## Everyday Immunity Podcast Ep. 15 – Is There Any Truth to the Lemon Water Claims?

Hey! Welcome to the Everyday Immunity podcast - a place where we talk about different ways to boost the immune system naturally each and every day. I'm your host Alicia Rosati of Rosati Nutrition.

Hey guys, welcome back to another episode! If you’re new, welcome and thank you so much for joining us. And if you’re returning, thank you so much for coming back. So today we’re going to be talking about something that's a little bit controversial, which you can see from the title. We are going to be talking about lemon water. You know, the “cure-all, one size fits all” answer to all of our problems that we've been seeing circulating on social media for years now. So I want to dive into the claims a little bit today to see, is it true? Is there any weight behind these claims? Because they're pretty bold claims. So we're going to be talking about all of that.

Now before I dive on in, I do want to remind you guys that I do have a Patreon account where you can contribute to my efforts. I really do appreciate it if you guys were able to and if not, just you being here listening to me and hearing what I have to say means so much more than I can explain. So again, that's patreon.com/rosatinutrition if you did want to check it out.

But back to what we're going to be talking about today - the lemon water claims. So, I'm sure that you guys have seen that lemon water is the one thing that you've been missing that's going to make you lose a crazy amount of weight and make you super skinny. It's going to make you super healthy, your skin is never going to be better, your energy levels are never going to be better. Like, it really sounds like it's the one solution to all of our problems. And I wish I could tell you that it's true - drinking lemon water everyday will transform your life. But, unfortunately, I don't think the magnitude of the actual benefits are that extreme. So, yes there are benefits to drinking lemon water, but I don't think it's going to transform your life like a complete 180 like the social media posts claim that it will.

Let's talk about the most commonly shared, commonly talked about supposed benefits of lemon water, which is rapid weight loss. Now, where do these claim even come from? Years ago researchers looked at this lemon juice diet, which I don't remember the specifics, but it had something to do with only consuming lemon juice and honey and supposedly it did actually improve insulin resistance which led to weight loss. Which is fantastic! But right off the bat we're dealing with two completely different things here. That was a very restrictive and intense diet of lemon juice and honey and whatever else it was. And what were looking at in today's world is just simply adding some lemon to our water. So, we're already dealing with two completely different things here. Now, why are we so concerned about the insulin resistance and what it does with lemon?

Remember, insulin resistance often leads to weight gain, that's when our cells no longer respond to insulin and blood sugar builds up and then our body stores that as fat. So we obviously want to improve that insulin resistance so that it's easier for us to lose weight and it's harder for us to put weight on now. I came across this study called *Lemon Extract Reduces Angiotensin (ACE) Expression and Activity and Increases Insulin Sensitivity and Lipolysis in Mouse Adipocytes*. That sounds like a bunch of gibberish, I know. But we're going to go through it so don't worry.

First of all, what is angiotensin-converting enzyme or ACE for short? And why do we even care about it? Without getting into all the other specifics of what it is and what it does we're going to focus on what it does related to today's topic. So ACE is a biomarker for sustained weight loss and the lower the concentration of this enzyme the more weight loss we experience. So, when our ACE concentration is really high we're often dealing with excess weight gain, and it's harder for us to shed those pounds. We want to reduce that concentration found in our blood and it's also really important to note as well that this study looks at the effects on this ACE enzyme for both men and women, so this is not gender specific.

So, what this study did was it took matured stem cells that had turned into fat cells and it exposed these fat cells to lemon extract in a specific dosage and it found that this lemon extract actually contributed to a significant reduction in ACE gene expression, which was reduced by about 80% give or take 0.5% after 10 hours. Let's break down that claim because that's huge. It says that after these fat cells were exposed to lemon extract it resulted in a significant reduction ACE gene expression. Now remember, the lower the concentration of this ACE enzyme or ACE gene expression, the more weight loss we see. So that’s already a plus.

It says that this gene expression was reduced by about 80% after 10 hours. What that means is 10 hours after these cells were exposed to lemon extract the gene expression for this enzyme was reduced by about 80% That is huge. Remember, I did briefly talk about this in a few other episodes about the whole field of epigenetics and how the foods that we eat, the things that we ingest, the things that we smell, our environment, they all have an effect positive or negative on the expression of our genes. So essentially you can kind of turn some of your genetics on and off. We're not talking about things like the genes for your eye color or your height. We're talking about things like certain enzymes or certain processes that happen in the body. You actually do have the ability to turn these on or off, kind of like a light switch. So this study is just further proving that fact that lemon extract did reduce this ACE gene expression by about 80%. Now this study also says that it's not solely lemon extract. Lime also has the same effect.

This study was done on the mouse model. Scientists do use the mouse model quite often because it is somewhat similar to the human model and everything is done in you know dosage, like relative dosage. So, the dose is going to be like per kilogram or per gram of the mouse and then we can translate that to the human body. Now, this study does also reference various other studies, which have proven that citrus fruits actually do improve our insulin resistance and do reduce our HbA1c levels or our blood sugar. If you have ever gone to get a blood test to test your blood sugar, you probably have heard the term HbA1c before and that's just how they test your blood sugar. So other studies have proven time and time again, that citrus fruits do actually reduce these numbers, which is really great to know. Just from this one study and the studies referenced that I'm talking about, we can already see that citrus does have an effect on our ACE enzyme expression, on our blood sugar, on our insulin resistance.

This is looking really good for weight loss and you know all those claims. Do I think it's as intense as what these claims on Facebook and Instagram are saying? No. I do think that you have to take more of a whole approach. You can't go eat a cheeseburger and then drink some lemon water and think that they cancel each other out. Unfortunately, it doesn't work that way. Like I said, I wish it did but it's not that simple. If you lead a healthy lifestyle and include lemon water into your diet, you will see a ton of benefits and yeah, you may see some weight loss and increased energy, better skin. But is that because of the lemon water alone? No. So just keep that in the back of your mind

Another really cool thing about lemon extract or lemon in general is it contains a compound called limonene and I've talked about limonene time and time again. You guys have seen it on my Instagram and other podcast episodes, but it really is fantastic for you and great for your liver and for your detoxification. I did talk about that in my detox episodes fully in depth. So I’ll just briefly going to go over it today.

Limonene is a monoterpene and which is just a phytochemical and it's actually the major component in the oil of the peel. So it’s about 97% of the lemon peels oil. It's really, really potent which is why they say you get more of it from the lemon peel and not necessarily from the lemon flesh. So, how do we even get that? Does that mean I have to go grate a lemon into my water everyday? You can if you really wanted to! Or you can just slice up a lemon and keep that peel on. Make sure that you're washing it beforehand, but just keep that on when you add it to your water.

Or what you can do is just add some lemon essential oil to your water. And this is what I do. Lemon essential oil is made not from the lemon flesh, but it's actually just made from the lemon peel. So you're getting pretty much straight limonene if you're using lemon essential oil, which is why I say absolutely do not use more than one drop, at most two drops, but I wouldn't use two drops every day. I know sometimes it's really hard to gauge the drop that comes out of the bottle, so if you get two drops in there, don’t freak out. It’s not going to kill you. But do try to aim for the one drop a day.

And this is why I say be very, very careful with what essential oils you're ingesting and how much you're ingesting. I see so many people who are selling essential oils telling you to take two drops of this, plus two drops of that, and then put this in a capsule and guys, please do not do that!! That can be so dangerous for your body because remember, these are so freaking potent. I don't remember how many lemons it takes to put in one bottle of essential oil, and then translate that into one drop, but it is a lot and we don't know the lasting long-term effects of this on the body. So, play it safe. One drop is all you need and don't start mixing oils. Don't start ingesting lemon, and then also ingesting peppermint and then also ingesting this and that. Just don’t do it.

While we're at it, let's actually look at the science and talk about some safety tips here. So, this one study that I found looked at the safety of ingesting citrus essential oils, specifically lemon. And again, they did do this on mice. They found that orally ingesting lemon essential oil inhibited neoplasia of the lungs and forestomach of female mice. What does that mean? Neoplasia is simply an abnormal mass of cells or a tumor. It doesn't necessarily mean that it is cancerous. It may be, or it may be may not benign. But it did find that oral administration of this essential oil did reduce the occurrence of tumors in lungs and the forestomach of female mice. They also found that it is a neuroprotective since it does have radical scavenging properties. So, it does act as an antioxidant specifically for your brain, which again is fantastic!

Now, this was really cool. When I did the math and I translated this to human body weight, I was blown away! And I want to preface by saying I do not change my stance on one drop per day. They found that the LD50 was more than five grams per kilogram. The LD50 is the median lethal dose, or the dose that it takes to kill half of the population, and this is in rats again. So greater than 5 grams per kilogram. I converted that and that's about 2.3 grams per pound. So 2.3 grams of essential oil ingested per pound of body weight. So now let's translate that into relative terms that we can understand, because if you ask me how much 2.3 grams is per pound, I have no idea.

Now, a very rough estimate is that 20 drops of essential oil is roughly 1 gram. This is going to differ depending on the brand of essential oils you're using and the dropper that they use. That's why I said it's a very, very rough estimate. But like I said, let's go off of that average. So, if 20 drops equals approximately 1 gram, and it takes 2.3 grams per pound to kill half of the rat population, what does that mean? Well, I did find another study that did already translate that into humans, and they said, “In humans, some essential oils like lemon oil have an LD50 of above 5g/kg. Thus, the lethal dose would be 350g for an adult of 70kg, difficult to reach in normal circumstances.”

Let's translate that for those of us who don't use kilos. About 350 grams would roughly be 7,000 drops because, this is going off the average that 1 gram is about 20 drops. And for someone who weighs 70 kilos, that's roughly 155 pounds. I don't know about you, but I don't think I would ever consume anywhere near 7,000 drops. I don't even know if I would consume 7,000 drops in my lifetime. That would be interesting to figure out, because I'm not sure, and I wasn't able to find any science on how it actually builds up in your body, if there is any bioaccumulation, if your body can use it and get rid of it. I would think that your liver uses up the limonene and then gets rid of it, but I'm not sure about any of the other oils or monoterpenes or phytochemicals that are present in the essential oil as well.

And again, this is why it's so important to know where your oils are coming from and know if they're third-party tested, if they’ve been adultered, how they're actually processed, because there's many different ways of collecting essential oils and some of them are not healthy. Unfortunately, some companies, to keep costs low, do extract their essential oils using chemicals and unfortunately these chemical residues do end up in our essential oils. So, they're dangerous whether they're ingested or diffused because they're volatile. When you smell them, your body is still absorbing them. So please guys, it's a very, very, very important that you know where your essential oils are coming from and be very safe about how much you're ingesting and what you're ingesting because like I said, I don't know if there's any bioaccumulative effects. Just play it on the safe side – no more than one drop per day.

I haven't found any reports of any damage being done for people consuming one drop a day, but also keep in mind that essential oils are relatively recent, especially the idea of ingesting essential oils. So, err on the side of caution. If you're not comfortable doing it, I completely understand that 1000%. Just add some lemon with the peel on into your water if you’re more comfortable with that.

Now, I do want to finish off with some final essential oil safety tips, if you did choose to go that route. If you are going to ingest lemon essential oil, never ever, ever, ever, ever and I repeat ever put it in plastic. We should never be drinking out of plastic bottles anyways because, for one it’s really bad for the environment and two, I don’t care how many labels say that it's BPA free. There are so many other harmful plasticizers in plastic that unfortunately leach into our water and we should not be ingesting. When you add essential oils into that, especially citrus, it does actually break down the plastic even further and you're just ingesting even more of those plastic chemicals that unfortunately do mess with your hormones and do mess with your mood and your skin and your hair and all that kind of stuff.

So, repeat after me: never ever, ever put essential oils in plastic and just don't drink out of plastic anyways. There's so many other alternatives out there and that's really it! I did go over the toxicity potential, the unknowns, the knowns. I did go over those studies that found the median lethal dose, and I did talk to you guys about knowing your essential oil source, and that's really all it. That's really all it comes down to.

So, just a quick recap - lemon water does have a ton of benefits to it and it can be really, really good for detoxification in your liver, be really good for weight loss, but it's not going to be the one and only contributing factor. It's not going to be the one and only game changer. You do have to have a complete healthy lifestyle, or start to make some of those changes. You can't go eat McDonald's and then drink some lemon water and think that they're going to cancel out. It's not going to work. So just keep that in mind.

Summers coming around the corner, so make a really awesome summery drink! What I actually really love to do is fill a mason jar with some water, add some ice cubes, and then I add some lemon, lime and orange slices in there and it just tastes like a really good tropical drink. And I drink more water because I love the taste of it. It's really refreshing and I'm getting a ton of limonene and other beneficial phytochemicals that are really going to improve my life. Give that drink a try now that the weather is getting better, wherever you're at in the world. I know here in Canada spring and summer are just around the corner. But even if you're somewhere else in the world, give it a shot.

There are no studies showing that lemon water has ever hurt anyone. Adding fruit to your water has ever hurt anyone – unless you have a separate medical condition, which at that point consult your doctor first. But for the general population, this is completely safe. So, go ahead and add some lemon wedges to your water!

But anyways you guys, thank you so much for being here and for listening to me ramble on about lemon water and it's supposed claims. I really appreciate you guys being here. And again, if you did want to go check out my Patreon, that's patreon.com/rosatinutrition. So, until next time this has been your host Alicia of Rosati Nutrition, and I can't wait to talk to you in the next episode!