

# BACK AND NECK PAIN: LIFTING THE BURDEN

By John Clark M.D. [NorhternLightsHealthEducation.com](http://NorhternLightsHealthEducation.com)

George was having trouble with his back and came to see me as a second opinion. He was really tired of being called “the invalid” by his teenage sons who wanted him to join them in a game of basketball.

He wasn't doing too well on his job, stocking shelves at a Walmart, either. He had come to see me, probably to apply for disability.

Five years earlier he had fell down a set of stairs into somebody's basement while delivering heating oil. He had been pulling a hose across the snow when he slipped and fell. He was in trouble and went to see a doctor who treated him with some anti-inflammatory pills and sent him to physical therapy. When he didn't get better they did an MRI where they discovered something wrong with his back that they felt surgery would help. For six months after the surgery he did better, but then it was back to square one, pain in the back, aching pain. Pain that seemed to take away all his energy. Pain that radiated down his hips and down his legs. He was off work again for pain and he went to see the doctor. They gave him more anti-inflammatory pills and sent him back to physical therapy. Nothing seemed to help. Another MRI didn't show anything that needed to be operated on. But he was still not doing well. He started switching from job to job, but nothing was working. The doctor even put him on narcotic pills and ordered more physical therapy. They gave him steroid injections in his spine, called epidurals. But they were no help. Another year passed and then they sent him to see another spine surgeon who ordered another MRI, but found nothing that needed an operation. Finally, he was sent to me, for a second opinion, possibly to get disability.

George was in trouble. As he would stock the shelves, the pain in his back would stop him. He'd take time off work from time to time. At

age 52 he just felt like life had passed him by, that he was going to have to stay disabled at home from now on. He just really wasn't planning, in middle age, to be laid up like this. We're going to come back to George, but let's talk about back pain and how it's related to all his symptoms.

---

Our goal in this article is to help back pain sufferers recover without drugs, injections, therapy, or surgery.

---

I specialize in Lifestyle medicine. Lifestyle medicine maximizes your health above the probability of disease. I have been practicing lifestyle medicine since 2005, as well as researching and teaching people how to overcome back pain and other lifestyle diseases.

Back pain responds best to simple lifestyle improvements.

Overview: In this article I will be addressing spine physiology, good hydration, Impact of Obesity, the food we eat and how it affects the spine, exercise and stretching, and the mind/body connection.

In the last 15 years, physician visits for back pain have increased by 40%.<sup>1</sup>

Back pain is the second most common cause of disability in US adults<sup>2</sup> and a common reason for lost work days.<sup>3,4</sup> An estimated 149 million days of work per year are lost because of back pain.<sup>5</sup> The condition is also costly, with total costs estimated to be between \$100 and \$200 billion annually, two-thirds of which are due to decreased wages and productivity.<sup>6,7</sup>

## ARE YOU AT RISK FOR BACK PAIN?

There are many risk factors for back pain. Risk factors include: driving,<sup>8</sup> vibration,<sup>9</sup> physical inactivity,<sup>10</sup> sedentary occupation and

prolonged standing or sitting,<sup>11</sup> smoking,<sup>12</sup> previous full-term pregnancy,<sup>13</sup> increased body mass index,<sup>14</sup> tall stature,<sup>15</sup> frequent twisting or bending,<sup>16</sup> and depression, stress, fear, anxiety.<sup>17</sup>

When someone comes to the doctor reporting work related back pain, the sooner the patient can be returned to gainful employment the more likely they will remain productive. For the most part 95% of patients return to work within 3 months, otherwise they may not ever get back to work. Only 20% return to work after 1 year of being off work on disability, and only 2% will return to work after 2 years of disability. Don't get stuck in disability!

---

Many people get into trouble with their backs through poor lifting techniques,<sup>18</sup> and/or poor posture<sup>19</sup> or poor ergonomics.<sup>20,21</sup>

---

Aside from the risk factors for back pain, there is usually an instigating event that sets off the cascade to pain and disability. These may include, lumbar "strain" or "sprain" in 70% of cases, degenerative changes in 10%, herniated disk in 4%, osteoporosis fractures in 4%, spinal stenosis in 3%, spondylolisthesis in 2%, spondylolysis, discogenic low back pain or other instability in 2%, traumatic fracture in <1%, congenital disease in <1%, cancer in 0.7%, inflammatory arthritis in 0.3%, and infections in 0.01%.<sup>22</sup>

### **BACK PAIN AND CELL PHONE USE**

I was also interested to discover that there is a relationship between the use of electronic devices in our modern age and back pain. To be exact, daily TV watching, more than 3 hours a day, increases the risk by 17%, daily use of a laptop computer increases the risk by 40%, use of a cell phone in the supine or laying position increases the risk by 23%, use of the cell phone in semi-supine or half laying half sitting position increases the risk by 49%, daily cell phone use for more than 3 hours increases the risk by 36%, and the use of a tablet increases the risk by

67%.<sup>23</sup> Are you aware of, or managing your device time?

### **DON'T MISS THESE WARNING SIGNS**

There are certain characteristics of back pain we refer to as, "Red Flags" due to their ominous character. History of cancer, because pain could indicate recurrence. Unexplained weight loss, because it too could indicate cancer. Osteoporosis, if present would suggest compression fractures of the spine. Prolonged use of corticosteroids, because they cause osteoporosis and resultant fractures. Older age, and/or major trauma, because they could indicate undiagnosed fractures. Intravenous drug use and/or fever, because they could indicate an infection in the spine. Back pain at rest or at night, because cancer, autoimmune disease or infection can present this way. Bowel or bladder dysfunction, because it indicates advancing disease.

That said, indications that something like surgery may need to be done include: loss of bowel or bladder control; progressive motor loss (advancing weakness); or sometimes even otherwise uncontrollable pain. And surgery is not a panacea, indeed, after two years most patients are the same, whether or not they opted for surgery.<sup>24</sup>

### **WHY DOES BACK PAIN REALLY HAPPEN?**

It has a lot to do with the anatomy in the back. If we look at the spine, there are vertebra with disks between the vertebra. The disc is very much alive and needs to have access to some blood flow for oxygen and nutrition. But there's an interesting thing about these discs, there is only blood flow to the outer edge of the disk. The middle of the disc doesn't have blood vessels running through it, and so it's very vulnerable to not having good blood supply. If you looked at the top of the disk, down from above, you would see that there are blood vessels all the way around the edge but none in the middle. This makes the disk very vulnerable to not getting enough nutrition.<sup>25</sup> You have to

get nutrition in, and then you have to get waste products out.<sup>26</sup>

## **PERFECT HEALTH DEPENDS ON PERFECT CIRCULATION**

Think of it like a sink, you want to have a good flow of water into the sink, that would be like the blood flow to the disc. And, you want to have a good drain where the water could go out of the sink, anything that plugs the drain is going to cause the sink to back up and overflow and you will have troubles. We call it a problem of perfusion, blood flow to the disc, and elimination, blood flow out, any impediments to the blood flow in or out and your back is going to give you problems.<sup>27,28</sup>

Now in your back you have unusual blood vessel anatomy. Everywhere else in your body, where ever two blood vessels come together, or branch, they come together at a “Y” --a gentle angle, so the blood can flow on to the branches. But the blood vessels coming off your aorta (the biggest blood vessel in your body) to your spine, come off at a right angle. This creates turbulence. Turbulence is a spot where more atherosclerotic plaque usually develops. So, the back is very vulnerable to having plaque build-up right where the blood vessels are coming off to feed your spine.<sup>29</sup> Anything that plugs the pipes, we're talking plaque here, will cause disc degeneration and back pain.<sup>30</sup> Plaque can develop anywhere in your blood vessels, and it's very likely to develop in your aorta.<sup>31</sup> Sometimes we take a chest x-ray and we find more calcium in the plaque in the aorta than in the vertebra themselves. When this happens, all that calcium can end up plugging the spinal blood vessels. We know if plaque is in the aorta, it's probably in other blood vessels in the body as well, including the spinal blood vessels.

You can have plugged pipes (blood vessels) too, for example from inflammation. If you get inflammation building up around blood vessels it tends to squeeze the blood vessels closed. As the inflammation squeezes a blood vessel, less and less blood comes to your spine, and your spine deteriorates.<sup>32</sup> If you work hard, under these conditions, your discs will wear, but they

won't repair. The next time you work hard the damage will accumulate, and your back will keep getting worse and worse.

## **BACK PAIN PROTOCOL FOR GEORGE**

Let's get back to George our back pain patient in my office. George was hinting that he might like to be on disability, but I reminded him that he told me he'd like to be out there with his teenage boys playing basketball, and that he had said he was tired of being called the invalid. he admitted that was right. I asked him if he would be willing to try something to get him over his back pain and return to work and being able to play basketball with the kids. He said he would be willing to try anything. I said how about for a week, one week! He said he would be willing to try anything for a week.

I handed him a piece of paper and a pen, and I started writing too. I told him the first thing he needed to do when he got up in the morning was to drink two glasses of water, big glasses, like 12-ounce glasses, and then not to eat for about a half hour, but then, when he did eat his breakfast eat nothing but oatmeal for the next week. Now by nothing but oatmeal, I mean, he could put some things in his oatmeal, like soy milk, or nuts, or raisins, but no oil, no margarine, no sugar, just oatmeal. Then I had him take a vitamin C, 500 milligrams right after breakfast.

---

In one week, our plan is to reverse five years of back pain that failed surgery, failed physical therapy, failed epidural steroids, failed narcotics and failed anti-inflammatories. Our goal is that in one week we're going to take this guy and put him back to normal, back to work.

---

Then, immediately upon completing breakfast, I asked him to take a walk for 10 minutes, a 10-minute walk, come rain or shine, or snow, just put on the right clothes, just go out and do it.

Two hours after breakfast, or mid-morning, I had him drink two more glasses of water, large glasses.

At lunchtime I had a special plan for his lunch, vegetables only, and preferably raw, but the idea especially is not to have any oil or excess salt. So, for the week he was to eat salads. I warned him not to put vinegar and oil on the vegetables, just things like olives, sunflower seeds, not commercial dressings that have things in them that aren't particularly helpful.

He was to have another vitamin C after lunch and another 10-minute walk.

Mid-afternoon he was to have two more glasses of water, large glasses.

At supper time which was to be at least three hours before going to bed he was to eat just fresh fruit, raw fruit, fruit like cantaloupe, and watermelon, and apples, and bananas, and strawberries, and just raw fruit and make sure it's three hours before bedtime. He was then to have another vitamin C. Then he was to take another outdoor walk for 10 minutes, immediately after eating. Then two glasses of water two hours after supper.

I told him, no coffee, tea, sodas, no tobacco, luckily, he didn't smoke, no alcohol, no eating between meals. I said if you do get hungry between meals, then drink ice water. And so, we had his plan. When he got through writing it all down, and he said, okay. I asked him if he thought he could do all that and he said he thought he could. And I gave him a follow up appointment in one week.

---

What is the nature of the cure? Why did I tell him to do the things that I told him? What difference do these recommendations make for back pain?

---

## **WATER BENEFITS**

For starters, I had him drinking water from the very moment he got up in the morning. Dry discs can be the source of pain.<sup>33,34</sup> Research shows that men, on average, need 3.7L of water a day and women, 2.7L.<sup>35</sup> These numbers would

have to be modified on days when the temperatures rise, and also when a person's activity level increases. Urine color is a good indicator of hydration status, as you approach good hydration, urine color tends to lighten compared to times when you knew you were dehydrated.<sup>36,37</sup>

Disc dehydration can happen, not just from poor water intake, but also from mechanical pressure brought to bear on the disc from an increased body mass index, and also from carrying heavy objects.<sup>38</sup> This, and other reasons make obesity a risk factor of back pain especially of disc disease origin.<sup>39,40</sup> It's like squeezing the water out of a sponge, the sponge becomes dehydrated. So, with the back, obesity puts loads on the discs that squeezes them out, or dehydrates them.

## **BREAKFAST FOR BACK PAIN SUFFERERS**

A breakfast of oatmeal may not seem like a cure-all for back pain, but given its ability to keep the stools regular and lower blood thickening cholesterol, oatmeal has actually been found to be helpful for musculoskeletal complaints.<sup>41</sup> It also has to do with the displacement phenomena, if you're eating a lot of oatmeal, you're probably not eating a lot of other stuff. I had taken a history of his diet in the process of talking with him and he was on an average American diet that was fairly high in grease and low in fiber, so this was a good change for him.

Oatmeal is a whole plant food, it has not been submitted to any refining processes that would reduce its fiber and nutritional qualities. When foods are eaten that have been processed or refined, making them deficient in fiber and nutrients, the result is increased blood sugars, increased blood cholesterol, triglycerides,<sup>42</sup> and glycated hemoglobin (red blood cells coated with sugar) and glycation end products (other necessary body cellular components coated with sugar). These changes to the blood cells make them more likely to aggregate into clumps or chains we call "rouleaux".<sup>43</sup> Refined foods that cause this health destroying clumping of red blood cells include sugars or refined

starches, fats or refined oils such as cooking oils, margarines, butters, and animal shortenings. Clumped blood, or blood cells in chains, does not circulate well to the back and back pain can result.<sup>44,45</sup> These rouleaux or clumps or clots need to be broken down, or back pain and disability will result.<sup>46,47</sup>

The importance of fiber in the relief of back pain should not be overlooked. Fiber deficient foods cause constipation, and constipation can precipitate back pain.<sup>48,49</sup> Incidentally, constipation, in and of itself, can be the source of pain which can radiate to the back, or be felt in the spine.<sup>50</sup>

Speaking of the gut, your intestines are filled with a lot of bacteria, a diet deficient in fiber tends to favor bacteria responsible for increasing back pain.<sup>51</sup> Whereas a diet abundant in fiber nurtures bacteria that fight back pain.

---

A good recipe for healthy oatmeal for back pain:

- 2 cups water
- ½ cup whole rolled oats
- ¼ cup oat bran
- 2 Tbsp. ground flax seed
- ¼ tsp sea salt

Bring to a boil, let simmer for 45 minutes, eat with your favorite fresh fruit, nuts and seeds.

---

Oats and oat bran are not the only sources of fiber. Most unrefined, unprocessed foods, such as fresh fruits and vegetables, nuts and seeds, beans and grains, are high in nutrition and fiber. Fresh fruits and vegetables have the advantage of having antibiotic, antiallergic, tumor-protective, anti-inflammatory and immune system stimulating properties.<sup>52</sup> These are the types of foods you will want to be eating if you want to improve your back health and avoid pain.

Good whole plant foods also increase blood concentrations of antioxidants. This is a defense against back disability. For example, total plant-based vegetarians have significantly higher

intakes of antioxidants than omnivores.<sup>53</sup> Compared with omnivores, total plant-based vegetarians have significantly higher blood concentrations of: vitamin A, vitamin C, and vitamin E.

## OILS AND SPINAL OXYGEN SUPPLY

As we mentioned earlier, refined oils (margarines, butters, cooking oils, animal shortenings, etc.) are not going to promote back health, because they cause clumping of the red blood cells. They also cause a decrease in the oxygen carrying capacity of the blood. When we eat a high fat meal, within six hours the oxygen in the brain falls below seventy percent, what's more it does not return to normal for three whole days!<sup>54</sup> This happens to all the tissues of the body including the back. Low oxygen levels in the back result in pain, poor recovery from exercise or injury, and chronic disability.

When choosing oils it is well to take into consideration their composition. If oils must be used, the best choice is oils high in omega-3 fatty acids because, in moderation, they can reduce intervertebral disc degeneration.<sup>55</sup>

## FERMENTED FOODS

Fermented foods are foods in which deterioration has caused inflammation in the actual food, which can be transferred to you and your back. Foods that are a product of fermentation are full of toxic waste products of putrefaction such as aflatoxins<sup>56</sup> and ethyl carbamate<sup>57</sup>, which can cause inflammation and cancer. Aflatoxins, formed in the process of aging or fermenting,<sup>58</sup> are a source of inflammation.<sup>59</sup> Dietary sources of aflatoxins include: cheese,<sup>60</sup> wine, vinegar, and any food created by rotting or fermentation. For the best results, in fighting back pain, fresh foods, free from any taint of rot or spoilage (fermentation) will give the best result.

“The salads are prepared with oil and vinegar, fermentation takes place in the stomach, and the food does not digest, but decays or putrefies. As a consequence, the blood is not nourished, but becomes filled with

impurities, and liver and kidney difficulty appear. Heart disturbances, inflammation, and many evils are the result of such kind of treatment, and not only are the bodies affected, but the morals, the religious life, are affected.”<sup>61</sup>

## **SUGAR AND REFINED CARBOHYDRATES**

I mentioned sugar as a refined food to be avoided earlier. There is a significant association between sugar and back pain symptoms. Sugar consumption increases the risk of back pain by 84%.<sup>62</sup>

## **SCHEDULE FOR SUCCESS**

Strict meal times are important. I have had patients who still had pain after starting this program which did not resolve till they realized that the part of the program they were not being conscientious about was their meal schedule regularity. Once they adhered to a consistent daily schedule, seven days a week, the pain resolved. Not everyone is used to such a consistent schedule. Some are used to eating whenever they can, others eat between meals. Some get hungry when they should not, especially when making changes in their schedule. To combat hunger at inappropriate times I recommend drinking cold water,<sup>63</sup> and taking a walk.

---

In the diet that I recommended for the patient in our story, fruits and vegetables played a major role, and I encouraged him to get as many of them in the raw state as I could. Studies of people with back pain show that eating more fruits and vegetables improves back pain outcomes.<sup>64</sup>

---

## **THE FRESH ADVANTAGE**

I also pushed him to eat only raw/fresh fruit for his third meal. This is because fresh fruit digests quickly and he would have better sleep if his digestion was all finished by the time he

went to bed. Better sleep is associated with better back health.<sup>65,66</sup> Ending the last meal at least 3 hours before retiring for the night helps ensure complete digestion before sleeping and improves sleep and back pain.

What kind of diet was I giving him? Isn't this the original diet? "Then God said, "I give you every seed-bearing plant on the face of the whole earth and every tree that has fruit with seed in it. They will be yours for food." "and you will eat the plants of the field."<sup>67</sup>

## **HABITS OF HARM**

Notice that I told the patient in our story not to use coffee, tea, sodas, alcohol, or tobacco, and not to eat between meals. Coffee is especially detrimental to spine health.<sup>68</sup> Coffee mimics the flight/fight reflexes in which blood is decreased to certain body tissues, like the back, and increased in others in the interest of survival when confronted with a threat or stress. Coffee greatly increases the incidence of chronic back pain.<sup>69</sup>

Nicotine is also a chemical which alters a person's body's blood,<sup>70</sup> it too makes the body mimic the physiological fight/flight response to stress or trauma. Additionally, Smoking decreases available oxygen for the spinal tissues and increases oxidative stress, and inflammation. People who smoke have a much higher incidence of back pain.<sup>71,72</sup>

## **PSYCHOLOGICAL STRESS**

Now that said, stress and trauma cause the same decrease in blood flow to important structures in the spine which result in pain.<sup>73,74</sup> For example, high anxiety people have 2 and ½ times higher incidence of back pain.<sup>75</sup> People who are lonely also have higher risks of back pain<sup>76</sup> and neck pain.<sup>77</sup> Poor job satisfaction can be a serious problem leading to increasing risks for back pain.<sup>78</sup> Because stress is such a driver of back pain, stress relief has a very positive effect at helping with back pain.<sup>79</sup>

Even the Bible makes a connection between stress and pain. "I stayed by myself and was filled with anger. Why do I keep on suffering?"

Why are my wounds incurable? Why won't they heal?"<sup>80</sup> "Sorely have they afflicted me from my youth, yet they have not prevailed against me. The plowers plowed upon my back; they made long their furrows."<sup>81</sup>

Forgiveness also plays a role in back pain. "Look upon mine affliction and my pain; and forgive all my sins."<sup>82</sup> "And the inhabitant shall not say, I am sick: the people that dwell therein shall be forgiven their iniquity."<sup>83</sup> Back pain patients who have learned by experience value of forgiveness have less pain, anger and psychological distress. It has been found that the anger resulting from a lack of forgiveness has the greatest impact. Patients who have the hardest time forgiving others are at the highest risk of back pain and psychological distress.<sup>84</sup>

Jesus had the ultimate stress management, "Come unto me, all ye that labour and are heavy laden, and I will give you rest. Take my yoke upon you, and learn of me; for I am meek and lowly in heart: and ye shall find rest unto your souls. For my yoke is easy, and my burden is light."<sup>85</sup>

## **VITAMIN C**

You may be wondering why I would have George take vitamin C as a tablet, and honestly, today my first choice would be to encourage him in eating some specific high vitamin C food, such as kiwi, pineapple, red cabbage, red bell peppers, etc. The reason I emphasize vitamin C for back pain is that most of your connective tissues are dependent upon vitamin C for repair. You may be aware that a deficiency of vitamin C results in a condition called scurvy, where a person's connective tissues deteriorate. That would certainly cause back pain. Vitamin C also helps thin the blood, and it a strong antioxidant. Vitamin C has been discussed in the literature as of benefit for back pain.<sup>86</sup>

## **PUMP LIFE INTO YOUR DISCS**

Intervertebral discs are highly dependent on cyclic loading for good nutrition, they have to be pumped. Since, as stated earlier, blood vessels do not traverse directly though any disc, the disc

is dependent on the diffusion of nutrients from surrounding tissues, which do have local blood supply, for its nutrition.<sup>87,88</sup> This is one of the reasons exercise, such as walking, is so important.<sup>89</sup> Indeed, one of the advantages of walking, outdoors in the fresh air, over, say running, is the increased blood and tissue oxygen levels and any given moment in time.<sup>90</sup> And, do not get me wrong, the benefits of walking are not limited to mechanical advantages, walking is also a great stress reliever.<sup>91</sup> Especially if you can experience nature as you exercise.<sup>92</sup> Walking is very good at reducing pain.<sup>93</sup> The best walking is energetic walking, holding the head high, and swinging the arms in time with your walking, while taking big steps.

While you are out there walking don't forget the benefit of sun to back pain. The sun stimulates antioxidants such as melatonin,<sup>94</sup> and it plays a role in vitamin D production. People with higher melatonin<sup>95</sup> and Vitamin D levels have less back pain.<sup>96</sup> The major determinant of melatonin and vitamin D levels is sun exposure.<sup>97,98</sup>

## **STRETCHING**

Now, while walking is the best overall exercise, there additional stretches and exercises which have value in treating back pain. Over all, personal fitness reduces back pain.<sup>99</sup> Stretching is particularly helpful, because it improves one's range of motion, makes connective tissues more flexible, and reduces stiffness which can lead to injury.<sup>100</sup> Stretching exercises can be a preventative measure as well as a treatment.<sup>101,102</sup>

Let's start with flexion exercises or stretching. Flexion exercises can be very good for the spine, easing back pain.<sup>103,104</sup> An easy example would be bending over and trying to touch your toes. Now, you may say, that's easy, I know how to do that. And while it is easy and you may know how to do that, do you know how long to do it for? The answer is two minutes. That's write, two minutes. Two minutes of stretching on each of these stretches ensures that the muscles assume a new length and do

not rebound and get tighter. Forward flexion exercises strengthen abdominal and buttock muscles reducing the load on the spine. They also stretch the back and hip muscles and widen the spaces between vertebrae, thereby reducing pressure on the nerves. These are slow, easy stretches. Sudden twisting or vigorous forward flexion, such as aerobic dancing and rowing could raise pressure in the discs and may actually do more harm than good.

The opposite of flexion, or forward bending, exercises are called extension exercises or stretches. These exercises open up the spinal canal and develop the muscles that support the spine. Extension exercises may minimize pain that radiates from your back to other parts of your body.<sup>105</sup> An example would be laying on your stomach on a bed, while keeping your pelvis flat on the bed, use your arms to do, as it were, a push-up, arching or extending your back. Again, hold each of these stretches for 2 minutes.

The next exercise or stretch, in this routine designed to fight back pain, would be a twisting stretch. My favorite variety of this exercise is to sit in a chair with my legs tucked under the seat between the chair legs, and then grab the back of the chair with my hands and twist my shoulders as far in one direction as is reasonable. For me, when I have had back pain, this stretch has made the most difference. Again, I hold it for two minutes. After two minutes, twist in the opposite direction for two minutes.

The next back pain stretch is what is sometimes referred to as the piriformis stretch.<sup>106</sup> While lying flat on one's back, flex the right hip up into sitting position, or 90 deg. Grab the knee with the right hand and the ankle with the left hand. Bring the right knee toward the right shoulder and the ankle toward the left shoulder as far as is reasonable. Again, hold it there for 2 minutes. Then perform the stretch on the opposite leg for two minutes.

The next exercise I refer to as the windshield wiper exercise. The exercise is done standing with your back to a wall. Slightly bend your knees (meaning, don't lock the knees in a straight position). Lift both shoulders at same time and roll them back to touch the wall. Put your hips

against the wall, then your back, and then the back of your head. You are now in the correct anatomical position. The bending will be done while staying in this position in contact with the wall. That way there is no twisting of the spine. Slowly bend to one side, reaching the hand down toward the knee, stretch to tolerance (will feel some stretching, but you don't want any pain). This exercise you will not do for 2 minutes, just hold the stretch for 10 seconds (or 4 deep breaths). Then come back up to the neutral position (standing up straight). On this side-bending exercise, the individual will need to bend the knee on the side he/she is bending towards. Next, slowly bend to the opposite side. Again, hold for 10 seconds or 4 deep breaths. Return to standing up straight. This is one repetition. Do a total of 6 repetitions and do the exercise once a day.

### **NECK EXERCISES FOR NECK PAIN**

For neck pain, stretches can also be helpful. Do each one for 2 minutes.

The first is to turn the head as far to one side as is practical and see if you can put your chin on or over your shoulder. Hold it there for 2 minutes and then turn to the other side for 2 minutes.

Next, flex the neck, with your chin to your chest, for 2 minutes and then extend the neck, chin toward the roof, for 2 minutes. If at any time you feel faint, stop the exercise and return the neck to its usual position.

Next is to try to put your ear on your shoulder, first one direction and then the other for 2 minutes each.

Next are exercises where you resist the push of your hand. Place your hand on your forehead and press against it for 2 minutes. Then repeat with your hand behind your head, pressing for 2 minutes.

Then, on each of left and right sides of your head, repeat this exercise of pressing against your hand for 2 minutes each side.

## AEROBIC EXERCISES

Aerobic exercises can also be helpful.<sup>107</sup> It would be good to get at least 30 minutes of aerobic exercise three times a week. Aerobic exercises include brisk walking, jogging, and swimming. Aerobic exercise gets your heart pumping faster. If you cannot do 30 minutes at a time, try three 10-minute sessions per day and work up.

## THE REST OF THE STORY

Let's talk about George again, the gentlemen that came to me for a second opinion on his back pain. I waited a week and looked at my list of patients, and he was on the list. I was thinking and wondering if he was going to show up. He did, and he was looking pretty stoic. I asked him to come in and he walked down the hall. I was bursting with curiosity, I said, "Well, did you do it? What happened? He says, "Well, Dr. Clark, within three days I could tell a dramatic difference, my back pain was totally gone, I was feeling so much better, that deep aching pain that always took all my energy way was gone, I could do things with the kids again", he said, "but, I had a problem, I was always drinking iced water between meals, because I was always hungry between meals, and I was always going to the bathroom." He said, "I was wide awake though, when I was on break at Walmart, everybody else was nodding off and going to sleep and eating their junk food, and here I was, wide awake!" We talked a little more, and I said, "Well, I guess there's not much more to do for you, you're basically fixed, and you did it yourself, and you'll have to expand on your diet, the more you can eat of a vegetarian diet, that's low in fat and low in refined products the better off you'll be. So, he left. About three months later I was going to Walmart and I walked over

to the vegetable section, and there he was, he was pushing a cart in the vegetable section, I said, "How are you doing" and he said, "Oh hi Dr. Clark, praise the Lord I'm doing well, my back's great, I'm finding a new house and I'm moving to a new area of town where I can walk out in the country."

## IN SUMMARY

- Hydration is very important because your discs are supposed to be about seventy to eighty percent water and if you don't drink your water they become zero percent water and turn into hard pancakes, like hard rubber, and then they're painful because that hard rubber has nerves in it.
- Nutrition is especially important, because nutrition is part of keeping the blood vessels open, and keeping the blood going to the discs, and keeping the best antioxidants reaching the discs.
- Exercise is valuable because it keeps pumping the discs so that you get the food to the center of the discs and the waste products away from the disc, it's also important for getting the oxygen to the disc cells.

It is best to exercise outdoors where you have more oxygen and less stress. Stress management is very important, because there's a lot of psychological connections between why people have low back or neck pain.

*For further ideas on how to incorporate what you have just learned into your daily life, see the article entitled, "How Can I Apply Healthy Principles in My Daily Life". Or Lifestyle Choices.*

<sup>1</sup> <https://www.boneandjointburden.org/fourth-edition/iiaac0/burden-back-pain>

<sup>2</sup> From the Centers for Disease Control and Prevention. Prevalence of disabilities and associated health conditions among adults--United States, 1999. JAMA. 2001 Mar 28;285(12):1571-2.

<sup>3</sup> Stewart WF, Ricci JA, Chee E, Morganstein D, Lipton R. Lost productive time and cost due to common pain conditions in the US workforce. JAMA. 2003 Nov 12;290(18):2443-54.

<sup>4</sup> Ricci JA, Stewart WF, Chee E, Leotta C, Foley K, Hochberg MC. Back pain exacerbations and lost productive time costs in United States workers. Spine (Phila Pa 1976). 2006 Dec 15;31(26):3052-60.

<sup>5</sup> Guo HR, Tanaka S, Halperin WE, Cameron LL. Back pain prevalence in US industry and estimates of lost workdays. Am J Public Health. 1999 Jul;89(7):1029-35.

<sup>6</sup> Katz JN. Lumbar disc disorders and low-back pain: socioeconomic factors and consequences. J Bone Joint Surg Am. 2006 Apr;88 Suppl 2:21-4.

<sup>7</sup> Freburger JK, Holmes GM, Agans RP, et al. The Rising Prevalence of Chronic Low Back Pain. Arch Intern Med. 2009;169(3):251-258.

<sup>8</sup> Porter JM, Gyi DE. The prevalence of musculoskeletal troubles among car drivers. Occup Med (Lond). 2002 Feb;52(1):4-12.

- <sup>9</sup> Barrero LH, Cifuentes M, Rodríguez AC, Rey-Becerra E, Johnson PW, Marin LS, Piedrahita H, Dennerlein JT. Whole-body vibration and back pain-related work absence among heavy equipment vehicle mining operators. *Occup Environ Med*. 2019 Aug;76(8):554-559.
- <sup>10</sup> Gotfryd AO, Valesin Filho ES, Viola DC, Lenza M, Silva JA, Emi AS, Tomiosso R, Piccinato Cde A, Antoniolli E, Ferretti M. Analysis of epidemiology, lifestyle, and psychosocial factors in patients with back pain admitted to an orthopedic emergency unit. *Einstein (Sao Paulo)*. 2015 Apr-Jun;13(2):243-8.
- <sup>11</sup> Kim SD. Association between sitting time and orthopedic conditions in Korean older adults. *Geriatr Nurs*. 2019 Nov-Dec;40(6):629-633.
- <sup>12</sup> Green BN, Johnson CD, Snodgrass J, Smith M, Dunn AS. Association Between Smoking and Back Pain in a Cross-Section of Adult Americans. *Cureus*. 2016 Sep 26;8(9):e806.
- <sup>13</sup> Heuch I, Heuch I, Hagen K, Storheim K, Zwart JA. Associations between the number of children, age at childbirths and prevalence of chronic low back pain: the Nord-Trøndelag Health Study. *BMC Public Health*. 2020 Oct 15;20(1):1556.
- <sup>14</sup> Siddiqui AS, Javed S, Abbasi S, Baig T, Afshan G. Association Between Low Back Pain and Body Mass Index in Pakistani Population: Analysis of the Software Bank Data. *Cureus*. 2022 Mar 30;14(3):e23645.
- <sup>15</sup> Sørensen IG, Jacobsen P, Gyntelberg F, Suadicani P. Occupational and other predictors of herniated lumbar disc disease—a 33-year follow-up in the Copenhagen male study. *Spine (Phila Pa 1976)*. 2011 Sep 1;36(19):1541-6.
- <sup>16</sup> Sørensen IG, Jacobsen P, Gyntelberg F, Suadicani P. Occupational and other predictors of herniated lumbar disc disease—a 33-year follow-up in the Copenhagen male study. *Spine (Phila Pa 1976)*. 2011 Sep 1;36(19):1541-6.
- <sup>17</sup> Andias R, Silva AG. Impact of Sex, Sleep, Symptoms of Central Sensitization, and Psychosocial Factors in Adolescents with Chronic Musculoskeletal Pain: An Exploratory Study. *Pain Med*. 2022 Sep 30;23(10):1777-1792.
- <sup>18</sup> Hsiang SM, Brogmus GE, Courtney TK. Low back pain (LBP) and lifting technique—a review. *Int J Ind Ergon*. 1997;19:59–74.
- <sup>19</sup> Meziat Filho N, Coutinho ES, Azevedo e Silva G. Association between home posture habits and low back pain in high school adolescents. *Eur Spine J*. 2015 Mar;24(3):425-33.
- <sup>20</sup> Andersen LL, Vinstrup J, Sundstrup E, Skovlund SV, Villadsen E, Thorsen SV. Combined ergonomic exposures and development of musculoskeletal pain in the general working population: A prospective cohort study. *Scand J Work Environ Health*. 2021 May 1;47(4):287-295.
- <sup>21</sup> Tatsumi M, Mkoba EM, Suzuki Y, Kajiwara Y, Zeidan H, Harada K, Bitoh T, Nishida Y, Nakai K, Shimoura K, Aoyama T. Risk factors of low back pain and the relationship with sagittal vertebral alignment in Tanzania. *BMC Musculoskelet Disord*. 2019 Dec 4;20(1):584.
- <sup>22</sup> Wang YXJ, Wu AM, Ruiz Santiago F, Nogueira-Barbosa MH. Informed appropriate imaging for low back pain management: A narrative review. *J Orthop Translat*. 2018 Aug 27;15:21-34
- <sup>23</sup> Bento TPF, Cornelio GP, Perrucini PO, Simeão SFAP, de Conti MHS, de Vitta A. Low back pain in adolescents and association with sociodemographic factors, electronic devices, physical activity and mental health. *J Pediatr (Rio J)*. 2020 Nov-Dec;96(6):717-724.
- <sup>24</sup> Brox JI, Nygaard ØP, Holm I, Keller A, Ingebrigtsen T, Reikerås O. Four-year follow-up of surgical versus non-surgical therapy for chronic low back pain. *Ann Rheum Dis*. 2010 Sep;69(9):1643-8.
- <sup>25</sup> Grunhagen T, Wilde G, Soukane DM, Shirazi-Adl SA, Urban JP. Nutrient supply and intervertebral disc metabolism. *J Bone Joint Surg Am*. 2006 Apr;88 Suppl 2:30-5.
- <sup>26</sup> Urban JP, Smith S, Fairbank JC. Nutrition of the intervertebral disc. *Spine (Phila Pa 1976)*. 2004 Dec 1;29(23):2700-9.
- <sup>27</sup> Bibby SR, Urban JP. Effect of nutrient deprivation on the viability of intervertebral disc cells. *Eur Spine J*. 2004 Dec;13(8):695-701.
- <sup>28</sup> Wilson Zingg R, Kendall R. Obesity, Vascular Disease, and Lumbar Disk Degeneration: Associations of Comorbidities in Low Back Pain. *PM R*. 2017 Apr;9(4):398-402.
- <sup>29</sup> Kauppila LI. Atherosclerosis and disc degeneration/low-back pain—a systematic review. *Eur J Vasc Endovasc Surg*. 2009 Jun;37(6):661-70.
- <sup>30</sup> Beckworth WJ, Holbrook JF, Foster LG, Ward LA, Welle JR. Atherosclerotic Disease and its Relationship to Lumbar Degenerative Disk Disease, Facet Arthritis, and Stenosis With Computed Tomography Angiography. *PM R*. 2018 Apr;10(4):331-337.
- <sup>31</sup> Kauppila LI, Mikkonen R, Mankinen P, Pelto-Vasenius K, Mäenpää I. MR aortography and serum cholesterol levels in patients with long-term nonspecific lower back pain. *Spine (Phila Pa 1976)*. 2004 Oct 1;29(19):2147-52.
- <sup>32</sup> Jayson MI. Vascular damage, fibrosis, and chronic inflammation in mechanical back pain problems. *Semin Arthritis Rheum*. 1989 May;18(4 Suppl 2):73-6.
- <sup>33</sup> Hughes SP, Freemont AJ, Hukins DW, McGregor AH, Roberts S. The pathogenesis of degeneration of the intervertebral disc and emerging therapies in the management of back pain. *J Bone Joint Surg Br*. 2012 Oct;94(10):1298-304.
- <sup>34</sup> Bruckner FE, Greco A, Leung AW. 'Benign thoracic pain' syndrome: role of magnetic resonance imaging in the detection and localization of thoracic disc disease. *J R Soc Med*. 1989 Feb;82(2):81-3.
- <sup>35</sup> Sawka MN, Cheuvront SN, Carter R 3rd. Human water needs. *Nutr Rev*. 2005 Jun;63(6 Pt 2):S30-9.
- <sup>36</sup> Muñoz CX, Bergeron MF. Characterizing Hydration Practices in Healthy Young Recreationally Active Adults—Is There Utility in First Morning Urine Sampling? *Int J Sport Nutr Exerc Metab*. 2023 May 24:1-10.
- <sup>37</sup> McKenzie AL, Muñoz CX, Ellis LA, Perrier ET, Guelinckx I, Klein A, Kavouras SA, Armstrong LE. Urine color as an indicator of urine concentration in pregnant and lactating women. *Eur J Nutr*. 2017 Feb;56(1):355-362.
- <sup>38</sup> Rodacki AL, Fowler NE, Provenci CL, Rodacki Cde L, Dezan VH. Body mass as a factor in stature change. *Clin Biomech (Bristol, Avon)*. 2005 Oct;20(8):799-805.
- <sup>39</sup> Urquhart DM, Berry P, Wluka AE, Strauss BJ, Wang Y, Proietto J, Jones G, Dixon JB, Cicuttini FM. 2011 Young Investigator Award winner: Increased fat mass is associated with high levels of low back pain intensity and disability. *Spine (Phila Pa 1976)*. 2011 Jul 15;36(16):1320-5.
- <sup>40</sup> Sheng B, Feng C, Zhang D, Spitzer H, Shi L. Associations between Obesity and Spinal Diseases: A Medical Expenditure Panel Study Analysis. *Int J Environ Res Public Health*. 2017 Feb 13;14(2):183. doi: 10.3390/ijerph14020183. PMID: 28208824; PMCID: PMC5334737.
- <sup>41</sup> Wolever TMS, Rahn M, Dioum EH, Jenkins AL, Ezatagha A, Campbell JE, Chu Y. Effect of Oat  $\beta$ -Glucan on Affective and Physical Feeling States in Healthy Adults: Evidence for Reduced Headache, Fatigue, Anxiety and Limb/Joint Pains. *Nutrients*. 2021 May 1;13(5):1534.
- <sup>42</sup> Cicha I, Suzuki Y, Tateishi N, Maeda N. Effects of dietary triglycerides on rheological properties of human red blood cells (abstract). *Clin Hemorheol Microcirc*. 2004;30(3-4):301-5.
- <sup>43</sup> Candiloros H, Muller S, Ziegler O, Donner M, Drouin P. Role of albumin glycation on the erythrocyte aggregation: an in vitro study. *Diabet Med*. 1996 Jul;13(7):646-50.
- <sup>44</sup> Leino-Arjas P, Kauppila L, Kaila-Kangas L, Shiri R, Heistaro S, Heliövaara M. Serum lipids in relation to sciatica among Finns. *Atherosclerosis*. 2008 Mar;197(1):43-9.
- <sup>45</sup> Longo UG, Denaro L, Spiezia F, Forriol F, Maffulli N, Denaro V. Symptomatic disc herniation and serum lipid levels. *Eur Spine J*. 2011 Oct;20(10):1658-62.
- <sup>46</sup> Pountant GD, Keegan AL, Jayson MI. Impaired fibrinolytic activity in defined chronic back pain syndromes. *Spine (Phila Pa 1976)*. 1987 Mar;12(2):83-6.
- <sup>47</sup> Jayson MI, Keegan A, Million R, Tomlinson I. A fibrinolytic defect in chronic back pain syndromes. *Lancet*. 1984 Nov 24;2(8413):1186-7.
- <sup>48</sup> Devroede G, Girard G, Bouchoucha M, Roy T, Black R, Camerlain M, Pinard G, Schang JC, Arhan P. Idiopathic constipation by colonic dysfunction. Relationship with personality and anxiety. *Dig Dis Sci*. 1989 Sep;34(9):1428-33.
- <sup>49</sup> Moezi P, Salehi A, Molavi H, Poustchi H, Gandomkar A, Imanieh MH, Malekzadeh R. Prevalence of Chronic Constipation and Its Associated Factors in Pars Cohort Study: A Study of 9000 Adults in Southern Iran. *Middle East J Dig Dis*. 2018 Apr;10(2):75-83.
- <sup>50</sup> Chun J. A patient presenting with abdominal pain radiating to the back. *Intest Res*. 2016 Jul;14(3):289-91.
- <sup>51</sup> Dekker Nitert M, Mousa A, Barrett HL, Naderpoor N, de Courten B. Altered Gut Microbiota Composition Is Associated With Back Pain in Overweight and Obese Individuals. *Front Endocrinol (Lausanne)*. 2020 Sep 2;11:605.
- <sup>52</sup> Gaisbauer M, Langosch A. Raw food and immunity. *Fortschr Med*. 1990 Jun 10;108(17):338-40.
- <sup>53</sup> Rauma AL, Törrönen R, Hänninen O, Verhagen H, Mykkänen H. Antioxidant status in long-term adherents to a strict uncooked vegan diet. *Am J Clin Nutr*. 1995 Dec;62(6):1221-7.
- <sup>54</sup> Swank RL, Nakamura H. Oxygen availability in brain tissues after lipid meals. *Am J Physiol*. 1960 Jan;198:217-20.
- <sup>55</sup> NaPier Z, Kanim LEA, Arabi Y, Salehi K, Sears B, Perry M, Kim S, Sheyn D, Bae HW, Glaeser JD. Omega-3 Fatty Acid Supplementation Reduces Intervertebral Disc Degeneration. *Med Sci Monit*. 2019 Dec 14;25:9531-9537.
- <sup>56</sup> Peiwu Li, Qi Zhang, Daohong Zhang, Di Guan, Xiaoxia, Ding Xuefen Liu, Sufang Fang, Xiupin Wang and Wen Zhang (2011). *Aflatoxin Measurement and Analysis, Aflatoxins - Detection, Measurement and Control*, Dr Irineo Torres-Pacheco (Ed.), ISBN: 978-953-307-711-6, InTech, Available from: <http://www.intechopen.com/books/aflatoxins-detection-measurement-and-control/aflatoxin-measurement-and-analysis>
- <sup>57</sup> Kim YK, Koh E, Chung HJ, Kwon H. Determination of ethyl carbamate in some fermented Korean foods and beverages. *Food Addit Contam*. 2000 Jun;17(6):469-75.
- <sup>58</sup> Hinton DM, Myers MJ, Raybourne RA, Francke-Carroll S, Sotomayor RE, Shaddock J, Warbritton A, Chou MW. Immunotoxicity of aflatoxin B1 in rats: effects on lymphocytes and the inflammatory response in a chronic intermittent dosing study. *Toxicol Sci*. 2003 Jun;73(2):362-77.
- <sup>59</sup> Roy RN, Russell RI. Crohn's disease & aflatoxins. *J R Soc Health*. 1992 Dec;112(6):277-9.
- <sup>60</sup> A case-control study of ulcerative colitis in relation to dietary and other factors in Japan. The Epidemiology Group of the Research Committee of Inflammatory Bowel Disease in Japan. *J Gastroenterol*. 1995 Nov;30 Suppl 8:9-12.
- <sup>61</sup> White, E. G. (1987). *Manuscript Releases, vol. 2* [Nos. 97-161]. Silver Spring, MD: Ellen G. White Estate. P. 143.
- <sup>62</sup> AlQuaiz A, Albugami M, Kazi A, Alshobaili F, Habib F, Gold EB. Dietary, Psychological and Lifestyle Factors Associated with Premenstrual Symptoms. *Int J Womens Health*. 2022 Dec 16;14:1709-1722.

- <sup>63</sup> Fujihira K, Hamada Y, Yanaoka T, Yamamoto R, Suzuki K, Miyashita M. The effects of water temperature on gastric motility and energy intake in healthy young men. *Eur J Nutr*. 2020 Feb;59(1):103-109.
- <sup>64</sup> Kirsch Micheleletti J, Bláfoss R, Sundstrup E, Bay H, Pastre CM, Andersen LL. Association between lifestyle and musculoskeletal pain: cross-sectional study among 10,000 adults from the general working population. *BMC Musculoskeletal Disord*. 2019 Dec 17;20(1):609.
- <sup>65</sup> Vinstруп J, Jakobsen MD, Andersen LL. Poor Sleep Is a Risk Factor for Low-Back Pain among Healthcare Workers: Prospective Cohort Study. *Int J Environ Res Public Health*. 2020 Feb 5;17(3):996.
- <sup>66</sup> Campanini MZ, González AD, Andrade SM, Giroto E, Cabrera MAS, Guidoni CM, Araujo PCA, Mesas AE. Bidirectional associations between chronic low back pain and sleep quality: A cohort study with schoolteachers. *Physiol Behav*. 2022 Oct 1;254:113880.
- <sup>67</sup> Genesis 1:29; 3:18 taken from the Holy Bible, New International Version®, NIV®. Copyright © 1973, 1978, 1984, 2011 by Biblica, Inc.™ Used by permission of Zondervan. All rights reserved worldwide.
- <sup>68</sup> Ahn S, Song R. Bone mineral density and perceived menopausal symptoms: factors influencing low back pain in postmenopausal women. *J Adv Nurs*. 2009 Jun;65(6):1228-36.
- <sup>69</sup> Citko A, Górski S, Marcinowicz L, Górka A. Sedentary Lifestyle and Nonspecific Low Back Pain in Medical Personnel in North-East Poland. *Biomed Res Int*. 2018 Sep 9;2018:1965807.
- <sup>70</sup> Porter SE, Hanley EN Jr. The musculoskeletal effects of smoking. *J Am Acad Orthop Surg*. 2001 Jan-Feb;9(1):9-17.
- <sup>71</sup> Malińska M, Bugajska J, Bartuzi P. Occupational and non-occupational risk factors for neck and lower back pain among computer workers: a cross-sectional study. *Int J Occup Saf Ergon*. 2021 Dec;27(4):1108-1115.
- <sup>72</sup> Cook CE, Taylor J, Wright A, Milosavljevic S, Goode A, Whitford M. Risk factors for first time incidence sciatica: a systematic review. *Physiother Res Int*. 2014 Jun;19(2):65-78.
- <sup>73</sup> Raspe A, Matthis C, Héon-Klin V, Raspe H. Chronische Rückenschmerzen: Mehr als Schmerzen im Rücken. Ergebnisse eines regionalen Surveys unter Versicherten einer Landesversicherungsanstalt [Chronic back pain: more than pain in the back. Findings of a regional survey among insureds of a workers pension insurance fund]. *Rehabilitation (Stuttg)*. 2003 Aug;42(4):195-203.
- <sup>74</sup> Vinstруп J, Jakobsen MD, Andersen LL. Perceived Stress and Low-Back Pain Among Healthcare Workers: A Multi-Center Prospective Cohort Study. *Front Public Health*. 2020 Aug 11;8:297.
- <sup>75</sup> Vinstруп J, Jakobsen MD, Andersen LL. Perceived Stress and Low-Back Pain Among Healthcare Workers: A Multi-Center Prospective Cohort Study. *Front Public Health*. 2020 Aug 11;8:297.
- <sup>76</sup> Christiansen J, Qualter P, Friis K, Pedersen SS, Lund R, Andersen CM, Bekker-Jeppesen M, Lasgaard M. Associations of loneliness and social isolation with physical and mental health among adolescents and young adults. *Perspect Public Health*. 2021 Jul;141(4):226-236.
- <sup>77</sup> Jahre H, Grotle M, Småstuen M, Guddal MH, Smedbråten K, Richardsen KR, Stensland S, Storheim K, Øiestad BE. Risk factors and risk profiles for neck pain in young adults: Prospective analyses from adolescence to young adulthood-The North-Trøndelag Health Study. *PLoS One*. 2021 Aug 12;16(8):e0256006.
- <sup>78</sup> Almutairi AH 2nd, Almalki AM, Alharthi EK, Alhossaini ZA, Alkurayzi AH, Alharthi N, Filfilan NN. LifeStyle and Exercise Relation to Neck and Back Pain in Saudi Arabia. *Cureus*. 2022 Dec 26;14(12):e32979.
- <sup>79</sup> Burns JW, Jensen MP, Thorn B, Lillis TA, Carmody J, Newman AK, Keefe F. Cognitive therapy, mindfulness-based stress reduction, and behavior therapy for the treatment of chronic pain: randomized controlled trial. *Pain*. 2022 Feb 1;163(2):376-389.
- <sup>80</sup> Jeremiah 15:17,18 quoted are from the Good News Bible © 1994 published by the British and Foreign Bible Society. Good News Bible © American Bible Society 1966, 1971, 1976, 1992. Used with permission.
- <sup>81</sup> Psalms 129:2,3. From the Revised Standard Version of the Bible—Second Catholic Edition (Ignatius Edition) Copyright © 2006 National Council of the Churches of Christ in the United States of America. Used by permission. All rights reserved worldwide.
- <sup>82</sup> Psalm 25:18, KJV.
- <sup>83</sup> Isaiah 33:24, KJV.
- <sup>84</sup> Carson JW, Keefe FJ, Goli V, Fras AM, Lynch TR, Thorp SR, Buechler JL. Forgiveness and chronic low back pain: a preliminary study examining the relationship of forgiveness to pain, anger, and psychological distress. *J Pain*. 2005 Feb;6(2):84-91.
- <sup>85</sup> Matthew 11:28-30, KJV.
- <sup>86</sup> Greenwood J Jr. Optimum Vitamin C Intake As A Factor In The Preservation Of Disc Integrity: Preliminary Report. *Med Ann Dist Columbia*. 1964 Jun;33:274-6.
- <sup>87</sup> Chan SC, Ferguson SJ, Gantenbein-Ritter B. The effects of dynamic loading on the intervertebral disc. *Eur Spine J*. 2011 Nov;20(11):1796-812.
- <sup>88</sup> Gullbrand SE, Peterson J, Mastropolo R, Roberts TT, Lawrence JP, Glennon JC, DiRisio DJ, Ledet EH. Low rate loading-induced convection enhances net transport into the intervertebral disc in vivo. *Spine J*. 2015 May 1;15(5):1028-33.
- <sup>89</sup> Taylor NF; Evans OM; Goldie PA. The effect of walking faster on people with acute low back pain. *Eur Spine J*. 2003; 12(2):166-72 (ISSN: 0940-6719)
- <sup>90</sup> Rissanen AP, Tikkanen HO, Koponen AS, Aho JM, Hägglund H, Lindholm H, Peltonen JE. Alveolar gas exchange and tissue oxygenation during incremental treadmill exercise, and their associations with blood O<sub>2</sub> carrying capacity. *Front Physiol*. 2012 Jul 11;3:265.
- <sup>91</sup> Kim Y, Lee YM, Cho M, Lee H. Effect of a Pedometer-Based, 24-Week Walking Intervention on Depression and Acculturative Stress among Migrant Women Workers. *Int J Environ Res Public Health*. 2019 Nov 9;16(22):4385.
- <sup>92</sup> Ikeda T, Hori D, Arai Y, Muroi K, Ikeda Y, Takahashi T, Shiraki N, Doki S, Oi Y, Sasahara S, Morita E, Matsuzaki I. Association between forest and greenspace walking and stress-coping skills among workers of Tsukuba Science City, Japan: A cross-sectional study. *Public Health Pract (Oxf)*. 2021 Jan 3;2:100074.
- <sup>93</sup> Shiri R, Falah-Hassani K, Heliövaara M, Solovieva S, Amiri S, Lallukka T, Burdorf A, Husgafvel-Pursiainen K, Viikari-Juntura E. Risk Factors for Low Back Pain: A Population-Based Longitudinal Study. *Arthritis Care Res (Hoboken)*. 2019 Feb;71(2):290-299.
- <sup>94</sup> Zimmerman S, Reiter RJ. Melatonin and the Optics of the Human Body. *Melatonin Research February 2019* 2(1):138-160.
- <sup>95</sup> Brzeszczyńska J, Brzeszczyński F. Benefit of sunlight and melatonin on back pain and inflammation. *Bone Joint Res*. 2023 Mar 7;12(3):199-201.
- <sup>96</sup> Lotfi A, Abdel-Nasser AM, Hamdy A, Omran AA, El-Rehany MA. Hypovitaminosis D in female patients with chronic low back pain. *Clin Rheumatol*. 2007 Nov;26(11):1895-901.
- <sup>97</sup> Kanaujia V, Yadav RK, Verma S, Jain S, Patra B, Neyaz O. Correlation between Vitamin D deficiency and nonspecific chronic low back pain: A retrospective observational study. *J Family Med Prim Care*. 2021 Feb;10(2):893-897.
- <sup>98</sup> van der Rhee HJ, de Vries E, Coebergh JW. Regular sun exposure benefits health. *Med Hypotheses*. 2016 Dec;97:34-37.
- <sup>99</sup> Stevenson JM, Weber CL, Smith JT, Dumas GA, Albert WJ. A longitudinal study of the development of low back pain in an industrial population. *Spine (Phila Pa 1976)*. 2001 Jun 15;26(12):1370-7.
- <sup>100</sup> Hatefi M, Babakhani F, Ashrafzadeh M. The effect of static stretching exercises on hip range of motion, pain, and disability in patients with non-specific low back pain. *J Exp Orthop*. 2021 Jul 27;8(1):55.
- <sup>101</sup> Chen HM, Wang HH, Chen CH, Hu HM. Effectiveness of a stretching exercise program on low back pain and exercise self-efficacy among nurses in Taiwan: a randomized clinical trial. *Pain Manag Nurs*. 2014 Mar;15(1):283-91.
- <sup>102</sup> Ghasemi M, Khoshkhalagh AH, Ghanjal A, Yazdanirad S, Laal F. The impacts of rest breaks and stretching exercises on lower back pain among commercial truck drivers in Iran. *Int J Occup Saf Ergon*. 2020 Dec;26(4):662-669.
- <sup>103</sup> Elnaggar IM, Nordin M, Sheikhzadeh A, Parnianpour M, Kahanovitz N. Effects of spinal flexion and extension exercises on low-back pain and spinal mobility in chronic mechanical low-back pain patients. *Spine (Phila Pa 1976)*. 1991 Aug;16(8):967-72.
- <sup>104</sup> Dettori JR, Bullock SH, Sutlive TG, Franklin RJ, Patience T. The effects of spinal flexion and extension exercises and their associated postures in patients with acute low back pain. *Spine (Phila Pa 1976)*. 1995 Nov 1;20(21):2303-12.
- <sup>105</sup> Woo SD, Kim TH. The effects of lumbar stabilization exercise with thoracic extension exercise on lumbosacral alignment and the low back pain disability index in patients with chronic low back pain. *J Phys Ther Sci*. 2016 Jan;28(2):680-4.
- <sup>106</sup> McGovern RP, Kivlan BR, Martin RL. Length Change Of The Short External Rotators Of The Hip In Common Stretch Positions: A Cadaveric Study. *Int J Sports Phys Ther*. 2017 Dec;12(7):1068-1077.
- <sup>107</sup> Meng XG, Yue SW. Efficacy of aerobic exercise for treatment of chronic low back pain: a meta-analysis. *Am J Phys Med Rehabil*. 2015 May;94(5):358-65.