A CLINICAL RESEARCH STUDY TO ASSESS THE DENTAL PROFESSIONAL'S SHADE MATCHING COMPETENCE BY USING ISHIHARA COLOR BLINDNESS 14 PLATE TEST

[1]Dr Hamza Nazir Chohan, [2]Anam Samreen, [3]Dr. Shuaa Iftikhar
[1]Frontier Medical College, RHC Vanike Tarar
[2]DHQ Teaching Hospital Dera Ghazi Khan
[3]UHS, Lahore

Abstract:
Objective: *The objective of this clinical study was to evaluate and assess the shade matching proficiency of dental professionals under day and yellow light without being formally trained.*
Methods: *We conducted this research at Allied Hosp Faisalabad (October 2017 to July 2018). We evaluated the dental professional's ability to test the colour blindness with the help of fourteen plate test (Ishihara Color Blindness). We also used guidelines of Vita Pan Shade under two sources of light. Participants were divided into five equal groups including twenty participants in each group of dental students, dental interns, dental practitioners, dental technicians and prosthodontists. Every professional was assessed and compared through the same test (Ishihara Color Blindness Test). Every group matched three artificial maxillary shades visually by using the mentioned guidelines.*
Results: *Total research sample of 100 participants was further subdivided into five groups including twenty participants in each group. The participants were in the age bracket of 18 – 50 years. We did not include the colour coefficient. The highest score was obtained by dental interns about the accurate matching of the shades. Ninety percent of the respondents were prosthodontist using light-yellow light, the dental practitioner (65%), dental interns (65%) did accurate matching of shade. Correct shade matching was not carried out by dental students and technicians.*
Conclusion: *Dental students and prosthodontists were highly accurate in the shade matching process in the presence of light-yellow light source; whereas, dental interns were good in the normal daylight. It is preferable to use a visual method of shade matching as dental students and prosthodontists become dependent on the presence of light-yellow light source for the shade matching process.*
Keywords: *Color Matching, Shade Matching, Ability, Color Blindness, Ishihara, Dental, Interns and Prosthodontists.*

Corresponding author:
Hamza Nazir Chohan,
Frontier Medical College, RHC Vanike Tarar

QR code

INTRODUCTION:

There are three components of a colour which include a source of light, object and observer [1]. The light source illuminates the object. The object transmits, absorbs or reflects light towards the observer. Finally, the reflected light is perceived by the observer. There are various clinical applications of shade matching including composite restorations, porcelain, gingival components and removable prosthetic teeth. Clinical skills decide the determination of precise shade with the availability of light conditions and shade guiding system. The most challenging process of dentistry is shade and colour matching [2]. More accurate matching is possible through technical aids such as calorimeter devices and computerized spectrophotometer for colour quantification [3]. These instruments are still not widely in use in the field of dentistry [4]. Numerous factors are involved in the visual colour selection which leads to different perceptions and colour selection [5]. It is also notable that individuals do not stay the same throughout the process. Colour perception is dependent on light source, object and observer not being a part of the whole process [6].

The combination of tooth colour is enamel layers and dentin. Dentin reflects incident light and gives better colour quality [7]. It is important that a clinician is to bring a basic shade of the tooth with the features of value, chroma and hue in order to match the structure of the remaining tooth [8]. Relative darkness is defined with the help of brightness and lightness, the value is an often a vital element in the determination of shade dimension [9, 10]. Various individuals have different colour vision deficiencies or confusions. Individuals posing a deficiency in the red-green colour possess reduced scores of colour vision for yellow colour regions in the visible spectrum of light and it is also very common in the field of dentistry [10]. It is also estimated that eight to fourteen percent of dental professionals are colour deficient [11, 12]. Colour perception is different for every individual as it is dependent on various unchanging manners. Incorrect responses are mostly similar in terms of chroma, value and hue [13]. The objective of this clinical study was to evaluate and assess the shade matching proficiency of dental professionals under day and yellow light without being formally trained.

METHODOLOGY:

We conducted this research at Allied Hosp Faisalabad (October 2017 to July 2018). We evaluated the dental professional's ability to test the colour blindness with the help of fourteen plate test (Ishihara Color Blindness). We also used guidelines of Vita Pan Shade under two sources of light which are commonly employed in the field of dentistry. Participants were divided into five equal groups including twenty participants in each group of dental students, dental interns, dental practitioners, dental technicians and prosthodontists. Every professional was assessed and compared through the same test (Ishihara Color Blindness Test). Every group matched three artificial maxillary shades visually by using the mentioned guidelines. Detail of groups is shown in Table – I. Every group observed fifty subjects for two times and maxillary central incisors shade was also assessed by two observers. It is important to note that deficiency of colour vision can affect the shade matching process; so, we examined the participants on fourteen plates (Ishihara's Tests for Color Blindness). Every participant filled a questionnaire about demographic detail which included name, gender, age and experience in years.

The respondent and dental units matched the shades under daylight and yellow light respectively. Statistical analysis of the outcomes was carried out through SPSS software.

RESULTS:

Total research sample of 100 participants was further subdivided into five groups including twenty participants in each group. The participants were in the age bracket of 18 – 50 years. We did not include the colour coefficient. The highest score was obtained by dental interns about the accurate matching of the shades. Ninety percent of the respondents were prosthodontist using light-yellow light, the dental practitioner (65%), dental interns (65%) did accurate matching of shade. Correct shade matching was not carried out by dental students and technicians. Detailed outcomes analysis is given as under:

Table – I: Demographic data of Respondents

Respondents	Age (Years)	Experience (Years)
Prosthodontist	28 - 50	10 to 15
Dental Practitioner	23 - 40	5 to 10
Dental Interns	23 - 30	2 to 4
Dental Technicians	24 - 50	10 to 15
Dental Students	20 - 22	0

Table – II: Respondents Distribution

Respondents	Percentage
Prosthodontist	20
Dental Practitioner	20
Dental Interns	20
Dental Technicians	20
Dental Students	20

DISCUSSIONS:

The objective of this clinical study was to evaluate and assess the shade matching proficiency of dental professionals under day and yellow light without being formally trained working in various clinical setups. Same shade of the colour is perceived differently by different individuals so its assessment is totally subjective. Moreover, we also prefer to produce an artificial light on a natural light source because of the unchanged intensity. More reliable outcomes are possible through matching of the shades under yellow light which makes the shading process more reliable and accurate.

An American based policy maker institute: Glasgow Dental Hospital policies show that various colours are useful as source light to produce better shade matching even including natural light, incandescent light and fluorescent light. We gave only one-minute time to the respondents for a specific tooth or the tab which may have affected the research outcomes. A clinic needs a proper source of light with added suitable conditions. More investigative research studies will also help to build a better understanding of the shade matching process through various devices. Appropriate conditions and light source are mandatory for an ideal clinical setting.

CONCLUSION:

Dental students and prosthodontists were highly accurate in the shade matching process in the presence of light-yellow light source; whereas, dental interns were good in the normal daylight. It is preferable to use a visual method of shade matching as dental students and prosthodontists become dependent on the presence of light-yellow light source for the shade matching process. Importance of light source in inevitable as the outcomes of daylight is not satisfactory.

REFERENCES:

1. Chu, Tarnow DP. Digital shade analysis and verification: A case report and discussion. Pract Proced Aesthet Dent 2001.
2. Winkler S, Bobrick KG, Weitz KS, Datikashvili I, Wood R. Shade matching by dental students. J Oral Implantol 2006; 32(5): 256-
3. Yuan JC, Brewer JD, Monaco EA, Jr., Davis EL. Defining a natural tooth colour space based on a 3-dimensional shade system. J Prosthet Dent 2007.
4. Della Bona A, Barrett AA, Rosa V, Pizzetta C. Visual and instrumental agreement in dental shade selection: three distinct observer populations and shade matching protocols Dent Mater 2009; 25(2): 276-81.
5. Li Q, Wang YN. Comparison of shade matching by visual observation and an intraoral dental colourimeter. J Oral Rehabil 2007; 34(11): 848-54.
6. Winkler S, Broderick K, Weitz K, Datikashvili I, Wood R. Shade matching by dental students. J Oral Implantology 2006; 32(5): 256-58.
7. Visual shade matching performed with use of shade guides depends on tooth colour determination. Correct shade choice is limited by knowledge of colour science, clinical experience, time restriction, and patient's cooperation.
8. Wee AG, Kang EY, Jere D, Beck FM. Clinical colour match of porcelain visual shade-matching systems. J Esthet Restor Dent 2005.
9. Burkinshaw SM. Colour in relation to dentistry. Fundamentals of colour science. Br Dent J 2004.
10. Villarroel M, Fahl N, De Sousa AM, De Oliveira OB, Jr. Direct esthetic restorations based on translucency and opacity of composite resins. J Esthet Restor Dent 2011.
11. Baltzer A, Kaufmann-Jinoian V. Shading of ceramic crowns using digital tooth shade matching devices. Int J Comput Dent 2005; 8(2): 129-52.
12. Wachtler T, Albright TD, Sejnowski TJ. Non-local interactions in colour perception: nonlinear processing of chromatic signals from remote inducers. Vision Res 2001: 41(12): 1535-46.
13. Ish26 Winkler S, Broderick KG, Weitz KS, Datikashvili I, Wood R. Shade matching by dental students. J Oral Implantol 2006.