

Practice Perspectives of Left-Handed Clinical Dental Students in India

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ABSTRACT

Introduction: Handedness becomes important for students during their training period. Limited literature is available regarding the same.

Aim: The purpose of this study was to assess the dental practice perspectives and determine the hand preference and discomfort level among the Left-Handed (LH) clinical dental students.

Materials and Methods: A 30-item survey tool was used to conduct a cross-sectional survey among four successive LH cohorts (third and final year undergraduates, dental interns and postgraduates) in all the dental colleges of Bengaluru, Karnataka, India, during the year 2014.

Results: A total of 84 students completed the survey, response rate being 100%. About one-third (37%) reported that their institution was not properly equipped to accommodate LH students. Majority felt that LH dentists were at a higher risk of developing musculoskeletal complications. Mouth mirror handling showed equal distribution for handedness as compared to the other dental activities, whereas discomfort levels were negligible ("without any difficulty"). Dental practice perspective scores significantly correlated with the difficulty levels ($r=-0.333$, $p<0.001$).

Conclusion: Overall, the left-handers had a right dental practice perspective and their responses indicate a need to address their issues empathetically.

Keywords: Dental practice, Dental students, Handedness, Limitations of left handedness, Manual dexterity, Musculoskeletal complications

INTRODUCTION

Dentistry is a specialized field which involves high degree of manual dexterity along with neural coordination [1]. However, with the scientific advance, numerous new technologies and equipments have emerged improving the overall dental care [2]. A great deal of finesse can be achieved through an ideal posture. This in turn is very much dependent on the dominant hand and fingers [3]. The choice of hand use i.e., handedness involves three factors: hand "preference," hand "skillfulness" and hand "strength" [4]. It is not only determined by biological aspects, but is a manifestation of biological and social factors [5]. Around 90% of the population shows a preference for the right hand [6,7]. The evolutionary ladder has shown left-handedness to be less prevalent (5-25.9%), while some research reported a prevalence of 2-30% [8,9]. Similar findings have been reported in the studies conducted among orthopaedic surgeons and orthodontists [6,10]. Other surveys among dental students found 1 in 12 (6.6-8.6%) to be a Left-Handed (LH) user [10-12].

Most dental instruments are "universal", but the overall built and design is suited for the Right-Handed (RH) users [11,13]. This might force the left-handers to adapt, thereby leading to decrease in their performance with increased perception of discomfort. Many dental schools do not have dental chairs designed specifically for LH users [2]. However, there are manufacturers who cater equipment for LH dentists, which are total mirror image of RH equipment [13]. But its popularity and usage is relatively lesser [2,12]. It has been reported that chairs designed for RH users result in manual discomfort for LH dentists [10]. Difficulties in working conditions that might leave LH dentists with some manipulative disadvantage have also been reported [9]. Hence, a cross-sectional survey was conducted to assess the dental practice perspectives and determine the hand preference and discomfort level among the LH clinical dental students.

MATERIALS AND METHODS

A cross-sectional survey was conducted in all the 16 dental colleges of Bengaluru in the academic year of 2014. The list of the dental colleges was obtained from Rajiv Gandhi University of Health Sciences website (www.rguhs.ac.in) [14]. Ethical approval was obtained from the Institutional Review Board of Government Dental College and Research Institute, Bengaluru, Karnataka, India. Permission was sought from the head of institutions of each college.

The study participants were four successive left-handed cohorts of clinical dental students (third and final year undergraduates, dental interns and postgraduates). The study population was identified through a network of informants (Class leaders and student representatives) that further chained a cascading progression. This snow balling approach employed in each college helped to enlist the number of left-handers [15].

Inclusion Criteria: All the LH clinical dental students in the dental colleges of Bengaluru city.

Exclusion Criteria: Acquired left-handedness due to medical conditions like trauma/polio/paralysis etc.

All the eligible left-handers present on the day of the study were invited to participate in this study. These students, then, received an explanatory statement outlining the purpose of the study and anonymity about their identity disclosure. Their consent was implied by completion of the questionnaire, which took 10-15 minutes approximately.

Development of Study Tool: After a thorough literature search [9,12,13], a questionnaire was designed and checked for its face validity. Content validity of the questionnaire was further checked using the Lawshe approach, by a team consisting of a Psychiatrist, a Statistician, and two specialists in Public Health Dentistry [16]. The questions were further analyzed on a scale of 1-10 using Aiken

V index and all the questions with value of $V > 0.7$ were considered for inclusion in this study [17]. The questionnaire was pilot tested on 10 LH clinical dental students and test-retest reliability was carried out after 10 days at Government Dental College and Research Institute, Bengaluru. The test-retest reliability score for Dental Perspective Questionnaire (DPQ) and Dental Handedness Questionnaire (DHQ) ranged from 0.81-0.96 and 0.97-0.99 respectively. The internal consistency (Cronbach's alpha) for DPQ and DHQ ranged from 0.63-0.8 and 0.63-0.89 respectively. Hence, the final questionnaire consisted of 17 items on dental perspectives (DPQ) and 13 items on handedness (DHQ).

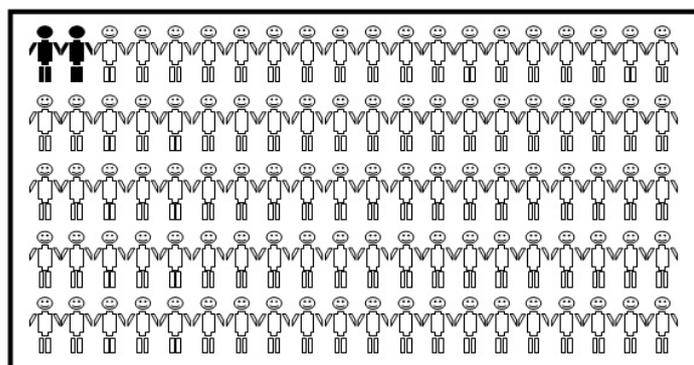
Study Proforma: The proforma consisted of three sections: (1) Demographic information; (2) DPQ; (3) DHQ.

DPQ consisted of 17 close ended questions. Six questions regarding the problems faced by left-handers formed a scale to the sum of responses, each measured on a 3-point scale (yes=0, sometimes=1, no=2). Likewise, two questions regarding perceptions towards practicing dentistry being a left-hander (yes/not sure=0, no=2) and six questions on perceptions towards musculoskeletal complications (agree/uncertain=0, disagree=2). Three questions on future perceptions were also scored in a similar way (yes/not sure=0, no=2).

DHQ constituted two sections enlisting 13 dental activities. The first section on "hand preference" assessed the dominant hand in performing those dental procedures. The sum of the responses was measured on a 5-point Likert type-scale (Always Left=1, Usually Left=2, Both Equally=3, Usually Right=4 and Always Right=5). For the second section, the respondents were asked to score their difficulty from 1-10 (1-4: "I do not have any difficulties"; 5-7: "I have little difficulties"; and 8-10: "I have a lot of difficulty"). At the end, there was a provision for the participants to write their opinions and further suggestions about the survey. The data was manually entered in electronic format as a Microsoft Excel 2007 file. The DPQ scores were clubbed into three categories for the ease of analysis. Similarly, the DHQ scores were also clubbed into three levels as: Level I, Level II and Level III. Data analysis was undertaken using SPSS (Statistical Package for the Social Sciences Version 15.0, SPSS Inc., Chicago, Illinois, USA). Frequency distribution, mean and standard deviation were used to summarise the demographic data. Pearson's correlation was applied for assessing participants' response to the dental practice perspectives and dental handedness scale at $p < 0.05$.

RESULTS

In the academic year of 2014, about 2.44% (91 out of 3726) were found to be LH clinical dental students [Table/Fig-1]. Among the 91 students, 84 were available on the day of the study and agreed to participate, giving an overall response rate of 100%. Among these, 14 (16.7%) were accounted in third year, 15 (17.9%) in final year, 17 (20.2%) were interns and 38 (45.2%) were postgraduate students. There were 45 female (53.6%) and 39 male (46.4%) left-handers [Table/Fig-2]. Their age ranged from 19 to 29 years



[Table/Fig-1]: Pictogram depicting the percentage of left-handers among the clinical dental students.

Characteristics	N (%)
Age (in years)	
19-22	23 (27.4%)
23-26	48 (57.1%)
27-29	13 (15.5%)
Gender	
Male	39 (46.4%)
Female	45 (53.6%)
Clinical Dental Students	
Third year undergraduates	14 (16.7%)
Final year undergraduates	15 (17.9%)
Interns	17 (20.2%)
Postgraduates	38 (45.2%)
Total	84 (100%)

[Table/Fig-2]: Demographic characteristics of study participants.

PROBLEMS FACED		Yes	Sometimes	No
I.	Do you have a problem with the right-handed instructors or supervisors?	07 (08.3%)	46 (54.8%)	31 (36.9%)
II.	Do you have a problem in being left-handed to do the required dental work?	25 (29.8%)	28 (33.3%)	31 (36.9%)
III.	Have you ever felt discriminated for being left-handed during your dental course?	11 (13.1%)	64 (76.2%)	09 (10.7%)
IV. Do any of your patients complain in the following situations:				
a.	If you are working with a left-sided chair?	0 (0)	03 (03.6%)	81 (96.4%)
b.	If you are working with a left hand?	04 (04.8%)	03 (03.6%)	77 (91.6%)
c.	If you are working on the left side?	04 (04.8%)	04 (04.8%)	76 (90.4%)
DENTAL PRACTICE PERCEPTIONS				
		Yes	Not Sure	No
I.	Do you think the quality of care is depressed by working on a right-sided chair?	39 (46.4%)	14 (16.7%)	31 (36.9%)
II.	Do you believe that your performance would be better if you were right-handed?	09 (10.8%)	15 (17.8%)	60 (71.4%)
		Agree	Uncertain	Disagree
III.	Do you believe that a left-handed dentist is at a higher risk of developing musculoskeletal complications related to:			
a.	Hands	35 (41.6%)	24 (28.6%)	25 (29.8%)
b.	Shoulder	54 (64.3%)	16 (19.0%)	14 (16.7%)
c.	Neck	52 (61.9%)	18 (21.4%)	14 (16.7%)
d.	Back	44 (52.4%)	21 (25.0%)	19 (22.6%)
e.	Legs	45 (53.6%)	21 (25.0%)	18 (21.4%)
f.	Feet	47 (56.0%)	17 (20.2%)	20 (23.8%)
FUTURE PERCEPTIONS				
		Yes	Not Sure	No
I.	Would you prefer to introduce yourself as a left-handed dentist in your Curriculum Vitae?	58 (69.1%)	10 (11.9%)	16 (19.0%)
II.	In future, will you correct the habit of your children if they show the habit of using their left hand?	06 (07.1%)	05 (06.0%)	73 (86.9%)
III.	Do you think being a left-handed dentist will affect your dental assistant's ability or convenience to work?	13 (15.4%)	24 (28.6%)	47 (56.0%)

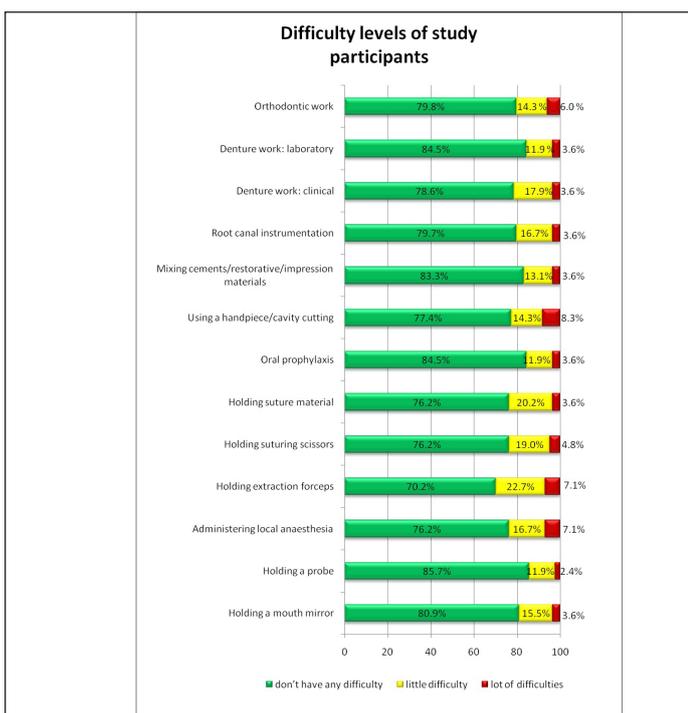
[Table/Fig-3]: Dental perspectives and participants' responses (DPQ).

Quadrant 1	Quadrant 2
29.8%	41.7%
Quadrant 4	Quadrant 3
11.9%	16.6%

[Table/Fig-4]: Percentage of left-handed participants' responses regarding most difficult quadrant of the dental arch to work.

Dental Procedures		Left Hand (Always & Usually)	Both Hands	Right Hand (Always & Usually)
a)	Holding a mouth mirror	35 (41.7%)	15 (17.8%)	34 (40.5%)
b)	Holding a probe	54 (64.3%)	09 (10.7%)	21 (25.0%)
c)	Administering local anaesthesia	57 (67.9%)	09 (10.7%)	18 (21.4%)
d)	Holding extraction forceps	58 (69.1%)	07 (8.3%)	19 (22.6%)
e)	Holding suturing scissors	64 (76.2%)	04 (4.8%)	16 (19.0%)
f)	Holding suture material	57 (67.9%)	08 (9.5%)	19 (22.6%)
g)	Oral prophylaxis	58 (69.1%)	09 (10.7%)	17 (20.2%)
h)	Using a handpiece/during cavity cutting	59 (70.2%)	05 (6.0%)	20 (23.8%)
i)	Mixing cements/restorative/impression materials	63 (75.0%)	08 (9.5%)	13 (15.5%)
j)	Root canal instrumentation	63 (75.0%)	08 (9.5%)	13 (15.5%)
k)	Denture work: clinical	52 (61.9%)	15 (17.9%)	17 (20.2%)
l)	Denture work: laboratory	56 (66.7%)	17 (20.2%)	11 (13.1%)
m)	Orthodontic work	57 (67.9%)	13(15.5%)	14 (16.6%)

[Table/Fig-5]: Hand preference of the study participants.



[Table/Fig-6]: Difficulty levels of study participants regarding various dental procedures.

with a mean of 23.93±2.3 years. A relatively greater number of left-handers emerged among the postgraduates (45.2%). There were at least two left-handers in each college (minimum two and maximum ten).

Dental Practice Perspectives: Being a left-hander, around 37% did not have problem in carrying out the dental work and also having a RH instructor; and only 10.7% of them did not feel discriminated during their course. More than one-third felt that quality of care is not depressed while working on a right-sided chair while more than two thirds believed their performance would not increase if they were right-handers. However, more than half of them believed that left-handed dentists using the right-handed dentist facilities

are at a higher risk of developing musculoskeletal complications. Around 7 in 10 study participants preferred to introduce themselves as a LH dentist in their Curriculum Vitae (CV) in future. Around 87% were not inclined to correct their childrens' habit of using left hand and more than half believed that their handedness would not affect their assistant's ability [Table/Fig-3]. A total of 35 (41.7%) reported being educated for left-handed manipulation in their clinical sessions whereas only 15 (17.9%) during theory hours. Thirty (35.5%) respondents felt their institution was not properly equipped, 23 (27.4%) of them remained uncertain about it. Majority of them preferred to work on the left side (65.5%) and left-sided dental chair (64.3%), if provided. While using handpiece, almost half of them (48.8%) preferred their left foot, 28 of them preferred their right foot and 15 of them used both feet to manage foot-controller. Around 71% were likely to buy a left dental unit in their future practice. Additionally, second quadrant emerged out to be the most difficult working quadrant [Table/Fig-4]. Mean DPQ scores regarding problems faced, the score ranged from 4-12. The scale distribution was towards more positive with a mean of 9.82±2, which indicates that majority of them had a positive outlook. Dental practice perceptions score ranged from 0-16 with a mean of 6.10±4.4, indicating their positive perceptions. Future perception scores ranged from 0-6 with a mean score of 4.24±1.6, suggesting a positive future stance.

Dental Handedness Scale

Hand preference of the study participants: Except for mouth mirror, around two-third of the study participants were using their left hand. However, mouth mirror handling showed similar distribution: left (41.7%) and right (40.5%) [Table/Fig-5]. Overall, their score ranged from 13-39 with a mean of 20.04±7.05, indicating left hand dominance in performing the dental activities.

Difficulty levels of the study participants: Around three-fourth of the study participants "did not have any difficulty" (Level I) in performing the thirteen-item list of dental activities [Table/Fig-6]. The difficulty scores ranged from 13-39 with a mean of 16.27±4.95. There was a significant negative correlation between dental practice perception scores and difficulty levels ($r=-0.333$, $p<0.001$).

Participants also revealed that they were mostly enlightened on LH manipulation during their clinical training in periodontics, oral surgery and conservative dentistry. Some participants suggested the need for at least one left-sided chair in each department.

DISCUSSION

In order to mirror the emphasis on a LH clinical dental student, the views of the participants from the pilot study were considered to devise the study tool under similar headings. A left-hander might face some problems and have his/her perspective while studying in a dental school. This might have consequences on the hand preference to do the required dental activities. Hand preference in DHQ was based on the philosophies of the previously validated Waterloo Handedness Questionnaire (WHQ) [18]. The present study probed into LH clinical dental students' perceptions about the various aspects related to handedness in dentistry.

A consensus has not yet been reached in the prevalence of left-handedness but the most common estimates are 10% [9]. In the current study, left-handers constituted 2.44% of the total clinical dental students in Bangalore city. This figure is comparatively lesser than reported in previous studies among the dental students [2,10-12], but in line with the general population (2-30%) [9], this differentiation might be due to different assessment criteria [9].

In the present study, more than one-third clinical dental students were not having any problem with their RH instructors and performing the dental activities. However, contrary findings were reported by Al Johany [12], where slightly lesser proportion (22.7%) reported some trouble with the RH instructors. Surprisingly, majority

of the study participants expressed their distress as only one-tenth of them did not feel discriminated during the dental course. It shows the existing stigmatisation prevalent in this profession regarding the so-called sinistrality.

Out of the 84, more than 90% of the participants did not complain working with their left-hand, on the left-side, with a left-sided chair. This is an important claim as the patients are the beneficiaries of any dental treatment and their percepts should be given higher importance. However, it is an indirect opinion and these data can be biased based on the study participants' viewpoints and feelings. More than two-thirds of them were pleased with their performance and felt it would not increase, had they been right-handers. These findings depict positive attitude in the present group of students, that has still persisted during the course of dentistry; when compared to previous studies by Silva et al., and Henderson et al., where most of them felt their performance would increase if they were RH [2,10].

In contrast to 33.6% of the dental students and interns in Saudi Arabia [12], more than half of the present study participants believed that a LH dentist using RH dentist facilities is at a higher risk of developing musculoskeletal complications related to shoulder, neck, feet, legs and back. This reflects their belief that handedness might pose a future threat on their health as an occupational hazard. The clinical students in the present study displayed a positive future outlook. This was expressed as approximately 87% of them were less likely to correct the hand dominance of their children, if they show any sign of being a left-hander. More than half of the study participants stated that it would not affect their dental assistant's ability and preferred to introduce themselves as a left-hander in their CV. These figures are relatively greater than those reported in a previous study by Al Johany [12]. Only some of the study participants felt that they had been educated with left-handed manipulation. This was similar to a study by Silva et al., where majority of the students reported not receiving guidance in the proper use of dental equipment [2]. Likewise, in another study only one out of the 15 orthodontic practitioners was educated for the same [9]. This reiterates the teachers and the dental institutions consider it empathetically such that the needs of this minority group are felt and met to some extent. Almost two-thirds of them preferred to use a left-sided dental chair unit, if provided. This proportion was lower than the study by Al-Johany [12] and higher as compared to that reported by Odabas et al., [9]. Another important observation was 37% of the participants who claimed their institution as properly equipped to accommodate them. However, this percentage was relatively less as compared to Al-Johany study [12]. There are no specific guidelines available for the type of chairs (left or right-sided) for the dental institutions in India [19]. The results of this survey also showed that most of the left-handers were apprehensive working in the second quadrant of the mouth. This was pointed out in a previous study where the pre-clinical students reported discomfort to position them to the right of the mainikin [2]. However, this finding corresponds to their handedness or in general; their working posture was not assessed in the present study. Regarding the hand preference, mirror handling showed no hand dominance. This is similar to the previous findings among orthodontic practitioners as reported by Odabas et al., [9]. However, for the other 12 dental activities, most of them (2/3rd) were using left hand. This is in accordance with Al-Johany [12] who reported that most of the participants were able to use left hand or both the hands in performing dental procedures which could be advantageous for them. An interesting finding which is worth mentioning is despite the left hand preference, three-fourths of them were not having difficulties. Significant negative correlation between dental practice perceptions and difficulty levels suggest an overall positive outlook in this study. This shows how a left-handed clinical dental student has naturalized in a right dominated dental profession.

The booming world of medical technology also focuses on the majority wherein the equipment is designed mainly for RH people. Researchers in the past have claimed that however, dextrous and practised, the left-handers emerge out to be a little more bilateral succumbing to the exigencies of surviving in a RH world [20]. Pegum had put forth an argument for all the surgeons to be ambidextrous, detailing the intricacies involved in the correct use of scissors for a left-hander [21]. Many studies have used Edinburg Inventory to assess handedness in their surveys but reported that the handedness scores correlated with self-reports of the participants [9]. Thus, in the present study, handedness was taken as answered by the participants. To the best of our knowledge, this is the first study to assess dental practice perspectives and handedness among LH clinical dental students in India. Additionally, the response rate for this study (100%) is considered to be high, increasing the extrapolation of the results.

RECOMMENDATIONS

To hone the skill sets, adaptability and deftness with procedures, one must have a skill to operate tools and instruments with both the hands [6]. Moreover, the manufacturers could construct right-sided dental units more portable in a manner that spittoon block and reflector light attachment would be mounted to the right side of the dental unit easily [9]. However, there is a need for a guideline from the regulatory agencies regarding left sided dental equipment in dental institutions for an improved quality of training and ergonomics.

LIMITATION

Limited sample size and social desirability bias in self-reported surveys prove to be a major limitation to the present study. Moreover, as the level of clinical exposure varied among the successive cohorts (least among the third years). Hence, future studies among LH dentists (general practitioners and specialists) using DHQ are recommended that might reflect the exact clinical scenario. It is also important to mention that because this study is cross-sectional, it does not allow for cause and effect associations. Neither a qualitative design was employed to grade or measure their difficulties in a real-time set up. Further research may be carried out on those lines.

CONCLUSION

The percentage of LH clinical dental students was 2.44%. The results suggest that being a left-hander, they had the right perspective. Majority of them were using their left-hand for dental activities and not having difficulties. The findings from this study provide an insight towards the felt needs of this minority group and warrants further investigation on some issues such as: Do teachers/patients perceive "handedness" important in the outcome of the treatment? Can working conditions of the LH students affect their occupational health?

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