WHY IS IT SO NECESSARY TO DISCUSS THESE SPORTS FROM A MEDICAL POINT OF VIEW?

BECAUSE PHYSICIANS ARE LIKELY TO SEE MORE POWER KITTING INJURIES AS THE POPULARITY OF THESE SPORTS INCREASES!

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WHAT EXACTLY IS A POWER KITE?
POWERKITING INCLUDES DIFFERENT SPORTS IN WHICH POWER KITES ARE USED INCLUDING KITESURFING, SNOWKITING & KITEBUGGYING.
Power kites can be divided into two main types: foil kites and leading edge inflatables.
Foil kites are constructed using layers of fabric assembled in a communicating cells structure, inflated by the wind which enters through special inlets. They are cheaper, faster to set up and simpler to launch.
Leading edge inflatables consist of a single layer of fabric applied to a supporting inflatable structure. They are more suited to kitesurfing, since the inflatable structure allows them to keep their shape and float if they fall into water, allowing them to be relaunched.
Most kites measure between 5 and 20 square metres.
Most kites have four lines, of 27 metres in length, with a thickness of just a few millimetres, and a load capacity of approximately 3 hundred kilogrammes each.
HOW CAN THIS KITE BE USED?
The handlebar is a tubular structure, about 45 centimetres in length, normally in carbon fibre.

By pulling one side of the bar towards himself, the kiter increases the tension of one of the back lines, steering the kite to that side; by pulling the whole bar towards himself, tension is increased on both back lines, changing the angle of incidence of the wind on the kite and increasing the power supplied.
The harness is similar to that of windsurfers but it is much more reinforced.
The kite is attached to the kitesurfer's harness by way of a chicken loop; a device hooked permanently into the harness, even if it can be released to perform special free-style manoeuvres.
A quick release system allows the kiter to detach himself immediately from the kite in the event of an accident; a leash keeps the kite connected to the kiter and helps de-power the kite completely.
The kite flies in an area of the sky shaped like a quarter of a sphere, downwind from the kitesurfer: the wind window. The edge is the neutral area, while toward the centre the power increases, reaching the maximum in the power zone.
KITESURFING IS AMAZING!
Today there are different disciplines in kitesurfing:

Course racing events are similar to yacht races and both speed and tactics are important.
In Speed racing the kiter aims to complete a 5 hundred metre course in the fastest time possible.
In terms of its physical demands, kitesurfing there are huge differences between the sport in its simplest form (crossing), and the free-style.
Crossing is a moderately intense activity and the effort is prevalently aerobic, while Freestyle is an intense activity involving both aerobic and anaerobic metabolism.
To be more precise, the effort is quasi-isometric; prevalently isometric but interrupted by the small movements required to adjust the course in response to changes in the wind and to follow the movement of the waves.
In Freestyle various tricks are performed, including jumps and unhooked manoeuvres.
To prepare a jump directing the board into the wind, the isometric effort performed by the kiter to maintain the profile of the kite increases considerably. Many kiters report irritation or pain in the joints of the lower limbs and the abdominal muscles during this initial phase of jumps. The jump can lift the kiter to a height of several metres.
During landing, the legs bend and absorb part of the impact, the effort of the postural muscles, especially those of the back and the abdomen, allow the body to take up the correct position for landing, while the lower limb muscles contract during landing.
Unhooked manoeuvres are much more physically demanding and traumatic since by unhooking the kite from the harness the kiter is less able to counteract slipping and in order to maintain sufficient tension on the lines at all times, the kite must always fly in power zone.
The distance travelled in a certain interval of time & similarly ranking position in freestyle competitions improve proportionally with aerobic fitness levels. Therefore it is important that kiters – especially those who wish to compete – achieve an adequate level of physical fitness.
Kitesurfing requires a variety of skills - strength, coordination, velocity, flexibility and endurance. So suitable training regimes include practice in water, endurance training and weight training, but also exercises for proprioception, core stability and articular mobilization.
Fatigue increases the risk of accidents so proper athletic preparation helps to prevent injury as well as warming up before each session.
Defining the injury rate for this sport is very difficult due to the many factors involved, such as the environmental conditions, the equipment and the discipline practised.
The risk of injury is more than double in competitive kitesurfers than in amateurs. Among competitors accidents occur more frequently during training than in competition, in course racing than in freestyle.
The majority of injuries are mild followed by moderate and severe. Expert kiters sustain more serious accidents.

The most common injury types are contusions, lacerations and abrasions but also fractures, dislocations and ligament tears account for 20.6% of the total.
Both sides of the body are equally affected, while the lower limbs are the most affected body area, with the ankle being the articulation most frequently involved (64%), followed by the foot and knee.
with the ankle being the articulation most frequently involved (64%), followed by the foot and knee.
Errors during manoeuvres and tricks or jumps performed intentionally are the main cause of accidents mainly due to bad landings or falls. As in wakeboarding, shoulder dislocations are mainly the result of unsuccessful tricks or jumps.
of the articular capsule, anterior and posterior cruciate ligaments, of the medial collateral ligament and meniscus.
Knee sprains are especially common due to a rotation of the femur with respect to the fixed tibia and can cause tears or sprains.
The most common cause of sprains to the foot and the ankle is excessive supination or inversion and extreme plantar flexion, which can cause lesions of varying degrees to the ligaments of the ankle [10], dislocation, and frequently also fractures.
CASE REPORTS

Thrown to ground from 10m
Strong wind with sudden gusts
-Fracture C6, C7 and right leg
-Luxation right shoulder
-Bleeding Wounds

Massive destruction of cranium & maxilla
Died at the scene

Thrown against a pole in stormy winds

Thrown against a dyke & landed against a car
Strong Wind
Fracture-
Dislocations
humerus
femur

Flew for 20m and collided with billboard:
- bleeding wound left arm
-Bilateral carotid dissection & frontal lobe ischemia

Injuries in 74%

ENVIRONMENTAL FACTORS
Inflatable kites are fundamental aids for stranded kiters far from the shore, and should not be abandoned for any reason, being highly visible and allowing the kiter to be located by rescue personnel.
Upward currents can lift kitesurfers into the air.

Being a sport practised close to shore, it is important always to consider that the wind passing over big obstacles like houses, trees, buildings, ships, moves upwards and creates upward currents which can literally lift nearby kitesurfers into the air.
Head injuries, including concussion, injuries to the eye and rupture of the eardrum may be caused by hard impact with a wave, the board, or obstacles of various kinds.
Only 40% of kitesurfers use a helmet, despite being obligatory in many countries: helmets specially designed for kitesurfing, extremely light and which do not interfere with the kiter's hearing or peripheral vision are widely available.
It would seem that acute injuries are more common than overuse injuries, accounting for 76.3% and 23.7% of injuries respectively.
Nevertheless during crossing the irregularity of the water surface causes repetitive microtrauma which have the potential to cause inflammation and degeneration of the joints.
Vibration levels were correlated with gliding speed, while the effect of the waves was limited. Vibrations cause involuntary muscular contractions, inducing localized fatigue, reducing motor performance levels and increasing the risk of errors in freestyle.
Today we are studying overuse injuries in a group of 50 kitesurfers that we are following with a new method.
Snowkiting! It is practiced on snow using normal freestyle skis or snowboards. Both inflatable and foil kites are used.
Speeds of over 110 Km/h can be reached.

A Buggy is a light three-wheeled cart: the front wheel is steered by the pilot's feet, leaving the hands free to control the kite.
In buggying the athlete accelerates and slows down by applying steering manoeuvres in coordination with flying manoeuvres of the kite.

Speeds of over 100 (hundred) km / h can be reached in KB.
Feletti F. Kitebuggying Injuries, 2013-2014
A Study involving 101 international athletes

**Injury Rate**
\[
\text{2/1000 h of practice}
\]
Feletti F. Kitebuggying Injuries, 2013-2014
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**TYPE OF INJURY**

- Contusion (Bruise)
- Fracture
- Joint Sprain
- Concussion
- Laceration
- Joint Dislocation
- Muscle Tear
- Abrasion
- Open Wounds
- Ligament Rupture
- Others
Feletti F. Kitebuggying Injuries, 2013-2014
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Dynamic of Injury

- Out of buggy experience
- Technical mistakes
- Buggy roll over
- Collision with obstacles
- Embossed/rough terrain
- Equipment breakage
- Loss of control of kite
- Collision with other kite-buggies
- Hit by part of the equipment
- Extreme freestyle crash
In SK & KB slight or mild are prevalent but severe injuries are a little more frequent than in kitesurfing.
The most important difference in the kind of injuries is that fractures are more common in kite-buggying.
Injuries to the ankle and foot are much less frequent in SK rather than in kitesurfing & KB due to the use of boots which stabilize and protect these areas of the body. The shoulders and back are very prone to injury in SK & KB and the use of specific protectors should be considered in these sports.
Boots stabilise & protect ankle & foot

In kitesurfing and ski knee injuries are common.
it is not the same in KB, probably because of the seated position in this sport.
In SK the main cause of accidents are errors in controlling the snowkite (75.8%) followed by gusts of wind or errors in estimating wind strength and poor snow conditions.

Although it is dangerous to practise this sport in strong wind, 80% of the accidents occurred in winds below twenty knots.
Since SK & KB are practiced on hard ground, kiters are more inclined to use protective equipment than in kitesurfing, in particular helmets and back protectors.
# CREDITS

**KITESURFING, SNOWKITYING & KITEBUGGING**

**Videos courtesy of**

- Alberto Rondina
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- Fabio Ingrassia
  - North Kiteboarding Team Dvd - Products Guide, Video Sections.

**Photo by**

- Claudio Marossa
- Dr Marco Tagliaferri
  - courtesy of Alberto Rondina
  - http://www.albertorondina.com
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**WINDSURFING**

**Videos courtesy of**

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- Claudio Marossa

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- Greta Benvenuti
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