

## Chapter 1

### INTRODUCTION

Water sports are a growth industry; water activities have become a popular way to keep fit as an ever increasing number of people enjoy swimming for sport, exercise and recreation.

In simple terms, aqua fitness might be defined as any type of physical exercise undertaken in water, with the purpose of maintaining or developing a desired level of fitness.

#### Who is This Book For?

The short answer is .....Everyone!

This book is for anyone interested in aqua fitness not just fitness professionals but anyone who just wants to keep fit. While many other aqua fitness books are largely collections of exercises can do in water; this book is much more - it aims to:

- Provide **injured or disabled** people with a guide to safe and appropriate exercising in a pool.
- Provide any domestic **pool owner** with ideas of how their pool can be better used to maintain their health and fitness.
- Provide **fitness leaders** with a guide to developing aqua fitness programs.
- Provide the **individual** with the knowledge that will enable them to safely and effectively undertake aqua fitness activities.
- Provide **pool managers** with a guide to managing facilities which are used for aqua fitness activities.

This then is an ideas book: a 'who, when, where, how and why' guide on how to promote aqua-fitness and how to give fitness instruction.

### AQUA FITNESS ACTIVITIES

Aqua fitness activities could be considered as any fitness activity undertaken when the body is submerged, or partially submerged, in water. This might include swimming, diving (board, platform or scuba), snorkelling, aqua-aerobics, hydrostatic stretching, deep water running, or even more structured activities such as water volleyball or water polo. The information in this book is applicable to all types of water activities, with the emphasis being on aqua-aerobics, deep water running, and stretching.

There are many similarities between exercising in water and any other type of exercise. Participants need to warm up before starting any work that is strenuous or that will increase the heart rate. The exercise session should be challenging but without causing injury or over-exertion. Participants are always advised to move from hard work to a 'cool down' session slowly, and then to finish with some stretches at the conclusion of exercise session.

Aqua-exercises do have some unique characteristics though; they are less likely to cause damage to muscles or joints through rapid or sharp movements, or from pounding (impact) on hard surfaces. Additionally, the body is less likely to over-heat, because it is surrounded by water - which is a continual source of cooling. Also for those who are sensitive about their personal appearance, much of the body is hidden under water and from other participants.

This aspect may be desirable for those who feel they don't perform as well as some others, or are not happy with their body image. And finally, working out in water can be deceiving. It may feel as if very little work is being done while you are exercising in the pool, but after a good aqua-fitness exercise session, you may come out of the water quite exhausted!

## WATER AND EXERCISE

Water, as a medium, allows for different type of exercise than exercise performed on the ground. The following points illustrate why:

### **Water is Buoyant**

When a body is partly submerged in water, the force of gravity is countered by the buoyancy effect of water (i.e. the water pushes you up to the surface - or causes your body to float, countering gravity, which pulls you down). The net result is a less jarring affect (than on the ground) as the body moves up and down. The work load and motion are the same, but the water resistance gives it a feeling of being gentle. This allows a high impact work-out, with the qualities of a low impact work-out. Water is also an excellent medium for exercise for older people. The water in this case acts as a support, allowing movement and flexibility that may not be allowed on the ground.

The deeper a body is submerged, the less effect gravity has upon it - in essence, by submerging more of your body in water you are reducing your effective weight.

For example, at chest depth, a person who weighs 60kg out of the water may only have an effective weight of 12 kg in the water. Be aware that these figures can vary according to the fat percentage in each individual's body weight. Fat in the body is more buoyant than other tissues, which means that a higher fat proportion in the body will cause an overweight person to be effectively lighter in water than another person of similar weight - whose body comprises more muscle and less fat.

### **Water is Cooling**

Depending on the temperature of the water, it can remove any heat build-up in the body faster than any heat build-up that occurs when exercising on land. It is important however, that the water you are exercising in is not too cool, as you can rapidly lose too much body heat when you are submerged in very cool water.

### **Compression Forces are Decreased**

The weight of the body on land tends to compress joints. Weight above the base of the spine causes the joints at the bottom of the spine to squash together, and this impact is increased when exercising. When the body is immersed in water, these forces of compression are significantly decreased hence there is less wear and tear on the joints.

### **Hydrostatic Pressure on the Body is Even**

There is equal pressure on the body in all directions (around parts of the body) at any given depth of water. This means that any damage by sharp or irregular movement is decreased.

For instance, if a twisting movement is made at the waist, the density of the water slows the movement down. This not only increases the amount of energy being expended to make the movement, but also makes the movement less harsh and easier on the muscles. The water acts as a dampener, buffering and slowing such movements.

### **Can Affect Blood Movement**

Any part of the body that is submersed will have a greater pressure on the skin than normal air pressure on the skin does. This situation means that the heart must push blood harder to get it into blood vessels that are close to the skin surface. As the primary goal of exercise is to increase the heart rate, this assists in meeting this criterion more easily. However, it is something that also needs to be watched, especially if any participants have a history of high blood pressure problems.

### **Increased Resistance to Body Movements**

The resistance to movement in water can be around 830 times greater than the resistance to the same movement in air. And this is really what water fitness programmes are all about. The combination of a greater work load in a softer, more supportive environment, makes water exercise ideal for all age groups and fitness levels. Water sport can be very demanding though, as can be seen by the health and fitness of elite athletes such as swimmers and triathletes. But it can also be gentle, making it a good type of exercise for nearly anyone, as well as one that can be increased as the level of fitness increases.

## **RESPIRATORY FITNESS**

The lungs can benefit greatly from aqua-exercise. Any exercise on land or in the water which increases the heart rate, will in turn increase the depth of breathing. By breathing more deeply, lung capacity is gradually increased. Unlike exercise on land though, the water surrounding the body can help prevent over-heating, and excessive perspiration (and rapid water loss) during heavy exercise.

There are three levels of lung capacity, residual volume, tidal volume and vital capacity:

- Residual volume is the air still left in the lungs after all air has been breathed out. Even when we have expelled as much air as is physically possible, about 25% of the lungs still hold some air.
- Tidal volume is the amount of air that is breathed in and out at a regular breathing pattern.
- Vital capacity is the total capacity of lung available for holding air. It is a sum of the residual volume, the tidal volume, and inspiratory reserve volume; or that air that we can inhale, but is not needed for regular breathing (like taking a deep breath before diving in a pool).

Swimming is particularly good for increasing lung capacity, not only is the body stimulated to breathe more by an increased heart rate, but the swimmer tends to take deeper breaths - particularly with underwater or lap swimming. Vital capacity is often much greater in swimmers than in non-swimmers.

## AQUATHERAPY (Also known as Hydrotherapy)

Aqua-exercise is particularly useful as a therapeutic tool for people recovering from injury, or with some other problem that hampers their ability to exercise on land.

Various things, from surgery to severe pain or a range of different types of disabilities, can impair a person's ability to participate in more traditional exercise. In many of these cases aqua-exercise, if properly prescribed, may be a very appropriate alternative. A doctor or physiotherapist should be consulted prior to starting any type of exercises, especially if special conditions do apply.

They also may be able to suggest particular exercises to try and those to avoid. Overworking is also a concern, as the water can lessen the impact, but can also mask soreness or pain if muscles are worked too long or hard.

### **Flexibility**

Because the effect of gravity is reduced, the body can move more freely when submerged. This may allow an injured part of the body to be stretched more - with less pain. It is usually reduced flexibility, as well as pain from wear and tear, arthritis, etc., that often makes exercise difficult for older adults. Stretching can be very important to enhancing recovery or allowing increased flexibility in movement, both on water and on land. Exercise in the water can therefore, in due course, lead to increased flexibility.

### **Strength**

Because water offers greater resistance than air, muscles will be strengthened as they are moved through water. Many of the movements made, especially in aerobic type exercise, will not only increase the heart rate and the aerobic benefits, but this added resistance will increase muscle tone. The same can be said when comparing swimming versus running. Swimming will give a much better upper body work out, while still using the legs; while in running, or jogging, the legs benefit (and the arms, to some extent, from swinging in rhythm), but the rest of the body muscles are used very little.

### **Re-education of Muscles**

After surgery or a serious accident, the way in which certain muscles are moved might be altered and the relevant part of the body may need to be re-taught how to move properly. After a period of reduced (or nil) use, muscles can be very weak, difficult to use, and easily damaged. This re-education can be much easier in water where the muscles are supported through buoyancy, therefore more easily moved.

### **Balance**

The buoyancy of water causes the body to move more slowly, allowing a person more time to adjust to loss of balance. This reduces the chance of injury (from falling) and increases the coordination of movements. As water will slow down the movement, it is easier to keep good posture and form, which is often a problem in achieving the best results, especially in aerobics.

### **Muscle Spasms**

There are a number of conditions which can cause muscle spasms, some slight, some severe. These include Cerebral Palsy, Parkinson's disease, Multiple Sclerosis or strokes. People with such conditions often find movement much easier in water than on land. In addition to the benefit of buoyancy, if the water is relatively warm, the muscles are able to be kept warmer during exercise, and due to improvement in blood circulation, there is a resultant decrease in muscle spasms.

## THE PHYSIOLOGY OF AN AQUA EXERCISE SESSION

There are some things that are similar to an exercise session on land and other things that are different. With all types of exercise, there are broadly three stages to any session:

- Stage 1:** Warm-up - bringing body functions into a condition that can support active exercise without causing any stress.
- Stage 2:** Aerobic Activity - carrying out maximum exercise.
- Stage 3:** Cool-down - returning the body to normal functions without causing any stress.

### Stage 1

The water exercise situation, stage 1 (or the warm up) actually should be comprised of two parts:

The first recommendation is to warm up body joints and muscles before entering the water. Simple stretching, walking on the spot, or moving and "loosening" the body generally increase the heart rate - creating a faster blood flow and warming the body. Ensure that you move all parts of the body, stretching and releasing neck muscles, rotating the trunk, swinging the arms, stretching sides and legs and flexing hands and feet. Don't overdo the movements though. If this period is extended or you start to feel yourself breathing deeply, the warm-up will become a form of aerobic exercise in itself and may detract from the aqua fitness session.

Part 2 of stage one – recommendation is to do further warm-ups once in the water. At the beginning of a lesson, as the participants first enter the water, body temperature may decrease and heart rate may slightly increase (due to anticipation and readiness to begin the lesson). As the pressure of the water surrounds the participants, the water force may necessitate stronger breaths (i.e. lung, cardio and diaphragm exercises). If the water is too cold, peripheral circulation may be decreased (but this is uncommon as most lessons are held in pools at the right temperature). Repeat the warm up performed on land, alternatively the lesson may begin with warm up stretches in the water. The stretches and movement at this stage should be a little more advanced than those performed out of the water, as you are preparing to move right into stage 2, the aerobic exercise session.

### Stage 2

Commencement of activity will result in increased blood circulation to those limbs in action. As the body is exerted, the lungs work more toward their full capacity the body takes in more oxygen as a result, with more oxygen also entering the blood stream causing the blood to circulate at a higher rate. As the amount of oxygen in the body increases, so does the amount of carbon dioxide passing out as a waste product of the higher circulation. The action and reaction of the lungs is controlled by the brain and is an involuntary action.

All parts of the body benefit from an aerobic work-out. The higher rate of blood circulation works not only the lungs, but all of the other organs of the body. The kidney and liver will increase their work load, the muscles receive more oxygen and start to build up and even the brain receives a stimulus in the form of endorphins, which give the body a type of "high". With the increased resistance provided by the water, the workload of the body increases, and so will the benefits.