



BEING A LEFT-HANDED DENTIST: BOON/FLAW? A SURVEY IN DENTAL COLLEGES AROUND THE UAE

Sabrin AZIM, Leila MOSTAWE, Amneh DARWISH

Ras Al Khaimah College of Dental Sciences

Ras Al Khaimah Medical and Health Sciences University

Abstract:

Background: Left-handedness has been considered a simple inconvenience by some or something as convoluted as "the sinister," the Latin word for the left, by others. It has been suggested that majority of the humanity are right-handed because their early hominid ancestors are thought to have linked early speech to muscle actions already lateralized to our brain's left hemisphere at an earlier point in hominid evolution⁹. Although, the level of modern technology enables the adaptation of the workplace for both groups of students (lefties and righties) under the same conditions, ensuring equal comfort for them all and avoiding possible psychophysical harm.

Objective: To find if there are any difficulties faced by Left-Handed dentists and dental students, identify these difficulties and how can we overcome them.

Methodology: The research was conducted through a paper and pencil questionnaire that was distributed to dentists, dental students and interns in 4 dental colleges in different regions in United Arab Emirates. The number of participants was 46, the age range was between 20-75 years old, among them there was 24 Female and 22 males.

The collected data were analyzed with the SPSS Inc., Chicago, IL; version 16.0. Descriptive statistics were used to summarize the responses, and independent proportional t-test were used to compare differences.

Results: the study found that out of the 46 participants n=8 (17.4%) were ambidextrous and n=38 were left handed. There was highly significant difference between the LH Students and Dentists (i.e. $r=0.68$) and $p=0.54$. The Survey revealed that 84.6% of the dentists and 57.6% of the students works on a right-handed dental unit. 30.8% of the dentists and 6.1% of the students were forced to change laterality. 61.5 % of the dentist and 36.4% of students reported not receiving guidance from their supervisor, and that their institution is not properly equipped. Not forgetting to mention that 76.9% of the dentists and 63.6 % of the students declared facing difficulties. 73.9% of the respondents reported having musculoskeletal complications due to the use of facilities of RH dentists. 69.2% of the dentists and 60.6% of the students sees that being a left-handed will affect the assistant's ability to work.

Conclusion: The conclusion from this study is to highlight the needs of this minority group as many LH dental students face challenges. Dental schools should provide LH students with needed equipment and a proper learning environment. Expert senior LH dentists should help junior LH dental students to learn techniques and procedures used by left-handers.

Keywords: "Dental", "Dentistry", "Right-handed", "left-handed", "dental procedures", "instruments", "questionnaire".

★Corresponding Author: Leila Mohamed MOSTAWE, Ras Al Khaimah College of Dental Sciences Ras Al Khaimah Medical and Health Sciences University

Introduction and Review of The Literature:

Left-handedness has been considered a simple inconvenience by some or something as convoluted as "the sinister," the Latin word for the left, by others. It has been suggested that majority of the humanity are right-handed because their early hominid ancestors are thought to have coupled early speech to muscle actions already lateralized to our brain's left hemisphere at an earlier point in hominid evolution⁹. Eleven percent of Americans (20% of men and 8% of women) are left-handed²⁸. A higher incidence is observed in males compared to females³⁰. Although left-handers are considered to be more intellectual⁴ musical^{29,14} and artistic^{29,14} studies have documented that left-handed people are more prone to unintentional injuries^{16,15} head trauma²³ motor vehicle accidents⁷ industrial occupational accidents¹¹ and increased sports injuries; because we live in a right-handed world and have done so for many centuries.

Studies reflect similar percentages of lefthanders among medical personnel, where one in ten medical personnel is left-handed with additional reports of 8.6% incidence of left-handedness among dental students and 17.2% incidence in orthodontists¹⁹. Left-handedness has been considered a simple inconvenience by some, whereas some left-handed surgeons feel that they are "the last unorganized minority." It might be thought that sinistrality would be a handicap given that only a low percentage of left handed surgeons are provided with left handed instruments while training¹².

The perceptions of left-handed surgeons regarding their laterality related inconveniences are unknown¹² Surgical professions demand higher cognitive skills, good ergonomics, and coordination³⁶. Schueneman and Pickleman²⁸ have shown that although left-handed surgical residents are more proficient on a neuropsychological test of tactile-spatial abilities, they tend to be more cautious, more reactive to stress, and have lesser operating skills. However, they are more prone to needle stick injuries than their right handed colleagues¹. Despite this, there is complete paucity of literature for left-handed surgeons. An online literature search reveals only 5 articles related to "left-handed surgeon's."^{10,26,4,30,13}

It is very necessary to find out the difficulties that is faced by left handed dentists and try to overcome it.

The discrepancy in the functions of the human brain hemispheres is manifested by laterality³¹.

At birth, both hemispheres act equally, but one hemisphere will start to dominate as neurological maturity proceeds. This process can continue between five and six years and, at the end of this period, the person presents a defined laterality³⁴, although the biological basis of this laterality remains unknown⁵. The reason why 90% of the population present right-side dominance and only 10% - 12% are left-handed is not known, but several theories have been proposed, for example genetic factors and pre- and post-natal conditions³³. The preference for the use of the right or left hand is a typical example of laterality and cannot be considered as an exception or bad habit, as it is a natural manifestation of dominance of a particular brain hemisphere.

Manual dexterity is defined as the ability to integrate precision and speed with finely coordinated movement of the arm, hand, and fingers.²⁵ Brayer et al. defined skill as proficiency that results from training and practice.⁸

The lateral asymmetry is related to biological factors, so intrinsic to the individual. Although handedness is determined by biological aspects, its demonstration is a product of biological and social factors, because child needs, very early, to adapt to the use of objects designed for righties.¹⁷

Despite all the social and technological changes, the modern world remains predominantly right handed and left-handed frequency tends to decrease with age, possibly due to social pressure, adaptation, even though it decreased the tendency to force left handed children to write with their right hand, which denotes an attitude of understanding for the biological characteristic and respect.¹

Some professional fields such as dentistry, which require a high degree of manual dexterity as well as mental images to perform a particular clinical procedure, do not grant better performances to lefties, rather, they commonly feel the inconvenience of their condition, according to a study by Henderson et al.²⁴

Dentistry is a demanding profession requiring concentration, precision, and skills³⁷.

Successful dental treatment depends on such factors as the anatomy and location of teeth, selection of a well-adapted instrument, proper angulations of the instrument, and the proper

Leila Mohamed MOSTAWA et al. / BEING A LEFT-HANDED DENTIST: BOON/FLAW? A SURVEY IN DENTAL COLLEGES AROUND THE UAE

position of the patient and the dentist as well as manual skills.²¹

The lack of general equipment adapted to the dominant brain condition¹⁷ of left-handers exposes the fact that usually these characteristics of left-handed people are “forgotten”.

Studies on Repetitive Strain Injury/Work-Related Musculoskeletal Disorders (RSI/WRMD) in dentists have been carried out since the 1950's and currently locate these professionals in the first place regarding leaves of absence due to temporary or permanent incapacities²².

WRMD are a result of the combination of the excessive use of muscular groups in repetitive motions, with or without local strain, associated with the permanence of body segments in a specific position during a long period of time and insufficient time for the recovery of these segments²⁷

Another study, however, observed the prevalence of neuropathic symptoms co-existent with musculoskeletal pain among right- and left-handed odontology students, related to weakness (42% and 40%, respectively), painful sensation equivalent to perforation with pins and needles (35% and 22%, respectively), and dormancy (23% and 19%, respectively). Left-handed students presented a significantly higher prevalence of musculoskeletal symptoms than right-handed students³⁷. In this sense, although it is possible that a left-handed student learns to work with a dentistry chair designed for right-handed professionals, this process can be long and accelerate towards a stage of joint strain/wear and painful symptomatology²¹. If the left-handed student already practiced with a chair that was adequate to his/hers dominance particularity, this period of adaptation could be applied to improve practical abilities in a work position that is appropriate to the specific lateral dominance³¹.

The use of high end technology tools and equipment allowed improving the quality of dentistry work with the execution of increasingly complex tasks. However the industrial production system develops products that meet the majority of the population who is right handed, forcing the lefty to adapt and this can lead to a decrease in performance and increased perception of discomfort when compared to the same task performed by righties³⁸

Although, the level of modern technology enables the adaptation of the workplace for both groups of students (lefties and righties) under the same conditions, ensuring equal comfort for

them all and avoiding possible psychophysical harm.

Since there was no enough information in the literature regarding left-handed dentistry as well as there were no available studies that reported concerning left-handed dentistry in UAE, It is essential to find out the difficulties that is faced by left handed dentists and try to overcome it.

Materials and Methods:

This research was approved by different Universities in United Arab Emirates such as: Rak Medical and Health Sciences university, Mohammed Bin Rashid University Of Medicine and Health Sciences, Ajman University and University of Sharjah.

This research was a questionnaire based on (A Survey of Left-Handed Dental Students and Interns in Saudi Arabia) however this questionnaire was modified according to our objectives. A paper and pencil questionnaire was distributed and filled by the left handed dentists, dental interns and students from different Dental colleges in UAE.

The number of participants was 46, the age range was between 20-75 years old, among them there was 24 Female and 22 male.

The questionnaire consisted of 14 questions that assessed the following:

- 1-Demographic information
- 2- Any perceived difficulties due to being left-handed in dental school and practice;
- 3- Preferred hand in performing various dental procedures
- 4-Musculoskeletal complications
- 5-Any efforts to change the use of the left hand.

The questionnaires were distributed to dentists, dental students and interns in 4 dental colleges in different regions in United Arab Emirates.

Theses dental schools were: Rak Medical and Health Sciences university, Mohammed Bin Rashid University of Medicine and Health Sciences, Ajman Medical University and University of Sharjah.

The Questionnaires were distributed to the participants by the Co-investigator personally with the help of the instructors in some universities (University of Sharjah and MBRU). Only students in their 4th year and above who were involved in clinical dentistry courses were

Leila Mohamed MOSTAWA et al. / BEING A LEFT-HANDED DENTIST: BOON/FLAW? A SURVEY IN DENTAL COLLEGES AROUND THE UAE

surveyed because most of the survey questions were clinical oriented.

The collected data were analyzed with the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL; version 16.0). Descriptive statistics were used to summarize the responses, and chi-square and independent proportional t-test were used to compare differences. A p-value <0.05 was accepted as significant.

Sample size was identified based on Raosoft Calculator, in which we depended on 5% error and 95% confidence. Moreover, there are 100 participants from 4 Universities and 46 participants were selected.

Results:

In the academic year of 2017-2018 among Four Universities in UAE out of 100 left handed dental students and dentists only 46 participated in this survey. Among these, 28.3% were dentists, 26.1% were accounted in 4th year, 37% in Final year and 8.7% were Interns. The participants were divided into two groups of Dentists and students and statistical analyses were made accordingly.

There was highly significant difference between the LH Students and Dentists at the four different Universities (i.e. $r=0.68$) and $p=0.54$, but there is no significant difference between LH participants of both genders 47.80 percent for Male and 52.20 percent for Female, age ranging from Twenty to seventy one years old and were on an average of 34 years of age for dentists and 22 years old for students. There was at least one LH student in all the schools and in all the class levels.

The highest percentage of LH students 51.5% was found to be in RAK Medical and Health Sciences University, while the lowest percentage 18.2% was found in Ajman University.

Among the dentists there was a significant difference regarding the speciality with the highest percentage of General Practitioners 53.8% and lowest percentage was for Periodontists and Prosthodontists for each 7.1%, however there was no surgeons among the participants.

The Survey revealed that 84.6% of the dentists and 57.6% of the students works on a right handed dental unit, while 69.2% of the dentists and 78.8% of the students prefer working on a left-handed dental unit. 30.8% of the dentists were forced to change laterality, while only 6.1% of the students have switched, essentially due to; social influence, parental influence, peer influence, injury or disability, and their particular speciality.

There was no significant correlation between the preferred dental unit and working experience of the dentist ($p=0.047$). The same was for the Student educational level where it wasn't statistically significant with the preferred dental unit.

As for the difficulties encountered by left-handed dentists, 61.5% reported not receiving guidance from their supervisor during their learning time, and that their institution is not properly equipped to accommodate them as left-handed dentist, compared to 36.4% of the students who confessed not receiving help from their supervisors and 48.5% thinks that their institution is not properly equipped to accommodate them as left-handed students. Not forgetting to mention that 76.9% of the dentists and 63.6% of the students declared facing difficulties due to their hand-preference.

The problems faced by dentists were significantly correlated with their work experience ($p=0.098$), the availability of a properly equipped institution for the left-handed dentist has no significant correlation with the experience ($p=0.005$), as well as between student educational level and equipped institution ($p=0.001$). However, there was high statistical significance between student level and the tendency to experience difficulties ($p=0.325$).

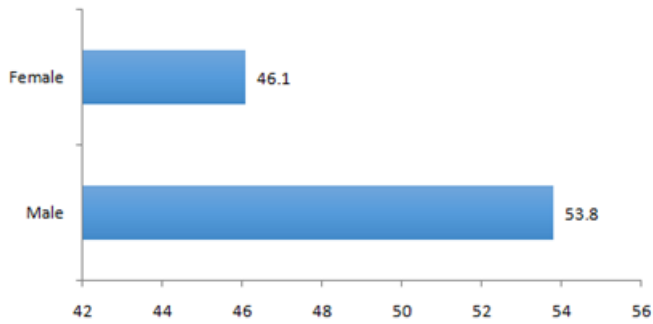
While performing the procedure in the clinic, 69.2% of the dentists and 60.6% of the students sees that being a left-handed dentist will affect the dental assistant's ability or convenience to work in a negative way. There was no significant correlation between student educational level and effect of dentist's handedness on assistant's ability to work ($p=0.004$). No correlation was detected between dentist's work experience and effect of dentist's handedness on dental assistant ability to work ($p=0.036$). 92.3% of the responding left-handed Dentists said that their patients never expressed concern regarding the operating dentist's laterality and would not include being a left-handed in their CV. With reference to the students 87.9% didn't notice any discomfort shown by the patient when they are treated by left-handed dentist and 57.6% would not include being a left-handed in their CV.

According to our study 84.6% dentists and, 93.9% students won't change their children habit of being a left-handed. 73.9% of the respondents reported having musculoskeletal complications due to the use of facilities of RH dentists (76.9% dentists and 66.7% students).

Gender:

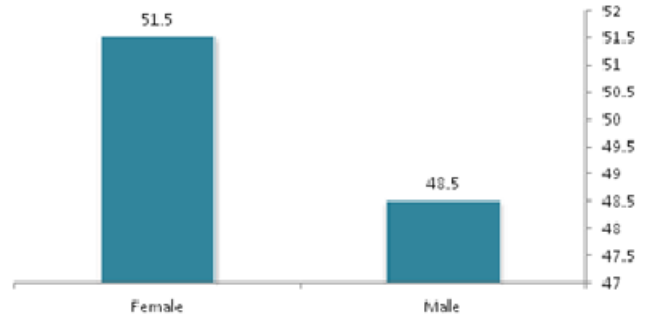
Dentists

Gender%



Students

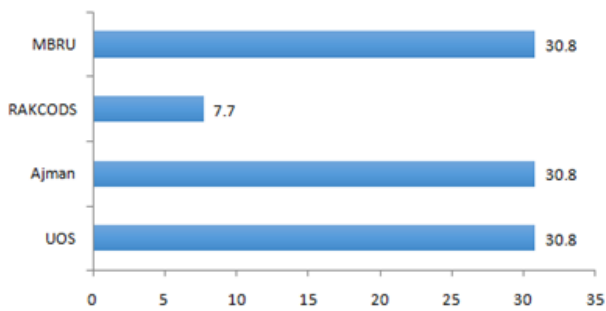
Gender%



University:

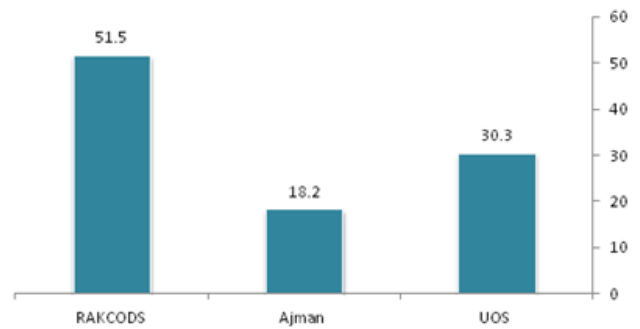
Dentists

University%



Students

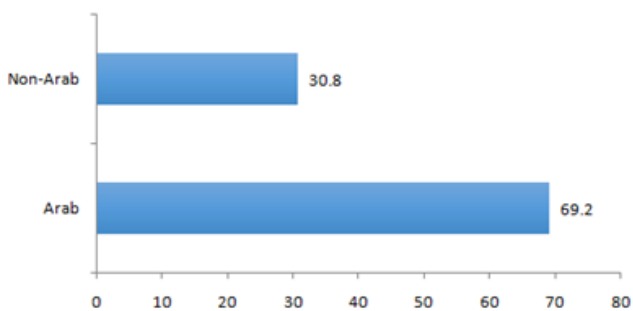
university%



Nationality:

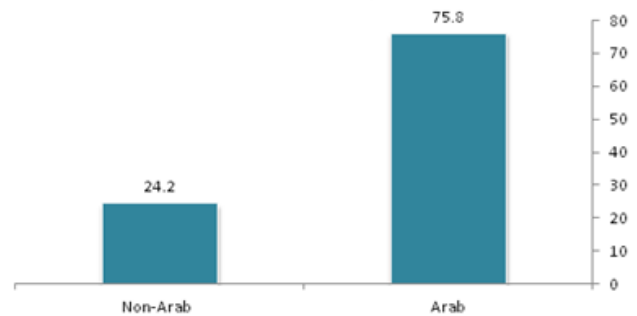
Dentists

Nationality%



Students

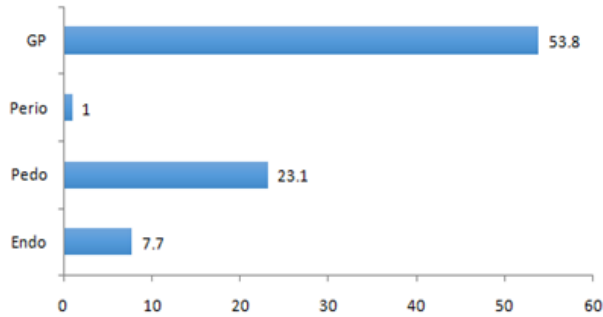
Nationality%



Specialty and study level:

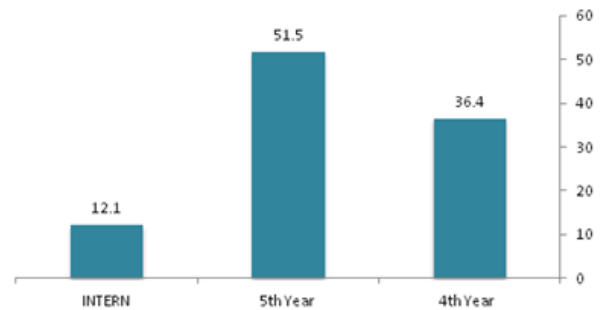
Dentists

Speciality%



Students

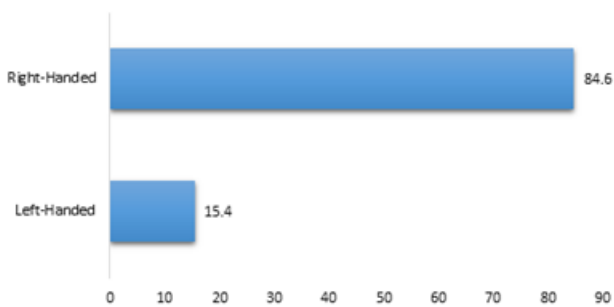
student level%



Dental unit:

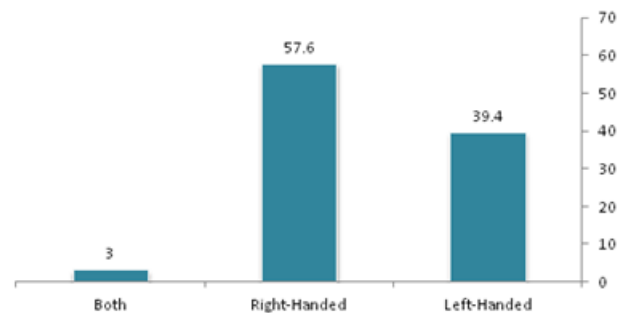
Dentists

Dental Unit%



Students

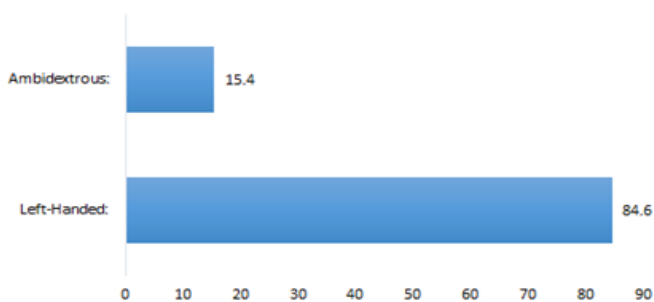
Dental Unit%



Handedness:

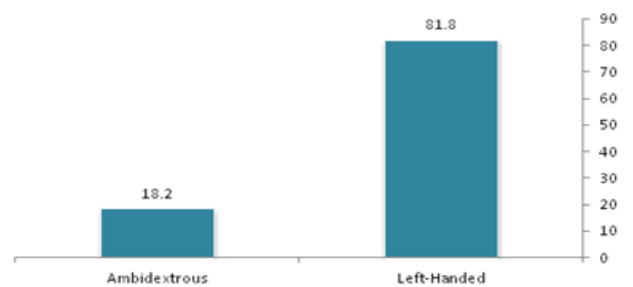
Dentists

Handedness %



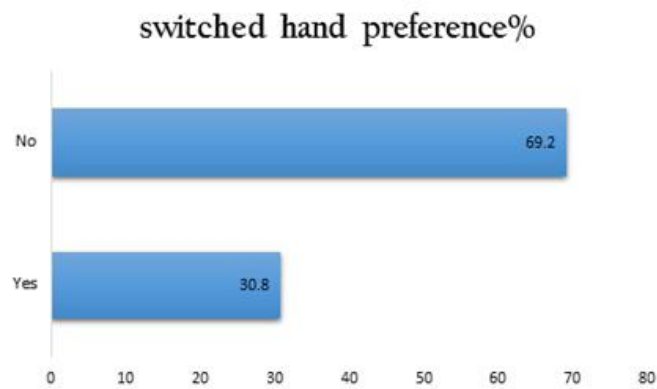
Students

Handedness%

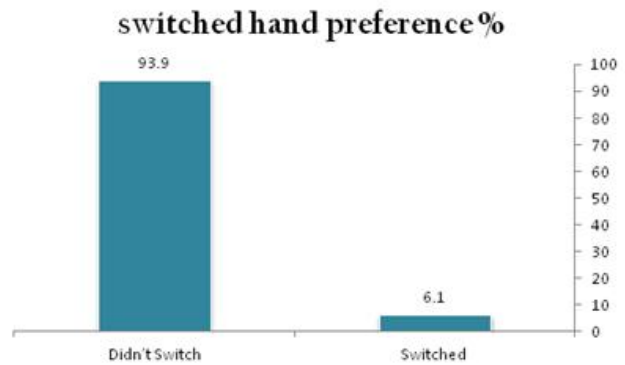


Switched hand preference:

Dentists

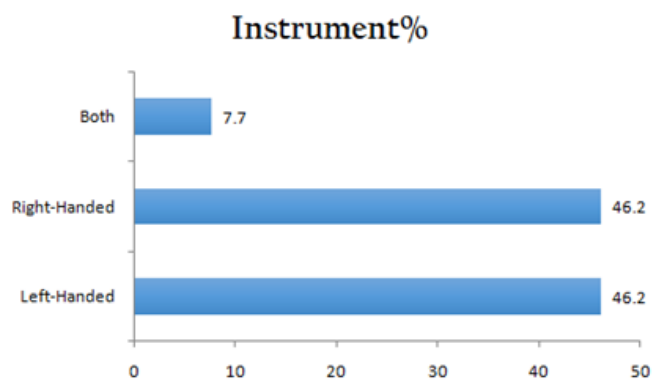


Students

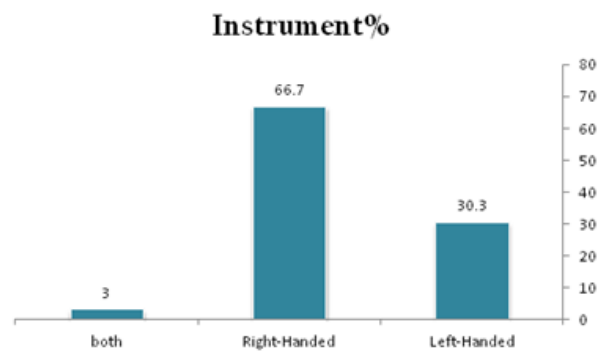


Instruments:

Dentists

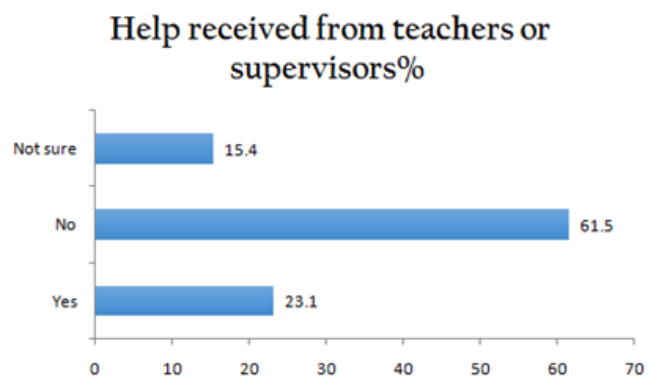


Students

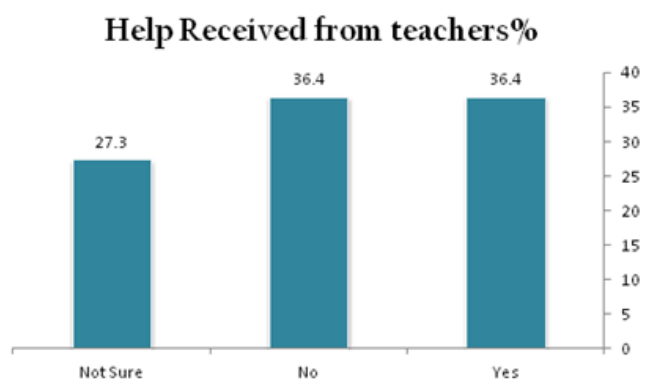


Help received from teachers:

Dentists

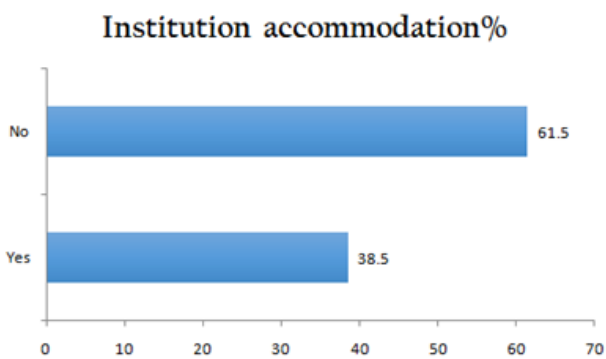


Students

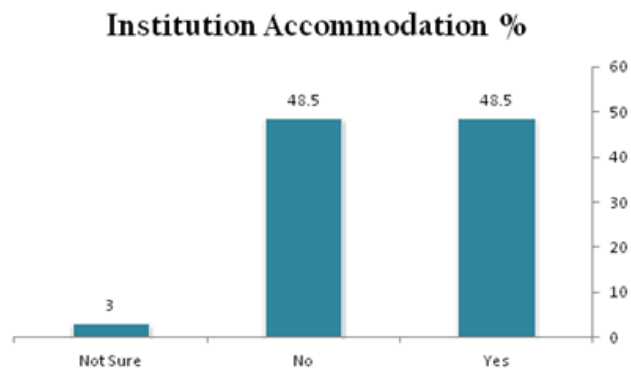


Institution accommodation:

Dentists

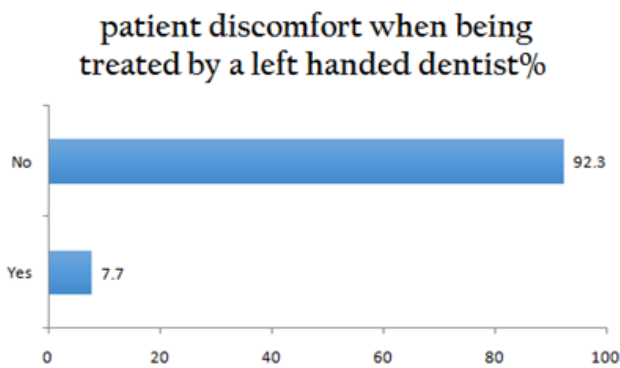


Students

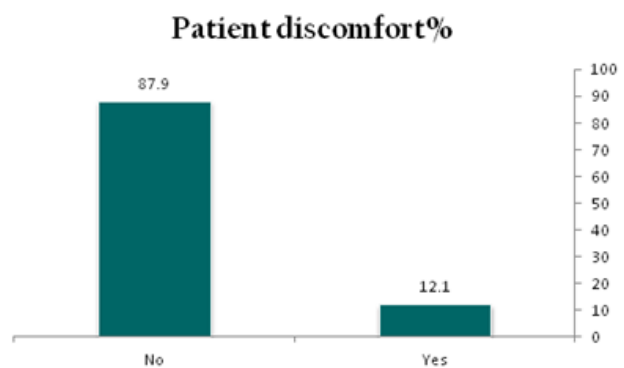


Patient discomfort when being treated by a left handed dentist:

Dentists

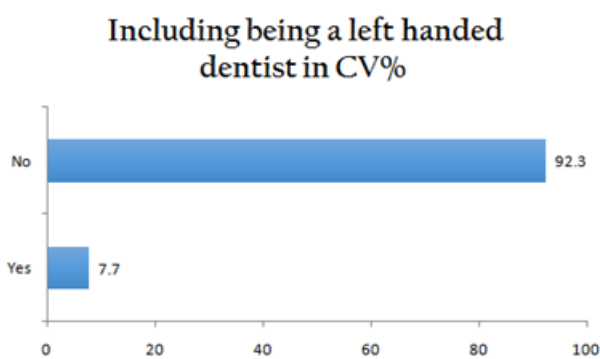


Students

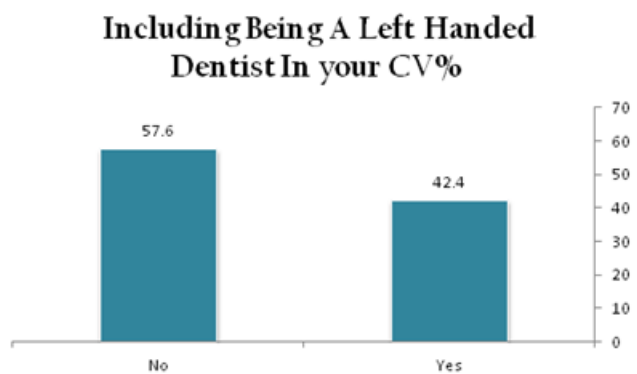


Including being a left handed dentist in your CV:

Dentists



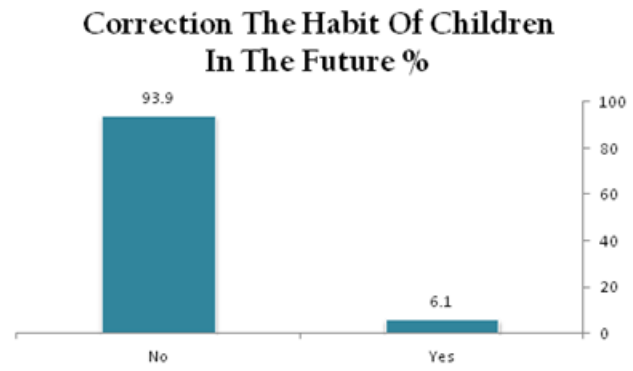
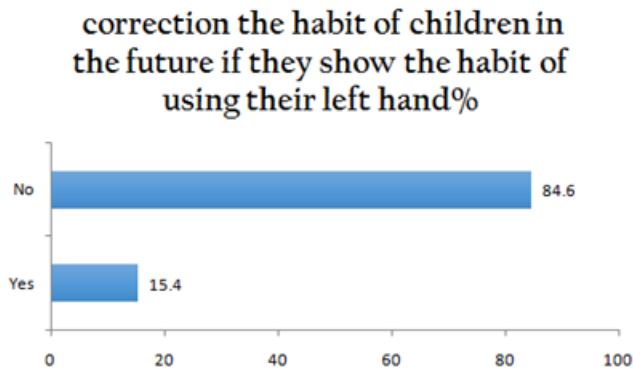
Students



Correction the habit of children in the future:

Dentists

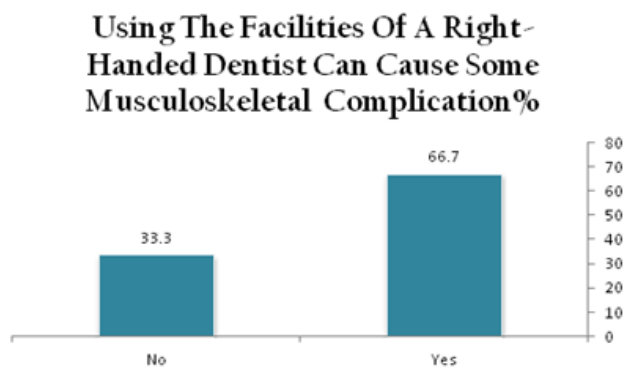
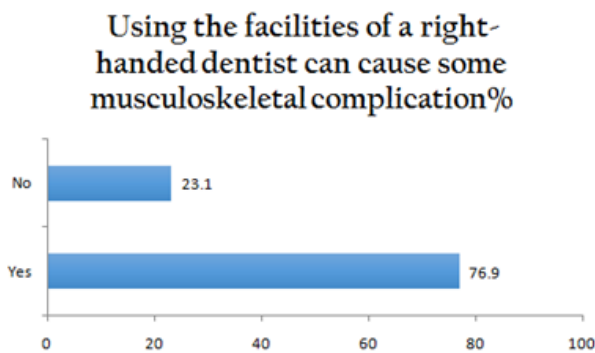
Students



Musculoskeletal complication:

Dentists

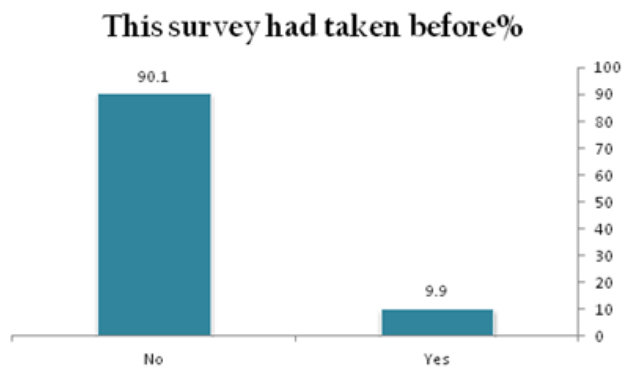
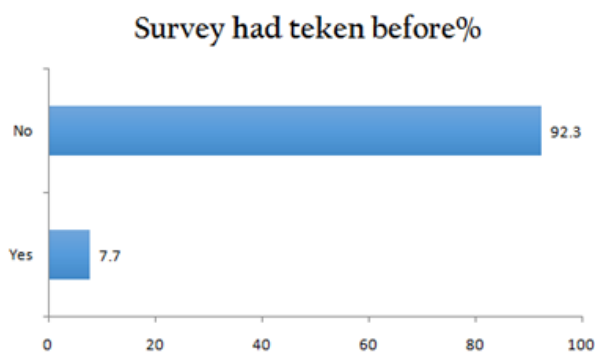
Students



Survey had taken before:

Dentists

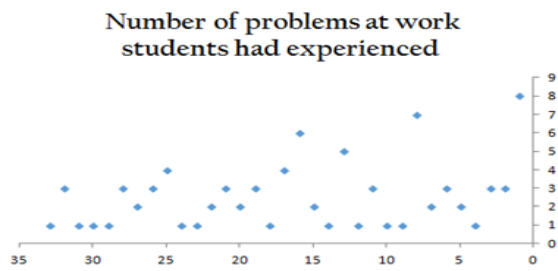
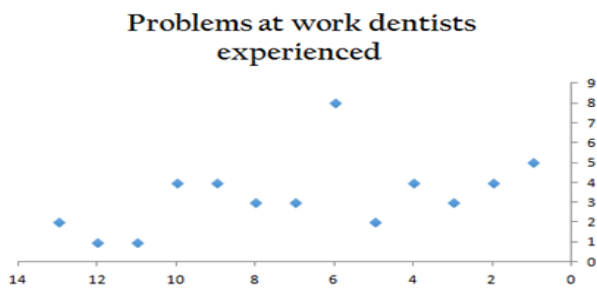
Students



Problems at work:

Dentists

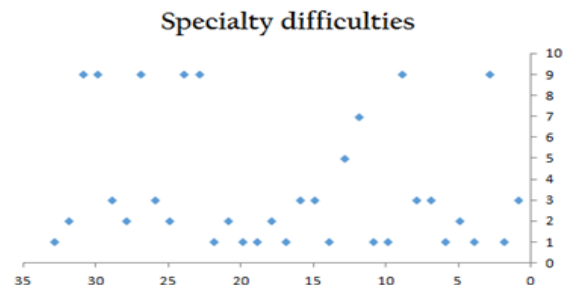
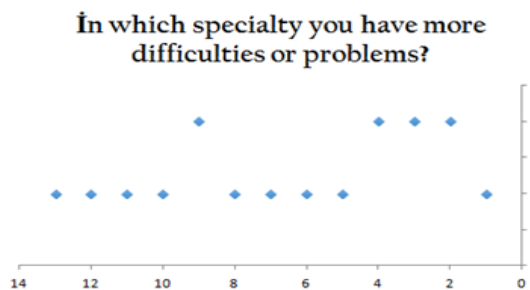
Students



Specialty difficulties:

Dentists

Students



T-Test

T-Test - Paired Samples Test - June 2, 2018

		Paired Differences							t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference						
					Lower	Upper					
Pair 1	workexperience - problemsperienced	7.84615	15.78948	4.37921	-1.69533	17.38764	1.792	12	.098		
Pair 2	workexperience - dentalunit	9.38462	15.28909	4.24043	.14551	18.62372	2.213	12	.047		
Pair 3	workexperience - dentalassitantability	9.92308	15.14079	4.19930	.77359	19.07257	2.363	12	.036		
Pair 4	problemsperienced - institutionequipped	1.76923	1.87767	.52077	.63457	2.90389	3.397	12	.005		

T-Test

T-Test - Paired Samples Test - June 2, 2018

		Paired Differences							t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference						
					Lower	Upper					
Pair 1	studentlevel - whichdentalunitprefer	.93939	.93339	.16248	.60843	1.27036	5.782	32	.000		
Pair 2	studentlevel - problemsperienced	-.36364	2.08893	.36364	-1.10434	.37707	-1.000	32	.325		
Pair 3	studentlevel - dentalassitantability	.48485	.90558	.15764	.16374	.80595	3.076	32	.004		
Pair 4	problemsperienced - institutionequipped	1.03030	1.68606	.29351	.43245	1.62815	3.510	32	.001		

Discussion:

This study aimed to identify the main difficulties confronted by the left-handed dentist and dental student in four different universities in the UAE, and how to overcome them. There was not enough information in the literature regarding left-handed dentistry as well as there were no available studies that reported concerning left-handed dentistry in UAE. In our study the left-handed dentists and students were asked to give their opinion regarding the various aspects of practicing dentistry, as per the results of the survey 71.7% of the students and 28.3% of the dentists were left-handed. Out of the 46 participants 8 (17.4%) were ambidextrous, who switched their hand preferences due to; parental influence 2.2%, peer influence 2.25, injury or disability 2.2%, and their particular speciality (dentistry) 4.34%.

In the present study, out of 46 left-handed participants, there were 47.80% males and 52.20% females. Similar results were found in studies done by Shivam Kapoor et al.²⁰, Pratibha Sultane et al.³⁵ and Silva MA et al.³², but contrasting results were found in the study done by Al-Johany³, in which 57% were males and 43% were females and Prasad S. Adusumilli (80.9% males and 19.11 females)¹.

In our survey, maximum number of participants in general 37% was final year students (51.5% from within the students' group). Contrasting results were found in the studies conducted by Kapoor et al.²⁰ and, Pratibha Sultane et al.³⁵

Since 96.2% of the dentist and 75.8% of the students who participated in the study were Arabs, therefore there is a significant increase in the Arab left-handed dentists and students.

In this research it was very clear that majority of participants 76.1% (78.8% students) preferred using a dental chair designed especially for a left-handed dentist, parallel to 83.8% in a study by Pratibha Sultane et al. and 84.5% by Al-Johany³. Only 34.8% of the participants (30.3% students, 46.2% dentists) mentioned that they are using instruments manufactured to be used by the left-handed dentist. However, 14 (39.4%) students stated that they have left-handed dental unit and 20 (57.6%) that they were using right-handed station, compared to 15.4% of the dentists having left-handed stations.

It is not surprising to find that most of the 52.2% respondents (48.5% students and 61.5% dentists) said their institution is not equipped properly to accommodate them as LH dental

students., contrasted with 84.5% in a study run by Al-Johany³.

The fact that almost all dental education and practices in dental schools are designed only for the right-handed students, and the dental chairs (Graham, 1995; Henderson and Stephens, 1995; Canakci et al., 2001), justifies that majority of the participants 67.4% agreed that they have experienced a problem or difficulty in being left-handed to do the required dental work. This is in accordance with the study done by Al-Johany 50.9%³, and Kaya, R. Orbak²¹ detected 85.7% participants being uncomfortable to work on the chairs designed for the right-handers, nevertheless our results conflict with the studies conducted by Pratibha Sultane et al. 17.1%³⁵, Kapoor et al. 36.9%²¹ in addition to Prasad S. Adusumilli et al.¹ who put up that 15% of the left-handed surgeons encountered practical difficulties in medical school because of their laterality.

It is very important for the left-handers to be familiar with the equipments designed for RH, in order to prepare themselves to the labour market which almost totally provides equipments for RH. But this requires extra efforts exhibited by the left-handed students and dentist to evolve their proficiencies while availing instruments and equipments fabricated for right-handers.

It is probably not easy for dental schools to provide these needed modifications of the dental chairs and laboratory stations. However, this can be achieved.

In their study (Kaya MD, Orbak R.)²¹ found that the performance of the left-handed students when working on the left side of the patient was significantly superior to work done on the right side of the patient.²¹

Despite the fact that a left-handed dentist can learn to work on a dental chair designed for right-handers, it will consume time. Instead of ruining time just for learning in a troublesome position, one may use up his time to improve his ability in a more comfortable position. This could be accomplished only by providing dental chairs designed for lefties and by granting the opportunity for left-handed dentists to work from the left side of the patient.²¹

Our study revealed that the majority of the participants 43.5% (36.4% students and 61.5% dentist) agreed that they did not receive guidance from their supervisor during their learning time, similar to the results found by Prasad S.

Leila Mohamed MOSTAWE et al. / BEING A LEFT-HANDED DENTIST: BOON/FLAW? A SURVEY IN DENTAL COLLEGES AROUND THE UAE

Adusumilli et al 97%¹, Pratibha Sultane et al 51.3%³⁵ and Al-johany 68.2%³ in which their participants agreed that they have a problem with their instructors or supervisors in being left-handed and they are right-handed. Moreover, Kapoor et al found that only 08.3% of the participants had a problem with their instructors or supervisors and 54.8% of them had a problem sometimes.²⁰ In addition, Silva MA et al. stated in their study that the main difficulties reported in the evaluation questionnaire refer to specific guidance regarding the handling of equipment and lack of dental chairs specific to them.³²

This could be due to the difficulty of the RH instructors to teach a LH student some techniques that may require certain modifications or to adjust to their LH station for the evaluation of their work.

Barely 10.9% (12.12 students, 7.7% dentists) knew that patients felt discomfort while being treated by left-handed dentist. Similar result was found by Pratibha Sultane et al 12.8%³⁵, but a slightly higher percentage was revealed by Al-johany³.

As for the difficulties faced by left-handed dentistry students it was found that they do exist, and main difficulties reported were ; Problems with right-handed biased tools or equipment , problems with right-handed biased layout of work environment, injury due to right-biased equipment or layout of work environment ,performance (speed or skill) lessened by right-biased tool and /or Layout ,teasing from co-workers/s ,Teasing from supervisor/s ,difficulties in suturing techniques are the most faced problems by our participants.

All the participants find difficulty in at least one specialty of dentistry.

While performing the procedure in the clinic ,69.2% of the dentists and 33.3% of the students (total of 43.5% of the participants) sees that being a left-handed dentist will affect the dental assistant's ability or convenience to work in a negative way. Similar finding was found in study done by Kapoor et al 56%²⁰ and 57% by Al-Johany³, but when we compared it with another study by Pratibha Sultane contrasting result was found 93.2%³⁵. In the present study, majority of participants 73.9%(76.9 % dentists and 66.7% students) agreed that a left-handed dentist using facilities of right handed dentist can cause some musculoskeletal medical complications. This was in agreement with the study done by Kapoor et al; conversely, conflicting result was found (33.6%) according to the study done by Al-Johany.³

As documented by Schmauder et al. (1993) that righthanders were less universally employable than left-handers in assembly work, it was wise of 67.4% of our study participants to say that they would not include being a left-handed in their CV. This was in accordance to a study done by Prasad S. Adusumilli where 97% of the surgeons didn't mention their laterality in their residency interviews¹, but it contrasts with the study done by Pratibha Sultane et al 43.6%³⁵ and 19.0% Kapoor et al²⁰. In our study, as compared to 7.7% of the dentists, majority of the students 57.6% declared that they would include being a left-handed in their CV, and this could be due to their lack of experience in the work market. According to our study 84.6% dentists and , 93.9 % students (total of 91.3% of the participants) won't change their children habit of being a left-handed this in accordance with the findings of Al-Johany, Kapoor et al and Pratibha Sultane et al.^{3,20,35}

Conclusion:

This research has attempted to bring the attention of the profession to this important issue as many LH dental students face challenges and because literature has shown that there is no information regarding this issue in UAE, as well as there were no available studies that reported concerning left-handed dentistry in UAE, and having the majority of the participants (90%) not taken this study before supports that. According to the literature that was found by us it is a worldwide problem. In his study Al-johany raises a serious questions of whether applicants for admission to dental schools should be asked about their preferred hand to allow the school to prepare ahead of time the equipment needed for LH students, Should it be mandatory for dental schools to provide LH dental educators or mentors to teach LH dental students, Shall this be included as part of the academic accreditation requirements? More research is needed to answer these and related questions.

Dental schools should provide LH students with needed equipment and a proper learning environment. Expert senior LH dentists should help junior LH dental students to learn techniques and procedures used by left-handers. This could be done by involving LH educators in dental education or by publishing articles and reading materials for LH dental students.

The conclusion from this study is to highlight the needs of this minority group. Dental schools, and also educators, ought to know about the presence of this group to better steer the equipment to

Leila Mohamed MOSTAWA et al. / BEING A LEFT-HANDED DENTIST: BOON/FLAW? A SURVEY IN DENTAL COLLEGES AROUND THE UAE

their requirements, which results in superior guidance for these students.

Although the instruments and dental chairs are available, but they are very limited. The availability of left-handed dental equipments in widespread and cheaper prices will definitely reduce the difficulties and the number of problems faced by the left-handers resulting in more space for creation and art which makes a big part of dentistry and for the achievement of better treatment outcomes and satisfaction for both the dentist and the patient.

Acknowledgement:

First of all we would like to thank our Research Supervisor Dr. Sabrin Ali Azim for her continuous support and motivation, and appreciate her efforts being available anytime and anywhere to discuss our research.

She was determined on allowing this paper to be our own work, under her guidance whenever she thought we need it.

Special thanks to our colleague Yousef Hafidh who provided a great help in the statistical analysis, without him the research could not have been successfully conducted.

Thank you.

References:

- [1.] Adusumilli PS, Kell C, Chang JH, Tuorto S, Leitman IM. Left-handed surgeons: are they left out? *Curr Surg.* 2004;61(6):587-591.
- [2.] Adusumilli PS, Kell C, Chang JH, Tuorto S, Leitman IM. Left-handed surgeons: are they left out? *Curr Surg.* 2004; 61(6):587-91.
- [3.] Al-Johany S.S. ,A survey of left-handed dental students and interns in Saudi Arabia(2013). *Journal of Dental Education*, 77 (1) , pp. 105-112.
- [4.] Annett M, Manning M. Arithmetic and laterality. *Neuropsychologia.* 1990;28:61-69.
- [5.] Arteaga, C. and Poblano, A. (2008) Handedness of Children Determines Preferential Facial and Eye Movements Related to Hemispheric Specialization. *Arquivos de Neuro - Psiquiatria* , 66.
- [6.] Bernstein G. Needle holders—an instrument especially for the left-hand surgeon. *J Dermatol Surg Oncol.* 1988; 14:505-506.
- [7.] Bhairo NH, Nijsten MW, Van Dalen KC, Ten Duis HJ. Hand injuries in volleyball. *Int J Sports Med.* 1992;13: 351-354.
- [8.] Brayer WK, Mellonig JT, Dunlap RM, Marinak KW, Carson RE. Scaling and root planing effectiveness: the effect of root surface access and operator experience. *J Periodontol* 1989;60(1):67-72.
- [9.] Brown PW. Less than ten—surgeons with amputated fingers. *J Hand Surg.* 1982;7(1):31-37.
- [10.] Corbu D, Pento V, Iordache N, Dragomirescu C. Laparoscopic cholecystectomy in the hands of the left-handed surgeon. A technical note. *Chirurgia (Bucur).* 1998;93(1): 49.
- [11.] Coren S. Left-handedness and accident-related injury risk. *Am J Public Health.* 1989;79:1040-1041.
- [12.] Dobson R. The loneliness of the left handed surgeon. *BMJ : British Medical Journal.* 2005;330(7481):10.
- [13.] Freeman MJ, Singh J, Chell P, Barber K. Modular phakoemulsification training adapted for a left-handed trainee. *Eye.* 2004;18(1):35-37.
- [14.] Gotestam KO. Left-handedness among students of architecture and music. *Percept Mot Skills.* 1993;70:1323- 1327.
- [15.] Graham CJ, Cleveland E. Left-handedness as an injury risk factor in adolescents. *J Adolesc Health.* 1995;16(1):50- 52.
- [16.] Graham CJ, Dick R, Rickert VI, Glenn R. Left-handedness as a risk factor for unintentional injuries in children. *Pediatrics.* 1993;92:823-826
- [17.] Grga D, Miletić V. Dental education of Left-handed students. *Stom Glas S.* 2006; 53: 138-43.
- [18.] Grga, D. and Miletić, V. (2006) Stomatološka edukacija levorukih studenata. *Stom Glass* , 53.
- [19.] Henderson NJ, Stephens CD, Gale D. Left-handedness in dental undergraduates and orthodontic specialists. *Br Dent J* 1996;181(8):285-288.
- [20.] Kapoor, S., Puranik, M. P., & Uma, S. (2016). Practice Perspectives of Left-Handed Clinical Dental Students in India. *Journal of Clinical and Diagnostic Research : JCDR*, 10(10).
- [21.] Kaya M, Orbak R. Performance of left-handed dental students is improved when working from the left side of the patient. *Int J Ind Ergon* 2004;33:387-93.
- [22.] Kowjoundjian, J.A. and Araujo, R.G.M. (2006) Carpal Tunnel Syndrome and

Leila Mohamed MOSTAWE et al. / BEING A LEFT-HANDED DENTIST: BOON/FLAW? A SURVEY IN DENTAL COLLEGES AROUND THE UAE

- Manual Milking. *Arquivos de Neuro - Psiquiatria* , 64, 747-749.
- [23.] MacNiven E. Increased prevalence of left-handedness in victims of head trauma. *Brain Inj.* 1994;8:457-462.
- [24.] Orbak R, Tezel A, Canakci V, Tan U. Right- and left-handed dentists using right- and left-sided dental chairs in treatment of calculus. *Int J Neurosci.* 2002; 112(1):15-30.
- [25.] Ozcan A, Tulum Z, Pinar L, Baskurt F. Comparison of pressure pain threshold, grip strength, dexterity, and touch pressure of dominant and non-dominant hands within and between right- and left-handed subjects. *J Korean Med Sci* 2004;19(6):874-8.
- [26.] Pouw L, Tulloh B. Laparoscopic cholecystectomy for the left-handed surgeon. *Br J Surg.* 1995;82(1):138.
- [27.] Puriene, A., Aleksejuniene, J., Petrauskiene, J., Balciuniene, I. and Janulyte, V. (2008) Self- Reported Occupational Health Issues among Lithuanian Dentists. *Industrial Health* , 46, 369-374.
- [28.] Rohrich RJ. Left-handedness in plastic surgery: asset or liability? *Plast Reconstr Surg.* 2001;107:845-846.
- [29.] Schachter SC, Ransil BJ. Handedness distributions in nine professional groups. *Percept Mot Skills.* 1996;82(1): 51-63.
- [30.] Schueneman AL, Pickleman J, Freeark RJ. Age, gender, lateral dominance and prediction of operative skill among general surgery residents. *Surgery.* 1985;98:506-515.
- [31.] Searleman, A. and Porac, C. (2001) Lateral Preference Patterns as Possible Correlates of Successfully Switched Left Hand Writing: Data and a Theory. *Laterality* , 6, 303-314.
- [32.] Silva MA et al 10.14295/bds.2012.v15i4.853
- [33.] Sitnikova, M. (2012) Educational Peculiarities and Difficulties of Children with Left Sided Laterality: The Technological Solution of the Problem. *Cypriot Journal of Educational Sciences* , 7, 14-24.
- [34.] Steyer, V.E. (2010) The Child "Left-Handed" and the Acquisition of Written Language: Myths and Meeting the Special Needs. *IV Simpósio Internacional VII Fórum Nacional de Educação* , 35.
- [35.] Sultane, Pratibha & Sen, Nandini & Bhat, Nagesh & Patil, Vishal & Patel, Shivani & Patel, Hetvi & Limbachiya, Parth & Dudhat, Darshan. (2017). Perspectives, Realities, and Difficulties in Clinical Practice Experience of Left-handed Dental Students in Udaipur, India. *International Journal of Preventive and Clinical Dental Research.* 4. 179-183. 10.5005/jp-journals-10052-0105.
- [36.] Taras JS, Behrman MJ, Degnan GG. Left-hand dominance and hand trauma. *J Hand Surg.* 1995;20:1043- 1046.
- [37.] Tezel A, Kavrut F, Tezel A, Kara C, Demir T, Kavrut R. Musculoskeletal disorders in left- and right-handed Turkish dental students. *Int J Neurosci* 2005;115(2):255-66.
- [38.] Yarid SD, Diniz DG, Orenha ES, Arcieri RM, Garbin AJI. Aplicação de princípios de ergonomia no atendimento odontológico. *Interbio.* 2009; 3(2):11-7.