Original Article

Experience of Dental Professionals in Determination of Gender by Observing Smile

Sourav Sen, Javeria Khan, Wajeeh Khan, Shravani Deolia, Rakashree Chakraborty Sen[1]

From the Departments of Public Health Dentistry and [1]Oral Medicine and Radiology, Sharad Pawar Dental College, Wardha, Maharashtra, India

Abstract

Introduction: Every individual in his or her entire life has a photograph of smile. This makes identification as well as dead bodies and remains possible with the help of forensic odontology and medicine.

Aims and Objective: The aim of this study was to use only smile from photograph for gender identification by various experienced dental specialist.

Materials and Methods: In this cross-sectional study, a digital camera (Sony Cyber-shot DSC W800) was used to capture smile photographs, where participants were at a distance of 0.5 m from the lens and they were made to sit in a relax position with the Frankfort plane parallel to the floor. Among 50 captured photographs, 10 photographs were randomly selected, among which 5 males and 5 females, for pictorial questionnaire. Using Adobe Photoshop version 7.0, only teeth were made visible and other soft tissues were cropped so as not to make it a bias study.

Results: All 5 dental colleges of Vidarbha region were included, in which 213 staff members participated in the study. Gender-wise distribution depicted 39.9% male and 60.10% female participants with no significance ($P = 0.223$). According to department-wise also was without any significance ($P = 0.823$). Now, according to designation wise, it was found that experience plays a vital role. Professor being the most experienced staff when compared with tutors ($P = 0.03$) and postgraduates ($P = 0.015$). Professors were most accurate in their opinions comparatively.

Conclusion: This study concluded that identification of gender through only smile from photographs can be done with ease by professors due to their years of experience.

Key Words: *Forensic odontology, gender determination, professional experience, smile*

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Introduction

Smile is a facial expression formed primarily by flexing of muscles at the sides of face. The facial expression denotes pleasure, sociability, happiness, amusement, or anxiety.[1] It is a person's ability to express a range of emotions starting from the movement of lips to the display of teeth. Smile, which seems to be a simple act, is a result of blend of all its components. Various components of smile are lip line, smile arc, upper lip curvature, lateral negative space, smile symmetry, frontal occlusal plane, and other dental components such as color, size, and shape of teeth govern the attractiveness of smile.[2]

Every person has a unique smile. Dental records such as radiographs, dental casts, antemortem, and postmortem photographs are rarely preserved; however, in the present century, almost everyone in his/her entire life has a photograph of smile. Such a photograph can be very helpful in forensic odontology for the identification of dead bodies and their remains. In case of natural calamities such as earthquake, floods, cyclones, and human-made mass destructions such as large scale fire, roadside accidents, and air crash, personal identification becomes difficult due to charred, decomposing, mutilated, and skeletonized individuals.[3] In such catastrophic conditions, identification with the help of smile photograph and sometimes with the help of gender identification makes the procedure a bit easy and time-consuming.

While smiling, the anterior teeth are generally exposed; and there is a difference between a male and a female smile, which sometimes becomes very difficult to recognize even for the professional eye. It is noticed that women teeth are more rounded and smaller compared to men who have more angular and larger teeth. Comparing the canines, the male canine seems to be sharper than female, except in some ethnicities.[4]

Dental enamel, being highly calcified even more than bone, is the hardest tissue of the body which is considered as the best postmortem material for identification. It has been revealed by various studies previously that even after decomposition of bone and other soft tissues, enamel remains intact and so

Address for correspondence:
Dr. Sourav Sen, E-mail: drsouravsen@gmail.com

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would dental materials adjacent to teeth. Therefore, in our study, we are mainly concerned about teeth excluding soft tissues.[5]

Sir Julius Caesar once said "Experience is the teacher of all things." Identification of dead bodies is an art which comes with years of experience. In the identification of such cases, experience is of utmost importance. Experience comes with years of working on it. No such study has been conducted till date where experience of dental professionals has been stressed. Thus, the aim of our study was identification of gender by observing smile, mainly hard tissue, by various dental professionals according to their designation and work experience. This study was purely for educational purpose.

Materials and Methods

This was a cross-sectional study approved by the Institutional Ethical Committee. Photographs of smile were captured using a digital camera (Sony Cyber-shot DSC W800). The participants were made to sit in relaxed position on a dental chair with the Frankfort plane parallel to floor and at a distance of 0.5 m from the lens with the dental reflector turned off. Photographs of smile were captured in frontal norm while the participant exhibited a normal or social smile. In total, 50 smile photographs were taken out of which 25 photographs were of males and females each. Randomly 10 photographs were selected which included 5 males and 5 females.

The inclusion criteria were as follows:

- No apparent facial disharmony
- Class I molar and canine relationship
- Lips should be competent with no lip crustations or other marks
- No history of orthodontic or prosthodontic treatment
- Ten participants consisting of five males and five females.

The photographs of smile were edited using Adobe Photoshop software Version 7.0 (Trialware, SaaS), where the lips and other soft tissues were cropped and only teeth were on display [Figure 1]. A pictorial questionnaire was made which included all 10 smiles randomly arranged. Staff members and postgraduate students of all 5 dental colleges of Vidarbha region were made to identify the smiles in the questionnaire.

Results

Data collection was done in all 5 dental colleges of Vidarbha region, in which 213 staff members were involved. Professors, readers, lecturers, tutors, and postgraduate students participated. Each participant was given a pictorial questionnaire which had 10 randomly arranged smile photographs; 5 being male and 5 female smiles. Out of 2130 smile photographs, 1103 were correct, including 557 males and 546 females. 1027 photographs were incorrect, including 508 males and 519 females.

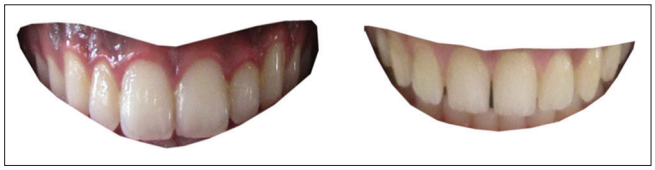

Figure 1: Example of pictorial questionnaire

Table 1 depicts, 39.9% were male participants and 60.10% were female participants with no statistical significant difference (P = 0.223). There was no significant difference between the mean (P = 0.823) and median rank (P = 0.230) for department-wise distribution.

Tables 2a and b depicts that maximum participation was from department of conservative dentistry (19.71%) followed by oral medicine and radiology (14.55%), prosthodontics (12.67%), pedodontics (11.73%), oral surgery (10.32%), periodontics (9.3%), oral pathology and orthodontics (8.45%), and public health dentistry (4.69%). There was no significant difference in mean (P = 0.823) and median rank (P = 0.230).

As depicted in Tables 3a and b, major participation was from postgraduate students (43.19%) followed by lecturer (25.35%), reader (14.55%), professor (11.73%), and tutor (5.16%). It was observed that designation has a significant role (P = 0.03) in gender identification based on smile.

Also in Table 3c, a significant difference was found when professor and tutor were compared (P = 0.03). Professor

Table 1: Gender-wise distribution

Gender	*n* (%)	Mean rank	*P*
Male	85 (39.9)	113.19	0.223
Female	128 (60.1)	102.89	
Total	213 (100)		

Table 2a: Department-wise distribution (Mean rank)

Department	*n* (%)	Mean rank	*P*
Oral medicine and radiology	31 (14.55)	108.47	0.823
Oral surgery	22 (10.32)	88.41	
Periodontics	20 (9.3)	121.48	
Oral pathology	18 (8.45)	100.36	
Conservative dentistry	42 (19.71)	112.93	
Orthodontics	18 (8.45)	110.03	
Prosthodontics	27 (12.67)	110.56	
Pedodontics	25 (11.73)	102.12	
Public health dentistry	10 (4.69)	98.60	
Total	213		

Table 2b: Department-wise distribution (Median)

Department	Median	>median	≤median	*P*
Oral medicine and radiology	5	10	21	0.230
Oral surgery	5	5	17	
Periodontics	6	11	9	
Oral pathology	5	6	12	
Conservative dentistry	6	22	20	
Orthodontics	5.5	9	9	
Prosthodontics	6	14	13	
Pedodontics	5	10	15	
Public health dentistry	5	3	7	

and postgraduates when compared, a statistically significant value ($P = 0.015$) was obtained.

Discussion

In this study, photographs of 50 participants were involved. Photographs were captured using by digital camera (Sony Cyber-shot DSC W800). Out of 50 photographs, randomly 5 male and 5 female photos were selected and edited using Adobe Photoshop software Version 7.0. To avoid bias and reduce the effects of confounders, lips were cropped. It would have been easy for a professional to identify the gender if soft tissues were present in the photographs. These photographs were then arranged randomly to prepare a pictorial questionnaire.

The result of the present study implied that out of 213 participants, 85 (39.9%) were males and 128 (60.10%) were females. This might be due to that there are more female staff members than male staff in the dental colleges of Vidarbha region. However, this result does not play any significant role in this study ($P = 0.223$).

In each questionnaire, 10 smile photographs were involved. Hence, in 213 questionnaires, 2130 smile photographs were there. Out of which 1103 (51.7%) were correctly identified by participants, among which 557 (50.4%) males and 546 (49.6%) females. While 1027 (48.3%) photographs were identified wrong, among which 508 (49.4%) were males and 519 (50.6%) females. This clearly suggested that males are slightly more precise in gender identification than females. However, this result was not statistically significant ($P = 0.223$). Similar results were obtained by Kaplan.[6]

Comparison between the departments for the sensitivity and accuracy regarding gender identification only with the help of the smile photograph was assessed in this study. This study would help in forensic sciences for personal identification in case of charred, destroyed, and mutilated bodies or their remains and mass destruction. However, there was no significant difference among all nine specialty departments of dentistry ($P = 0.823$). This might be suggested that all the departments had equal contribution to forensic odontology rather than any single department. This may be because, in India, forensic dentistry is not a separate specialized subject by Dental Council of India; hence, it is the responsibility on all the branches of dentistry to help it flourish. Prosthodontists are experts in restoration and replacement of teeth. They are concerned about smile designing of dentulous and edentulous patients and make their smile look beautiful and function the way they should. Orthodontics plays a major role in dental esthetics and is concerned mainly in aligning the malaligned teeth, whereas endodontics is a branch where apart from conservation of tooth structure esthetic treatments such as diastema correction, veneers, and bleaching of teeth are done for improving esthetics and rendering a beautiful smile to the patient. Oral surgeons, on the other hand, along with general dentists help in reconstruction of a healthy and vibrant smile. The department of oral pathology and oral medicine and radiology helps in diagnosis of the diseases and its treatment planning, thus indirectly helps in maintaining esthetics. "Pink esthetics" in periodontics is a current topic of interest where depigmentation is done to improve esthetics. Community dentistry is the department that makes people aware of need of dental hygiene and a healthy smile. In an analogous study done by Suzuki *et al*.,[7] comparison was made between department of orthodontics, department of oral and maxillofacial surgery, and laypersons for the perceptions of gingival display esthetics. Later through this study, it was found that perceptions from orthodontists and oral and maxillofacial surgeons were

Table 3a: Designation-wise distribution (Mean rank)

Designation	*n* (%)	Mean rank	*P*
Professor	25 (11.73)	131.22	0.030*
Reader	31 (14.55)	122.06	
Lecturer	54 (25.35)	109.75	
Tutor	11 (5.16)	80.68	
Postgraduate	92 (43.19)	96.88	
Total	213		

*Significant at the 0.05 level

Table 3b: Designation-wise distribution (Median)

Designation	Median	>median	≤median	*P*
Professor	6	16	9	0.015*
Reader	6	17	14	
Lecturer	5	24	30	
Tutor	5	2	9	
Postgraduate	5	31	61	

*Significant at the 0.05 level

Table 3c: Designation-wise distribution (multiple comparisons)

Designation (I)	Designation (J)	Mean difference (I-J)	SE	Significance
Professor	Reader	0.25161	0.42533	0.555
	Lecturer	0.55926	0.38276	0.145
	Tutor	1.25455	0.57249	0.030*
	Postgraduate	0.87609	0.35687	0.015*
Reader	Lecturer	0.30765	0.35654	0.389
	Tutor	1.00293	0.55530	0.072
	Postgraduate	0.62447	0.32859	0.059
Lecturer	Tutor	0.69529	0.52341	0.186
	Postgraduate	0.31683	0.27125	0.244
Tutor	Postgraduate	−0.37846	0.50479	0.454

*The mean difference is significant at the 0.05 level. SE: Standard error

almost similar while that perception of laypersons from these two departments differed. Thus, suggesting that as such departments do not play any specific role in this study.[7]

Another aspect of this study was to focus on the role of experience in determining gender with the help of a smile in a photograph. Thus, all the professors, readers, lecturers, tutors, and postgraduate students of different departments from all five dental colleges of Vidarbha region were asked to give their opinions regarding gender identification. Postgraduate students were highest in number (43.19%), followed by lecturers (25.35%), readers (14.55%), professors (11.73%), and tutors (5.16%). When professors were compared with other staff members, it was found that they were more accurate in identification of genders than readers ($P = 0.555$), lecturers ($P = 0.145$), tutors ($P = 0.030$), or postgraduate students ($P = 0.015$). Similarly, readers were more precise than lecturers ($P = 0.389$), tutors ($P = 0.072$), or postgraduates ($P = 0.059$). Lecturers being more specific than tutors ($P = 0.186$) and postgraduates ($P = 0.244$); and tutors more specific than postgraduates ($P = 0.454$). Such a difference in the P value is because of the differences in the experiences among each staff members. Professors were more experienced than other staff members and thus were more precise and specific in gender identification. On the other hand, postgraduate students who lack years of experience and skills and are still under academics were least accurate. Similarly, readers were more experienced than lecturers, tutors, and postgraduates and thus their results. In a similar study by Abu Alhaija *et al*.[8] to rate the attractiveness of different smile variables, and to compare the perception of Jordanian laypeople, general practitioners, and orthodontists to altered smile esthetics, it was found that orthodontists considered an attractive smile more important than general practitioners and laypeople, with a significant statistical difference between laypersons and general practitioners. Thus, showing that professionals are more critical, accurate, and reliable in determining an attractive smile and suggesting experience plays a vital role for this.[8] Similar studies were done by Rosa *et al*.[9] who obtained significant differences in smile perceptions of dentists and orthodontists (professionals), orthodontic patients, and laypersons.[9] Clearly suggesting that experience plays a major role in personnel and gender identification by observing only smile.

This was in disagreement with the study conducted by Silva *et al*.[3] Comparison was done between dental undergraduates and Forensic Odontology postgraduates through smile photographs for human identification, where output obtained from postgraduates and undergraduates was approximate to each other thus suggesting that experience does not play any significant role in this study.[3]

Limitations

The drawback of our study was that the gender identification through smile from a photograph can be done more accurately only if the participant's recent photograph is available because identification varies with the status of teeth which changes with age.

Furthermore, as smile along with age changes, teeth gets attrited or abraded which lead to the changes in the smile of the participant and lead to the misjudgment. With the change in ages, participant might also have missing teeth leading to altered smile of the participant. Limitations of this study also include pathological drifting of the teeth which might affect the accuracy of the specialist.

Conclusion

This was strictly an educational based study. In this study, professors, readers, lecturers, tutors, and postgraduates of all nine disciplines of dentistry were included in the study. To conclude:

- Gender did not play any significant role in personnel identification though males were slightly more accurate than females. But this did not have any importance in this study
- According to department-wise distribution, no noteworthy results were found. It was concluded that all the departments were equally in charge of forensic odontology
- It was also found that experience had a major influence on the results. The result obtained in the study was more accurately given by the professors who were one of the participants in the study. The reason being due to the understanding as compared to other staffs participated in this research.

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Conflicts of interest

There are no conflicts of interest.

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