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

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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 evolution. 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 “.

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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 evolution 9. Eleven percent of Americans (20% of men and 8% of women) are left-handed 28. A higher incidence is observed in males compared to females 10. Although left-handers are considered to be more intellectual 4 musical and artistic 29,14 studies have documented that left-handed people are more prone to unintentional injuries 16,15 head trauma 23 motor vehicle accidents 7 industrial occupational accidents 19 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 orthodontists 19. 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 training 12.

The perceptions of left-handed surgeons regarding their laterality related inconveniences are unknown 12. Surgical professions demand higher cognitive skills, good ergonomics, and coordination 30. Schueneman and Pickelman 28 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 colleagues 1. 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 laterality 31.

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 laterality 34, although the biological basis of this laterality remains unknown 5. 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 conditions 35. 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 5. 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. 7

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 skills 37. 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
position of the patient and the dentist as well as manual skills.\textsuperscript{21}

The lack of general equipment adapted to the dominant brain condition \textsuperscript{17} 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 incapacities \textsuperscript{22}.

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 segments \textsuperscript{27}

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 students\textsuperscript{37}. 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 symptomatology \textsuperscript{21}. 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 dominance \textsuperscript{31}.

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 righties\textsuperscript{34}.

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
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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 expirties (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 dental 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).
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Gender:

Dentists

<table>
<thead>
<tr>
<th>Gender</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>46.1</td>
</tr>
<tr>
<td>Male</td>
<td>53.8</td>
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</table>

Students

<table>
<thead>
<tr>
<th>Gender</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>51.5</td>
</tr>
<tr>
<td>Male</td>
<td>48.5</td>
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University:

Dentists

<table>
<thead>
<tr>
<th>University</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBRU</td>
<td>30.8</td>
</tr>
<tr>
<td>RAKCDS</td>
<td>7.7</td>
</tr>
<tr>
<td>Ajman</td>
<td>30.8</td>
</tr>
<tr>
<td>UOS</td>
<td>30.8</td>
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</table>

Students

<table>
<thead>
<tr>
<th>University</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAKCDS</td>
<td>51.5</td>
</tr>
<tr>
<td>Ajman</td>
<td>10.2</td>
</tr>
<tr>
<td>UOS</td>
<td>30.3</td>
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</table>

Nationality:

Dentists

<table>
<thead>
<tr>
<th>Nationality</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Arab</td>
<td>80.8</td>
</tr>
<tr>
<td>Arab</td>
<td>19.2</td>
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</tbody>
</table>

Students

<table>
<thead>
<tr>
<th>Nationality</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Arab</td>
<td>24.2</td>
</tr>
<tr>
<td>Arab</td>
<td>75.8</td>
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</table>
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Specialty and study level:

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Dentists</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>52.8</td>
<td></td>
</tr>
<tr>
<td>Perio</td>
<td></td>
<td>51.5</td>
</tr>
<tr>
<td>Pedo</td>
<td>28.1</td>
<td></td>
</tr>
<tr>
<td>Endo</td>
<td>7.7</td>
<td></td>
</tr>
</tbody>
</table>

Dental unit:

<table>
<thead>
<tr>
<th>Dental Unit</th>
<th>Dentists</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right-Handed</td>
<td>84.6</td>
<td></td>
</tr>
<tr>
<td>Left-Handed</td>
<td>15.4</td>
<td></td>
</tr>
</tbody>
</table>

Handedness:

<table>
<thead>
<tr>
<th>Handedness</th>
<th>Dentists</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambidextrous</td>
<td>15.4</td>
<td>01.9</td>
</tr>
<tr>
<td>Left-Handed</td>
<td>84.6</td>
<td></td>
</tr>
</tbody>
</table>
Switched hand preference:

**Dentists**

- No: 69.2%
- Yes: 30.8%

**Students**

- Didn't Switch: 93.9%
- Switched: 6.1%

Instruments:

**Dentists**

- Both: 7.7%
- Right-handed: 46.2%
- Left-handed: 46.2%

**Students**

- Both: 3%
- Right-handed: 66.7%
- Left-handed: 30.3%

Help received from teachers:

**Dentists**

- Not sure: 15.4%
- No: 61.5%
- Yes: 23.1%

**Students**

- Not sure: 27.8%
- No: 36.4%
- Yes: 36.4%
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### Institution accommodation:

<table>
<thead>
<tr>
<th>Dentists</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institution accommodation %</strong></td>
<td><strong>Institution Accommodation %</strong></td>
</tr>
<tr>
<td>No</td>
<td>61.5</td>
</tr>
<tr>
<td>Yes</td>
<td>38.5</td>
</tr>
</tbody>
</table>

### Patient discomfort when being treated by a left handed dentist:

<table>
<thead>
<tr>
<th>Dentists</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient discomfort %</strong></td>
<td><strong>Patient discomfort %</strong></td>
</tr>
<tr>
<td>No</td>
<td>92.3</td>
</tr>
<tr>
<td>Yes</td>
<td>7.7</td>
</tr>
</tbody>
</table>

### Including being a left handed dentist in your CV:

<table>
<thead>
<tr>
<th>Dentists</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Including being a left handed dentist in CV %</strong></td>
<td><strong>Including Being A Left Handed Dentist In your CV %</strong></td>
</tr>
<tr>
<td>No</td>
<td>92.3</td>
</tr>
<tr>
<td>Yes</td>
<td>7.7</td>
</tr>
</tbody>
</table>
Correction the habit of children in the future:

**Dentists**

- Correction the habit of children in the future if they show the habit of using their left hand [84.6%]
- Yes: 15.4%

**Students**

- Correction The Habit Of Children In The Future %
- No: 93.9%
- Yes: 6.1%

Musculoskeletal complication:

**Dentists**

- Using the facilities of a right-handed dentist can cause some musculoskeletal complication [76.9%]
- Yes: 23.1%

**Students**

- Using The Facilities Of A Right-Handed Dentist Can Cause Some Musculoskeletal Complication %
- No: 33.3%
- Yes: 66.7%

Survey had taken before:

**Dentists**

- Survey had taken before [92.3%]
- Yes: 7.7%

**Students**

- This survey had taken before %
- No: 90.1%
- Yes: 9.9%
Problems at work:

Students

Number of problems at work students had experienced

Specialty difficulties:

Dentists

In which specialty you have more difficulties or problems?

Students

Specialty difficulties

T-Test

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

Paired Samples Test

Paired Differences

Mean Std. Deviation Std. Error Mean 95% Confidence Interval of the Difference Lower Upper t df Sig (2-tailed)

Pair 1 student level - which dental unit prefer

9.2929 .9339 .36248 .60843 1.27036 5.702 32 .000

Pair 2 student level - problems experienced

.36264 2.08893 .36264 .110434 .37707 -1.000 32 .325

Pair 3 student level - problems experienced

.48465 .96558 .15764 .16374 .80595 3.076 32 .004

Pair 4 problems experienced - institution equipped

1.03003 1.86096 .29351 .43245 1.62815 3.510 32 .001
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Discussion:

This study aimed to identify the main difficulties confront by the left handed dentist and dental student in Four different Universities in the UAE, and how to overcome them. 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. 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.22, but contrasting result was found in the study done by Al-Johany4, in which 57% were males and 43% were females and Prasad S. Adusumilli (80.9% males and 19.11 females)3.

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 al20 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-Johany4. 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 ran by Al-Johany4.

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%1, and Kaya, R. Orbak31 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%, Kapoor et al 36.9%21 in addition to Prasad S. Adusumilli et al 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.
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 interviews, but it contrasts with the study done by Pratibha Sultane et al 43.6% and 19.0% Kapoor et al. 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.

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
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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 face 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.

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