Ergonomics Research Techniques

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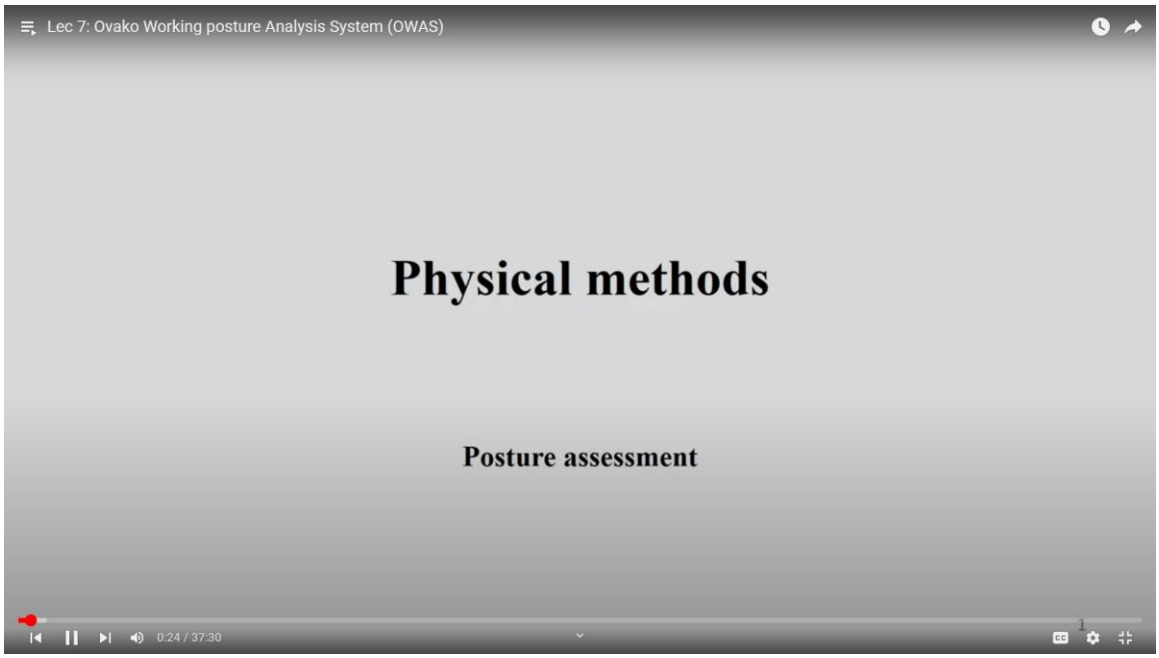
Week – 02

Lecture - 07

Lec 7: Ovako Working posture Analysis System (OWAS)

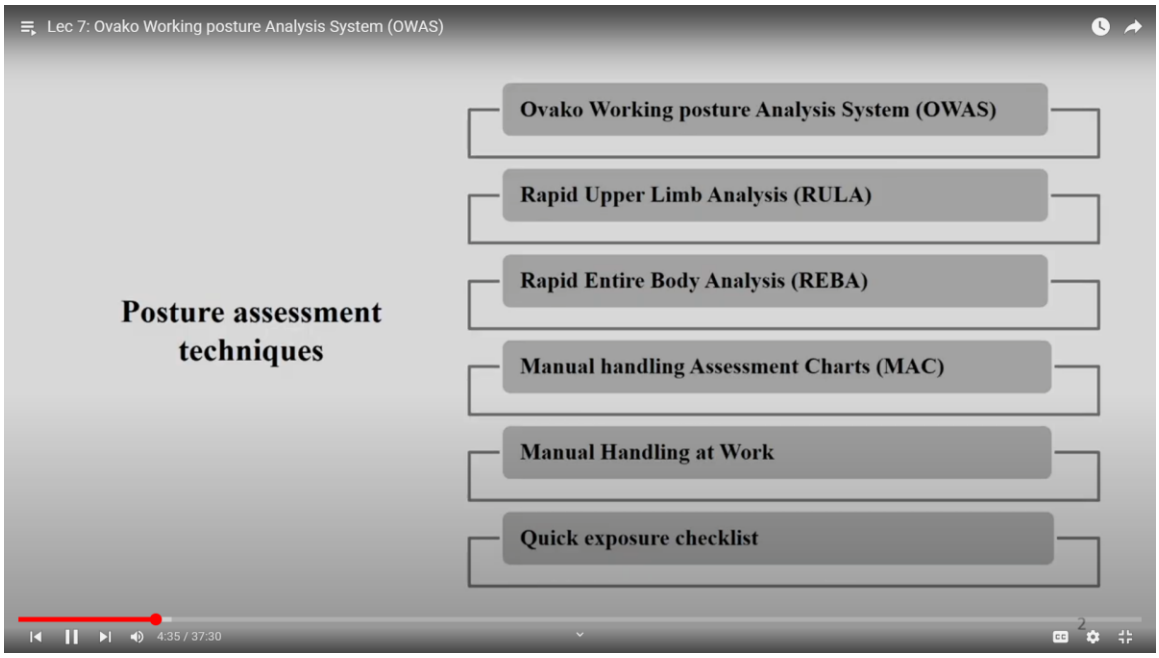


Welcome back. Today, we will start by detailing each technique regarding the posture assessment. So, in the last introductory class on physical methods, I mentioned that there are varieties of small tools available for posture assessment. So, at the very beginning, what types of tools or techniques did we use for posture analysis? Slowly, how has it been modified, and how has it gone into more detail that we will take further? Now, the question is it is not always like posture. When we talk about posture analysis or assessment, it is not always about the whole body. Depending on the requirement, depending on the type of activities people are doing, we choose a tool and take part in it.

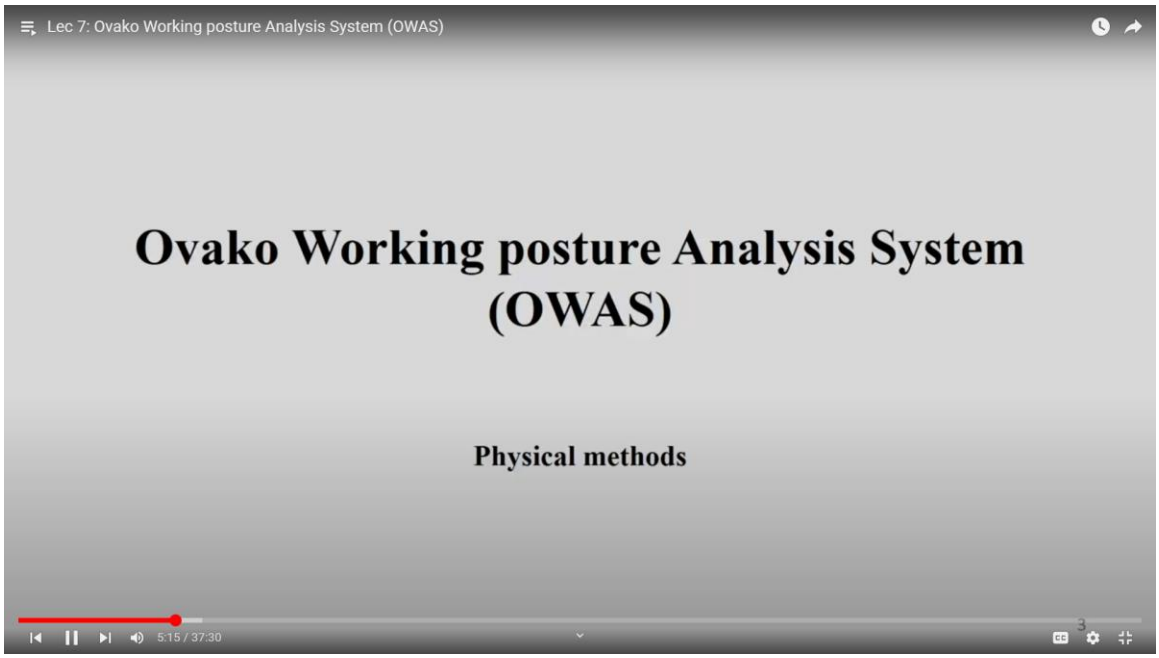
So, if you look back, maybe 30 or 40 years, what used to happen is that most of the work was very physical in nature. So, everything was quite manual more than 50 years ago before our industrial revolution. So, people used to do a lot of manual activity, a lot of heavy load lifting, a lot of awkward posture, and a lot of shift in the whole body posture during the work shift. Now, based on such things those days some tools were developed.

Slowly, over a period of time, due to different changes in our working nature posture, it has been observed that in recent days, postures are very much static in nature, and it happens that most of our limbs are in an active condition, especially upper limbs. So, we sit in a particular posture that occupies a sitting posture, and we bend, do activities, and do such things. Although it is not completely true for construction workers or, you know, shop floor workers, it is not true for them; in most cases, in the case of office workers, what is the kind of majority of the things right now, they occupy a sitting posture. So, for them, though, the earlier tool was not applicable, and they have developed some other tool that is very specific for the sitting posture. After that, there was also some realization that not only sitting posture but also some activities, like when we developed some stand work station rights.

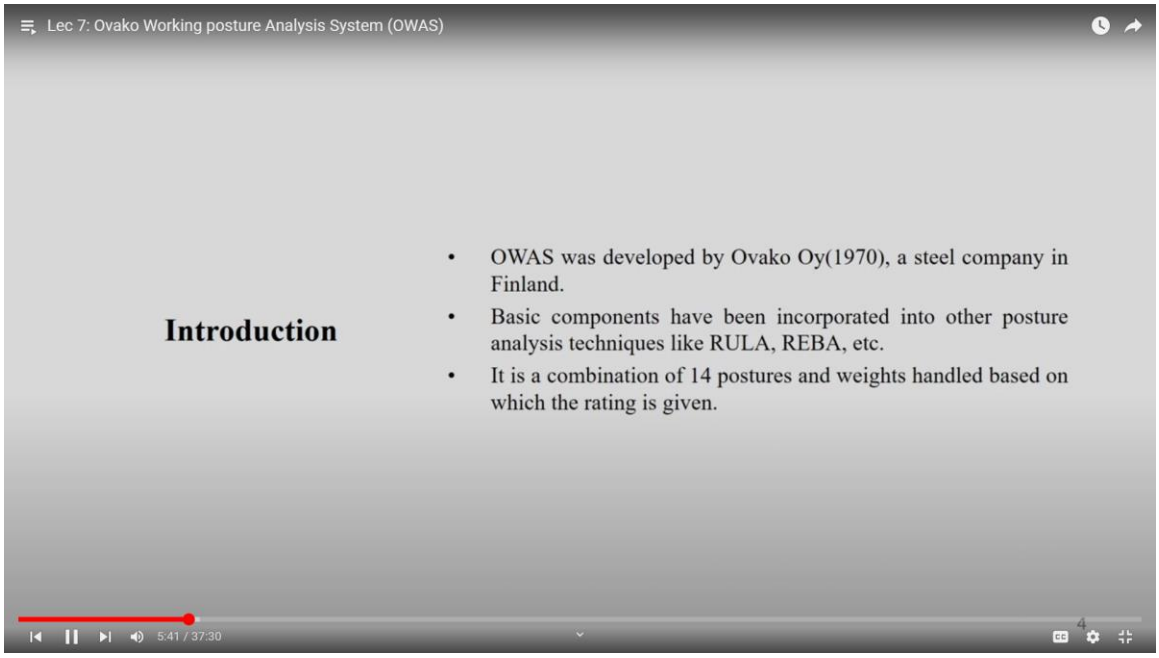
So, in the case of a sit-stand workstation and for many such cases where it is necessary for us to understand the whole body posture then, there are also some changes. In some postural posture assessment tools, more emphasis is placed on the duration of exposure and frequency, and, in some cases, specific body parts of the posture of specific body parts are important. So, we will not be able to cover everything. However, we will try to spend as much time as possible on this particular course. So, let us start with the very old tool, the Ovako working posture and assessment or analysis tool.



So, first, let us understand what we are going to cover during this particular set, you know, the set of or section of this posture assessment tool or posture assessment technique. So, first, we will be going for the OWAS Ovako working posture analysis system. A very commonly and widely used tool is the RULA rapid upper limb analysis. Third, rapid entire body analysis, manual handling assessment chart or MAC, then manual handling. How do we handle manual work? In the end, maybe we will take up the quick exposure checklist, which is very common now, you know, in the current scenario.



So, let us start with the Ovako working posture analysis system.



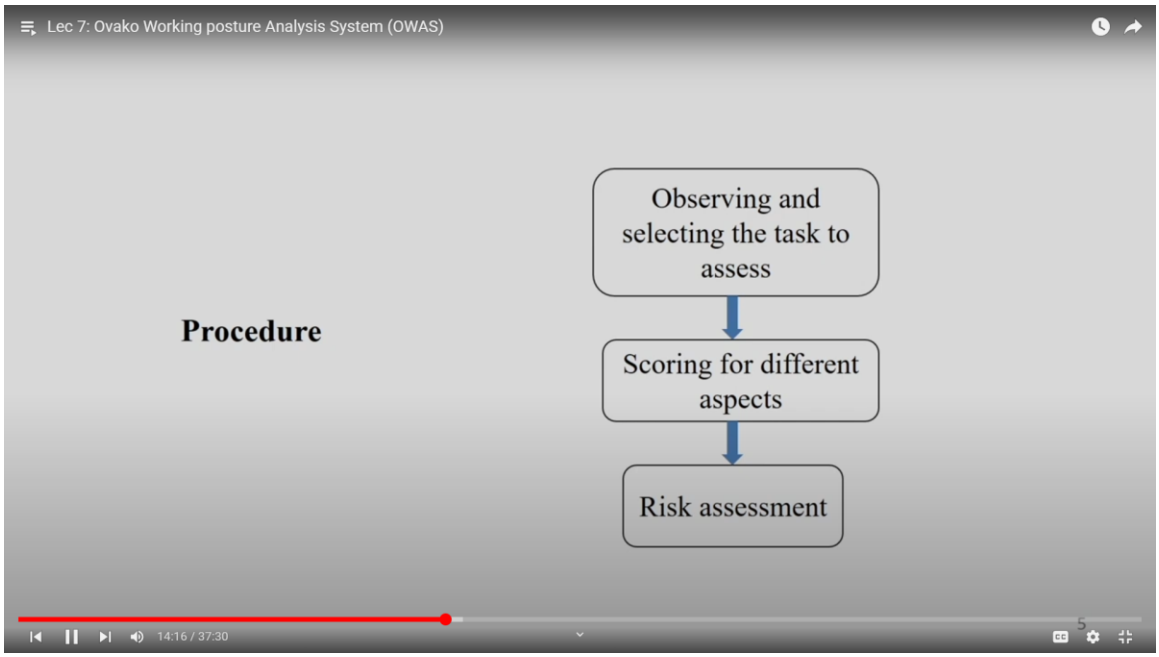
So, it is this is a very old tool, and as per my understanding and from many other researchers, this is a primitive and very old tool in the case of posture assessment. So, this was developed in 1970. This is a company named Ovako, and from there, only this particular tool's name came into existence. So, it was a steel company in Finland, and there, the safety and health department basically developed this particular tool. So, basic components of various other tools, such as RULA and REBA, are actually derived from this particular basic tool.

Now, what was the concern when they developed this technique or developed this particular tool? They realized during the work assessment that when somebody is working in some non-neutral posture, then there is a chance or there are some reports that they have some discomfort or, for a long period, some disability for those particular body parts. From that point of observation, they started enquiring about how we try to understand or assess the working posture. So, before going into the discomfort level or before going into the disorder level, we can prevent it, and we can modify the posture and the working posture, and therefore, we will be able to save money. So, whenever there is a company, and there is, you know, posture, posture-related disorder, and they go for medical treatment, then there is always what will happen the cost is associated with the company or with that particular institution. So, from that perspective, they started enquiring, and once they started enquiring, they found that, to some extent, we can assess the bad work posture or awkward posture, and that work posture also we can give some kind of grading.

Now, if we give a grading to some working posture from that grading, we can understand this posture. If it is extremely towards the higher side of awkwardness, then this particular posture needs some kind of intervention. Normally, posture is very much associated with the working tool, working machinery, working workstation, or work condition. If there is some kind of sharp edge present in your work environment or work days, you will try to avoid it, and you will occupy some kind of posture that is not normal or non-normal or neutral; it will go in an awkward direction right. So, if something needs to be worked on very far from your body, then also there is always a chance that you are going to occupy some kind of awkward posture. Therefore, if at the very beginning, there is a chance for us to evaluate or to analyze and assess where my posture is graded, then there is always a chance for us to rectify it at the design phase, and there will always be a chance to have less discomfort, less disorder and less medical cost associated to that particular work ok.

So, from that perspective, only this particular tool was developed, and now we are going to discuss it further. So, what is the procedure to go ahead with this particular tool? The first is observation. What are you going to observe? You are going to observe the working posture. Now, the question is which posture you are going to observe because if you look at a particular working posture or working scenario, the posture is not always constant. It keeps on changing.

It is very much dynamic in nature. So, our observation is based on the objective of this study. Here, there are some general guidelines. We try to observe those postures that frequently occur during a particular shift or work shift. So, some postures are frequently occurring.



Maybe in a particular cycle or in a particular work shift, if a particular posture is occurring very frequently, then we are going to observe, or we are going to assess that particular posture. What is the reason behind it? The reason is that if you are occupying a particular posture very frequently, your exposure level is going to decide the exposure level. So, that is going to tell you what kind of postural load you have on your body. So, what kind of musculoskeletal stress or strain is getting generated due to that particular awkward occupied posture? This is one thing that frequently occupies posture during a particular shift or particular exposure level. The second observation or second selection can be the apparently, which is very much awkward in nature that kind of. Posture, you can also check for your analysis.

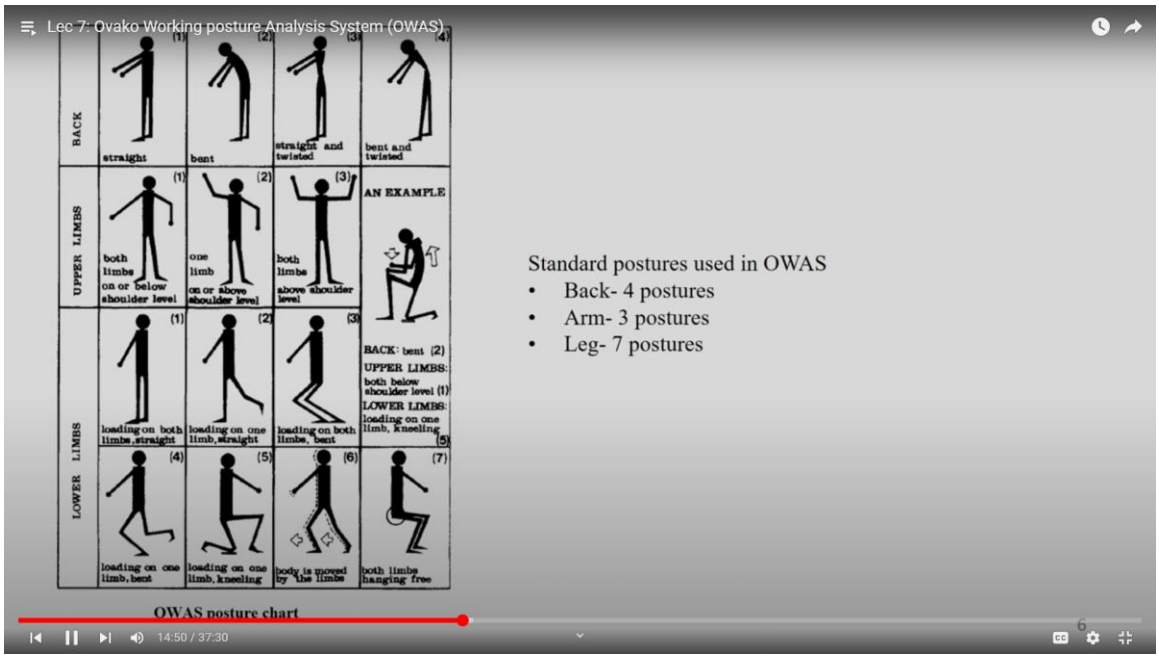
Third is the kind of posture that you are holding for a maximum period of time during your whole shift. One is frequently occurring, which means you are holding a posture. You are changing it again, and you are holding that particular posture. So, that is the kind of frequency you have to count. The third one is the kind of posture that you are holding for a longer duration. Those postures are also kind of dangerous or not dangerous. I would not I cannot say dangerous; I will say the posture is a concern. So, that kind of posture is also a kind of concern.

So, there are two major selection criteria: one is frequently occupied posture, and the other is the posture that the worker is holding for longer hours. So, from the observation you have to understand which posture you are going to assess. You always have the freedom to assess all varieties of posture. However, depending on your objective and

your study, you know the aim, and you should decide which posture you are going to adopt once you are going to select.

Now, once you select that particular posture, you have to understand which task is associated with that particular posture because when you are holding a particular posture, you are definitely connected with a particular task. So, you are going to do that at the very beginning of your posture analysis. So, first is your observation, and second is selecting which task or which posture you are going to analyze. Once you have that, then what you have to do you have to score for different aspects that we are going to understand in the next slide. So, you have to give scoring.

Now, once you do the scoring, you will automatically put it into the pre-computed table, and from there, you will assess the risk. This is the whole procedure for the Ovako working posture analysis system or assessment tool. Now, let us understand this particular picture. If you look at Ovako's working posture analysis system or OWAS, we have three major areas that we are going to analyze or assess. First is back, second is arm and third is leg.



Now, if you look at 1970 or 1960, those days were the major body components involved in major activities. So, you know, grossly. So, earlier, nothing was specific. So, grossly, it is the trunk, arm, and leg. The trunk actually holds your whole body, The upper arm, like these arms, helps you to lot of do hand movements and legs, which you know helps you to occupy different types of posture and also helps to go for the different movements, ok?

So that is why there are only three major components. Now, if you look at this figure back, we have four gross figures ok four gross postures that can be adapted to industrial situations. Now, here you will. You may have some arguments, but not only these types of bending, but there can be varieties of bending. Yes, theoretically, it is possible. However, if you look at the industrial activities and industrial movements, you will see these are the four major movements possible, and normally, they do this much.

So, what it says is that if you are working straight. So, if you are working straight, your spine is in very neutral condition. There is no bend, no problem. So, it is one ok fine. Next is bent, bent towards the forward direction.

So, this is two straight. However, it is a little twisted. So, you are standing straight. However, you are doing your activity little in the twisted design. So, your vision is not on the front side. It is either on the left side or on the right side.

So, in that case, there are three. You can understand that if you are looking straight in a forward direction, then it is a very natural kind of posture. So, that is why the score is one. When you are looking at it straight, however, you are bending a little forward, then it is two. If you are straight and doing your activity either on the left side or on the right side, then it is three. The last one in this particular table is four, which is when you are bent, you are, you know, in a forward bend condition, and either you are working on the left side or right side.

So, you are actually crossing your body midline. So, here, when you are actually crossing your body midline, then you are developing a lot of stress on your trunk muscles. That is why grades were given in this way. So, for trunk bend, sorry, straight one, bend in the forward direction, two straight left or right twisted three, and bend left or right twisted four. Now, here you again can come to argue that we can have a backbend, and you can have side bending.

Yes, it is possible, but if you look at the industrial working conditions, these postures are not normally being used. However, you will look at other adaptations or modifications in future posture assessment tools. There are some more considerations on these aspects. Clear? Clear about the trunk? Now, coming to the upper limb, ok. So, arm here, we have three major postures, both limbs on or below the shoulder level. So, this is your shoulder level if you are doing some activity that is below shoulder level.

So, your shoulders are in a kind of resting condition, and it does not get any kind of stress. So, you are having a score of 1. Now, if by chance one hand is below shoulder level and another hand is above shoulder level, then as per this figure, it is 2. It can be either the left hand or the right hand. It is in the figure. One kind is shown, but it can be both hands, like left hand up, right hand down, or left hand down and right hand up. That is all possible.

So, that is 2. The next is 3 when you are working with both hands above shoulder level. Of course, you can understand it is very easy. You can really connect it with the kind of stress you will be getting on your shoulder if you are, you know, working above shoulder level with both hands, ok? So, the arm has 3 postures. So, the backhand, back, or trunk has 4 postures, and the arm has 3 postures. Now, for legs, we have 7 varieties of posture.

It is very interesting over here because, in those days, a lot of stooping activities, kneeling activities, and half-sitting activities needed to be done in the industrial situation. So, it has 7 kinds of varieties. Now, legs are the only body parts that actually bear the whole load of your body. So, it is very important for us to know what the leg's postures are. So, what it says that first is the scoring one. It says loading on both limbs straight.

So, you know equally. So, you are standing straight, giving equal pressure on both your feet, and you are working. The second is loading on one limb, which is straight, and the other is the little bend, which is 2. So, there is no equal distribution of your body weight on both feet. So, one has more, and another has less. The third is loading on both limbs. However, both limbs are bent ok.

So, you can understand if you are in a half-sitting condition without sitting support, then what kind of posture it is. So, that is kind of 3. Loading on one limb, however, that limb also kind of bends more stress. So, it is 4. Loading on one particular limb, and that is in a kneeled condition.

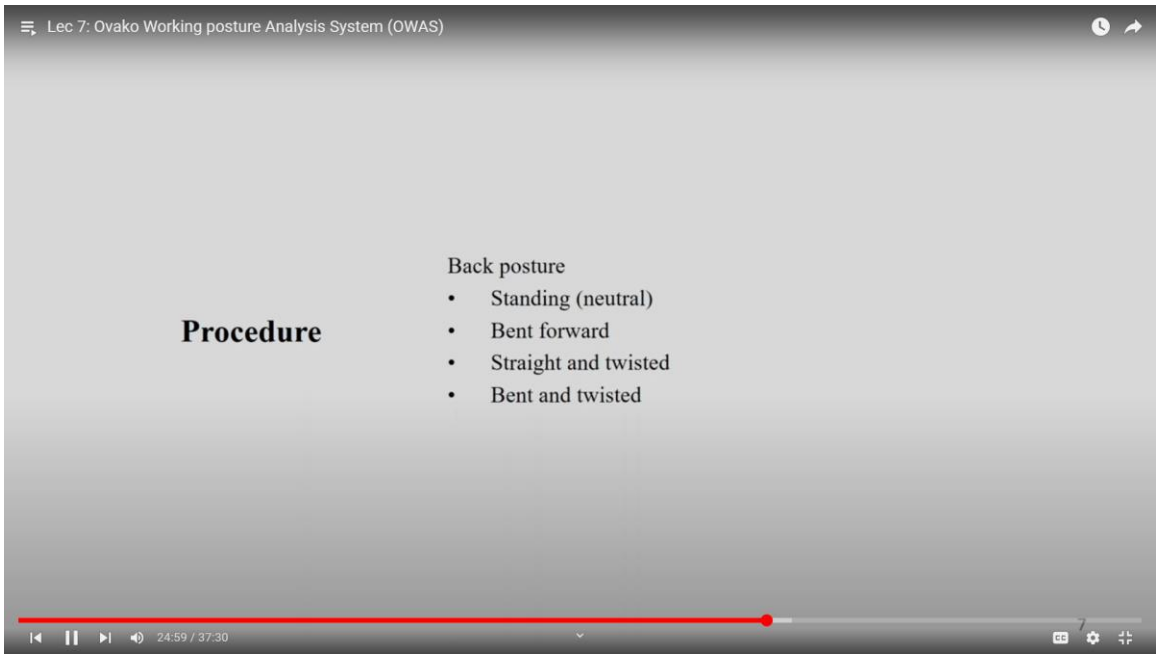
One limb is in a limb kneeled condition that is 5. The body is moved by the limb. So, you are walking kind of walking, okay? Then it is 6, and both limbs, you know, are hanging free. So, you are actually half sitting condition you are doing some activity that is 7. So, it is a very, very difficult posture to hold it for longer hours.

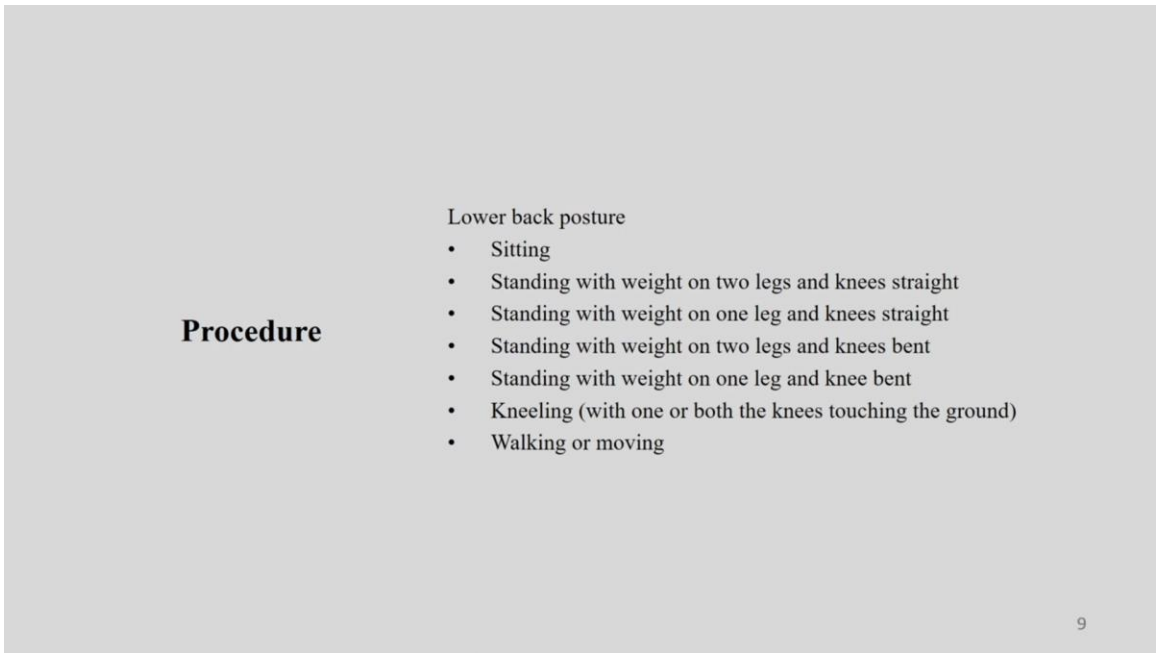
It is really next to impossible if you look at the current situation. So, this type of posture needs to be avoided very, you know, at immediate intervention through immediate

intervention. So, these are the kinds of limb lower limb postures we can have in the wash. So, we have back, we have leg, we have. So, these varieties. So, if you have to do for a particular posture once you decide yes, this posture needs to be assessed, what will you do? You will check for back first.

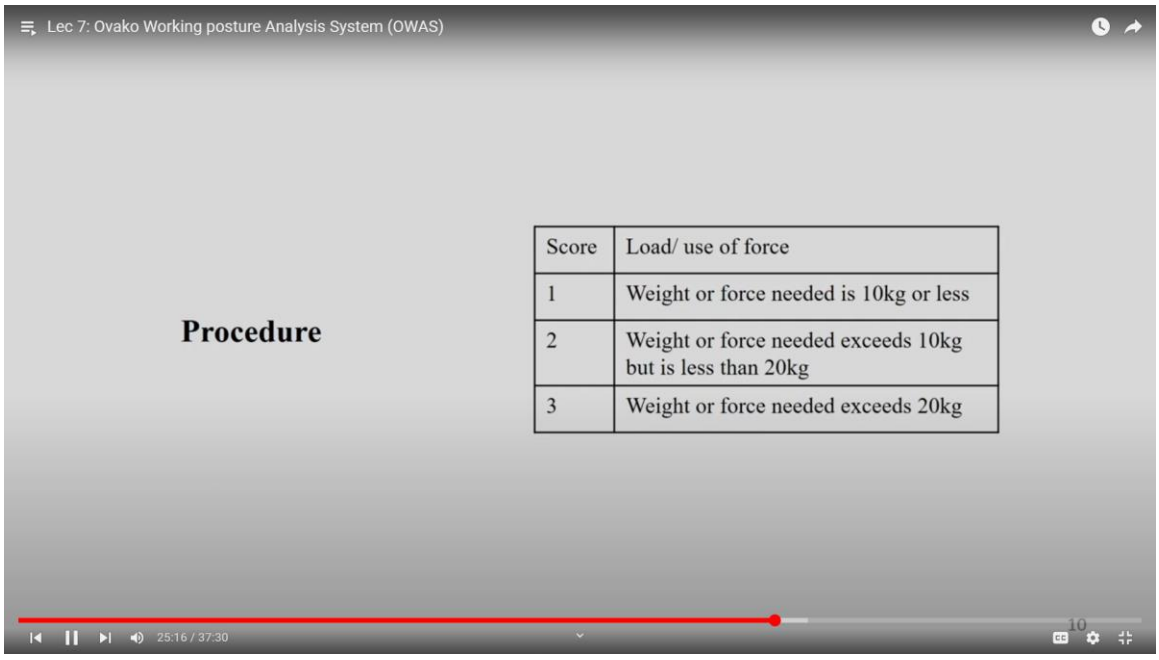
So, you will have to suppose this kind of situation, ok? Your back is in this situation. So, your back score is 3. In your case, it is a hypothetical case, maybe.

In your case, maybe your arm condition is this 2. So, this is your back or trunk, this is your arm, and maybe somewhere here 4 is your leg, suppose. So, your actual score became 3 to 4. Now, let us see how we analyze it. Now, these are the details like standing bend. We described it as arm posture 3 types and leg posture 7 types. We discussed it, right?

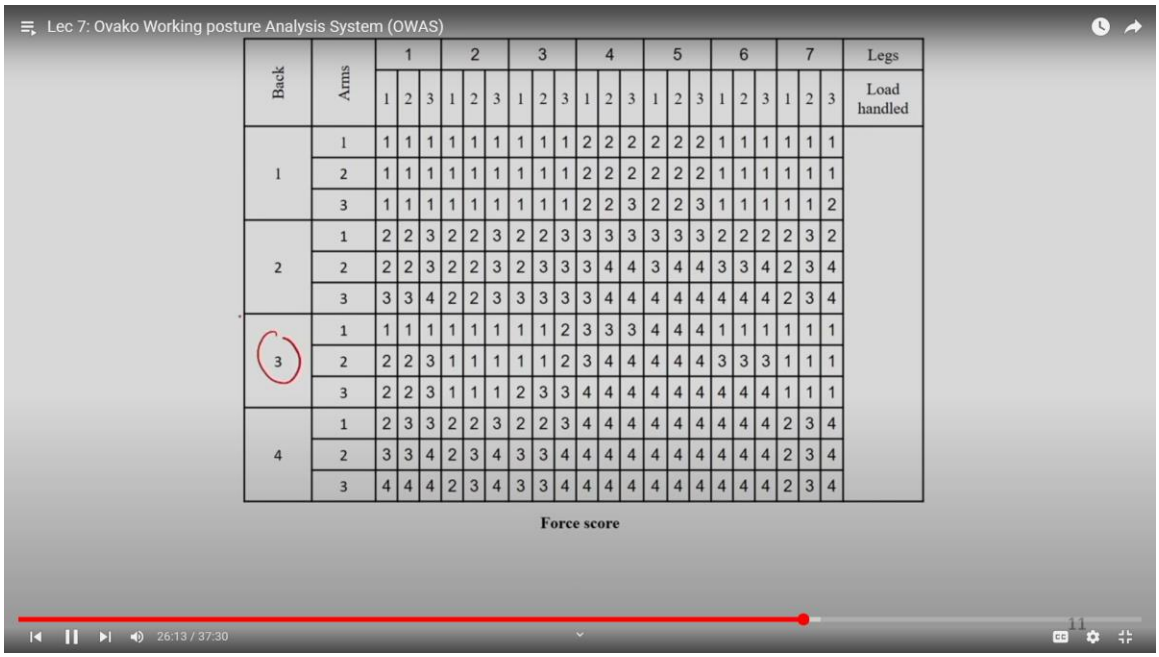




Now, let us understand how we get it. Now, from this table, I will come back to this table later. So, this is for your load and force use code. For this whole posture, if you have a weight or force needed that is 10 kg or less, then it is 1. If it is between 10 kg to 20 kg, it is 2, and if it is more than 20 kg, then it is 3.



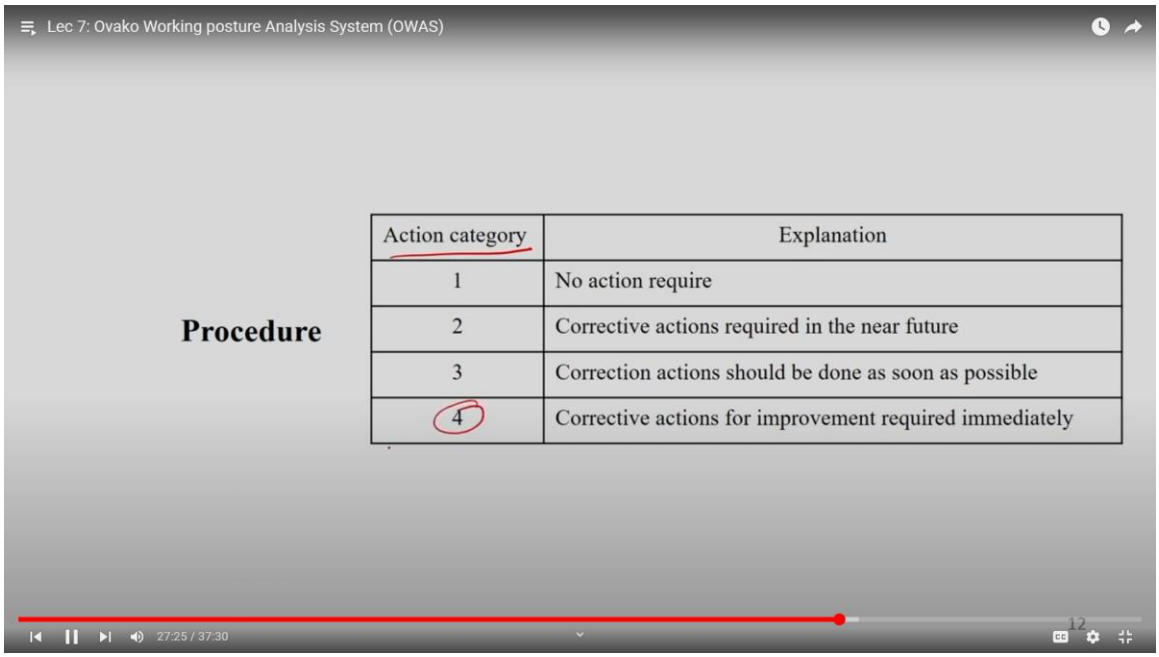
So, now, suppose your case is 2. So, you have a postural score of 3 to 4, and load or use of force is 2. So, if this is your combination, let us understand what your posture will look like. So, back was 3. So, your observation is on this particular portion. Now, your arm was 2.



So, this is right. So, your again observation is restricted to this particular sector. Now, your leg was 4. So, this particular column. So, you are here right in this region.

This is the region where your score is lying. Now, based on your load force score, which was 2, that means your score is 4 in this column. Ultimately, your score became 4. Your final score for the Ovako working posture assessment is 4.

Now, let us go back to the table. This is your action category. What it says you are here. Now, if it is 1, the final score if it is 1, then there is no action is required to be performed. So, you are in a good condition. There is no need to change any kind of posture.



It is a good posture. If it is 2, then corrective actions are required in the near future. If it is 3, then correction actions should be done as soon as possible, as this particular example that we adopted is 4. It says you need to make a change immediately. So, what is there? This particular assessment will tell you that, yes, this posture that is being adopted in the current situation is extremely dangerous. So, what do you need to change immediately, and what will lead you to that change? There are definitely changes in the work conditions, work positions, equipment or machinery design, workstation design, and many other things.

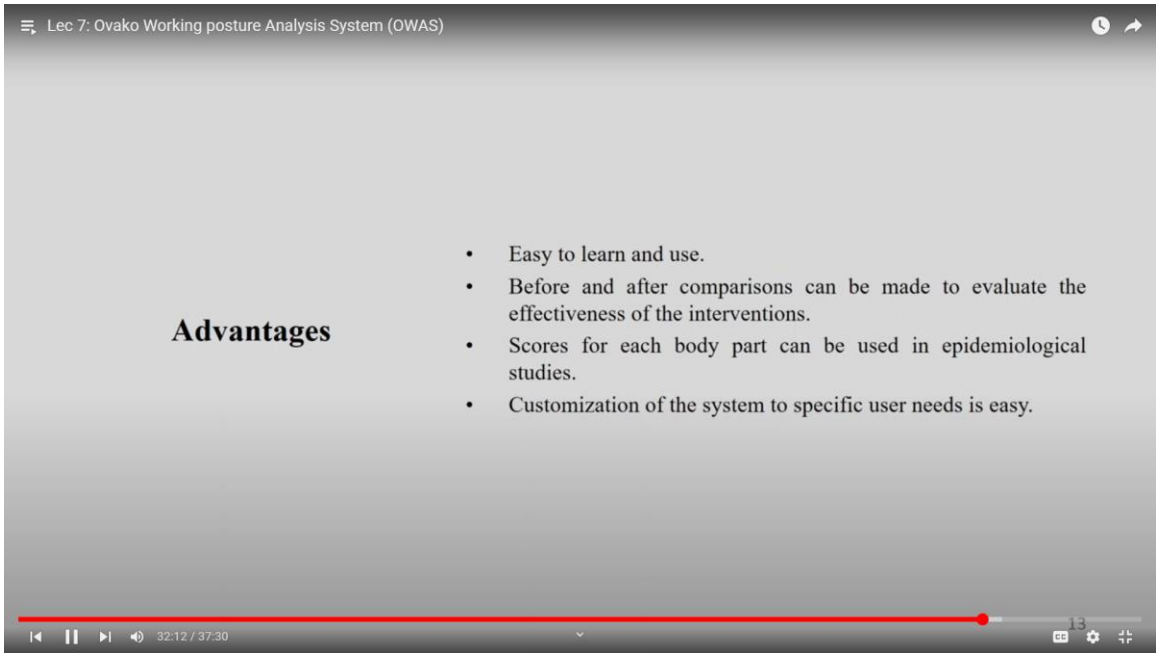
So, then we have to go into further enquiring about what is causing this particular awkward posture. What is causing this extremely awkward posture? if we can make changes in that particular causal factor, we will be able to correct this posture, and from 4, we may reduce either on 3 or 2. See, whenever we are doing any kind of activity, there is always a risk. We cannot avoid any risk. However, we need to understand risk levels should not go beyond the threshold.

Also, if it is going beyond the threshold, how we are taking it back to normal? So, what kind of recovery are we giving? In some cases, it is mandatory due to the work demand that this posture needs to be there, or you have to really hold that particular posture. You have to make sure that how I am doing the work shift cycle or work rotation is so that a particular person is exposed to that particular kind of awkward postural risk for a longer duration. If you can maintain that, that is why posture assessment is an important tool.

However, we need to understand the kind of exposure level. So, you know, the duration

of exposure is very, very important. If we do not understand that, we will not be able to really give the correct intervention program for the working population. It is not that there is; everything is one. No, it is not possible because if there is an occupation and if there is some task to be done, there is always a risk available, and you have to face those risks.

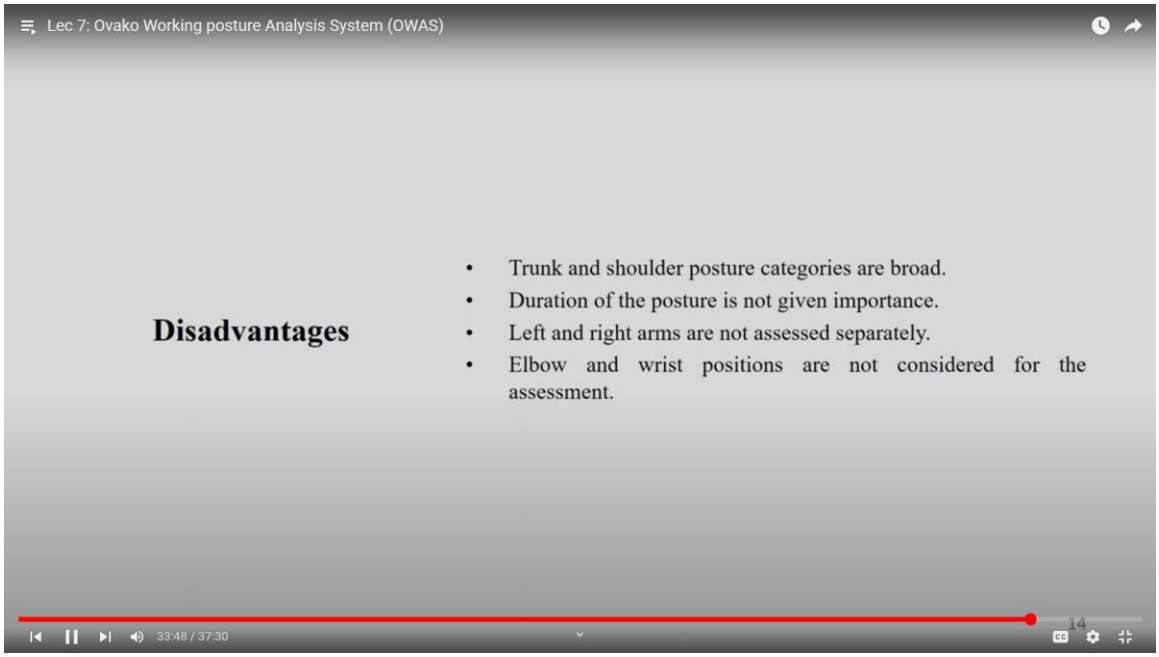
However, you need to understand how we control it and how we measure it. So, that is why assessing it is very, very important. As you know, it is a very dangerous posture that you are occupying, so you can definitely go and look and check back on what design interventions are possible. Is it possible to design the machinery? Is it possible to change the workstation design? Is it possible to change the frequency of that particular operation? Is it possible to rearrange the manpower in that particular system? However, we have to keep in mind that the ultimate productivity of the whole system cannot be compromised. So, this way, we can use the Ovako working posture assessment tool.



So, let us understand what are the advantages and disadvantages. So, it is very easy to learn. All of you must have learned till this time, as we are discussing. You can easily go and start implementing it. It is a very, very easy tool. Before and after comparisons can be made to evaluate the effectiveness of the intervention.

So, before the intervention, you have a typical posture, and after the intervention, you have a typical posture you can readily compare. It has been improved or not improved. So, it is a very, very easy and advantageous tool. Scores for each body part can be used in epidemiological studies.

As I mentioned, suppose we had 3 to 4, right? If that is the category, now, we need to understand for the higher value of the ultimate score which factor is causing major, you know, which is causing more impact, which is giving more impact to it. So, understanding that will give you a better understanding of the epidemiological studies in that particular sector. Customizing the system to specific users' needs is very easy.

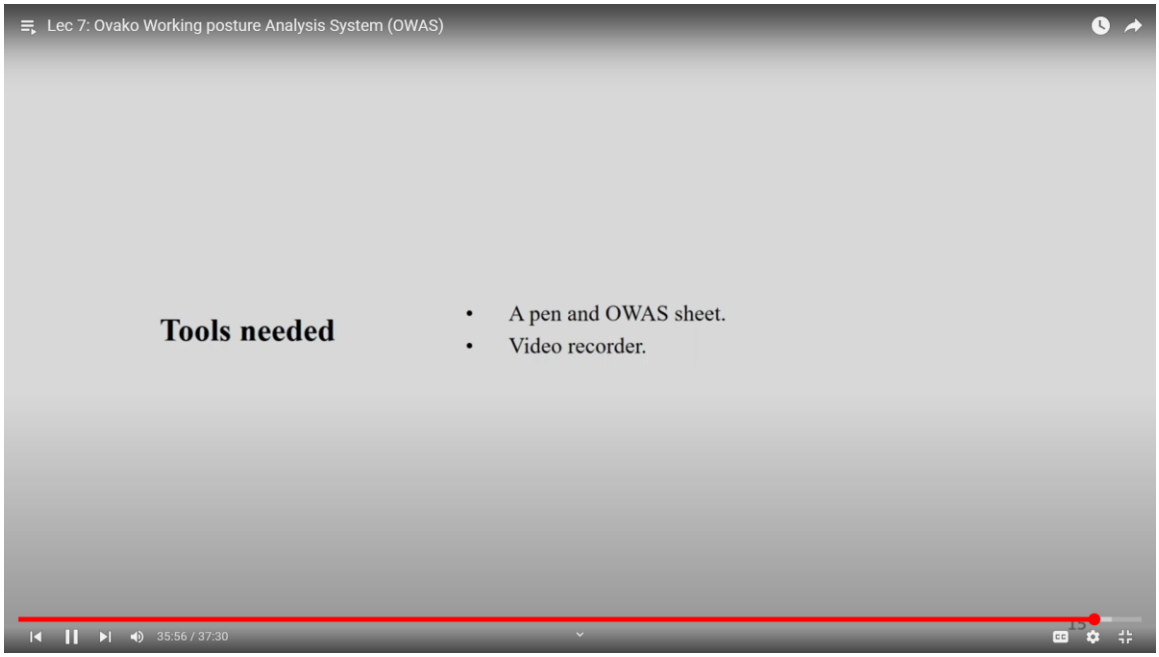


So, you can do that very quickly and very easily. So, that is the advantage. However, we have some disadvantages as well. Trunk and shoulder posture categories are very, very broad. You know you do not have those details. So, that is not being considered in this part. It is a very gross category, only back then arms and then legs.

So, you do not have, you know, shoulder finger and all those things are not there. Also, the duration of exposure is not given importance. It only assesses that particular posture. It never gives you an understanding of the impact of that particular posture if you are holding it for 1 hour, for 5 hours, or for, you know, a whole 8-hour shift, or if you are holding it now 3 times in an hour in an hour. So, no such impact analysis has been done. So, left and right terms are not assessed separately because if you look at the working habits, most people work with their dominant hand, ok? So, if you are a righty, then you will use your right hand. If someone is lefty, they will use the left hand.

Now, however, there is no such discrimination in this particular tool. You cannot understand what is happening with your right hand and what is happening with your left hand separately. However, we suggest that whenever we are using such a tool, we try to analyze or understand the dominant hand of that particular person, the dominant side of

that particular person. Elbow and wrist positions are not considered, as I mentioned earlier. So, for more details, maybe we should go for some other tool.



If you need those details, you should not go for OWAS. You should go for the other tool. So, these are the disadvantages of this particular tool. What do you need? You need this particular worksheet that I showed in these pictures on the slide, okay? So, for all these figures, you need that particular worksheet, and you need a video recorder. Now, you can ask why video recorder? It is suggested that if you take a video recording of the whole working posture after coming back to the laboratory, you can easily choose this posture to be analyzed or that posture to be analyzed.

So, you are suggested that you do a video recording. Proper video recording is necessary because you do not have any kind of degree measurement for this particular tool or technique. Only the whole body should be visible very clearly to depict the kind of posture that is there in the worksheet. So, these are the tools and tools required for OWAS analysis. That is all for today. In the next class, we will go for RULA, REBA, and many other tools, which we will discuss in detail. Thank you so much.