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Evaluation of perception of shade matching by dentists of different specialities and comparison of perception of shade between picture and in-real

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Abstract:

The aim of this study was to evaluate the hue matching ability of dentists of different specialties and non-dentists and was to evaluate the difference of perception of the same shade in picture. There was significant difference found in part 1 of study {p=0.002} but no significant difference was found in second part of study {p =0.468}. Then, the difference of means between both part of study was analysed and it was found that there is no significant difference between the means (t-stat{0.00}) . This study shows that there is different judgement of shade between different speciality people due to one`s experience and clinical training which highlights the importance of education in this regard. On the other hand the shade in real doesn't significantly look different from that in picture taken with an average mobile phone which can be used as an indirect useful option to match shade or send to laboratory for shade matching.

Key words: *color perception, shade matching, shade guide.*

Introduction:

Aesthetically pleasing smile has always been a prime area of concern with a factor of fine function. Treatment outcome and patient satisfaction depends on aesthetic and functional factors. Aesthetics is dependent on matching the shade with accuracy with adjacent teeth and surrounding tissue .[1-4] Shade matching ability depends on knowledge of selection of shade which has basic criteria such as lighting condition and shade guide used and experience as well. There are studies which have evaluated the factors such as lightning conditions, different shade guides and color of tooth for shade matching [3, 5-24] but only few have evaluated the influence of one`s profession on shade selection[2,26] and even fewer have assessed the difference of shade of a tooth colour in pictures.

Training in a particular dental speciality modifies and moulds one`s thinking and personality according to the training which makes them better in that field as compared to the others. Generally, mostly the restorative dentists and prosthodontists along with or without dental technician do shade matching.Also there are some conflicting results regarding influence of experience on shade matching ability.[8, 19, 22,26]

With the new technology coming into dentistry this profession has become artistic and use of camera has flourished

this art. Different cameras have different results depending on resolution, which makes perception different among different people. Secondly, Often people complain of non-aesthetic smiles in pictures as they make magazine smiles as their idol.

There were two aims of this study. One was to evaluate the hue matching ability of dentists of different specialities and non-dentists and second was to evaluate the perception of hue of the same shade in picture.

Material and Methods:

Participants:

Ninty participants were included in the study and participants were informed about the research.

Forty one dental specialists (restorative specialists, prosthodontists, oral and maxillofacial surgeons, periodontists, orthodontists), twenty dental staff members (dental assistants, dental technicians), nine general dentists in private clinics, ten laypeople and ten dental students underwent tooth shade matching test.

The study participants were divided into 3 groups. Group 1(n= 30) consisted of participants who commonly do shade matching: restorative dentists, prosthodontists and dental technicians. Group 2 (n=30) consisted of participants who knew how to do shade matching but do not do it regularly: periodontists, oral and maxillofacial surgeons, orthodontists and general dentists. Group 3(n=30) consisted of participants who do not know the shade matching: laypeople, dental assistants, dental students.

Before start of study, All the Participants underwent Ishihara colour test to determine colour vision deficiencies.[25]

Questionnaire was given to each participant; the questionnaire was divided into 2 parts. One had choices of shade to be matched with the shade guide`s tooth strip. Second had choices of shades to be matched with the strip in picture. Participants in Group 1 and 2 knew how to use Vita shade guide classic while group 3 participants didn't. Thus, group 3 was control group. Also, none of the participants received any additional training in use of shade guide.

Inclusion Criteria :

Participants were included on the basis of convenient sampling. Moreover, the participants who were not color blind were included in the study.

Exclusion Criteria :

Colour blind participants were decided to be excluded from the study. But none of the participants proved to be colour blind.

Picture:

A tooth shade of D3 was selected from shade guide of Vitapan classical. Identity of the shade written on metal holder was blocked by green tape. Then the picture was captured with a DSLR camera by holding the strip in gray background in daylight. The picture was then fed into Q mobile A34.

Study Procedure:

Study was completed in 20 days in October 2015. Study was carried out in sunny days during 10 am to 2 pm. The study was conducted in a room where a window was present and direct day light was coming through it.

Each participant was given a strip of D3 shade from Vitapan classical shade guide to be matched with another Vitapan classical shade guide. Each participant was given 2 mins to match the shade. After the shade was selected, the participants were asked to mark the shade number in the list of options in questionnaire. Next, the participants were given the mobile in which picture of the same strip was fed which was taken with dslr camera. Then, the participants were asked to select the closest matching shade with Vitapan classical shade guide. When the shade was selected we asked participant to mark it in the next section of questionnaire. During procedure to prevent eye fatigue, participants were asked to stare at the blue colour situated close to them.

Statistical Analysis:

SPSS 16.0 software was used for analysis. X^2 test was applied to compare the qualitative data between groups and two sample independent t test was used to compare the means of in-picture and out of picture results. P value of <0.05 was considered to be significant.

Results:

There was significant difference found in part 1 of study (with strip in hand {p=0.002}) but no significant difference was found in second part of study (in picture {p =0.468}). In part 1 of study, out of 30 participants in group 1, accurate shade was judged by 19 (63.3%) participants as compared to 10 out of 30 (33%) participants in group 2 and 6 out of 30 (20%) participants in group 3 (figure-1). Whereas, in 2nd part of study ,out of 30 participants in group 1, accurate shade was judged by 7(23.3%) participants as compared to 6 participants out of 30 (20%) in group 2 and 10 out of 30 (33.3%) participants in group 3 (figure-2).

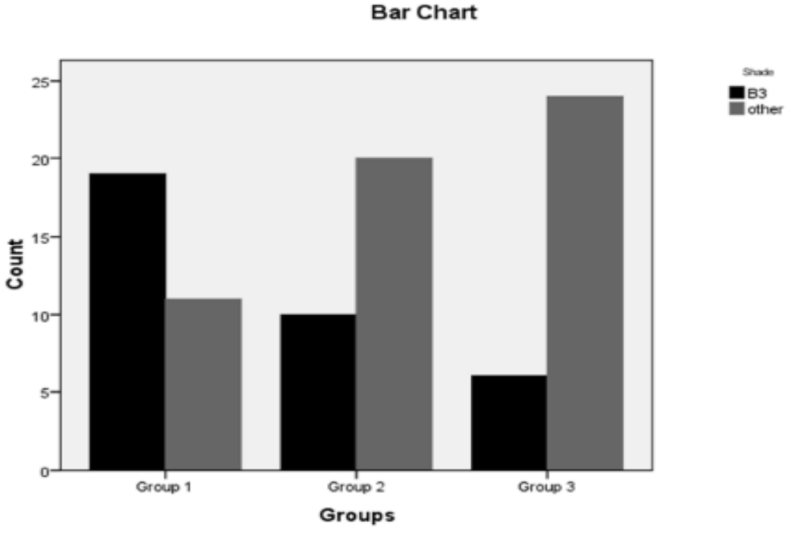

Figure 1- real strip in hand results

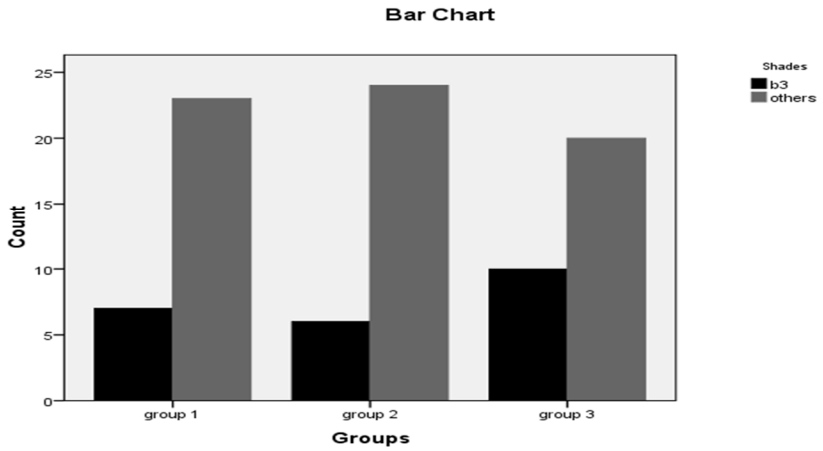

Figure 2- in-picture results

Then, the difference of means between both part of study was analysed and it was found that there is no significant difference between the means (t-stat{0.00} falls in acceptance region {between -2.364 and 2.364}). However, out of 90 participants, accurate shade was judged by 35 (38.8%) participants when they were asked to match the shade with the real strip in hand as compared to 23 participants out of 90 (25.5%) who were asked to match shade with the picture of strip(figure-3).

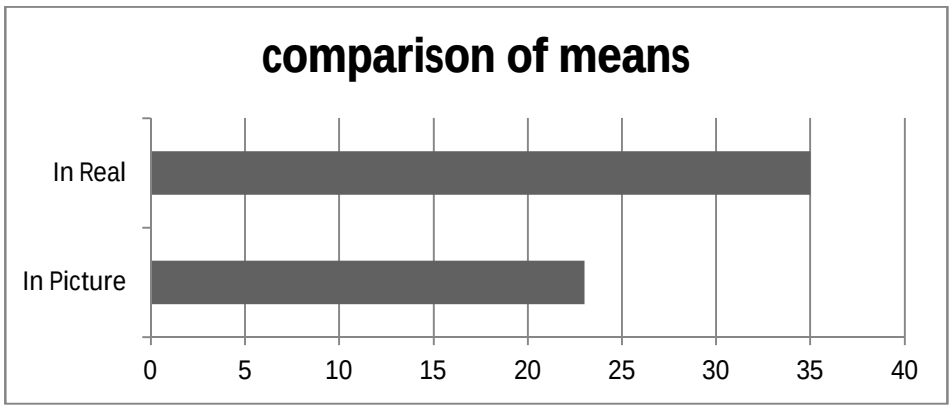

Figure 3- comparison of means

Discussion:

There were two objectives of the study. First was to assess the shade matching ability of the dentists of different specialities and second was to evaluate the difference of perception in pictures. Several studies have demonstrated that training and clinical experience are two key factors determining the accuracy of shade matching[15].

There was a statistical difference shown by this study in first part , which shows that highest success rate was achieved by restorative dentist. The difference was observed due to their training and common involvement in shade matching.On the other hand, to take things further ahead, maxillofacial surgeons scored low as compared to restorative dentists which also shows the experience and training matter the most.Another group which shows this is dental assistant(group 3) which obviously has the lower level of experience and training in selecting, scored the lowest.

These differences were in one view due to their different level of training, education and experience being major factor.Therefore it is very important to educate about shade selection. Shade selection through workshps, continuing dental education and curricula in order to enable dentist to make proper shade selection

The inconsistent results in 2nd part of study shows that the group 1 had highest success rate of perception of shade but on the contrary group 3 had higher success rate then group 2 which explains the difference of perception of shade in pictures. Although no statistically significant difference was found between two parts of study, the accuracy of judging shade was lower in pictures.

Shade:

Shade B3 was selected for this study. The major confusion which was faced by the participants, especially of group 2 and 3 was between A4 and B3 as these shades looked very similar.

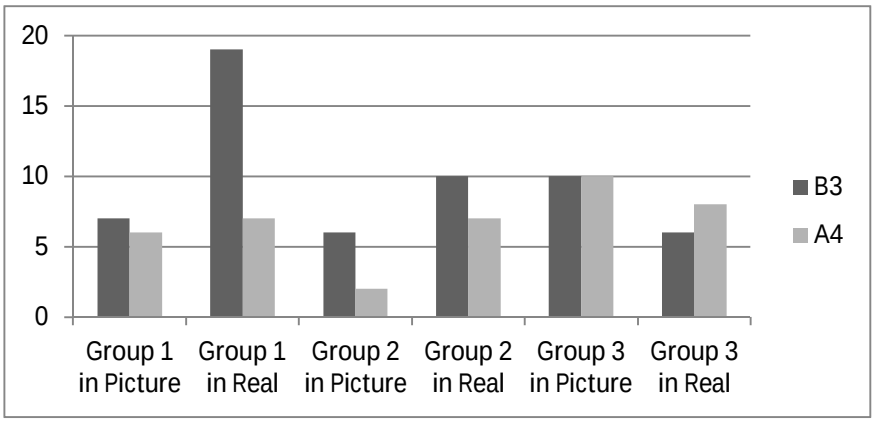

Figure 4- confusion between A4 and B3

Shade Guide :

The vita shade guide was selected because it has been used since last 10 years[7-9] and it gives accurate reproducible results[24,9,18,4,5]. Shade matching was conducted in daylight (10 am to 2 pm). We preferred day light because it is readily available thought there are studies which show better shade matching with a light source than with natural light[15,19].

Camera:

Camera used was dslr. Picture was taken in daylight with grey background without

flash/light.. The technique of taking picture might have influenced the picture and also may be the superior quality camera might have given even better result. This particular subject requires research.

Mobile:

Mobile Q –A34 which was used to show the picture was not a very high quality mobile. The mobile was chosen to represent the mobiles which majority of people have. Although the picture was taken with dslr and transferred to mobile but the picture quality might have changed a bit which could have changed the perception.

Secondly, the major problem the participants faced was the angulations of mobile. The shade was changing with different angulations of mobile and different distance and angle from where the picture was seen so it was hard to keep the mobile constant while at the same time seeing with the same angle and distance. This might have influenced the result.

Conclusions:

This study shows that there is different judgement of shade between different speciality people due to one`s experience and clinical training which highlights the importance of education in this regard. On the other hand the shade in real doesn't significantly look different from that in picture taken with an average mobile phone which can be used as an indirect useful option to match shade or send to laboratory for shade matching.

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