

Ergonomic Intervention with Dirgaswasam Modeling Combined with Exercise Prescriptions (DirgasExPres) Reducing Musculoskeletal Complaints in Dentists

Ni Nyoman Kristina
Udayana University, Bali
krisayudewi65@gmail.com

I Made Ady Wirawan, I Putu Gede Adiatmika, and I Nyoman Adiputra
Medicine Faculty of Udayana University, Bali, Indonesia
Ady.wirawan@unud.ac.id, ipgadiatmika@unud.ac.id, nadip2003@yahoo.com,
hadem@squ.edu.om

Abstract

From day to day the number of dental patients is increasing, so dentists spend more time in the dental chair. With this, dentists experience musculoskeletal complaints with an increasing prevalence. To prevent musculoskeletal disorders, this article discusses recipes for exercises that can be done. Aerobic exercise is an exercise that can improve the fitness of a dentist which can be divided into: (1) stretching exercises that focus on total body fitness; (2) Strengthening exercises that concentrate on prolonged and repetitive dental postures in which the muscles tend to tighten; (3) Movement that focuses on muscles that are moved vigorously in the opposite direction to the goal. This exercise recipe can be practiced independently by dentists because it is made as simple as possible and with minimal movement intensity.

Keywords

Ergonomics, Musculoskeletal Disorders, Stretch Prescription, Dentist.

1. Introduction

With the increasing number of dental problems in today's world, dentists are dealing with many patients due to the increasing number of dental problems. Hayes et al. (2009) said that musculoskeletal disorders in dentists were as high as 64-93 percent with the following details: on the back 36.3-60.1 percent; on the neck 19.8 – 85 percent; on the hand and wrist by 60-69.5%.

Movement by turning the body repeatedly and for a long time has a major risk factor for musculoskeletal complaints in dentists, so dentists work in a prolonged static posture with an awkward position and lack of flexibility and unbalanced core strength.

1.1 Repetitive Movement

With insufficient rest time, microtrauma that triggers inflammation with repeated force can cause inflammation and swelling of the muscles that are functioning. Winihastuti (2018) found more than 4 times per minute Repetitive movements of awkward postures made by respondents were 81.8%.

2. Awkward and Prolonged Static Posture

Musculoskeletal disorders that cause discomfort, pain and even disability due to a sedentary posture. Navah et al. in their study also said that awkward posture and time spent in a sitting position and the severity of LBA at the dentist had a significant correlation.

3. Muscle Imbalance

Prolonged time and in a fixed position can cause muscle ischemia and joint hypomobility, because the dentist is in optimal body position and increased muscle tension. Weakness in opposing muscles as well as one muscle group can result in tightness that can alter biomechanics. So, they have to incorporate daily stretching into their routine. Studies that support the recording of the Trapezius in the dominant position and high muscle activity in the splenius are in the EMG study. Other things are also caused by lack of exercise, inadequate surgical equipment, prolonged static posture and lack of awareness about correct posture among dentists. According to Kanteshwari et al. (2011) study only 78 percent reported that they were aware of correct posture, and only 90 percent had ergonomic awareness of the student study group. There is a need for awareness to design ergonomic workstations with correct posture, adequate operating tools and appropriate lighting intensity, so that good literature can be held among dentists. To do physical work and describe the ability and improve the dentist's overall fitness there must be stretching exercises. Flexibility, endurance, musculoskeletal strength requires cardiopulmonary function by doing physical work efficiently. To prevent musculoskeletal disorders, dentists can use the stretching recipes given in detail in this article.

4. Aerobic Exercise

Decreased oxygen to muscles and decreased nutrient flow are one of the main causes of musculoskeletal disorders. To increase efficiency by increasing blood flow to tissues by increasing oxygen transport, attention is paid to concentration aerobic exercise. So that blood triglycerides are cleared, and blood flow can increase rapidly. Waaler (2007) psychologically and socially physical activity or sport is very beneficial. To maintain balance, flexibility, strength, and aerobic capacity can be increased by physiological exercise.

5. Warming up

Stretching and total body movement is done for approximately 10 minutes.

5.1 Practice Period

- Duration: 30 minutes
- Intensity: HRmax 220-age maximum heart rate must be at a maximum of 70 percent HRmax 220-age.
- Exercise mode: weight training, climbing stairs, swimming, running, cycling and walking according to the dentist's preference.
- Frequency: 3 times a week.

5.2 Cooling period

Full body movement and stretching for 10 minutes

5.3 Stretching Exercises

After the development of 51 dentists at public health centers throughout Denpasar in the optimal standing posture, it produces muscle tension caused by muscle tension that is maintained for a long period of time. Some say that static posture for a prolonged period of time requires a contraction of 50% of the total body muscles, so it is necessary to stretch the muscles for approximately 30 seconds which is done slowly in order to minimize tension in the muscles. Stretching movements that are carried out slowly, gently and do not because pain can be done 3 times a day and can even be done in a dental chair for 30 seconds.

5.4 Exercise Prescription with 27 Movements to Reduce Musculoskeletal Complaints

Dirgaswasam before exercise prescription:

- Take the breath as shown in Figure 1.

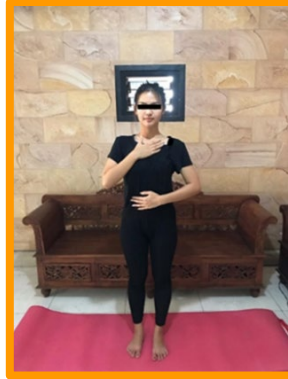


Figure 1. Open breathing diaphragm

- When you feel it, choose a comfortable position, place your right hand on the chest chakra area, gently place your left hand on your navel, inhale from your nose. eyes, and open them again. Do it 3 times.
- Keep your head straight by folding your arms behind your head as shown in Figure 2. And do the movement over and over again.

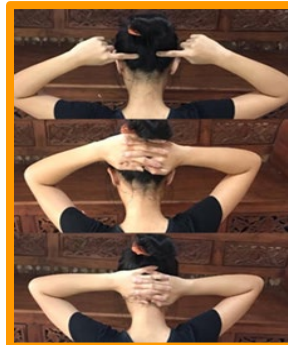


Figure 2. Upper neck stretch

- Standing straight facing a corner of the wall with your hands straight and bent up and the palms of your hands looking down and looking down, as shown in Figure 3.



Figure 3. Stretch lower neck

- As shown in Figure 4, stand straight with your left hand back straight and your right hand down and looking forward. Likewise, stand straight with your right hand back straight and your left hand down and looking forward.

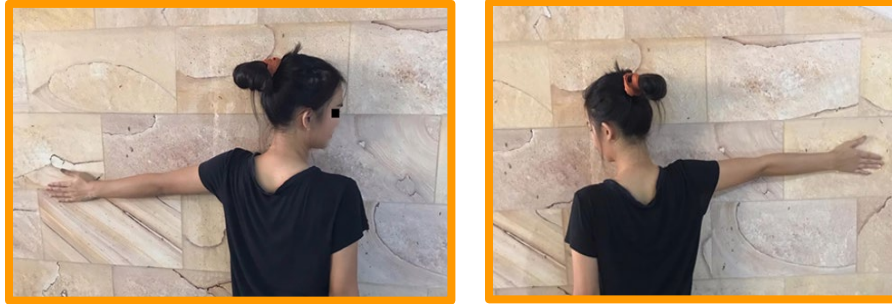


Figure 4. Shoulder stretch

- As shown in Figure 5, stand straight by bending your left hand back, touching your shoulder and bending your elbow then holding your right hand in line with your head. Moreover, stand straight by bending your right hand back, touching your shoulder and bending your elbow then holding your left hand in line with your head.



Figure 5. Upper arm stretch

- As shown in Figure 6, stand with your feet open, and drop your weight left and right with your hands straight down and up alternately to the left and right.



Figure 6. Drop weight

- Stand straight by dropping your weight to the left and folding your palms facing up above your head as shown by Figure 7. Do the same to the left and to the right.

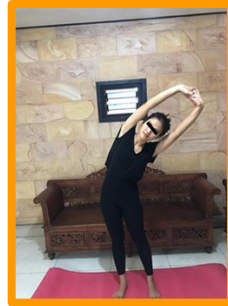


Figure 7. Stretch on the waist

- As shown in Figure 8, stand straight by folding your arms while holding your shoulders with your hands in front of your chest and alternately.

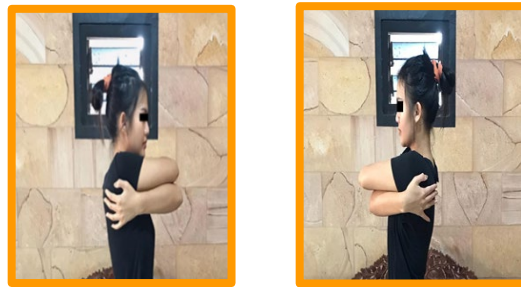


Figure 8. Stretch on the right forearm

- Pull the right leg on tiptoe back and both hands are pulled straight up with a straight look up, as shown in Figure 9. Do it alternately (left and right).

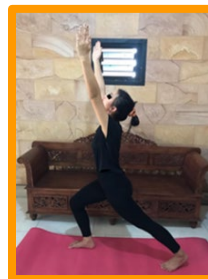


Figure 9. Stretch on the waist

- Take a standing position as shown in Figure 10. Fold your arms forward with an upright body position and puff your chest forward by bending your legs in a half squat position and lock your stomach so you feel your buttocks tight.

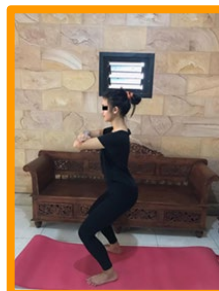


Figure 10. Buttocks stretch

- As shown in Figure 11, take an upright standing position swing your arms to the left and lift your left leg, do the same to the right.

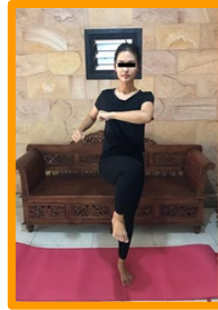


Figure 11. Stretch on the butt

- Take a standing position facing forward, bend your elbows and hold your wrists together, like Figure 12.

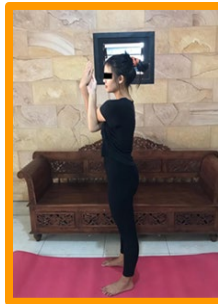


Figure 12. Stretch on the left elbow

- Take a standing position as shown in Figure 13, fold your hands, pointing to the left and right while holding your left and right elbows, then tilt your body to a 30-degree position. Do left and right movements.



Figure 13. Stretch on the right elbow

- As shown in Figure 14, direct the right arm to the side against the left shoulder and fold the right hand up while holding the left elbow with the fingers open and straighten the fingers.

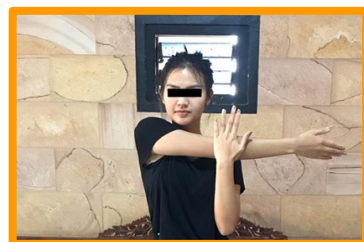


Figure 14. Stretch on the left forearm

- As shown Figure 15, direct the right arm to the side against the left shoulder and fold the right hand up while holding the left elbow with the fingers open and straighten the fingers.



Figure 15. Stretch there is a canning bottom right

- Point your hand forward with the position of the right hand facing out and pressing the left hand, as shown in Figure 16. Likewise, point your hand forward with the position of the right hand facing out and press the left hand and continue pressing on the fingertips of the left hand.

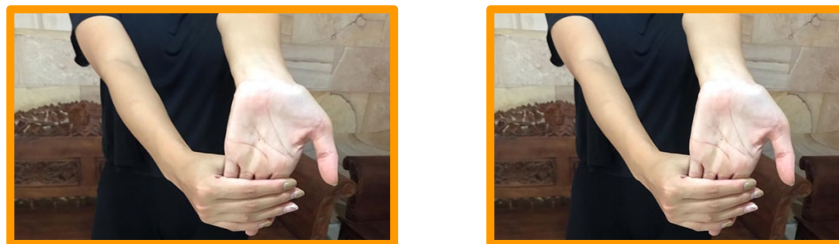


Figure 16. Palm stretch

- Position the body perpendicular to the knee and pull the left leg back straight in a tiptoe position and place both hands on the knee of the right leg with a forward view, as shown in Figure 17. Likewise, position the body perpendicular to the knee and pull the right leg back straight in a tiptoe position and place both hands on the knee of the left leg with a forward view.



Figure 17. Stretch on the thigh

- Stand straight by pulling your left knee up with both hands and looking straight ahead, as shown in Figure 18. Next, stand straight by pulling the right knee pulled up with both hands and looking forward.

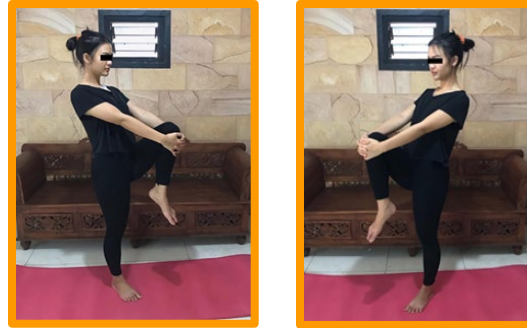


Figure 18. Stretch on the knee

- As shown in Figure 19, bend your right leg forward, pulling your left leg straight back and placing your palms perpendicular to the wall. Then, bend the left leg forward, by pulling the right leg straight back and the position of both palms perpendicular to the wall.



Figure 19. Stretch on the calf

- As shown in Figure 20, stand straight by pulling your right leg with your right hand and position your left hand straight down and look straight ahead. Stand straight by pulling your left leg with your left hand and position your right hand straight down and look straight ahead.

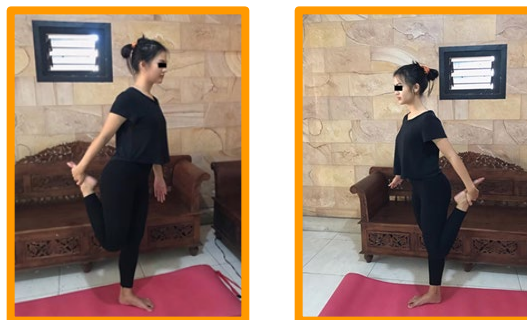


Figure 20. Stretch on the ankle

- As shown in Figure 21, stand facing a wall, raise your arms, and place your palms against the wall. Put your right leg back, then hold it so that the knee remains straight. After that, bend your left knee forward and keep your heel on the floor. Move your hips forward and hold the position for 30 seconds before switching to the other leg. Repeat this movement three times for each leg.



Figure 21. Stretch on the foot

- Closing/Dirgaswasam (Take the breath)
When you feel it, choose a comfortable position, place your right hand on the chest chakra area, gently place your left hand on your navel, inhale from your nose. eyes, and open them again. Do it 3 times.

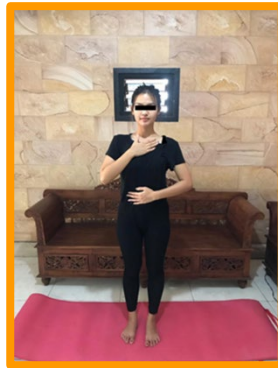


Figure 22. Closing

6. Discussion

Lack of awareness among the problems that they get when a career as a dentist has been proven by many studies. Research supporting the importance of an explanatory stretch prescription is still very limited. Therefore, to increase awareness of the problems faced by dentists related to their work, we try to provide stretch prescriptions that aim to prevent musculoskeletal disorders in the dentist's own hands.

The risk factor for musculoskeletal disorders related to the work of dentists is very large, because the majority of dentists are vulnerable to the risk of being exposed to these problems. This can be proven from the results of research by Valachi and Valachi (2003) in their article related to the problem of risk for the occurrence of musculoskeletal disorders in dentists, namely lack of flexibility and muscle strength, awkward posture, repetitive movements, and prolonged work postures. Another study also stated that dentists during work there was an increase in muscle activity. Milerad et al. (1991) The same thing was also revealed by Finsen et al. (1998), that high muscle loads on the trapezius such as neck, shoulder and arm muscles during dentists' doing In the article, Warren (2010) stated that the risk factors for the development of musculoskeletal disorders in dentists should also consider psychosocial problems. In the article Valachi and Valachi (2003) stated that stretching exercises, the importance of regular rest, positioning strategies, the use of enlargements were discussed problems regarding the prevention of musculoskeletal disorders. in clinical dentistry. In this study general guidelines for performing these exercises and naming the muscles to be trained. Article Jones and Forsythe (2005) say that functional training for dentistry consists of exercises under three categories which include trunk training: the one who passes on core spinal strengthening, which includes both lower and upper body strengthening exercises, discusses muscle aerobic endurance for the whole body. This exercise should be performed with the optimal level of exertion. The aerobic exercise program to overcome the problem of musculoskeletal complaints in this article defines the movements with a clearer version. Exercises on certain muscles at the dentist that are done regularly can reduce and prevent musculoskeletal complaints. So that in daily practice the dentist is emphasized to strengthen the loose muscles so that the muscles are ready to withstand the increase in strength that

plays an active role in the dentist's work. Therefore dentists can practice independently so that this practice is made as simple as possible and dentists must be given material that is included in the curriculum that should be studied carefully from the beginning of their profession.

7. Conclusion

To implement strategies to prevent musculoskeletal complaints in dentists with the increasing prevalence of these problems seems an urgent need. Strategies that must be followed and taught to dentists related to the causal mechanisms that cause musculoskeletal disorders can be carried out effectively. The stretch recipe given in detail in this article is an effort to prevent musculoskeletal disorders in dentists. So that dentists can concentrate more on patient care.

References

- Finsen, L., Christensen, H., and Bakke, M., Musculoskeletal disorders among dentists and variation in dental work, *Applied Ergonomics*, vol. 29, no. 2, pp. 119–125, 1998.
- Hayes, M., Cockrell D., and Smith A., Systematic review of musculoskeletal disorders among dental professionals, *International Journal of Dental Hygiene*, vol. 7, no. 3, pp. 159–165, 2009.
- Jones, A. C., and Forsythe, S., Functional training for dentistry: an exercise prescription for dental health care personnel, *Journal of the California Dental Association*, vol. 33, no. 2, pp. 137–145, 2005.
- Kanteshwari et al., Correlation of awareness and practice of working postures with prevalence of musculoskeletal disorders among dental professionals, *General Dentistry*, vol. 59, no. 6, pp. 476–483, 2011.
- Milerad et al., An Electromyographic study of dental work, *Ergonomics*, vol. 34, no. 7, pp. 953–962, 1991.
- Valachi, B., and Valachi, K., Mechanisms leading to musculoskeletal disorders in dentistry. *The Journal of the American Dental Association*, vol. 134, no. 10, pp.1344–1350, 2003.
- Valachi, B., and Valachi, K., Preventing musculoskeletal disorders in clinical dentistry: strategies to address the mechanisms leading to musculoskeletal disorders. *The Journal of the American Dental Association*, vol. 134, no. 12, pp. 1604–1612, 2003.
- Waler, N., It's Never Too Late: Physical Activity and Elderly People, Norwegian Knowledge Centre for the Health Services, Norway, 2007.
- Warren, N., Causes of musculoskeletal disorders in dental hygiene students: a study of combined biomechanical and psychosocial risk factors, *IOS Press Content Library: WORK*, vol. 35, no.4, pp. 441–454, 2010.
- Winihastuti, H., Hubungan faktor risiko ergonomi dan keluhan kumulatif trauma disorders pada dokter gigi di PT. X Tahun 2014. *Jurnal Administrasi Rumah Sakit Indonesia*, vol. 3, no. 1, 2018.