



Ethics at Workplace: True-Four Handed Dentistry Vs Conventional Method

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Abstract

Dental team is a profession which serves patients' treatment need, but in a same way, their physical and mental health needs to be preserved. The practice is applied by using correct method to protect their body as an *amaanah* given from Allah (s.w.t). True-four handed (TFH) dentistry is ergonomically the most favorable method in terms of time and efficiency. It minimize undesirable verbal and body movements, thus protecting physical well-being of the operating team. The purpose of this study was to determine the number of TFH dentistry applied and to compare the treatment time and body movement between conventional FH and TFH dentistry among dental clinician in Kulliyyah of Dentistry IIUM. The study was conducted as a cross sectional and quasi experiment among 60 operators as participants. Observation of TFH dentistry practice was conducted and results were recorded. Six groups, consist of twelve dental students were trained with TFH dentistry application in terms of instruments and equipment, layout and procedure. Treatment time and body movement were measured and the statistic was generated using SPSS version 16. Pre and post training results were compared by using k-related sample test. From the observation, 100% of the 60 operators had an ergonomics dental instruments and equipment. Among all, 60% of the participants had assistants. Only 6.7% of the operators with assistant (four-handed) communicated non-verbally. In terms of positioning, 68.3% and 45% of the operators and assistants were sat in right position respectively. Whereas, only 11.7% of the dental team used the transfer zone correctly. There was significant difference in treatment time between pre and post training ($p=0.02$). There was statistically significant difference for Class II, III and Class IV body motion of the dental teams, pre and post TFH training ($p<0.05$). Hence, the effectiveness of TFH dentistry application in reducing treatment time and body movement was proven. More training is required among the dental practitioners to be able to practice a safe dentistry

Keyword: True-four handed, reducing time, body movement, ergonomics in dentistry

Abstrak

Pasukan pergigian adalah profesion yang memberi khidmat keperluan rawatan pesakit, tetapi kesihatan fizikal dan mental mereka perlu dipelihara. Amalan yang diaplikasi perlu menggunakan kaedah yang betul untuk memelihara tubuh mereka yang diamanahkan oleh Allah (s.w.t). Pergigian "true-fourhanded" (TFH) secara ergonomik adalah kaedah yang paling baik dari segi masa dan kecekapan. Ia meminimumkan pergerakan lisan dan badan yang tidak diperlukan, oleh itu melindungi kesejahteraan fizikal bagi pasukan operasi. Tujuan kajian ini adalah untuk menentukan bilangan pergigian TFH yang diaplikasikan dan membandingkan masa rawatan dan pergerakan badan antara pergigian FH konvensional dan TFH di kalangan doktor pergigian di Kuliyyah Pergigian IIUM. Kajian ini dijalankan sebagai percubaan keratan rentas dan kuasi di kalangan 60 pengendali sebagai peserta. Pemerhatian terhadap amalan pergigian TFH telah dijalankan dan keputusan telah direkodkan. Enam kumpulan yang mengandungi dua belas pelajar pergigian dilatih dengan aplikasi pergigian TFH dari segi peralatan dan kelengkapan, reka letak dan prosedur. Masa rawatan dan pergerakan badan diukur

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dan statistik dijana menggunakan SPSS versi 16. Hasil latihan pra dan pos dibandingkan dengan menggunakan ujian sampel "related-k". Daripada pemerhatian, 100% daripada 60 operator mempunyai peralatan dan kelengkapan gigi yang ergonomik. Pada keseluruhannya, peserta mempunyai pembantu adalah 60%. Hanya 6.7% operator yang mempunyai

pembantu (“four-handed”) berkomunikasi tanpa lisan. Dari segi kedudukan, 68.3% dan 45% daripada operator dan pembantu masing-masing berada di kedudukan yang betul. Manakala, hanya 11.7% daripada pasukan pergigian menggunakan zon pemindahan dengan betul. Terdapat perbezaan yang signifikan dalam masa rawatan antara latihan pra dan pos ($p = 0.02$). Terdapat perbezaan yang signifikan secara statistik bagi pasukan pergigian pada pergerakan Kelas II, III dan Kelas IV, latihan pra dan pos TFH ($p < 0.05$). Oleh itu, keberkesanan aplikasi pergigian TFH dalam mengurangkan masa rawatan dan pergerakan badan telah dibuktikan melalui kajian ini. Peningkatan latihan diperlukan di kalangan pengamal pergigian untuk dapat mengamalkan latihan pergigian yang selamat.

Kata kunci: “four-handed”, pengurangan masa, pergerakan badan, ergonomik dalam pergigian

Introduction

The Prophet (s.a.w) admitted that the health and well-being are greater blessing from Allah. Worship cannot be performed well without good health and well-being as Abu al-Darda’ (r.a) had once voiced to the Prophet (s.a.w). Since health is the most valued, precious, and generous gift from Allah (s.w.t), therefore, to keep good physical and mental health is a focal point to pursue. Hashi (2011) mentioned that ethical values in daily practice, especially in Islam, aim to bring human interest (jalb al-maslahah) and to prevent hardship (dar’ al-mafsadah). In a job scope, the fundamental of the work field must be convenient and effective, thus, not giving any illnesses to the operators.

As a safety at workplaces, the teaching of Islam represents the first principal guide for inviting man to observe the security and safety, measures Islam has surpassed the industrial revolution by centuries for calling for safety. In dentistry, musculoskeletal Disorders (MSDs) are the most common occupational disease that are caused by multiple factors, including physical, work organizational, psychosocial, and individual factors. Working environment was considered as the major factor affecting the prevalence of MSDs (Asmui et al., 2012). According to Colombini and Occhipinti (2006), Jonker (2010), Harutunian, Gargallo Albiol, Barbosa de Figueiredo & Gay Escoda (2011) and Khan and Chew (2013), high prevalence of MSDs is found among dentists and women; they may suffer from pain in various body regions such as arms and shoulders due to unnecessary body movement and long standing of continuous tasks. Allah SWT has reminded us in Surah Al-Baqarah, verse 195 ‘And make not your own hand contribute to your destruction’. Thus, we should avoid any practices that gives us harm.

MSDs is believed to be preventable; by providing ergonomic equipment, micro-break in between work time, physical exercise and maintenance of general health (Harutunian et al., 2011). Ergonomic equipment is known to assist workers, health, and safety of one person who potentially face significant risk of MSDs. It serves to minimize work related musculoskeletal injuries and improve worker’s health,

comfort, and performance at work. The equipment could reduce fatigue, injuries and treatment time all in one. Besides that, condition of the workplace, adjusted patient’s chair when accessing different quadrant of patients mouth, placing instruments and materials within easy to reach, working with elbows lower than shoulders have been advised in order to improve posture in a clinical environment thus minimizing fatigue and the risk of developing MSDs in dentistry (Chowanadisai, Kukiattrakoon & Yapong, 2000; Khan and Yee Chew, 2013).

Four-handed (FH) dentistry is one of ergonomic applications in dentistry. It is applied when a dentist work together with an assistant while handling patient’s mouth. The technique requires ergonomic of instruments, equipment and layout of the equipment. Dental procedures will be running smoothly provided all dental team members have knowledge on the application of four-handed and the procedure.

The assistant plays an important role to assist the dentist running the dental procedure smoothly. Hence, the technique upgrades the quality of work by reducing fatigue and stress among dental team (Holmes, Squire, Arneson, & Doering, 2009; Finkbeiner and Muscari, 2010). This technique takes such works of the dentist and the assistants become easier by minimizing body movement and saving time during dental procedures. Allah has mentioned the value of time in Surah Al-Asr, verse 1-3;

“By the Time! Man is surely in loss, except those who believed and did good works, and exhorted one another to Truth, and exhorted one another to patience.”

Thus, He encourages all of us to conscientiously and judiciously utilize the working hours in dispensing all their duties and responsibilities with proper work planning.

As stated by Khan and Chew (2012), four-handed dentistry had reported a least symptom in both elbows and forearm. Patients will receive a good quality of treatment, reduce the treatment time and less of the fatigue all at once. As a result, it may result in shorter

appointment for patients compared to operator working by their own (Ahmad & Owoyemi, 2012). It is demonstrated in a study done by Holmes et al. (2009) which aimed to compare productivity in four-handed clinic and unassisted clinic that four-handed clinic received more patients visit per day compared to unassisted clinic. However, most of the dental teams who claimed that they have been practicing four-handed dentistry still suffers from MSDs (Yamalik, 2007).

According to Finkbeiner (2010) TFH dentistry application by choosing an accurate and specific equipment, favorable arrangement of work environment, minimize undesirable movements and more of using a non-verbal communication are the sets of criteria that meet the goals of TFH dentistry. True technique of FH dentistry with standard operating procedure (SOP) together with the correct selection of dental equipment to use in an ergonomic is integral to the success of the concept. Hence, proper training is critical to establish a true-FH dentistry application (Sanders and Turcotte, 1997; Yamalik 2007). A number of dental schools in Malaysia practice FH dentistry. However, the effectiveness of the FH needs to be explored to certify that the practice is safe for the dental teams.

Thus, this study aims to observe the norm practice among dental operators in Kulliyah of Dentistry (KOD), IIUM during dental treatment and to inculcate SOP of true-FH dentistry. The effectiveness of timing of the procedure and the body movement, before and after the exposure of true-FH dental practice were compared.

Methodology

a. Study design & data analysis

A cross sectional study was used to determine the number of TFH dentistry applied among dental operators in dental polyclinic of IIUM, Kuantan as a baseline of FH dentistry practice. For the second objective, the study design was a quasi-experiment. It was a pre-post-test design without a control group. In this study design, no randomization was done and it was conducted in natural setting. The method used in this study was a convenient sampling. For the first part of this study, sixty dental operators among dental students of Kulliyah of Dentistry (KOD) IIUM, Kuantan were involved. Secondly, the other six groups consist of twelve dental students (2 person in a group) from the same kulliyah was selected by similar sampling method. The number of TFH dentistry application was analyzed by using descriptive frequency. Meanwhile, to compare the body movements and treatment time between pre

training and all three post training was k- related sample test. All statistics were generated using SPSS version 16 for Windows.

b. Data Collection

Consent from the authority

The consent to conduct of this study was obtained from IIUM Research Ethics Committee (IREC).

A baseline study (observation)

This observation measured the number of TFH dentistry application in dental polyclinic among sixty dental operators among dental students of IIUM, Kuantan. The findings of the study was utilized to measure the frequency of TFH used among them during clinical work.

TFH dental training

A workshop with the six dental teams consist of twelve dental students was arranged before starting the training. The objectives of the research, principles of TFH dentistry application and the problems that dental practitioners faced such as MSDs were explained to the participants. At the same time, consent forms and information sheets were distributed to the participants. The participants were divided randomly into 6 groups named as Group 1, Group 2, Group 3, Group 4, Group 5 and Group 6.

Pre-test

In a controlled room equipped with four cameras for recording, a pre-test was performed. The participants were required to do a Class I composite restoration on a phantom head with a set of upper and lower teeth. The test was begin from Group 1 until Group 6 respectively. All of the instruments and equipment required for the treatment were prepared prior to the test. The pre-training test was recorded from the start of the treatment until the last body movement of the team. The treatment time spent and their body movement were noted. Regarding body movement, motion Class I, II, III, IV, V and VI were observed and compared. The details of classes of body motion were explained in appendix A.

Training of TFH dentistry and Post-training test

A video on TFH dentistry application was presented to all participants. They were trained on TFH dentistry application, including the most efficient delivery system, arrangement of instruments, and standard operating procedure (SOP) of composite restoration. The SOP consists of transferring technique, usage of non-verbal communication and sequential of treatment (Finkbeiner, 2010).The post

training test was conducted as in the pre-test and repeated three times.

Materials

The lists of instruments and equipment used during the treatment are shown in Table 2.1 and Table 2.2, respectively.

Table 2.1 List of instruments used during composite treatment

| Instruments | Brand/source | instruments used restoration |
|-------------------------------|------------------|------------------------------|
| Bur | Microdont | |
| Examination and Diagnosis Set | Dentech, Germany | Stainless, CE |
| Light cure | Planmeca | |
| High and Low Handpiece | W&H Dental Work | |
| Composite | Shofu Inc, Kyoko | |
| Etching | Spiden Co. Ltd | |
| Bonding | Shofu Inc, Kyoko | |
| Composite Lining | Medesy CE, Italy | |

Table 2.2 List of equipment during pre and post training

| Equipments | Brand/source |
|--------------------|-----------------------|
| Dental Chair | Planmeca |
| Artificial teeth | Nissin |
| Phantom Head | Frasaco |
| Latex Exam Gloves | Nugerd |
| Surgical Face Mask | Medicos |
| Tripod Stand | DigiEye |
| Camera1 | Sony Cybershot |
| Camera2 | Lumix Mega O.I.S |
| Camera3 | Canon Digital IXUS 75 |
| Camera4 | Nikon Coolpix s5100 |

Results

Types of dental treatment

Table 3.10 shows the percentage of different treatment during the observation done. Filling shows the highest type of treatment and extraction is the lowest percentage of treatment during the observation.

Table 3.1: Types of dental treatment performed by the 60 dental operators

| OBSERVATION | Yes n (%) | No n (%) |
|--------------------------------------|-----------|-----------|
| Ergonomics Instruments and equipment | 60 (100) | |
| Trans-thorax delivery system | | 60 (100) |
| Operator with an assistant | 36 (60) | 24 (40) |
| Non-verbal communication | 4 (6.7) | 56 (93.3) |
| Good positioning | | |
| Operator | 41 (68.3) | 19 (31.7) |
| Assistant | 27 (45) | 33 (55) |
| Patient | 58(96.7) | 2 (3.3) |
| Usage of transfer zone | 7 (11.7) | 53 (88.3) |

Practice of four-handed dentistry

Table 3.2 shows the results of an observation among dental students in dental polyclinic which shows 100% instrumentation and equipment were ergonomic. However, none of the operators practiced a trans-thorax delivery system.

As FH dentistry is concern, it requires the presence of an operator with the help of an assistant during the procedure instead of working unassisted. We found

that 60% of dental students worked with the help of assistants, while the rest worked without an assistant. The study also found that 40% of them were employed in a sitting position next to a seated patient while 60% comfortably worked in standing position. However, this study also reported that only 6.7% of the dental teams used non-verbal signal to communicate between them during the procedure.

Table 3.2: The observation made regarding application of FH dentistry in the polyclinic among 60 dental operators in Kuliyyah of Dentistry, IIUM Kuantan

| OBSERVATION | Yes n (%) | No n (%) |
|--------------------------------------|-----------|-----------|
| Ergonomics Instruments and equipment | 60 (100) | |
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| Operator with an assistant | 36 (60) | 24 (40) |
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| Good positioning | | |
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| Assistant | 27 (45) | 33 (55) |
| Patient | 58(96.7) | 2 (3.3) |
| Usage of transfer zone | 7 (11.7) | 53 (88.3) |

This study showed that 68.3% of the operators posed good position during dental treatment, while lower number of the dental assistant (45%) applied good position range. However, majority (96.7%) of the patient’s position were satisfactorily placed. Only 11.7% dental teams were observed to practice transferring dental instrument and materials at the transfer zone (Figure 3.1).

Treatment duration pre and post training

As showed in Table 3.3, the p-value for treatment time was 0.02 which was less than 0.05. It showed that there was a significant difference between treatment time of pre-training and all 3 post-training measurements.

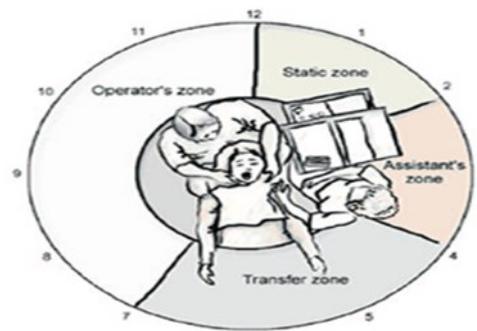


Fig. 3.1: Zones of activity for a right-handed dentist (Finkbeiner, 2010).

Table 3.3: Average of treatment time spent by the operators to perform a composite restoration, pre and post training of TFH dentistry

| | Mean rank (min) | df | P-value |
|-------------------|-----------------|----|---------|
| Pre TFH training | 3.67 | 3 | 0.020 |
| Post TFH training | 2.11 | | |

Body motion during dental treatment

Dental Operator

Chart 3.1 shows the average of Class I, Class II, Class III, Class IV, Class V, and Class VI motions between pre- and post-training of the six operators. The body movement was reduced by 19.84 between pre-training to the third post-training. It was similar to Class IV

motion that the operators made up 14.83 reductions in body movement from pre-training to third post training. Meanwhile, Class II motion was increased by 6 from pre-training to the first post-training. However, the body movement was kept decreasing from the first post training to third post training with 3.5. No changes was shown for Class VI motion of the operators.

Dental assistant

Chart 3.2 shows larger changes of body movement for Class II, Class III, and Class IV among the assistants. For Class II and Class IV motion, the patterns were increased at the first post-training and reduced further after the 2nd and 3rd post-training. In Class II, the body movement increased by 10.33 from the pre- to the first post- training. However, there was decrement of body movement from the first post to the third post-training (9.7). Whereas, in class IV motion, the result shows the biggest increment between pre-training and first post training by 15.5. However, the assistant succeeded to maintain the reduction of body movement from the first post training to the second post training by 2, while the second post to the third post training was 7.33.

From k-related sample test done in order to analyze the body movement, there are significant differences for Class II, Class III, and Class IV motion of the operators. The p-value for Class II, Class III, and Class IV motion were 0.006, 0.007, and 0.004 respectively. Meanwhile, the assistant showed significant differences for Class II and Class IV motion. The p-value for Class II motion was 0.042 whereas Class IV motion was 0.009.

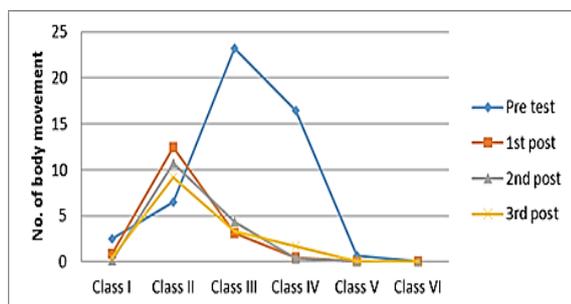


Chart 3.1: Comparison of the average body movement as classes of motion between pre and post training of TFH dentistry among the 6 operators.

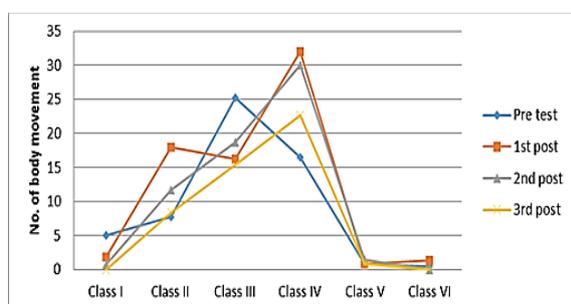


Chart 3.2: Comparison of the average body movement as classes of motion between pre and post training of TFH dentistry among the 6 assistants.

Discussion

The number of TFH dental application in IIUM dental polyclinic was identified. As referred in the literature review by Finkbeiner (2010), to achieve the effectiveness of TFH dentistry application four criteria should be covered which are instruments, equipment, lay out, and procedure. According to Murtomaa (1983), the dental team needs functionally-designed dental equipment and meets the ergonomic principles. Equipment must be ergonomically designed to minimize unnecessary motion. It is supported by Finkbeiner and Muscari (2010) that purchasing specific equipment should be taken seriously in order to use for long-term with a set of criteria that meets the goals of TFH dentistry application. According to Dalai et al (2014), the most effective layout for four-handed dentistry is trans-thorax delivery system unit. It is because the dental unit position is over patient’s thoracic area, thus the dental assistant can easily retrieve the hand-piece and transfer them to the operator. The instruments and materials are placed within comfortable reach of the assistant. It prevents shifting of operator’s vision away from the operating site. Besides that, there are no hoses to interfere with the assistant’s position. According to Kamal Hassan (1988) regarding work ethics, employees must adhere to diligence and efficiency as well as fairness in preserving public interest. Thus, the patients deserved the best treatment provided by dental operators.

Practicing ergonomic in dental equipment and instrument design can reduce the risk of MSD (Khan and Chew 2013; Morse, Bruneau, & Dusssetschleger, 2010). Good ergonomic contributes to reducing pain in all parts of the body. As result, it gives comfort both on the dental team and patients. According to Finkbeiner and Muscari (2010), trans-thorax unit design meets the requirements of time and motion concepts and promotes good ergonomic positioning. It is part of the requirements of TFH dentistry application. Contrary to the side delivery unit system design, the hand-piece and movable tray are located on operator’s side of the chair. Thus, it requires the operator to retrieve and place the hand-piece, which in turn would force the shift of vision from the treatment site to grasp the wanted instrument and then refocus the eyes back on the operative field. It also strain the arm to reach the instrument and material. This will result in physical stress and eye fatigue. The assistant only transfers the suction equipment and additional instrument from nursing station and fixed cabinet to the operator. Thus, the assistant needed to retrieve the instruments and materials that were stored in fixed cabinet located at the operator’s side instead of the assistant’s side. It has increased the body movement

of the assistant while working. This unit includes a spittoon which actually interfered with assistant's position which was immobile. Finkbeiner (2010) recommended to conserve time and movement during treatment by placing supportive equipment and supplies within a 21-inch radius of assistant's hands.

Interacting between operator and assistant is part of the criteria in TFH dentistry application. They need to have mutual understanding and understand SOP well. The treatment flow becomes smoothly with non-verbal communication instead of verbal communication. Non-verbal signal indicates the need to exchange an instrument in order to avoid tedious and repetitious verbal communication throughout the day. Eventually, the operator and assistant have the same knowledge about the treatment, but lack of dealing before treatment between the dental team is one of the factors TFH dentistry applications were not achieved through non-verbal communication.

In terms of positioning of the dental teams, the result showed that majority of dental students as operators utilized the range from 10 o'clock to 1 o'clock position for right-handed and 10 o'clock to 4 o'clock position for left-handed according to the required teeth position. However, less than 50% of the assistant applied the range position of assistant as more than 50% of them, preferred standing than sitting. These are related to the placement of the dental equipment and materials which were located far from the working area.

Instrument transfer is the process of transferring instrument and materials to and from operator within the transfer zone required. Due to the settings of the dental chair as side delivery unit, all the instruments and hand-pieces were on the operator's side. Hand-pieces and instruments were transferred to the patient's mouth by the operator themselves. Therefore, more than 80% of the dental students did not occupy the transfer zone. Compared to side delivery system, trans-thorax delivery unit in TFH, needs the assistants to deliver the instruments and materials to the operators. The TFH dentistry application is not successfully achieved when the dental team needs to reach for the instrumentation and patients uneasily. A set of principles on TFH dentistry application was explained in requiring organization and planning in advance. Thus, the study on the efficiency of TFH dentistry application was investigated through pre-and post-training on TFH dentistry among dental team.

The result shows a significant reduction in treatment time after the TFH training. According to Ahmad & Owoyemi (2012), Islam lays great emphasis on work. In many places in the Quran and Hadith, it has been made clear that time should not be wasted. In the

Qur'an, Allah draws attention to all the magnificent creations as an indication of the proper planning in any career that leads to wonderful results. In this field, both the operators and assistants understood their own task, through an advanced systematic treatment planning on transferring instruments and materials between the dental team before treatment. Eventually, the treatment duration has reduced after the pre-training. As in training, the dental teams were encourage to communicate via non-verbal instead of verbal language. The operator gave signals for an exchange by moving the used instrument from the tooth and bringing outside the mouth. They also maintained the finger rest. This demonstrates that both operator and assistant understood well the SOP and applied during the treatment to achieve TFH dentistry.

There is a significant difference in Class II motion for both operators and assistants as shown by positive difference in body movement. Class II motion includes movement of fingers and wrist to transfer instruments between dental team (Finkbeiner, 2010). The body movement of operator was minimized by the help of assistant that well-organized the instrument through right way of passing them. After the operator gave a non-verbal sign by removing the hand from patient's mouth, while still maintained finger rests, the operator was ready to receive the instruments from assistant which involved Class II motion of body movement of the operator.

The frequency of movement for Class II operators was increased from pre-training to first post training because they obtained the instruments and materials from the assistant compared to the pre-training, whose the operator reached the instruments alone using Class IV motion that lead to high number in pre-training. However, the Class II motion was reduced, from 2nd post training to 3rd post training. In relation to this, the motion of Class IV of the operator and assistant was significantly reduced at post training after it was high at beginning. With more practice, further reduction of motion in Class IV could be achieved.

Class III motion involves movement of wrist, forearm as well as the elbow. Class III motion of the operator was significant because there was reduction in the number on the related body region before and after the training. They used less movement of the forearm and elbow in order to reach the instruments. The instruments were arranged in sequence of use in order to facilitate rapid location of needed instruments during a procedure. Thus, the assistant stayed alert for any changes of the next stage of the procedure.

In this study, several limitations have been determined. Due to the limited time table for dental students, it was challenging to allocate time for the

pre and post trainings. Further study should be done with more follow ups at post-training and should involve higher number of participants. The association of true-FH dentistry and MSD among dental practitioners also need to be conducted.

Conclusion

Decent work is considered in Islam a type of worship. It is clear, that the concept of worship in Islam is comprehensive, which includes all the positive activities of the individual. That is why Islam encourages seeking knowledge, thus provides guidance to the smallest details of one's life on all these levels. From the results of the study, as in a job scope, it was concluded that TFH dentistry application reduces treatment time after training and minimized unnecessary body movement. Dental students in polyclinic of KOD, IIUM can improve themselves by practicing true FH dentistry. With ergonomics dental instruments and equipment, proper training and guidance, FH dentistry would be a pleasant practice to both dental operators and their assistants. Proper system of work would not only lighten the burden of the employee, but also eliminates hazards at the workplace and minimize the risks of injury to the employees.

Classification of Motion (Finkbeiner, 2010)

Class I: Movement of the fingers only as when picking up a cotton roll.

Class II: Fingers and wrist motion as used when transferring an instrument to the operator.

Class III: Fingers, wrist, and elbow as when reaching for a hand-piece.

Class IV: The entire arm and shoulder as when reaching into a supply tub.

Class V: The entire torso as when turning around to reach for equipment from the fixed cabinetry.

Class VI: Need the whole body movement to reach any materials out of the operating field.

References

- Ahmad, S., & Owoyemi, M. Y. (2012). The concept of Islamic work ethic: An analysis of some salient points in the prophetic tradition. *International Journal of Business and Social Science*, 3(20), 116-123.
- Chowanadisai, S., Kukiattrakoon, B., Yapong, B., Kedjarune, U., & Leggat, P. A. (2000). Occupational health problems of dentists in southern Thailand. *International dental journal*, 50(1), 36-40.
- Colombini, D., & Occhipinti, E. (2006). Preventing upper limb work-related musculoskeletal disorders (UL-WMSDs): New approaches in job (re) design and current trends in standardization. *Applied ergonomics*, 37(4), 441-450.
- Dalai, D. R., Bhaskar, D. J., Agali, C. R., Gupta, V., Singh, N., & Bumb, S. S. (2014). Four handed dentistry: an indispensable part for efficient clinical practice. *Int J Adv Health Sci*, 1(1), 16-20.
- Finkbeiner, B. L. (2010). Fourhanded Dentistry, An Overview Concept, Part 1. Retrieved from <http://www.dentalcare.com/media/enUS/education/ce65/ce65.pdf> accessed on 8th October 2013.
- Finkbeiner, B. L. (2010). Fourhanded Dentistry, Equipment Selection, Part 2. Retrieved from <http://dentalcare.com/media/enUS/education/ce66/ce66.pdf> accessed on 8th October 2013.
- Finkbeiner, B. L. (2010). Fourhanded Dentistry, Instrument Transfer, Part 3. Retrieved from <http://www.dentalcare.com/media/enUS/education/ce67/ce67.pdf> accessed on 8th October 2013.
- Finkbeiner, B. L., & Muscari, M. (2010). Let ergonomics and true four-handed dentistry help you. *Today's FDA: official monthly journal of the Florida Dental Association*, 23(1), 34-7.
- Harutunian, K., Gargallo Albiol, J., Barbosa de Figueiredo, R. P., & Gay Escoda, C. (2011). Ergonomics and musculoskeletal pain among postgraduate students and faculty members of the School of Dentistry of the University of Barcelona (Spain). A cross-sectional study. *Medicina Oral, Patología Oral y Cirugía Bucal*, 2011, vol. 16, num. 3, p. 425-429.
- Hashi, A. A. (2011). Islamic ethics: An outline of its principles and scope. *Revelation and Science*, 1(03), 122-130
- Hassan, M. K., & Abd, Z. (1988). *Pendidikan Dan Pembangunan: Satu Perspektif Bersepadu*. Kuala Lumpur: Nurin Enterprise.
- Holmes, D. C., Squire, L. J., Arneson, S. K., & Doering, J. V. (2009). Comparison of student productivity in four-handed clinic and regular unassisted clinic. *Journal of dental education*, 73(9), 1083-1089.
- Jonker, D. (2010). Self-assessed and direct measured physical workload among dentists in public dental clinics in Sweden during a period of rationalizations (Unpublished doctoral thesis), Linköping University, Sweden.
- Khan, S. A., & Chew, K. Y. (2013). Effect of working characteristics and taught ergonomics on the prevalence of musculoskeletal disorders amongst dental students. *BMC musculoskeletal disorders*, 14(1), 118.

- Morse, T., Bruneau, H., & Dussetschleger, J. (2010). Musculoskeletal disorders of the neck and shoulder in the dental professions. *Work*, 35(4), 419-429.
- Murtomaa, H. (1983). Conception of Dentists and Dental Nurses About Ergonomics. Taylor & Francis Group, 26(9), 879-886.
- Sanders, M. J and Turcotte, C. A. (1997). Ergonomic strategies for dental professionals. *Work* 8, 55-72.
- Yamalik, N. (2007). Musculoskeletal disorders (MSDs) and dental practice Part 2. Risk factors for dentistry, magnitude of the problem, prevention, and dental ergonomics. *International dental journal*, 57(1), 45-54.

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