4 doesn't equal 9.6 so this is a bit confusing.

Ok.

In our study, the weather conditions were a main or contributing cause of accidents in 10,1% of cases

13. Accidents due to 'mental confusion' - do these fall under the category of pilot error?

Various reports also describe that pilot errors had been to some extent determined by a state of mental confusion suffered by the pilot during the execution of acrobatic stunts.

14. What does (Agama) refer to?

It is therefore inadvisable to fly a paramotor over or near water; it is essential that pilots, wishing to do so, adopt the use of self-inflating and specially designed safety systems.
These auto-inflating flotation devices are mounted on a paramotor's frame and are activated by a CO2 cartridge which fires upon submersion: so no pilot input is required.
Paragliding injuries mainly involve lower limbs and spine [3, 8-14] while in PPG the upper limbs are more frequently affected, while spinal injuries are less frequently involved.

15. The discussion doesn't cover any limitations of the study, such as the self-report nature of the data in the database and what kind of coverage the database has.

This study has some limitations.
First of all since there is no way of finding exactly how many people knew the existance of the database, the effect of of under-reporting bias due to the voluntary nature of our data collection, can be hardly estimated .
In addition, beeing the injury reporting online, only powered paragliders with access to the Internet were able to participate. For this reason, even though most people use the Internet, selection bias cannot be excluded at all.
Finally the lack of a specific question about the kind of injury in the form, might have led to the loss of some data even if in almost all the cases it was possible to obtain detailed informations on the type of injuries by a careful reading of the narrative section of the reports.

16. The data presented in bar charts/pie charts would be better provided in a table. Other researchers can extract the exact value from a table much more easily.

Table 7. Severity of Injuries by Type of Incident
Type of incident
Minor (%)
Major (%)
Fatal (%)
Collision with Terrain/Obstruction on Ground
62,5
18,8
18,8
Powerplant Equipment Malfunction
100
0
0
Body contact with spinning prop
44,4
55,6
0
Hard Landing
74,1

22,2
3,7
Fall
54,5
40,9
4,5
Wing Malfunction or Deflation
31,2
56,2
12,5
Other
80
0
20
Handling
53,8
23,1
23,1
Line Tangle/Damage
100
0
0
Collision with other Aircraft/Ultralight
40
40
20
Water Immersion
14,3
14,3
71,4
All Types of Incident
56,6
31,2
12,2

Reviewer Name Prof. Aristomenis Exadaktylos Institution and Country Department of Emergency Medicine University Hospital Inselspital Bern Switzerland Please state any competing interests or state ‘None declared’: None declared The manuscript "Powered paragliding accidents and injuries: a cross- sectional study to investigate this extreme sport's risks" seems to be an adequate study about a quiet new topic. Nevertheless further studies are necessary to confirm the findings of the study. More references would be desirable.

[2] Feletti F. Multiple injuries in paramotoring: a case report to assess this sport's risks American Journal of Sports Science. 2013; 1(1): 7-11.

[12] Hasler RM, Hüttner HE, Keel MJ, et al. Spinal and pelvic injuries in airborne sports: a retrospective analysis from a major Swiss trauma centre. Injury. 2012; 43(4): 440-5.

[13] Exadaktylos AK, Sclabas G, Eggli S, et al. Paragliding accidents--the spine is at risk. A study from a Swiss Trauma Centre. Eur J Emerg Med. 2003; 10(1): 27-9.

[14] Gauler R, Moulin P, Koch HG, et al. Paragliding accidents with spinal cord injury: 10 years'

experience at a single institution. Spine. 2006; 31(10): 1125-30.

[15] Laver L, Mei Dan O. Paragliding. In Mei Dan O, Carmont M. Adventure and Extreme Sports Injuries. Springer-Verlag London 2013; 12: 247-272.

Reviewer Name Rekand Institution and Country Dept of Neurology Haukeland University Hospital Norway Please state any competing interests or state 'None declared': None declared The topic is interesting and necessary because traumas due to extreme sport are probably increasing and it is necessary that medical community has knowledge of profile of injuries.

My comments to this manuscript are as follows:

The title is too long, it should be shortened: Accidents and injuries related to powered paragliding: a cross sectional study

Title: Accidents and injuries related to powered paragliding: a cross sectional study

Abstract: Background and aim should be shortened, Results should be primarily about findings after injuries and mechanisms of injury, strength and limitations should be shortened

ok
ABSTRACT
Objectives - Powered paragliding is a clearly distinct sport from paragliding, mainly because of the use of an engine. We supposed that the differences between these two sports result in different types of injuries.
Setting - To test this hypothesis, we analysed 384 incident reports gathered by the United States Powered Paragliding Association from 1995 to 2012.
The majority of the incidents described occurred in the US, while 26 incidents occurred elsewhere: Canada (8), Mexico (5), Panama (1), China (1), Japan (1), Malaysia (1), Indonesia (Java)(1), Europe (8): of which Spain (1), Belgium (1), United Kingdom (3), Italy (1), Romania (1), Unknown (1).
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Conclusions - To help to prevent the specific injuries of powered paragliding, the most appropriate equipment should be identified.
The results of this study also suggest that in future this sport should be studied using studies and case reports distinct from those of paragliding.

Strengths and limitations of this study
This is the first study in literature on powered-paragliding
We analyzed a large amount of data (384 incident reports) collected from 1995 to 2012.
Under reporting-bias due to the voluntary nature of our data collection can be hardly estimated since there is no way of finding exactly how many people knew the existence of the database.

Results – average age should be 44.,5 and SD should be given 9.54
ok
(average age= 44.5, median= 48, SD= 9.54).

Table 2 should be erased, use text (too many tables in this manuscript),

Erased;

The following factors were taken into consideration:, the phase of flight during which the accident took place (table 3), the primary cause (table 4) and the type of accident (table 5).
As for the experience of the pilots involved, pilot rating was distributed as follows: 25,5% PPG2, 13,5% PPG1, 15,1% PPG3, 9,1% Instructor, 12,8% None, 11,7% Not applicable, 6% Unknown, 1,8% Other.

Table 4 and 5 should be erased (use text, this is not main finding)

Erased:
With reference to the place where the accidents occurred, these are the following data: 70,5% flat terrain, 11,4% not applicable, 8,8% hilly terrain, 2,6% water, 2,6 % mountainous terrain, 2,6% unknown data, 1,3% other.
Table 3. Phase of Flight

.. Table 6 – should be grouped to fewer groups- take-off-cruise-landing.

OK:
Table 3. Phase of Flight
Phase of Flight
Count
%
Takeoff (including inflation and runup)
165
43%
Cruise
107
27,9%
Landing (including approach and after landing)
55
14,3%
Not Applicable/Other
56
14,6%

Table 7 is difficult to read_ again too many categories, many subgroups with pilot errors + something else. It should shortened and just one , main course of accident shown

Table 4. Primary cause of accidents
Primary cause
Tot.
%
Pilot Errors (only)
205
53,5
Mechanical Failure (including fuel exhaustion)
67
17,5

Pilot Error & Weather
17
4,4
Pilot Error & Mechanical Failure
17
4,4
Weather (Gust, Thermal, Rain, Wind increase, etc..).
22
5,7
Not Applicable/unknown
24
4,4
Other (including wake Tight takeoff/LZ Area)
31
1,8

Table 9 is very difficult to read- what is difference between multiple trauma and arm, elbow, calf ankle? This table should be erased, show types of injury in table 10.

Table 9 erased; types of injuries showed in table 10 (now Table 6):

Table 6. Distribution of the injuries sustained in the different body regions in power paragliding as emerged from this study.(chi -square , p < 0,001).
Body region
Body area
No. Cases
Types of Injury
(number of cases)
Tot
% of all injuries
Head
Head
7
Concussions(3), unknown(2), contusions(1),
open wounds(1)
18

7%
Neck
3
Burnings(1), C2 fracture(1), unknown(1)
Face
8
Fractures(4>), lacerations(2), burnings(1), other(1)
Chest
Chest
7
Rib fractures(2), abrasions(1), burnings(1), contusions(1), open wounds (1), unkown(1)
7

2.7%
Upper Limb

Shoulder
32
Fractures(6), open wounds(5), bruising(4), other(3),tendon injuries (3),dislocations (2),lacerations (2),unknown (2),abrasions (1),burnings (1),contusions (1),muscle strains (1), sprains (1)
114
44.5%
Arm
26
Lacerations(7), burnings(5), contusions(3), fractures(3), unknown(3), open wounds(2), tendon rupture(1), abrasions(1), sprains(1)
Forearm
11
Burnings(2), lacerations(2), fractures(2), unknown(2), contusions(1) open wounds(1), soft tissue injuries(1)
Wrist
8
Fractures(3), contusions(2), lacerations(1), other(1), sprains(1)
Elbow
5
Open wounds(2), abrasions(1), burnings(1), unknown(1)
Hand
32
Fractures(17; 11 with amputation), open wounds(6), lacerations(3), contusion(2), muscle strains(1), other(1), sprains(1), unknown(1)
Abdomen
Abdomen
2
Contusion(1), soft tissue(1) ,
2
0.7%
Back
Back
25
Fractures(8), unknown(8), other(3), contusions(2), abrasions(1), burnings(1), muscle strains(1), open wounds(1)
25
9,7%
Pelvis
Pelvis
8
Fractures(4), contusion(1), internal bruising(1), muscle strain(1), other(1)
8
3.1%
Lower Limb

Thigh
13
Fractures(4), contusions(2), lacerations(2), open wounds(2), abrasion (1), burnings(1), unknown(1)
82
32%
Knee
19

Contusions(4), sprains(4), lacerations(2), ligament ruptures(2), unknown(2), abrasions(1), dislocations(1), meniscus and ligament tears(1), muscle strains(1), others(1)
Calf
17
Fractures(7), burnings(2), contusions(2), lacerations(2), unknown(2), wounds(2)
Ankle
22
Sprains(8), fractures(5), contusions(3), unknown(3), dislocations(1), ligament ruptures(1), other(1)
Foot
11
Fracture(3), unknown(3), contusions(2), other(2), lacerations(1)

Table 11 and Table 12 should be erased, the main findings should be shown in text.

Table 11 and 12 erased: main findings in text:
Most of the injuries were minor ones (NACA I-II) followed by major ones(NACA III-VI) and fatals ones (NACA VII).
No significant difference in the distribution of fatal, major and minor injuries among the three main phases of flight (takeoff including inflation and runup, cruise and landing including approach) was found.
With regard to the relationship between accident dynamic and accident severity, body contact with spinning prop and wing malfunction/deflation prevalently caused major injuries (NACA III-VI), representing respectively 55,6% and 56,2% of the injuries causes.
Accidents due to water immersion were prevalently fatal (71,4%).
The other dynamics of injuries cause mainly minor injuries (NACAI-II).

Figures: too many figures, Figure 1 and one of figure 2-6 may be kept as the illustrations.
Ok Only 2 figures .

In the Discussion . Tables are not nessesary, usually Tables are not used in the Discussion; the findings from tables can be discussed in the text.
Tables have been erased from the Discussion.