

## THERMOGRAPHICAL METHODS IN HIGHLIGHTING THE TENDINITIS IN DENTISTRY

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**Abstract:** The aim of this study is to show how the absence of the ergonomics principles can cause musculoskeletal problems in the field of dental medicine, highlighting the tendinitis syndrome by using thermo graphical methods. The study was made by comparing the infrared pictures of the hands of two dentists, one with the tendinitis syndrome, who were performing a dental surgery. As results the infrared pictures show that the tendinitis syndrome modifies the hands temperature and temperature distribution. Generally the thermo graphical methods can highlight most of musculoskeletal problems, and can be an efficient tool in applying the ergonomics principles in dentistry especially in dental equipment design.

**Key words:** thermograph, tendinitis, ergonomics, dentistry

### 1. INTRODUCTION

The ergonomics aim is to adapt the working conditions to the workplace specific requirements and to the personnel work capacity. The applied ergonomics success is reflected by the productivity increase, reduced occupational diseases and staff satisfaction increase.

Without applying ergonomics principles, on the other hand, can cause musculoskeletal disorders caused by working conditions. In the category of risk factors, an important place is occupied by: repetitive tasks, long term effort activities, lifting and handling heavy objects, incommode and lasting working postures. The risk level depends on the intensity, frequency and duration of exposure to these factors (Rucker & Boyd, 1998).

It is estimated that musculoskeletal problems caused by work factors, are predominant in dental medicine.

Dental specific work leads to hand and wrist problems. The tendinitis syndrome can be associated with repetitive work. It is generally associated with repetitive movements, combined with prolonged objects handling without any hand or arm supports (Argesanu, 2004).

The tendinitis syndrome is most common in dental surgery. In this case the dentist is compelled to work by maintaining his hands in the air, for a prolonged time.

In this study we used thermo graphical methods to evidence the difference between two dentists, one with the tendinitis syndrome and the other with healthy hands.

The temperature recorder (thermograph) is an important tool for medical diagnosis because science has managed to prove that all diseases cause temperature changes in a suffering organ. Some types of disorders lower the temperature in that particular organ, others raise it.

The infrared camera we used was FLIR B200 which is based on settings that sense and record on tape the cold and warm areas of the human body by detecting infrared radiations wich react to blood flow. The FLIR B200 camera measures temperature values between -20°C and +120°C. The incorporated digital camera (1.3 Mpixels) offers the possibility to easily observe and evaluate the picture (flirb200.com.2010).

### 2. PRELEVATION OF DATA AND RESULTES

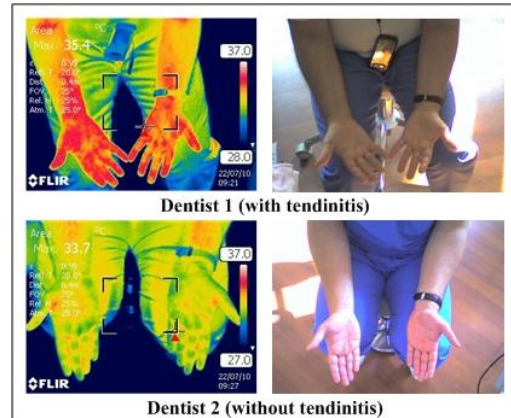


Fig. 1. Palm side of the hands (before the surgery)

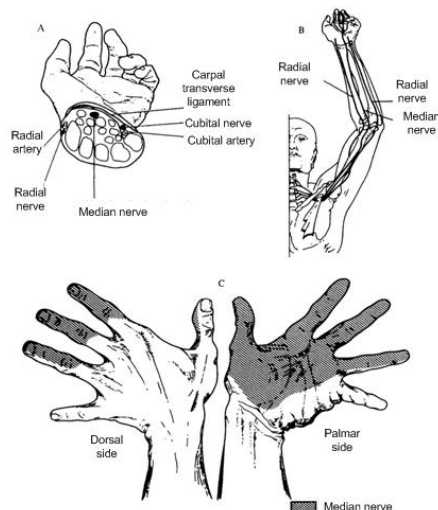


Fig. 1. Muscle – tendon – bone unit

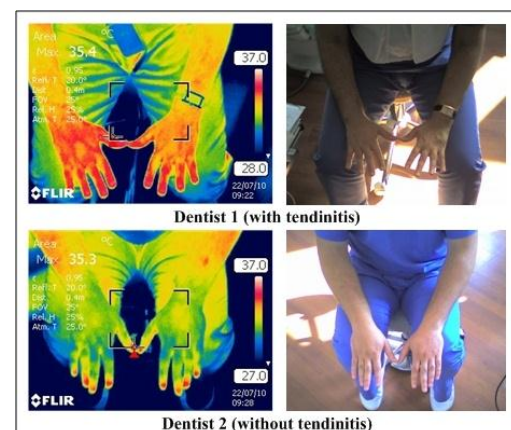


Fig. 2. Dorsal side of the hands (before the surgery)

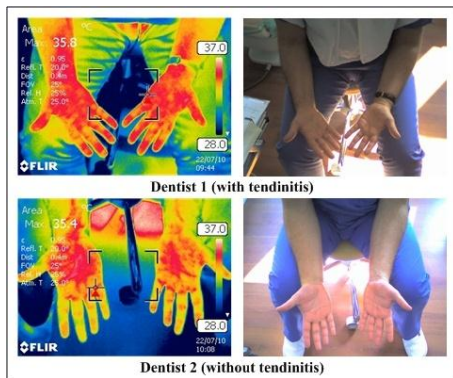


Fig. 3. Palm side of the hands (after 10 min)

This study underwent in one shooting session during a dental surgery performed by both dentists.

The prelevation of data started before the surgery and continued by taking the infrared pictures every 10 minutes, during the surgery.

The infrared pictures show both dorsal and palm sides of the hands highlighting the difference between a ill tissue and a healthy one.

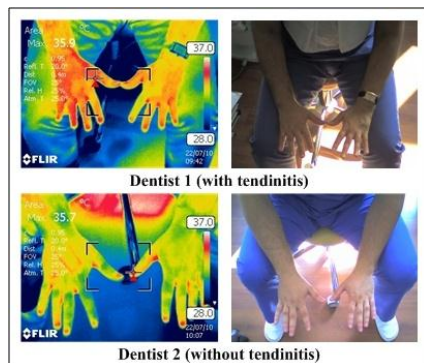


Fig. 4. Dorsal side of the hands (after 10 min)

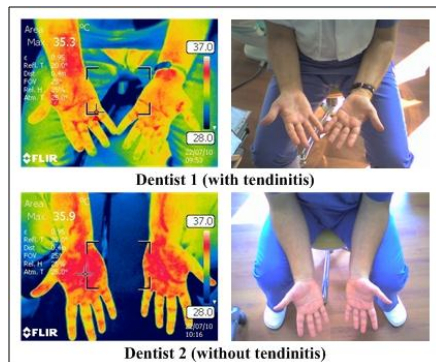


Fig. 5. Palm side of the hands (after 20 min)

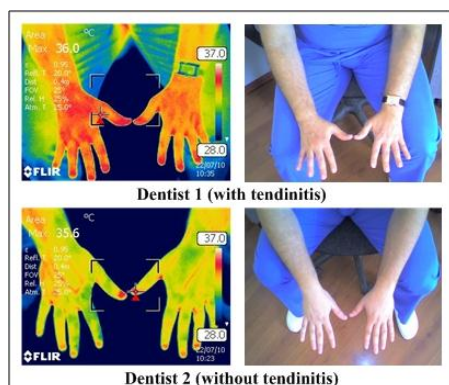


Fig. 6. Dorsal side of the hands (after 20 min)

The conditions that had to be fulfilled to assure the accuracy of the study were the following:

- Low surrounding temperature, to avoid errors in measuring the real body temperature ( the air was renewed, the airconditioner was turned on and the lights were turned off);
- The dentist's position was maintained for a longer period of time;
- The dentists have dried their hands before taking the picture.

### 3. CONCLUSION

After a careful examination of the infrared pictures it became apparent that the tendinitis syndrome modifies the hands temperature and temperature distribution. As shown the hands with the tendinitis have higher temperature within a larger range than the healthy hands.

After beginning the surgery, the healthy hands temperature and temperature distribution range started to increase, as normal. While the temperature distribution range of the hands with the tendinitis syndrome started to easily decrease.

This shows how the tendinitis syndrome can appear in the dental surgery field and generally musculoskeletal problems in the absence of the ergonomics principles.

The thermo graphical methods can highlight most of musculoskeletal problems, and can be an efficient tool in applying the ergonomics principles in dentistry especially in dental equipment design.

In the case of tendinitis, this research can lead to an improvement of prevention, and highlight the tendinitis syndrome as an occupational disease.

### 4. ACKNOWLEDGEMENTS

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