CONDITIONING FOR BADMINTON PLAYERS

MINIMAL EQUIPMENT NEEDED

Never be more tired than your opponent with “Conditioning for Badminton Players” - a program designed to improve stamina and speed for players at all levels

By Robert Jonsson

Table of Contents

Preface

Badminton is a sport that requires a combination of many physiological and psychological factors to be successful. It requires badminton-specific training (extremely much) in combination with strength training (including plyometrics and explosiveness), cardiovascular exercise (aerobic and anaerobic energy systems), mobility and much more. Something we've all noticed when playing matches is that we run out of energy. All of a sudden there is nothing left in the legs. We can't keep up with the opponent's pace or the match is too long. Sometimes it is due to having played many matches earlier in the day or weekend. Sometimes it is due to superior opposition and sometimes it is a lack of preparation. There are many explanations why we cannot continue to play at the level we want. One tip you often get is to "go out and run" to get more physically fit. In some cases that is true. In some cases it is not true. And what does it mean to go out and run? How far? How fast? How often? The same pace or intervals? There are many questions. This training program will go through and explain how to train to endure longer matches at a higher intensity (tempo) and how you can train depending on your needs based on your strengths and weaknesses.

Training principles

There are a number of training principles that all coaches and athletes should know about. They can be applied to strength training, sports, strength training and more, but for this program it is written mainly aimed at cardiovascular exercise and in some instances badminton specific cardiovascular exercise.

The principle of Adaptation (Load, Rest and Recovery) is about training hard enough to stimulate the body to make positive changes. Something even more important is to then rest and recover from the training. When we break down the body through exercise, growth takes place at rest. If we train too hard and/or too often, we just break down the body more and more. To get the most out of training, we should train at a challenging level and then rest and train a little harder the next time.

The overload principle was mentioned above. It is based on the fact that we have to train a little harder (longer distance, higher pace, more intervals, etc.) in order to make a progression. Imagine running 5 km three times a week in 30 minutes. In the beginning it feels very exhausting, but each time it feels easier. If you never push yourself by an increased pace and/or distance, you will not improve significantly. If you do the same training for several years you will not progress. A more reasonable approach (just as an example) would be to run one session at a slow pace for 40 minutes, another session with 6 intervals of 1 km. What you have to watch out for, however, is to recover enough so that you don't get overuse injuries. It also works to run a certain distance during the time you are out running, as in the example with 30 minutes per session. A good way for the example of the person above to increase training is to increase by 10% each week. The increase could come from total distance in a week or an increase in distance.

The principle of reversibility is not of great importance to this training program, but it is worth mentioning. If you stop training, you will not be able to stay at the

same level as before. However, you don't need to train as hard to maintain a certain level of performance as you do to improve it. A rule of thumb is that it takes three times as much training to get better as it does to stay at the same level. However, it should be mentioned that the higher level you are at, the more training is required to keep you at the same level.

The specificity principle is one of the most important things for badminton players and coaches to know and understand. To get better at something, you have to practice it. If you want to become a better runner, focusing on bench press may not lead to the positive effect you want even though you are technically training. If you want to get better at badminton, maybe you shouldn't play football 6 times a week. To be extremely clear, you need to practice a lot of badminton to become good at badminton. It is logical, but many people misunderstand this important part. If you want to be able to play longer matches at a high intensity as a badminton player, you need to train for just that. We can take as an example that you are a semi-professional player who wants to move up to the elite level in singles. Most likely, the matches will be at a higher pace. Therefore, you need to train to be able to do just that. However many players head out and run long distances to improve their fitness. That's great if you want to get better at running long distances, but is that really the best thing you can do to be able to play against the elite? (In the program it will be explained how you can combine running with badminton to cope with a higher pace.) What you want to get better at is badminton, therefore you need to play more badminton or at least train more badminton specifically such as footwork exercises or short intense intervals.

The principle of variation to some extent contradicts various things that are written above. It simply means that it is good to vary the training so that the body does not get too used to the usual training. If we take a boxer as an example, the upper body will work a lot during training and competition. If the boxer runs, it's the legs that work (of course it's cardiovascular exercise, i'm just trying to make a point). To train the upper body and cardio at the same time, for example, by using a rowing machine can be a good idea. However, it is rarely a bad idea to get more fit in general. During summer training for instance, it can be good to train differently compared to what training looks like during the season. Varying your training contributes to a reduced risk of injury because you are trained more evenly. It can also be good for the development as an athlete in general and can even lead to increased motivation.

The individualization principle is the last training principle. We are all different and therefore should not train in the same way. A 2 meter men's doubles player should not train like a 1.50 meter women's singles player. The same men's doubles player shall not train as another 2 meter tall men's doubles player. Everyone has different strengths and weaknesses and cannot be trained in the same way. Of course, there are major similar features for the sport, but you shouldn't train everyone the same way. However, it must be taken into account that trainers often (unfortunately) do not have the resources for completely individualized training. But you as a player can take responsibility and analyze your strengths and weaknesses and improve your

physical fitness yourself (or with the help of an expert) and communicate what you need to improve on the court to the coach.

What is conditioning?

Let's start with aerobic capacity and output, which this program will focus on the most. Aerobic training focuses on sustained, lower-intensity exercise that uses oxygen to generate energy. Aerobic capacity and output are relevant for sports because of the following:

1. **Endurance performance**: A high aerobic capacity, typically measured as VO2 max, is crucial for success in endurance sports like long-distance running, cycling, and swimming. Athletes with higher VO2 max values can sustain higher intensities for longer periods.
2. **Recovery between efforts:** In intermittent sports a good aerobic base allows athletes to recover more quickly between high-intensity bursts of activity. This enables them to maintain performance throughout a match or game and stay focused during practice.
3. **Overall fitness level:** Aerobic capacity is considered one of the best indicators of an athlete's overall physical capability and cardiorespiratory fitness. It provides valuable information for coaches and trainers in assessing an athlete's condition. It's the foundation for a badminton player.
4. **Sport-specific demands**: Different sports require varying levels of aerobic capacity. For example, soccer players typically have higher VO2 max values compared to volleyball players due to the higher endurance demands of soccer. Values for VO2max for badminton is not as high as for Soccer, but still fairly high.

On the other end we have anaerobic capacity and output. Anaerobic capacity is the total amount of energy that can be produced by the anaerobic energy systems without the use of oxygen.Anaerobic output refers to the energy produced through anaerobic metabolism, which doesn't require oxygen. This all means that shorter, much more intense activities use anaerobic energy systems. Why is this imporant for us as badminton players?

1. **Short intense bursts of effort,** as it is in badminton, requires well developed anaerobic capacity and output.
2. **Recovery between points**: Good anaerobic capacity helps you to recover more quickly between points and maintain a high level of performance throughout a match or tournament
3. **Technical and tactical advantage**: A higher anaerobic capacity may allow you to maintain better technique and make better tactical decisions under fatigue. This is also true for when we are under pressure during later stages of games and tournaments.
4. **Improved lactic acid tolerance**: Regular anaerobic training can increase your tolerance to lactic acid buildup, potentially improving your endurance during intense rallies or matches.
5. **Muscle development**: Anaerobic exercise helps build and strengthen the fast-twitch muscle fibers needed for explosive movements in badminton

VO2max (a measurement of your body's ability to deliver and use oxygen for energy), utilization rate and work economy (or exercise economy) are the components of endurance. What we focus the most on in this program is VO2max and the work economy. However endurance is the ability to maintain a certain

intensity over a longer period. For marathon runners, endurance means being able to maintain a certain pace for 42 km. For a badminton player, endurance is more about being able to play many matches or rallies at a high intensity. Endurance for a badminton player therefore becomes: the ability to maintain intensity (tempo, explosiveness) during an entire match or tournament.

VO2max is largely limited by the pumping capacity of the heart. It should be mentioned that a high VO2max leads to faster recovery between training sessions, rallies and matches. Therefore it is important for badminton players at all levels.

Work economy means how efficient you are with your energy and is determined by various factors. For badminton, work economy thus means the technique of the footwork and the characteristics of the muscles. In addition, it should be added that the style of play and tactical awareness determine how effective one is with one's energy when playing. A player with poor tactical knowledge will most likely have to run a lot to make up for misplaced shots or bad decisions. This also applies to those with inferior technique.

Concepts

To make it easier for you as a reader, I will write briefly about two parts of endurance training and conditioning that are mentioned in the text.

Aerobic exercise - Aerobic exercise means that there is oxygen available in the muscles which means that there is no lactic acid (the burning sensation in the muscles). We can perform aerobic activities for a long time such as walking or a slow jog. Easy distance training is an aerobic activity because the energy comes from oxygen. Aerobic capacity is the maximum amount of oxygen our bodies can utilize during exercise, VO2max.

Anaerobic exercise - we divide this part into two categories: anaerobic effect and anaerobic capacity. How it works physiologically is not of interest here. The important thing is to know that anaerobic training takes place in absence of oxygen. It can be said that Anaerobic effect (along with muscle strength) is linked to shorter sprints. Anaerobic capacity is at longer sprint distances. It is anaerobic exercise that causes our muscles to burn. The energy in aerobic exercise comes from oxygen, but from anaerobic activities it comes mainly from glycogen stored in the muscles.

To summarize, anaerobic capacity refers to the maximum amount of energy that can be produced without oxygen, while the anaerobic effect relates to the physiological and performance changes that occur as a result of anaerobic exercise and training.

What is the best conditioning exercises for badminton players?

This is a harder question to answer than one might think. Badminton is an interval-based sport with many changes of direction and high-intensity work. Based on that, we understand that the best training for the vast majority of people who want to increase their stamina on court is not to run 10 km three times a week. Why?

Because you don't jog straight ahead at the same pace without stopping and without lactic acid in badminton. How many times have you seen a runner do badminton specific footwork drills to run a faster marathon? This does not mean that long distance running is completely pointless for a badminton player. It just means that it might not be the most efficient. Of course, long distance running (at a correct pace) has some positive effects, which we will go through later.

As stated above, badminton is interval based. What do the intervals look like? The Swedish Olympic Committee [SOC] writes in its requirement analysis from 2020 of badminton that the rallies are an average of 6.4 seconds with a rest of 12.9 seconds. This means that the rest is twice as long as the work (ratio 1:2). The heart rate is on average 86 - 93% of a player's max. A singles player covers over 1800 meters per match and a doubles player "only" 1100 meters. However this is for the best in the world. The median VO2max for men in the Swedish national team is 63.5 and 52 for women. This is not important for you to know, but for me, who writes this, it is important. To put it in perspective, that means running over 3,300 meters and over 2,700 meters in 12 minutes (based on the result from a cooper test).

Defining what fitness or good conditioning is not as easy as it seems. Do we mean V02max? How many games and matches can we play in a weekend? Is it how fast we run a marathon after a badminton match? Or is to run a certain distance in a certain time? For this particular training program, conditioning will be defined as being able to maintain a high intensity (tempo) throughout the match, to be able to play at a higher tempo for longer and to recover faster between each rally and after each match.

Before we can answer the question of what is the best conditioning exercise for badminton players, we need to go through some tests. Also on what YOU need in order to improve your badminton game based on your strengths, weaknesses, opportunities and obstacles.

Tests

There are many different tests to measure aerobic fitness. We will go through some of the most common ones, how to interpret the test results and which ones you can do yourself.

The Cooper-test

This is a very simple test to perform on paper (hard to perform in reality) that gives a good indication of your VO2max. There are two different variations: run as far as you can in 12 minutes or run 3 km as fast as you can. Running 3 km in 12 minutes means very good fitness. This corresponds to 15 km/h for 12 minutes. Remember to run on a flat course. If you are running too much on mud with uphill and downhill you wont

get as good a result as you want or can. Try to find a good track or even a treadmill. If you are running on a treadmill you need to run at a 1° incline to simulate the outside conditions. Just make sure that when you do the test again, you run on the same course.

Depending on the level you are at, you should have different goals on this test. It is not the same requirement for a world class player as for a person in low level national tournaments. In some cases you will find lower ranked players with really good VO2max, even better than the best players in the world. But that won´t matter because the lower ranked player can't keep the same tempo for as long as a world class player.

As mentioned above, men in the Swedish national team have an average of 63.5 in VO2max, which is equivalent to running 3300 meters in 12 minutes (from "SOK kravanalys badminton" made by Badminton Sweden in 2010, with some changes 2020). Keep in mind that there are many different ways of testing VO2max and the national team did it in a laboratory (I assume). Based on that, it appears that national team players are on average above the limit for what is usually considered "excellent". Important to point out again, the cooper test is a physical test for a specific metric, not an indicator that you will be able to play at a high tempo during long matches. However, it is of course a good thing to have a high VO2max and a good result on the cooper test. Just for fun, and to put it in perspective, Jens Burman, a Swedish cross-country skier, ran 3000 meters in 8 minutes and 57 seconds! Burman is an athlete whose sport requires a high oxygen absorption capacity and the training he performs is carefully tailored for that very purpose. A badminton player should therefore not try to compete with an endurance athlete because all sports have different demands.

There are some good "VO2max calculators" online and some charts for interpreting your cooper-test result. I would encourage you to do a cooper-test a few times a year to have an understanding of your baseline. However, if you feel that you are not increasing endurance or not improving on court but only on the cooper-test you need to revise the program. If your VO2max and your cooper-test improves it's great, but the feeling and the performance on court is most important.

Beeptest

The best way to perform this is in a sports hall or some place where it is good grip. If you were to do it outside you might slip and injure yourself. The problem with the beep test is that you don't get as valid VO2max indication as with the cooper-test. However, it is better for badminton because there are changes of direction. Here you can compete against yourself. Say you reach level 7 the first time you take the test and after a few months you reach level 10. Then you've improved. However, there are tables and charts that can estimate oxygen uptake capacity based on the beep test. But use the test to compete against yourself.

Shadow badminton (footwork)

This is a very important test to do. This is what affects your performance on the field the most in terms of more endurance and getting faster. Why? Because the movements for badminton are unique. You cannot recreate the movement pattern or the changes in direction on a treadmill, on a bike or even while playing football. In addition, playing badminton without a shuttle (depending on how it is performed) means that you can reproduce the test better than if it is an exercise with a ball. This is because the feeder can vary its feeding from one occasion to the next.

How to measure this? I recommend that you place shuttles on the court that you will move to the other side and then back. The important thing is that you set up the balls in the same way every time and that you leave them in the same place every time. Then you can decide whether you could do more or less than last time. After that, you can choose to see how many times you can move the balls before you can't do anymore movements. Or set a timer of 6 - 7 seconds with a rest of 12 - 14 seconds (1:2) and see how many movements you can do at maximum pace before you can't do any more. Then you can determine that you managed 15 intervals the first time and 16 movements the next time. You may have an unchanged result on the cooper test, but you could do better in the badminton specifics. In addition, you can use a heart rate monitor to see if the heart rate was lower during the same work. You could also use the heart rate monitor to look at how much longer you can stay at a high heart rate without losing performance.

Badminton specific exercises

To take it a step further, you can try some kind of multi-shuttle variant. There are several different options there as well. You can have the same arrangement as with the shadow work to do intervals for 6-7 seconds work and then rest 12-14 seconds. Or you want to hit 200 (or any other number) as fast as possible. Maybe you run at maximum pace and can handle 300 shuttles at the beginning of autumn and before Christmas you can handle 450. There are endless options. Choose one that you can recreate (!). The problem with this is, as I said, that it is difficult to redo the feeding in exactly the same way. Therefore, you should have definite patterns, e.g. one long one short, smash then hit net etc. Then repeat that pattern the next time. What is positive, however, is that it cannot be exactly the same way. Why is it good? Because badminton matches are never the same. You've never played two games that look exactly the same.

My best recommendation would be to choose 4-8 different multi-shuttle drills with 12 shuttles each. I would do them with 10-20 seconds of rest in between (you choose what suits you the best) and do these exercises for 3 rounds (8 exercises x 12 shuttles x 3 rounds = 288 shuttles). I would take a 1 minute break in between each round. We cannot recreate the exact same feeding, but we can control the time we rest and what exercises we choose. If you are exhausted after the 288 shuttles we have now found your max. The goal could then be to maintain or even increase precision, speed, shot quality while adding one more round to the schedule after 4-8 weeks. If you are more worried about the speed of movement (which you should), you might stay at 288 shuttles, but increase the tempo. This will however be subjective since I don’t know how to measure speed on court without expensive

equipment. You could possibly time each exercise and try and reduce it by half a second, but I think that will be more difficult and complex than just going by feel.

Repeated Sprint Ability

The reason why this test is mentioned is because it requires short-term high-intensity work. It therefore resembles badminton reasonably well (apart from the lack of changes of direction). RSA tests are valuable because you need to perform many maximal movements and then recover quickly between them. This will not be mentioned too much in this e-book.

YoYo-test

This test is one of the better ones for badminton players because it consists of changes of direction. Because it can be difficult to do the test alone, you should talk to others about doing it together. It is much like a beep test except there is a short rest between each action. The YoYo-test is good because there are then changes of direction and short rest (intervals). The drawback might be that it is a bit more difficult to perform and prepare.

Other tests

You can choose tests that suit you better that I have not mentioned above. If you love cycling, you can try to improve your times on it. However, it becomes difficult to determine exactly how to interpret the result.

Your strengths and weaknesses

This question (what are your strengths and weaknesses) can be difficult to answer. Most often we talk about getting better, but then we don't do any follow-ups or evaluations. Now, however, you need to determine what your strengths are when we talk about footwork, pace and endurance. It should be stated that this is important to do in all areas of you as an athlete regarding physical, tactical, technical etc. There are a number of people who move very fast, but whose shots are slow or not good enough to pose a threat. They need to work on their technique to get the most out of their potential. However, it must be said that this is not the case with most people I have seen at competitions. And there is probably no one who believes that you can be too fast. Would Lee Chong wei, Lin Dan or Carolina Marin have been better if they were slower? Would anyone have been better if they were slower? Would Chen Long or Chen Yin have been better if they couldn't play long matches at a high intensity? What must be said, however, is that the players mentioned above have fantastic technique in their footwork. Without a good footwork technique, you can follow this program without noticing much of a difference on court. You will be able to do more than before, but not as much as you would have if you had good technique. That's why I think it's important to prioritize training footwork technique first, and then prioritize conditioning (of course you can do both at the same time). Footwork technique is about work economy and if you can move while wasting less energy, you will be able to do more. Not everyone has the opportunity to train as much as we like on court due to lack of time, lack of training facilities etc. However, try to be creative and find a group training room in a

gym or do it outdoors. Anyway, anyone who reaches a high level as a badminton player has good footwork. It might not be their greatest strength, but it is extremely rare to see someone at a high level who lacks technique and/or speed in footwork and/or whose general fitness is bad.

So what are your strengths and weaknesses? Can you play an entire match without getting particularly tired, but you can't handle a higher tempo? Can you play really fast and intense, but only for a short while and then lose due to fatigue? It is not uncommon for this to be the case. Think about recent matches you lost due to tempo, stamina or something else physiological. What happened?

You also have to think about your playing style. Do you prefer to play short duels that you want to decide or longer ball duels to tire the opponent?

General conditioning - aerobic base

This program is for those who want to start with general cardio/conditioning training before it becomes (too) specific to badminton. In this program you will build a foundation for later moving on to badminton-specific conditioning training. This is how you can think about your weekly schedule if you practice badminton 2 or 3 times a week. As well as you can imagine training fitness 1-2 times in addition to that. It works great to replace running with a bike or rowing machine. 2 + 2 per week- for you who wants to build a base

Day	Training	Description	Volume	Rest
Mon	Badminton	Footwork	10 x 10 sec	15-20 sec
Tue	Running	Intervals	4 x 4 min	3 min
Wed				
Thur	Badminton	Footwork	2 x 5 x 30 sec	30 sec + 2 min
Fri				
Sat	Running	Distance - easy	20 - 60 min	
Sun				

In the program above, you perform cardio on Tuesdays and Friday or Saturday (doing the workout on Sundays also works, but it's not preferred). 4 x 4 intervals are performed at a fast pace so that you are really out of breath after each interval, but not completely exhausted. You should be able to perform an extra interval afterwards as a measure of how much you should push yourself. After four minutes, rest for 3 minutes and then do it again. However, you should still move during rest so that you are not standing still. Do a fast paced walk as rest.

Thursday consists of 5 intervals of 30 seconds with 30 seconds rest between each. After the 5 intervals, rest for about 2 minutes and then proceed to do it one more time.

On Saturday, it's easy-pace cardio that you do either running, on a bike or on a crosstrainer. You must be in heart rate zone 2 and be able to hold a conversation

during the session. If it gets harder than that, it's going too fast and you need to take it easy. For beginners, it is usually best to alternate jogging and walking to maintain the right heart rate zone. On a bicycle or cross trainer, it is easier to adjust for beginners. Try to increase the duration by 10 percent per week.

2 + 2 per week - for you that is used to conditioning work

Day	Training	Description	Volume	Rest
Mon	Badminton	Footwork	10 x 10 sec	15 sec
Tue	Running	Intervals	8 x 2 min	1/2 - 1 min
Wed				
Thur	Badminton	Footwork	6 x 30 sec	20-40 sec
Fri				
Sat	Running	Intervals	6 x 60 sec	2 min
Sun				

3 + 1 per week - base/foundation

Day	Training	Description	Volume	Rest
Mon	Badminton	Footwork	6 x 30 sec	20-40 sec
Tue	Badminton	Footwork	10 x 10 sec	15-20 sec
Wed				
Thur	Badminton	Footwork	10 x 10 sec	15-20 sec
Fri				
Sat	Running	Distance - easy	20 - 60 min	
Sun				

3 + 1 per week - for the intermediate player

Day	Training	Description	Volume	Rest
Mon	Badminton	Footwork	8 x 30 sec	30 sec
Tue	Badminton	Footwork	10 x 10 sec	15-20 sec
Wed				
Thur	Badminton	Footwork	10 x 10 sec	15-20 sec
Fri				
Sat	Running	Intervaller	4 x 4 min	3 min
Sun				

Progression is important to consider and in this general program I recommend a slow progression. You can start by increasing the volume for the footwork training with one interval per week for 5 weeks. After that, you can start reducing the rest by one second per week. That means 15 x 10 seconds with 15 seconds of rest after five weeks. Week 6 you rest 14 seconds, the week after that 13 seconds, etc. You can

also choose to increase in another way, but do it at an appropriate pace. The different approaches will affect how fast you recover between duels or increasing speed-endurance.

Choose either a distance such as 5, 7 or 10 km or a time of 30, 40, 50 or 60 minutes. Try to increase by 5 - 10 percent per week. Do not increase more than 10 percent per week, because that is how overtraining and injuries occur! That is, for those who run 5 km week 1, you should run 5.25 - 5.5 km the following week. For those who run for time, you increase from 30 to 31:30 - 33 minutes and so on.

For the 6 x 60 intervals you could increase around 1 interval per week or progress by doing 1 x 30 seconds after you've completed the 6 intervals.

I do however have to really stress that increasing EVERYTHING at once might not be the best choice. Choose one or two days where you can increase 5-10 percent per session (total increase is 10 percent over the week). I understand that you want to progress fast, but just by committing to a program for 8 weeks will give fantastic results.

When the base and aerobic capacity is good: anaerobic training

We have already mentioned aerobic capacity as well as anaerobic effect and anaerobic capacity. Go to that section to read it again if you have forgotten it. We also mentioned some benefits for badminton if we develop these different energy systems.

I like to do this sort of training, the anaerobic, on court to get the full benefits of change of direction and so on. I tried a lot of intervals during my years as a player on bikes and treadmills, but they did not give me what I needed on court. I can only speculate, but I am very certain it was because I was too unspecific. Intervals on bikes and running can be really good and beneficial, but for my weaknesses on court I needed more on-court exercises such as what this chapter will introduce.

For anaerobic capacity I would use short, high-intensity intervals around 30-40 seconds with a LONG rest of about 2-2,5 minutes. But remember, you should be exhausted afterwards. The long rest will be quite strange as a badminton player, but if we want to develop certain areas we need to actually train them. This would be great for those who need to increase their explosive power as well since the long rest enables us to be fully prepared for the next round. This would be done for about 6 intervals. In between rounds you could practice some net shots, serves or other non demanding things.

For anaerobic output, which focuses more on endurance, we want intervals at around the same length as above (around 30-40 seconds). The difference is that we dont rest as long. For this I would recommend resting 1:1 to 1:3. My preference would be to do 6-12 30/30 intervals.

These could be done without a racket and using cones that you tap with your hands around the court. It doesn't have to be badminton specific movements, but incorporate CoD.

The example below is a thought experiment where I try to train all areas during the week, but more focus on anaerobic training. The danger in training everything at once is that we are less likely to improve.

Day	Training	Description	Volume	Rest
Mon	Badminton	Footwork	6 x 30-40	2-2,5 min
Tue	Running	Intervals	4 x 4	3 min
Wed				
Thur	Badminton	Fotarbete	6 x 30-40 sek	30-40 sek
Fri				
Sat	Running	Intervaller	6 x 1 min (hard)	2 min
Sun				

I do think that this will be quite effective for someone who is in need of improving all areas to get to a certain base level. The better we get at something the more we need to practice that specific thing in order to improve. That means that after a while, we need to choose one area to focus on for 4 weeks and then just maintain all other areas in the meantime. The 4 weeks after that are with a new focus and so on. So as you see we incorporate aerobic capacity, anaerobic effect and output during this week.

Even more specific intervals for badminton??

Okay, so even though we know that we rest twice as much as we work on court it's not always 6 seconds of work followed by 12 seconds of rest. Usually we have a few short rallies and then there might be 10 rallies that are long with short rest intervals afterwards. These irregularities is something we cannot train for, but we can try and mimic it as much as possible. Down below are suggestions for some intervals that follows that irregular work/rest ratio. You can use them on court, running on asphalt or hills as well as on a bike. Work and rest are in the unit seconds.

Version 1

Work	Rest	Number of intervals	Tot min
Block 1			
30	30	4	2
20	40	2	2
40	20	1	1
Active rest 1-2 minutes			
Block 2			
20	40	4	4
15	45	2	2
45	15	1	1
Active rest 1-2 minutes			
Block 3			
10	20	8	4
30 all out!		1	0,5
Cooldown 5-10 minutes			
Duration: 16,5 min + pauses			

Version 2 with slightly longer duration

Work	Rest	Number of intervals	Tot min
Block 1			
10	20	6	3
40	20	1	1
10	20	6	3
Active rest 1-2 minutes			
Block 2			
10	20	4	2
30	30	2	2
20	10	4	2
Active rest 1-2 minutes			
Block 3			
15	15	4	2
40	20	4	4
30 MAX		1	0,5
Cooldown 5-10 minutes			
Duration: 19,5 min + pauses			

Different types of conditioning and their benefits

Badminton players are not limited to just running for cardio. Cycling, rowing, cross trainer, Ski-Erg, jump rope and circuit fitness/HIIT are also cardio training. For injury prevention purposes, I prefer a large variety where you can improve the oxygen absorption capacity in more gentle ways. After all, the goal is to have more stamina on the badminton court, not to run 3 km in under 10 minutes (even if that would be cool). It is less tiring for the joints to perform 40 seconds of maximum work on a bike compared to sprinting. After all, the goal of that training is to perform maximal work for as long as possible to improve explosiveness, anaerobic power, and aerobic capacity. However, a counterargument is that cycling is less specific than running for badminton. It would thus mean that cardio training on the bike is less valuable than running. That may be true if the goal is only short-term performance, but from an injury prevention point of view, the bike may be a better option if you are planning to train a lot, if you weigh much or are prone to injuries. It depends on how an athlete feels. If there is some pain in the knees or something else, the bike is a better option in my opinion. However, one should consider resting or not exercising maximally if there are any pains or small injuries anywhere. That's because a less-than-optimal workout that keeps you injury-free is better than the perfect workout that leaves you injured. Then I should also add that if you get injured from a form of training, it cannot be perfect. It sounds very obvious when you read it, but there are many people who do not understand this. If there are any bad sensations in joints and/or muscles, perhaps an easier session with a cross trainer is preferable to both cycling and running. If the problems are in the lower body, the Ski-Erg can be an alternative for training fitness without strain on the lower body. It is a machine that corresponds to staking that cross-country skiers do, i.e. only with their poles.

Having a generally good condition is a very vague concept that is difficult to make sense of. How fit are you in general? What does this mean? Based on the purpose of this training program, it can be said that you should be good or at least decent on all different types of training forms that relate to fitness. For this program, talking about aerobic and anaerobic training and their different concepts, you should be decent on all of them. If you are great at running (long and short distances), but useless at short intervals and recovering betweens rounds, then you might lack in some areas of the anaerobic energy systems. Therefore, practicing different areas of your overall conditioning (both aerobic and anaerobic) makes you good at these different things. For you to be in generally good conditioning, you need to be balanced on all areas of your physical self. For conditioning we focus on being balanced on both aerobic and anaerobic energy systems. For strength we don’t want to be the athlete who is super strong but not explosive. Even there we search for a balance.

One thing worth mentioning is that all of us need to get better at different things. For some, it is to build an aerobic base, which means more work at lower intensities, e.g. long distance where you can have a conversation while training. Some have a good aerobic base, but need to get better at anaerobic moments to be able to produce more power for longer on the court. Additionally, it is important that athletes become comfortable with not being comfortable. It won't get easier just because you get fitter or faster, you'll have to get used to it being hard.

Now to make it easy to understand how you should use everything that is written about the different forms of training, I will show an example of training everything in a week.

2 + 2 per week

Day	Training	Description	Volume	Rest
Mon	Badminton	Footwork	6 x 30-40	2-2,5 min
Tue	Running	Intervals	4 x 4	3 min
Wed				
Thur	Badminton	Fotarbete	6 x 30-40 sek	30-40 sek
Fri				
Sat	Running	Intervaller	6 x 1 min (hard)	2 min
Sun				

This program was previously in the document as you might remember. Switching the intervals from running to biking works great. We want to have a small variation in the training just to reduce overuse injuries, but in most cases it works fine to do the same each week. If you want to make some changes because you can get sore knees from running too much then go ahead and change to a bike or something similar. The training will continue for many years to come so take your time and stay injury free.

High Intensity Interval Training (HIIT) can be performed in many different ways. Basically, it means you perform a maximum interval until you can't continue anymore, rest long enough to be able to do the work one more time and repeat. Imagine running as fast and as hard as you possibly can for as long as you can. Yeah, that sucks and usually it lasts 30-45 seconds. Then taking around 3-5 minutes to recover and doing it again. That type of training is most effective for improvements in both VO2max and speed. However, it is very tiring. Confusingly enough, there are also HIIT-classes which various gym chains often have as a workout class. They often involve performing various exercises such as a circuit workout with short or no rest between exercises. For example, it could be jumping lunges followed by jumping rope followed by standing rowing with a barbell and so on. This type of HIIT is not the same as the first one mentioned in this section. However, it might be fun and it might give some benefits for you as a player, but I would not overdo this and think my VO2max and everything will increase. If you were to do one of these sessions and plan it yourself you could however use movements that mimic those made on court. Furthermore, it's a time-efficient method, but one that may not optimally benefit the fitness training for badminton. However, it is as mentioned previously possible to make it a good tool for badminton players. By doing the exercises aimed at actions that take place on the field, you can get used to different actions. As mentioned above, it is tiring for the body and results in a lot of lactic acid. Imagine doing burpees, jumping lunges, shadow badminton defense for singles and jump rope before resting for a short while and then doing it again. Burpees correspond to how you get up after a dive, which today is common at all levels. Jumping lunges are for maintaining explosiveness and flexibility for one leg at a time which is practical for a badminton player. Shadow badminton is very badminton specific. Jump rope is more of a finishing exercise that is good for basically everything

connected to badminton. However, make sure you understand the differences between the circuit and the true HIIT as mentioned first.

Conditioning for junior-players

This program will primarily focus on those in their later teens and adults. A full program for juniors and youth players will be coming soon. However, it should be mentioned briefly here as well.

One thing to remember and understand is that the long-term perspective is important. The foundation you build before U19 will help you. That's because as a senior, you have very limited time to improve physical abilities during the season. And when there are periods of rest and recovery you need to focus on, you guessed it, rest and recovery. You can't improve your aerobic capacity AND rest. The players who compete in the biggest competitions have basically no breaks in their calendar to train hard for a month, they might get 2 weeks for that. All England is played in March, WC or Olympics at the end of August, Thomas and Uber Cup and more in the autumn. There are Super 1000 tournaments at the beginning of the year as well as in each quarter of the year, there are national championships etc. In addition, they need to compete to have a good ranking, which takes up the rest of the year. Normally, there will be a shorter period of rest, but then the athletes need just that: rest. Therefore, it is beneficial to have a very good aerobic capacity that you have steadily improved during the years as a youth and junior.

Until you are about 16 years old, it is important to have built a good foundation to be able to train hard when you get older. Whether you want to be the best in the world or just a little better at badminton, you will benefit from this. You don't have to spend too much time and energy finding the "perfect" program. Follow the guidelines with progression mentioned above. I do think you could use a lot of the programs as mentioned previously, but I think there needs to be a few microcycles per year where you focus more on different aspects than those of an adult.

For you who haven’t trained that much previously

Start by jogging until you find it difficult to hold a conversation, then you walk until your breathing calms down and start jogging again. Choose a duration that you want to be running for, let's say 20 minutes. Half the time might be spent walking and the other half jogging, then over a number of weeks try to be able to jog 20 minutes without walking while not being too out of breath when you get home. It's a great way to get better at running. There is no need to think about running fast. You should be running VERY slowly. Combine that with running the length of a football field (100 meters) and then you walk the short side (40 meters) and then run the 100 meters back and repeat. Do that for 15-30 minutes and you will have a great workout. That is called “the envelope”. You can start warming up or finish with footwork for badminton. However, focus on the footwork technique because it will give you the most positive effects for badminton.

For you who have trained previously

Use a similar principle as above but with a longer distance. Say you can run 20-30 minutes without the heart rate being too high, but you want to be able to run upwards of an hour. Then you run until breathing becomes too heavy (15-30 minutes) and THEN you start alternating brisk walking with jogging. So it's the same principle as above, but running first and then walking/running.

The envelope is an exercise that you do on a football field (also works on handball fields) where you run as fast as you can diagonally across the field and then walk/jog across the short side to run diagonally to the other side. Just as above, you can practice your footwork before or after doing the envelope for 15-30 minutes.

For you who are used to training

When you are experienced in running and training aerobically and anaerobically, it can be of good use to train more specifically for badminton. This applies to cardio training that includes changes of direction, intervals and footwork. Don't stop training long distance because it's important to be good at it until you play in the U17s or so. That's when you should focus more on explosiveness and being able to recover fast between intervals. I would say that long distance running might be good if you enjoy it, but doing too much will not help in my opinion when you reach age 17-19 and above. For me personally, I would have benefited from it more than others. And others would have gained more by doing shorter intervals.

Even for the well trained, the envelope is very effective. You who have trained a lot of fitness will get great effects from putting in those types of intervals. However, it may mean performing more intervals before exhaustion or just running faster. What you could also add are 10 to 12 high-effort 70/20 intervals to really work on improving aerobic capacity. This could be paired with faster, shorter intervals as well as seen previously in the document.

ATTENTION! No matter what level you are at, you benefit from long-distance and interval training. Do not overexert yourself with each session as this can lead to injury. Listen to your body, find the exercises that you find most enjoyable and do it.

Afterword

This is the first of many free programs that Sugiyama will publish with me, Robert Jonsson, as author. Our goal is to change badminton and a step in the right direction, according to us, is to issue easy-to-understand and basic training programs at no cost to all players throughout Sweden and the world. It should have been done years ago, but now it is available. Sugiyama and I hope that you who read this can take something with you to your training that will help you reach your goals.

When it comes to footwork, consider varying the length of intervals and rest to mimic matches. There are no set times once you play a match. However, it is worth training harder to get the body used to greater physical load than is required.

Because as you get better, your opponents get better and then you will experience the same difficulties as before.

Bonus section for us who likes research

In this part, some interesting studies or parts of books that are relevant to the area are described. Unfortunately, it must be added that there is a lack of research on badminton in particular and therefore in many cases one must use logic and experience to determine whether it can be transferred to badminton or not.

"The Effect of Eight-Week Sprint Interval Training on Aerobic Performance of Elite Badminton Players" by Liu et al., (2021)

A study conducted on elite level badminton players was conducted over eight weeks to investigate the positive changes in aerobic capacity. Training consisted of sprint interval training (SIT), which was done by interval training on a bicycle and one multiball session a week for one group, and the control group performed one multiball session a week and two Fartlek sessions. The reason why they used a bicycle was largely because it is less tiring than running, which means a reduced risk of injury. In addition, the bike is less dependent on weather, which is positive for those who train all year round (mainly winter for us in the north) or when it is too hot to run outside for other countries. The training was carried out on Mondays, Wednesdays and Fridays. The cycling was carried out on Monday and Wednesday and consisted of 5 intervals of 1-2 minutes of easy cycling and then 30 seconds of maximum power sprints followed by 5 minutes of active recovery. Even the multiball part of the training program consisted of maximum work for 30 seconds x 8 times followed by longer rest and then it was repeated again. The conclusion of the study was that the aerobic capacity is improved for the badminton players. Improvements in oxygen uptake and recovery ability could also be demonstrated as an effect of the training program.

In the book "fitness and endurance - for training, competition and health" (original title:"kondition och uthållighet - för träning, tävling och hälsa") by Mattsson & Larsen (2013) there are many important parts to understand for those who want to train conditioning. The most relevant and important part of the book for badminton players is that there are many ways to train conditioning, but it is with intervals that you get the best effect. In addition, it is important for badminton players to recover between each effort (rally) and it also makes intervals a more sport-specific exercise than long-distance running. However, long distance running may have some function for players who are in early summer and need to build an aerobic base. Continuing with too much long distance during the competition season is likely to be negative as the authors suggest that the muscle fibers can be converted from fast to slow. It's not that one session destroys all the explosiveness you've trained, but if the goal is to develop maximum explosiveness, you should take it easy with the jogging trips that last several hours.

Mattsson (2014) has written a book on training planning that is of great importance to understand and apply. You shouldn't train the same way all year round. How you train, how hard, how much, what and so on is determined by what part of the season it is and what the goal is for that particular part. When the spring semester is over for

the year, it may be time to take a shorter recovery period with some physical activity, but not too much high-intensity training (around 2 weeks). After that, a "build-up"

period begins, which turns into a more sport-specific training period and then becomes the competition season. Below is a proposal for an annual plan.

Month	**Part of Season**	**Focus Area**
June	Partly summer recovery	Recovery and minimizing loss in performance
July	Pre-season - general foundation	Aerobic capacity, strength and explosiveness.
Augus	Pre-season - sport specific	Aerobic capacity, explosiveness and plyometrics.
September - November	Competition	Maintain aerobic capacity. Develop explosiveness.
December	Partly recovery	Recovery, both mental and physical for spring semester.
January-may	Competition	Maintain the physical abilities developed and maintained from june and forwards.

What is missing is determining when the competitions are to be played as it is important for the annual plan. Making a training plan for each year is something that everyone should do. Decide which competitions will be played and which physical abilities that can be trained during the different periods.

This was just a small taste of what will be in the paid program. There will be many free training programs for different types of players based on playing style, category, age and more. However, you can use the principles in this training program and make it unique to you! Individualize.