



Aqua Fitness

2nd Edition

John Mason

AQUAFITNESS

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PREFACE

This is a book for everyone; from professional fitness instructors, to ordinary people who just want to improve their health and fitness.

Aquafitness can involve a wide variety of things: from swimming and snorkelling to water aerobics or deep-water running. Exercising in water has tremendous advantages over exercising on the ground. It is low impact, it reduces likelihood of short or long term injuries, and offers fantastic benefits to people who have impaired movement, or are undergoing rehabilitation. In addition, the cooling effect of the water reduces the chance of heat stress during a work-out.

The author, John Mason, has been involved in the Recreation industry since the mid 1970's when he worked as Director of Parks and Recreation for the City of Essendon in Victoria. He has been a member of the Australian Council of Physical Education and Recreation since 1977; and is principal of the Australian Correspondence Schools. Through this school, John has written (and delivers) accredited distance education courses including the Fitness Leaders Certificate and an Advanced Diploma in Recreation-Fitness. In addition, for the past 10 years John has practiced what he preaches in this book. He is a qualified scuba diver, has participated regularly in deep water running at a Gold Coast health club; and more recently designed and built his own home pool with specific features to accommodate aquafitness activities.

John has developed this book to serve two purposes:

- To provide a guide on how anyone can exercise properly and safely in their own home pool - or at a local swimming pool.
- To train fitness leaders in how to organise and instruct clients in aquafitness

(Note: the book has also been written to satisfy the requirements for the Aquafitness module required for registration as a fitness instructor in Australia).

If you know someone with back or knee problems, or who needs rehabilitation after an operation, aquafitness may be the best and safest way for them to rebuild their strength and mobility.

For older people with more fragile bones, aquafitness allows the best opportunity of regular exercise with minimum risk of injury.

For elite sportsmen, aqua exercise allows more frequent and intense exercise with reduced chance of long term detrimental effects on the body.

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 isEveryone!

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.

Stage 3

The heart is pumping hard, so blood is moving around the body faster than normal. The muscles have a higher than normal amount of blood in them and ideally, the participant will have reached a target heart rate that is safe for their age group. The rate of exercise should then be reduced slowly, allowing the blood levels in the muscles to drop slowly and the rate of blood flow to also drop slowly - without putting any excessive demands on the heart. To stop suddenly will cause the muscles to hold much of the extra blood, potentially resulting in cramps and muscle pain. Muscles which have been working and have lots of blood, need to be fully contracted and extended in gradually slower movements in order to reduce excess levels of blood. It is also believed that stretching the muscles at the end of an exercise session also helps to give them a better shape.

Blood vessels in the skin below the water surface have adapted to the pressure exerted by water on the body, so submerged skin will have blood pumping at a higher than normal pressure.

After exercise, this pressure in blood vessels needs to be reduced before getting out of the water, otherwise the pressure on the skin is abruptly dropped while the pressure in the blood vessels is still remaining high. This can cause damage. For example, in extreme situations, some blood vessels may suffer damage. So the cool down period is just as vital to the health and well-being of the participants as any other portion of the exercise session.

WHAT AFFECTS FITNESS

Aerobic fitness refers to the fitness of the cardio-respiratory system. A person who has good aerobic fitness has the ability to readily take in oxygen (breathing), assimilate that oxygen into the blood, transfer it to wherever it is needed in the body and at the same time remove any waste products from those areas, (including breathing out carbon dioxide). Aerobic fitness is something that all people need for good health. As we move toward more sedentary lifestyles, driving instead of walking, working at a desk rather than in a labouring job, we need to ensure that the exercise needs of the body are met.

It is generally recommended that 20 - 30 minutes of aerobic work 3 to 4 days a week is the minimum necessary for good health. Any increase in activity should result in an increase in fitness. However, people are all very different and there are a number of factors that can affect aerobic fitness.

Factors influencing aerobic fitness include:

1. Genetics (heredity)
2. Regularity of exercise
3. Smoking
4. Diet
5. Age
6. Stress
7. Disease
8. Drugs/medicines.

These things should all be taken into consideration when planning an aerobic work-out.

Anaerobic fitness refers to the ability of muscles to perform to a required work-load or endurance period, without the availability of oxygen (or limited oxygen). Generally these exercises are short bursts of energy. The efficiency of anaerobic fitness is dependent on the overall health, fitness and aerobic level of the individual. Anaerobic fitness is usually about building up muscle, or increasing muscle tone, but is of little value if it is not combined with aerobic fitness.

Depending on the fitness goals of the individual, different types of exercise can be used to achieve a range of results. Twenty minutes of aerobic exercise does not have to be limited to one type of exercise. For instance, two aqua-aerobics classes per week combined with two high intensity walks, gives a good amount of exercise, plus the diversity will lessen the likelihood of the participant becoming bored too quickly.

Many people will lament that they don't exercise enough, but simple things like taking the stairs instead of the elevator can add up during the course of a day. The main goal is to use the body, all of the body, on a regular basis, to achieve the ultimate in fitness.

SWIMMING

Swimming is not only a popular recreational activity, but is also a valuable form of exercise, and as well can be used as part of hydrotherapy programs.

Swimming can be incorporated as a component of aqua fitness sessions/programs (e.g. as a gentle warm up, or as part of aerobic conditioning), or it can constitute an exercise program in its own right.

Swimming is an excellent form of exercise in that it exercises all parts of the body. When swimming we tend to hold our breath, particularly when swimming underwater; this helps to overcome what is known as "shallow breathing". As a consequence it helps increase lung capacity, which has important health benefits - the more oxygen we can take in through each breath, the more oxygen can be supplied to our body.

During swimming, all of the joints are used at some stage, which helps develop and maintain mobility. Compression forces are also significantly reduced, allowing the whole body to stretch out, particularly the spine, as the swimmer exercises. Flexibility can also be readily increased, particularly of the legs and ankles, which, because they are not bearing any weight while immersed in water, can be extended from the hip, in the case of the legs, in all directions, and rotated over a much wider range. Using a number of different strokes can help change the emphasis on different groups of muscles, allowing some to be worked harder, while others are allowed to relax.

For those who may be overweight, the extra fat carried can help initially by providing extra buoyancy. As they start to get fitter, and their swimming skills improve, the exercise will help burn up the excess fat. Due to swimming being non weight bearing this allows an individual with lower back, leg or feet injuries to exercise at a level they may not be able to on land without putting these problems at risk. In fact it gives time for healing and may aid in the strengthening and improvement of injuries.

STARTING SWIMMING

As with any exercise program, it is best to start slowly, and progressively increase your work level without overdoing it. Refer to the chapter in this book on exercising programming to get an idea of how long and hard it is necessary to exercise to achieve results.

A good way to start is to enrol in a swimming class at a local pool. This is a great way to learn how to swim in the first place, or to provide a refresher on basic swimming skills. It also provides opportunities for social interaction, with other like-minded people, which can help encourage the swimmer to continue, and/or work a little harder.

SWIMMING AS PART OF HYDROTHERAPY PROGRAMS

Swimming is increasingly recommended by medical practitioners in treating a wide variety of medical problems, including post-surgical recovery. It is readily adapted to a wide variety of needs and capabilities. A major advantage of swimming programs is that for many with disabilities, or health problems, either temporary or permanently, who may require assistance on land (e.g. wheelchair, crutches, braces etc.). Water enables them to go without, or minimise the amount of assistance required. In many cases they are able to join in activities with the able-bodied with little or no disadvantages.

When swimming is used as part of a hydrotherapy program, it should be supervised by suitably qualified people (e.g. physiotherapists) with extensive training in human movement, and knowledge of the characteristics (e.g. pathology of disease, limitations of movement) associated with particular health problems. Hydrotherapy programs might incorporate appropriately amended swimming strokes, or therapeutic recreational swimming.

Qualified swimming teachers, with suitable training in hydrotherapy techniques (e.g. from tertiary institutions) could be readily involved in supervising or assisting in adapted swimming programs.

Choice of swimming strokes is very important. The person designing a swimming program for someone with a health problem (e.g. physiotherapist) must have a detailed knowledge of the patient's condition, degree of mobility, and the muscles used in different swimming strokes. An injury that is to be treated via rehabilitation requires specific exercises in appropriate amounts to ensure improvement and not hindrance.

Two important components of any therapeutic swimming program are firstly ensuring that the swimmer has been allowed to adjust to the differing conditions of the water environment (e.g. buoyancy, water resistance, turbulence) and has gained a suitable degree of breathing and head control, and secondly has been taught, or can demonstrate vertical and lateral rotational control of their body, and a combination of these rotations. The swimmer should be able to hold a balanced floating position against disturbing forces (e.g. turbulence in the pool), and be able to regain an upright position as required. Successful completion of these two components raises the confidence levels of the swimmer and ensures that they can always return themselves to a safe breathing position.

These components are commonly learnt, or assessed, as part of an orientation or pre-swimming program. As little as one session may be required; alternatively multiple sessions may be necessary to achieve satisfactory results, before commencing the swimming program.

Orientation sessions might involve walking in different directions (i.e. backwards, forwards, sideways), and in different depths of water, or holding on to the side of the pool or a kickboard in a horizontal position and doing gentle kicking movements. Floating in a balanced position might then be attempted with the assistance of a person the participant trusts for example a trainer, or perhaps friend or relative. As the learner gains confidence, and increasing control of their body, the assistance can be reduced, and eventually removed completely.

A high level of supervision is required at all times for hydrotherapy programs. Swimmers could easily overdo things and get into trouble, or as they get tired start to change their stroke, which could be potentially harmful.

Good supervision should ensure that such things do not occur. It also provides a feeling of security to the swimmers, helping to keep confidence levels high.

For further information on Hydrotherapy, the following book is recommended: **Hydrotherapy: Principles & Practices**, (1997) Edited by Margaret Reid Campion (Butterworth Heinemann).

