

RELATIONSHIP BETWEEN ERGONOMIC ORGANISATION AND MUSCULOSKELETAL DISORDERS IN THE DENTAL TECHNIQUE LABORATORY – PRELIMINARY STUDY

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Keywords:
musculoskeletal disorders, dental technique laboratory, ergonomics

Abstract: The problems of joint biomechanics, on which movement and individual posture depend, represent an integral part of musculoskeletal physiology. The precise analysis of certain anatomical assemblies primarily involved in performing some activities that are specific to the dental technician profession allows the design of ergonomic devices so that maximum efficiency with minimum effort can be ensured. Thus, in this paper, we present a statistical analysis, which aims at highlighting some musculoskeletal, especially spine, disorders among dental technicians.

INTRODUCTION

In general, the occupational diseases to which those working in the dental laboratory are exposed represent a topical issue, being discussed a lot. However, little is precisely known about them and therefore, too little is done in this respect. In fact, working conditions should be carefully considered as, in some cases, they can become etiological, favouring or predisposing factors for certain disorders that are qualified or not as occupational diseases.(1-5)

Thus, the presence of predisposing factors among dental technicians, such as working posture, keeping a poor or uncomfortable posture for long periods of time, results in an increased risk of musculoskeletal disorders, among which spine disorders hold a leading position.(1-5) In this context, we actually talk about the so-called ergonomic factors, which can be summarised as follows:(1-5)

1. poor posture at work, required by the specific job;
2. static loading
3. exposure, because of the specific job, to noise, vibration etc.

General data

The problems of joint biomechanics, on which movement and individual posture depend, represent an integral part of musculoskeletal physiology.(1-5) The thorough analysis of this system, as well as of the anatomical assemblies mainly involved in performing some tasks that are specific to the dental technician job (e.g. the shoulder-arm-spine segment involved in handling the straight hand piece attached to the dental engine or the leg-coxofemoral joint segment involved in operating the dental engine pedal) allows for designing some ergonomic mechanisms so that maximum efficiency with minimum effort can be ensured.(1-5)

Given that a dental technician performs 90% of the job-related tasks sitting, a proper work table and an ergonomic chair functionally adapted to the body dimension and the job specific can substantially enhance the work capacity.(1-5) Ensuring job-specific normal limb movement can have the same effect. Moreover, age, gender and general health are very important in performing the tasks specific to the dental technician job.(1-5)

PURPOSE

In general, an ideal, ergonomic, dental technician work table, one that is correctly made in each and every detail, should meet the following requirements:(5,6)

- to be about 720-750 mm in height and adapted to sitting;
- to be wide enough to allow placing the accessories and working safely;
- to have a half-round space for each place;
- to be provided with one or more shelves for the necessary tools without causing the dental technician discomfort;
- to have a matt surface (reflectance of less than 50%), a surface that is resistant to the action of acids and cleaning agents;
- to have enough space for the feet.

The dental technician chair should also have some ideal characteristics as follows:(5,6)

- the seat height should be adjustable (about 420-500 mm from the floor);
- the backrest should be adjustable vertically and horizontally;
- the support and movement system should have at least 5 locking casters;
- the seat surface should be sufficient;
- the front edge of the seat surface should be rounded;
- the surface should be padded;
- the chair should be provided with a footrest device that is non-slip, adjustable in height, and has low thermal conductivity and adjustable tilt angle.

The characteristics of the 2 pieces of furniture, considered to be ideal by a representative number of specialists in ergonomics, are observed to very small extent by manufacturers or craftsmen who manufacture furniture for dental laboratories. Consequently, the failure in meeting these requirements, combined with other factors such as noise, vibrations and jolts, may result in the emergence of pretty severe musculoskeletal disorders among dental laboratory technicians, affecting both the spine and the upper and lower limbs.

Based on this information, we conducted a statistical analysis, which we consider quite interesting.

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Article received on 27.03.2015 and accepted for publication on 25.05.2015

ACTA MEDICA TRANSILVANICA December 2015;20(4):144-147

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The purpose of the analysis is to highlight such musculoskeletal disorders, localised especially to the spine, among dental technicians.

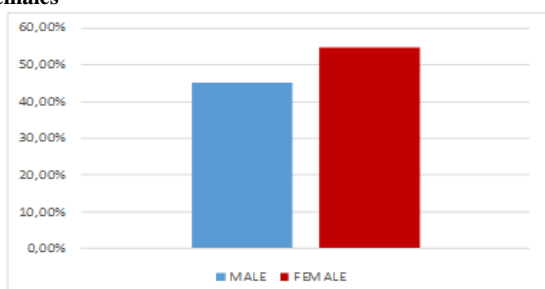
MATERIALS AND METHODS

To conduct the study, the questionnaire method was employed. The questionnaire extended version consists of 26 questions (26 items), administered to 128 subjects, dental technicians working in București and in other 10 counties in Romania, selected randomly: Brașov, Prahova, Giurgiu, Maramureș, Iași, Suceava, Galați, Teleorman, Constanța and Ilfov.

The selected dental technicians are both males and females, aged between 26 and 65, having worked as dental technicians for a period between minimum 5 years and maximum 40 years. For our preliminary study, due to the limited space allotted, we chose only 10 questions out of the 26 in the questionnaire, which we considered the most representative in relation to spine disorders. A brief statistical analysis was conducted based on the questionnaire, very suggestively represented using graphs.

Of the total 128 dental technicians questioned, 58 respondents, namely 45.31%, were males, and 70 respondents, namely 54.69% were females (figure no. 1).

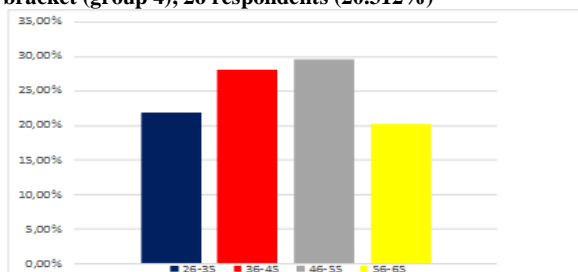
Figure no. 1. Distribution of dental technicians by gender: 58 respondents (45.31%) males, 70 respondents (54.69%) females



With regard to the age bracket of the dental technicians to whom the questionnaire was administered, the distribution was as follows (figure no. 2):

- group 1, 26-35 age bracket, 28 respondents (21.875%);
- group 2, 36-45 age bracket, 36 respondents (28.125%);
- group 3, 46-55 age bracket, 38 respondents (29.688%);
- group 4, 56-65 age bracket, 26 respondents (20.312%).

Figure no. 2. Distribution of dental technicians by age: 26-35 age bracket (group 1), 28 respondents (21.875%); 36-45 age bracket (group 2), 36 respondents (28.125%); 46-55 age bracket (group 3), 38 respondents (29.688%); 56-65 age bracket (group 4), 26 respondents (20.312%)



The questionnaire administered to dental technicians:

1. Are you aware of the spine disorders, such as scoliosis, lordosis, kyphosis, you are exposed to, given your job as a

dental technician?

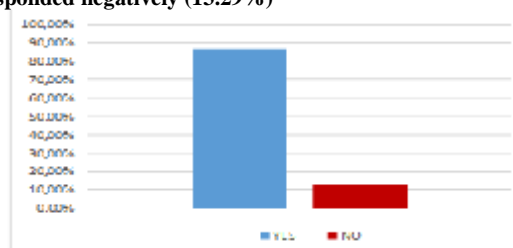
2. Have you got problems related to your body growth and development, such as scoliosis, lordosis, kyphosis over time?
3. Have you seen a specialist physician to diagnose you as having disorders related to your body growth and development?
4. Do you currently feel job-related discomfort, accentuated discomfort or pain localised to the spine?
5. Have you seen a physical therapist to diagnose the disorders localised to the spine?
6. Have you ever received physical therapy services?
7. Have you ever received massage therapy services?
8. Do you perform leisure time physical activities?
9. Are you aware of other disorders localised to the shoulder-arm or the leg-coxofemoral joint anatomical segments as a result of job-related factors (vibrations and jolts)?
10. Have you ever been to the spa to receive treatment for the job-related musculoskeletal disorders you suffer from (especially those localised to the spine)?

RESULTS

Following the analysis of the responses to the questions in the questionnaire, we noticed that some of them were very interesting. We present the responses using very concise graphs as follows:

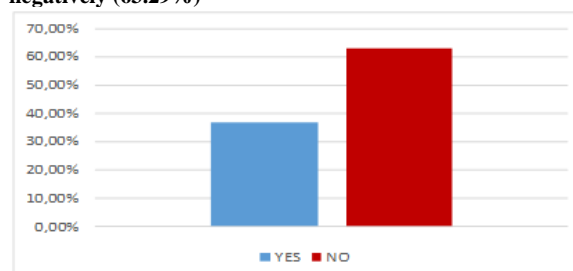
- to the first question in the questionnaire, related to the respondents' awareness of spine disorders, such as scoliosis, lordosis, kyphosis, 111 dental technicians, namely 86.71%, responded affirmatively, while 17 subjects, namely 13.29%, responded that they had no knowledge about such disorders (figure no. 3);

Figure no. 3. Distribution of the dental technicians' responses related to the 1st question in the questionnaire: 111 subjects responded affirmatively (86.71%) and 17 subjects responded negatively (13.29%)



- to the second question in the questionnaire, related to disorders, such as scoliosis, kyphosis or lordosis occurring during the body growth and development, 47 subjects, namely 36.71%, responded affirmatively, while 81 subjects, namely 63.29% responded negatively (figure no. 4);

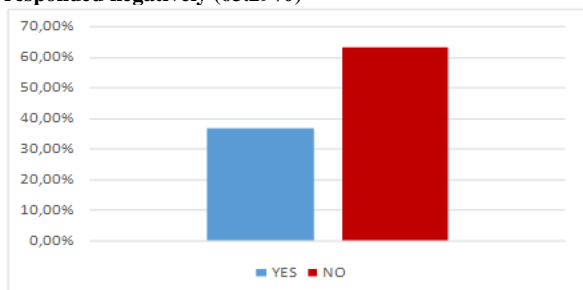
Figure no. 4. Distribution of the dental technicians responses related to the 2nd question in the questionnaire: 47 subjects responded affirmatively (36.71%) and 81 subjects responded negatively (63.29%)



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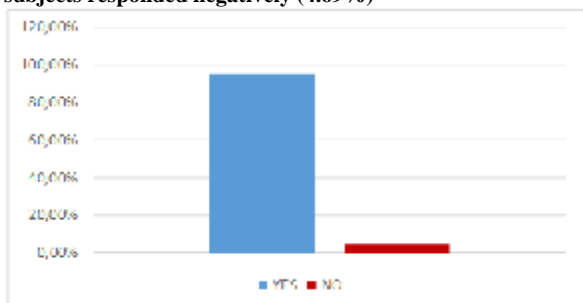
- to the third question in the questionnaire, related to seeing a specialist physician for diagnosis, 47 subjects (36.71%) responded affirmatively, while 81 subjects (63.29%) responded negatively (figure no. 5);

Figure no. 5. Distribution of the dental technicians' responses related to the 3rd question in the questionnaire: 47 subjects responded affirmatively (36.71%), and 81 subjects responded negatively (63.29%)



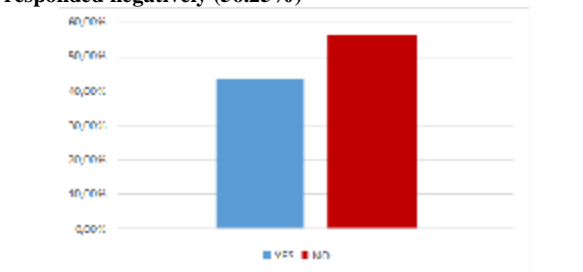
- to the fourth question in the questionnaire, related to existing discomfort or pain localised to the spine, 122 subjects, namely 95.31%, responded affirmatively, while 6 subjects, namely 4.69% responded negatively (figure no. 6);

Figure no. 6. Distribution of the dental technicians' responses related to the 4th question in the questionnaire: 122 subjects responded affirmatively (95.31%) and 6 subjects responded negatively (4.69%)



- to the fifth question in the questionnaire, related to seeing a physical therapist to precisely diagnose the disorders, 56 subjects, namely 43.75%, responded affirmatively, while 72 subjects, namely 56.25%, responded negatively (figure no. 7);

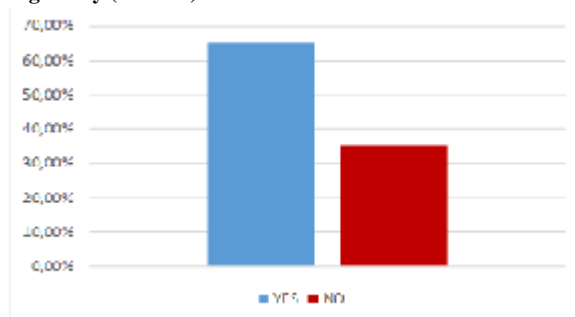
Figure no. 7. Distribution of the dental technicians' responses related to the 5th question in the questionnaire: 56 subjects responded affirmatively (43.75%) and 72 subjects responded negatively (56.25%)



- to the sixth question in the questionnaire, related to receiving physical therapy services, 83 subjects, namely 64.84%, responded affirmatively, while 45 subjects,

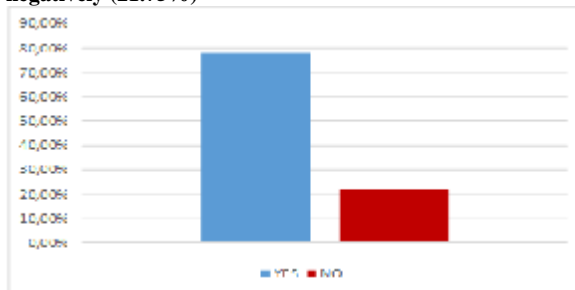
namely 35.16%, responded negatively (figure no. 8);

Figure no. 8. Distribution of the dental technicians responses related to the 6th question in the questionnaire: 83 subjects responded affirmatively (64.84%) and 45 subjects responded negatively (35.16%)



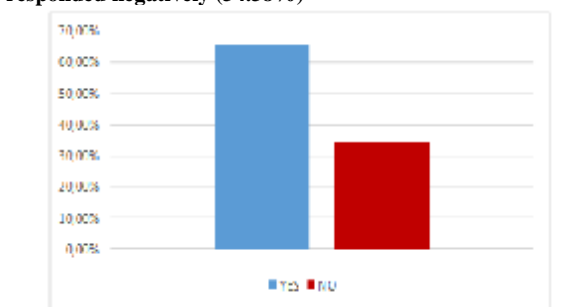
- to the seventh question in the questionnaire, related to receiving massage therapy, 100 subjects, namely 78.25%, responded affirmatively, and 28 subjects, namely 21.75%, responded negatively (figure no. 9);

Figure no. 9. Distribution of the dental technicians responses related to the 7th question in the questionnaire: 100 subjects responded affirmatively (78.25%) and 28 subjects responded negatively (21.75%)



- to the eighth question in the questionnaire, related to performing leisure time physical activity, 84 subjects, namely 65.62%, responded affirmatively, and 44 subjects, namely 34.38%, responded negatively (figure no. 10);

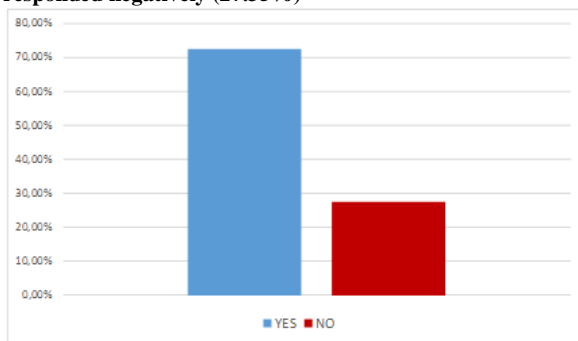
Figure no. 10. Distribution of the dental technicians responses related to the 8th question in the questionnaire: 84 subjects responded affirmatively (65.62%) and 44 subjects responded negatively (34.38%)



- to the ninth question in the questionnaire, related to existing disorders localised to the shoulder-arm or the leg-coxofemoral joint anatomical segments, 93 subjects, namely 72.65%, responded affirmatively, while 35 subjects, namely 27.35%, responded negatively (figure no. 11);

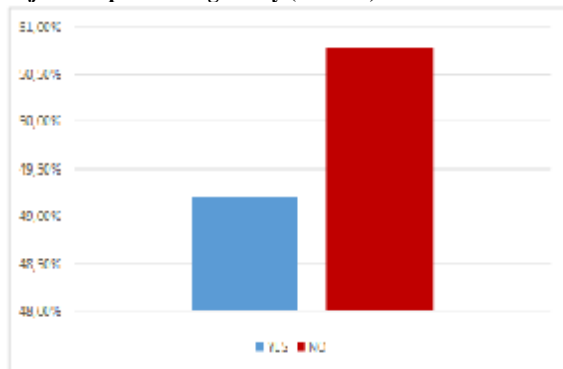
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Figure no. 11. Distribution of the dental technicians' responses related to the 9th question in the questionnaire: 93 subjects responded affirmatively (72.65%) and 35 subjects responded negatively (27.35%)



- to the tenth question in the questionnaire, related to receiving spa treatment following musculoskeletal disorders, 63 subjects, namely 49.21%, responded affirmatively, and 65 subjects, namely 50.79%, responded negatively (figure no. 12).

Figure no. 12. Distribution of the dental technicians' responses related to the 10th question in the questionnaire: 63 subjects responded affirmatively (49.21%) and 65 subjects responded negatively (50.79%)



DISCUSSIONS

The study, although presented in a preliminary form in the paper, represents the starting point for a larger number of studies regarding the dental technician job-related activity. Therefore, we consider extremely interesting that, in the near future, subjects such as Ergonomics or Physical Therapy should be introduced in the university curricula for the dental laboratory technology specialty too.(1-5)

CONCLUSIONS

It is pretty difficult to draw a set of pertinent conclusions from the above-presented questionnaire, which can become compulsory practical recommendations for dental technicians over time.

However, this preliminary study shows that, among dental technicians, there is very small or even no concern for the risk of developing some musculoskeletal disorders because of the job-related poor posture for long periods of time.(1-5)

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