

## ORIGINAL ARTICLE

# Estimation of Age and Sex using anterior Teeth Photographs

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### ABSTRACT

The aim of the current study was to determine the prediction accuracy of dentists, assistants and technicians for age and sex of patient's using anterior teeth photographs (color, form and alignment). In this study, there were 45 dentists, assistants and laboratory technicians (15 in each group) participated. Then photographs were taken from anterior teeth of 20 patients with different age and sex groups (20-26, 27-33, 34-40 and >41 years old) and offered to the dentists, assistants and lab technicians to identify their prediction accuracy for age and sex of patient's using anterior teeth color, form and alignment using an answer sheet. According to the results of Chi square test there was no significant difference in the accuracy of overall detection among dentists, assistants and lab technicians ( $P=0.804$ ). There was significant difference in detection of gender using anterior teeth photographs which dentists had 60% and 48% accurate report on male and female patients whereas Lab technicians had 51% correct report for male and 48% for female. The assistants had 55% and 47% of correct report for male and females, respectively ( $p=0.042$ ). The assistants had much more correct report on patients aged 34-41 and then 27-33 years old, respectively. The lab technicians had better investigation for patients with age ranging from 20-26 and 34-40 but had the lowest correct report for 27-33 and >41 years old patients ( $P=0.008$ ). The results suggest there was difference between dentists, assistants and technicians, so further researches are needed to improve their prediction accuracy.

**Keywords:** Estimation, Age, Sex, Anterior teeth

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## INTRODUCTION

Esthetics is the primary consideration for patients seeking prosthetic treatment. The size and form of the maxillary anterior teeth are important not only to dental esthetics but also to facial appearance [1]. The goal is to restore the maxillary anterior teeth in harmony with the facial appearance. However, there is little scientific data in the dental literature to use as a guide for defining the proper size and shape of anterior teeth or determining normal relationships for them [2].

Dental appearance is an important feature in determining the attractiveness of a face, and thus plays a key role in human social interactions. Among the significant factors affecting overall dental appearance are tooth color, shape, and position; quality of restoration; and the general arrangement of the dentition, especially of the anterior teeth [3]. Furthermore, an aesthetically pleasing smile was found to depend on tooth color, size, shape, and position, upper lip position, visibility of teeth and amount of gingival display. Although each factor may be considered individually, all components must act together to create a harmonic and symmetric entity that produces the final aesthetic effect [4].

During the last decades, numerous dental maturity studies have been reported and many are used to estimate maturity and age [5]. Some early studies report correlation between dental and chronological

age, but this gives little information of the magnitude or direction of difference between dental age and real age [6].

Previously, researchers revealed major goal was to give the denture patient a personalized denture, which led to the development of the sex, personality, and age factor [7]. For instance, it is reported roundness, smoothness, and softness, as feminine, should be reflected in dentures for women, just as the masculine vigor and boldness should be reflected in dentures for men [7].

The age factor was accomplished by using lighter shades for younger patients and darker shades for older patients, incorporating wear in the artificial dentition, and using more diastemas for older patients to simulate that which often occurs in the natural dentition [7]. To the best of our knowledge, scarce information exists about the role of dentists, assistants and technicians in detecting age and sex of patients using anterior teeth photographs reflecting these characteristics in the restorations. So, the aim of the current study was to determine accuracy of dentists, assistants and technician's prediction for age and sex of patients using anterior teeth photographs (color, form and alignment) and the degree to which the dentogenic factors mentioned in previous studies are in harmony with the teeth appearance in reality.

### MATERIAL AND METHODS

In this study, 45 dentists, assistants and laboratory technicians were divided into 3 groups. Then 20 volunteer patients who were referred to the dental school of Shahed University of Medical Sciences were allocated into 4 groups passed on their age and sex: 20-26, 27-33, 34-40 and >41 years old and both sexes. Then photographs were taken from anterior teeth of each patient. The patients had normal teeth or scarce dental caries or restoration (picture 1). Then, photographs plus a questionnaire form were provided to the dentists, assistants and technicians to identify their prediction accuracy for age and sex of patients using anterior teeth color, form and alignment. Each subject was educated about the benefits of the study and all personal information was kept as secret. All protocols for experiments were approved by the institution of Ethical Committee. Then the data was analyzed using one way of analysis of variance (ANOVA) using SPSS statistical software. To compare significant difference among the groups, mean was analyzed using Chi-Square test.  $P < 0.05$  was considered as significant differences between the groups.



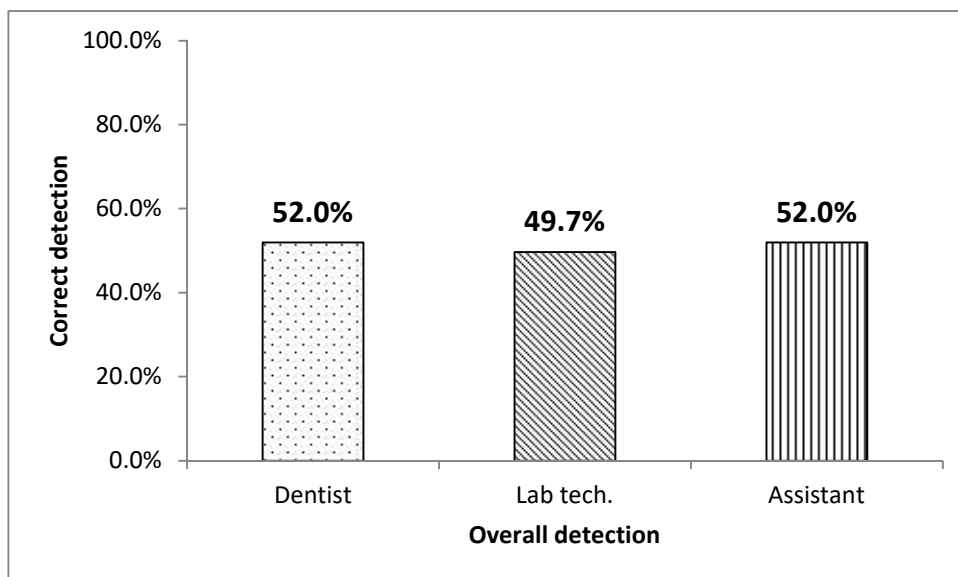
Picture1- Samples of Anterior teeth photographs

### RESULTS

The results of accuracy of estimation of age and sex using anterior teeth photographs (color, form and alignment) among dentists, assistants and lab technicians is presented in figures 1-4. The answer key of the questionnaire paper offered to the dentists, assistants and lab technicians is presented in table 1. As seen in figure 1, there was no significant difference in the accuracy of overall detection among dentists, assistants and lab technicians ( $P=0.804$ ). As seen 52% of dentists and assistants' detection was correct while it was 49.7% in the group of lab technicians.

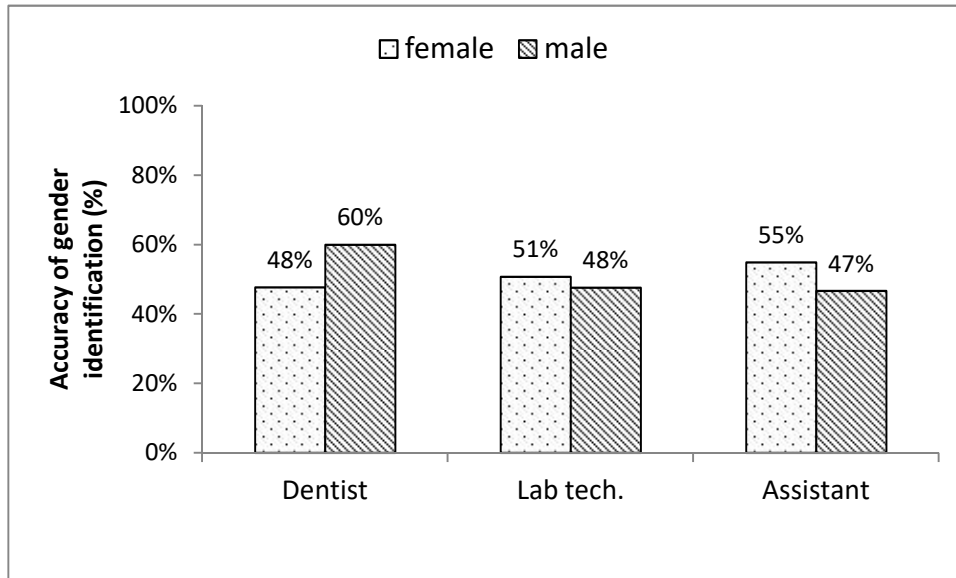
**Table 1.** The key answer sheet of the questioner paper offered to the dentists, assistants and lab technicians.

	Gender		Groups based on the age (Years)					
	Male	Female	20-26	27-33	34-40	41-47	48-54	55-61
1V	*				*			
2N	*			*				
3Y	*							*
4L	*			*				
5S		*			*			
6H		*	*					
7R		*		*				
8F		*		*				
9F		*			*			
10S		*	*					
11M		*	*					
12G	*						*	
13T		*		*				
14T		*	*					
15S		*	*					
16S		*		*				
17F	*						*	
18A		*	*					
19F	*						*	
20A		*			*			



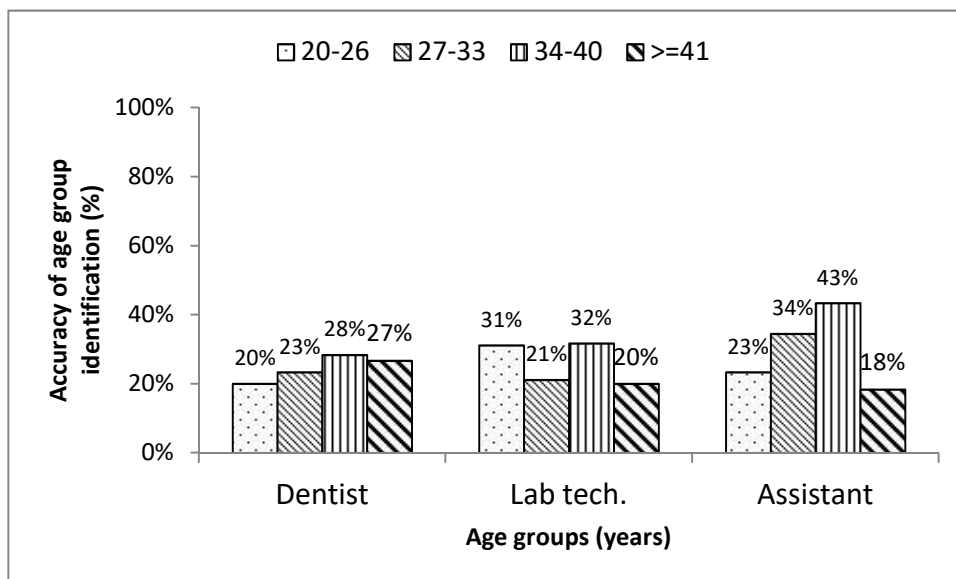
**Figure 1.** The accuracy of overall detection using patient anterior teeth photographs among dentist, assistant and lab technicians.

As seen in figure 2, there was significant difference in detection of gender using anterior teeth photographs between the 3 groups. The dentists had 60% and 48 % accurate report on male and female patients, respectively. Additionally, lab technicians had 51% correct report for male while 48% for female. Furthermore, the assistants had 55% and 47 % of correct report for male and female using anterior teeth photographs, respectively (p=0.042).



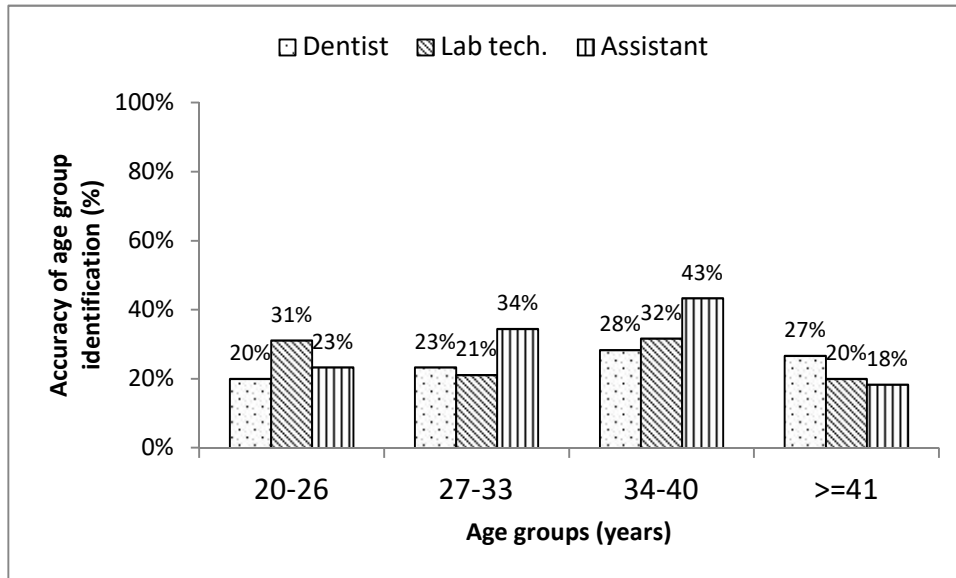
**Figure 2.** The accuracy of gender detection (male of Female) using patient anterior teeth photographs among dentist, assistant and lab technicians.

The accuracy of different age groups detection among dentists, assistants and lab technicians using patient anterior teeth photographs is shown in figure 3. According to the data significant difference was detected between 3 groups, dentists had uniform report on identification of patients' age. Additionally, the assistants had much more correct report on patients aged 34-41 and then 27-33 years old, respectively. Furthermore, the lab technicians had better investigation for patients with age ranging from 20-26 and 34-40 but had the lowest correct report for 27-33 and >41 years old patients (P=0.008).



**Figure 3.** The accuracy of different age groups detection among dentist, assistant and lab technicians using patient anterior teeth photographs.

The accuracy of detection of different ages within each group using patient anterior teeth photographs is provided in figure 4. According to the data there was a significant difference between 3 groups of participants in detecting age of the patients based on the patient anterior teeth photographs. According to the data, assistants had much more correct determination for ages ranging from 27-33 and 34-40 years old compared to the dentists or lab technicians. Also, lab technicians had better report for age 20-26 years old and the dentists had better reports on age >41 years old patients (P=0.008).



**Figure 4.** The accuracy of detection of different ages with dentist, assistant and lab technicians using patient anterior teeth photographs.

## DISCUSSION

To the best of our knowledge, scarce information exists about the relationship between anterior teeth appearance and detection of age and sex of patient's using anterior teeth photographs. As observed in the current study, there was difference between dentists, assistants and technicians. Dentist, dental laboratory technician and dental assistants were able to prove an advantage in determining age and sex.

Amongst the various methods used for age determination in individuals, the radiological method has certain advantages over histological and biochemical methods [8]. On the contrary, the radiographic method is a simple, quick, economic, non-mutilating and non-invasive method of age identification. Additionally, it can be applied for identifying the age in living persons [9].

The difficulty in estimating age and sex in dental patients is that they do not always fall into set patterns. Teeth do tend to darken with age but, this is not always true. Older dentitions sometimes show minimal wear and some younger dentitions can show moderate to excessive wear. The position of the maxillary lateral incisors does not always show male and female characteristics. Perhaps the best method to select denture teeth for a complete denture patient is to place more consideration on previous dentures and photographs and less on the age and sex of the patient [7].

The age distribution, structure, and sample size of both the reference and target samples are all important attributes. However, scarce researches were done on this field and little researches were done on the role of age estimating in children as well. Burchett and Christensen [7] reported dentists determined the age and sex correct 36% and 55%, respectively. However, dental laboratory technicians determined the age correctly 36% and sex 53%. Furthermore the dental auxiliaries determined the age and sex accuracy 35% and 51%. The total responses for all groups were 36% correct for the age group and 53% correct on the sex of each individual. Age estimation by radiographic evaluation of dentine is an established non-invasive technique for adults [11]. However, the accuracy of these dental methods should be verified in different populations [10].

Very few attempts have been made to find common standardization, calibration and evaluation procedures for methods of age estimation or to develop means of quality assurance for them. As observed, based on the previous and results of current study, there was difference between dentists, assistants and technicians, so further researches are needed to improve their prediction accuracy. We hope findings of the current study can be useful as a base information for further researches to determine direct method for creating accurate correlation between age and gender of the patients and their anterior teeth appearance.

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