

THE ROLE OF DIGITAL PHOTOGRAPHY IN DENTAL MEDICINE

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ABSTRACT

Digital photography, in the dental medicine office, begins to occupy an increasingly important place due to axiomatic advantages. Purpose of the study. Due to the variety of the equipment present on the market and the accessibility, it was tried to compare the dental photography performed with a DSRL camera associated with a macro type lens, with the photograph executed with the smartphone camera, so that the best images can be played, although the complexity of the photos realization are different depending on the equipment used. The study tried to evaluate the possibility of determining the color of the teeth in intraoral photographs, performed on patients of different ages, with different treatment requirements. Material and method. The study was conducted in a dental medicine office in Galati between 01.10.2018 - 01.06.2019, on a group of 30 subjects aged between 19 and 45 years, 13 males and 17 females, with various levels of training in the field of dense medicine - 10 doctors, 10 dental technicians, 10 students. The subjects' eyesight was tested with the Ishihara sample, finally all presenting a normal trichrome view. Results. Despite the average differences between the three teams of subjects, the results were statistically significant in terms of the disparities between the means of image capture, both with respect to each other and with the standard of clinical appreciation of the dental color. Conclusions. Regarding the means of photos displaying, a similar accuracy was found between the monitor of a computer and the screen of the DSLR camera, but a reduced accuracy in the case of the smartphone mobile screen.

Keywords: *digital photography, comparison, DSRL camera, dental color.*

INTRODUCTION

Digital photography, in the dental medicine cabinet, is starting to occupy an increasingly important place due to axiomatic advantages. It is fast, which is a time saver for the doctor. It is readily accepted by the patient (mental comfort due to lack of pain). The time spent in the patient's chair can be reduced if the dentist is tired, and will analyze the photos in another day / session. In addition, it is non-invasive and provides details and information that can sometimes be missed during a regular first clinical examination [1-3].

It offers the possibility of magnification through the zoom function, allowing the visualization of details that are hardly visible to the naked eye. It is an immediate form of universal communication. It can become a system for training and improving the doctor's analytical ability by constantly using photography. Allows examination for an unlimited period of time. From a financial point of view it is a very accessible method, the results obtained with medium level photographic systems being satisfactory for good. The quality of using professional photography tools in combination with professional camera

accessories brings major benefits to the clinician [4,5].

Aim study

Due to the variety of the equipment present on the market and the accessibility, it was tried to compare the dental photography performed with a DSRL camera associated with a macro type lens, with the photograph executed with the smartphone camera, so that the best images can be played, although the complexity of the realization photos are different depending on the equipment used.

In the present research, we tried to underline the importance of the photography use in the dental medicine cabinet for both the dentist and the patient, but also the use of a strictly necessary equipment in the quality execution of the photograph.

Also, the study has tried to evaluate the possibility of determining the color of the teeth in introral photographs, performed on patients of different ages, with different treatment requirements.

Material and method

The study was conducted in a cabinet in Galati between 01.10.2018 - 01.06.2019, on a batch of 30 subjects aged between 19 and 45 years, of which 13

males and 17 females, with various levels of training in the field of dense medicine - 10 doctors, 10 dental technicians, 10 students. The subjects' eyesight was tested with the Ishihara sample, finally all presenting a normal trichrome view. Part of the subjects did not have a high level of color choice experience, so for the first time all subjects were trained on how to select the color of the tooth [6,7].

During the study, 224 photos were taken, which were grouped according to the device used. Thus, 4 groups were created:

- Group A: 56 photos taken with a smartphone at low cost (SP1);
- Group B: 56 photos taken with a high-cost smartphone (SP2);
- Group C: 56 photos taken with a low cost DSLR camera (AF1);
- Group D: 56 photos taken with a DSLR camera at an average cost price (AF2).

Based on these photos, the subjects determined the dental color using the BlueLine® Plus color key (Ivoclar Vivodent™) as a reference point. Each subject had a questionnaire in which the shades of the color key were rated from 1 to 20 starting with the shade BL1 to D4. (Table 1).

Results were processed using the IBM SPSS Statistics™ program.

Table1. Scores assigned from key nuances of color B BlueLine® Plus (Ivoclar Vivodent™)

Nuance	Score	Nuance	Score
<i>BL1</i>	1	<i>B3</i>	11
<i>BL2</i>	2	<i>B4</i>	12
<i>BL3</i>	3	<i>C1</i>	13
<i>BL4</i>	4	<i>C2</i>	14
<i>A1</i>	5	<i>C3</i>	15
<i>A2</i>	6	<i>C4</i>	16
<i>A3</i>	7	<i>D1</i>	17

A4	8	D2	18
B1	9	D3	19
B2	10	D4	20

Results and discussions

The scientific method from which the research started was based on the evaluation of the study results. The uniform distribution of the subjects according to the level of professional training in the field of dental medicine ensured the necessary conditions for an individual assessment, not influenced by more experienced subjects in the distinction and / or the choice of the dental color. Thus, the method gained a level of randomization that could ensure the premise of individual subjectivity, unaltered. During the study, 56 patients were photographed and the images were randomly distributed. In the evaluation of the results, the clinical picture represented

in the photographs was not taken into account, in fact the efficiency of the apparatus in rendering as true and consistent a true, unaltered and unprocessed image was pursued. However, a number of factors were taken into account, such as age, gender, level of professional training, as well as a factor often overlooked - time, space and means by which the image analysis was performed [8-11].

The study included 13 male and 17 female subjects, most of whom were in the age range of 31-40 years (figure 1). Most men were in the age range of 31-40 years, and the majority of women in the age group 21-30 years.

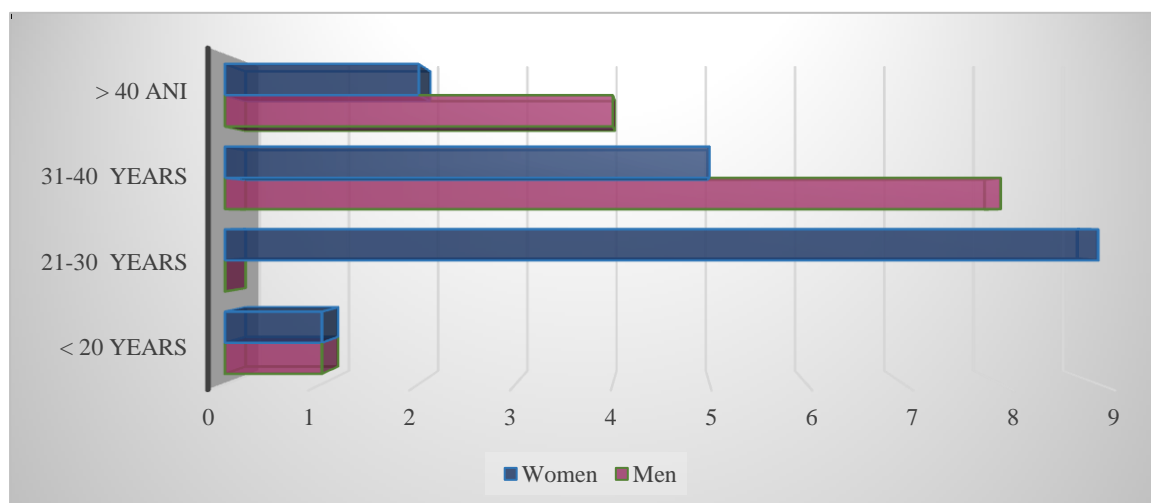


Figure 1. Distribution of subjects by age

Most of the dental practitioners and students belonged to the female sex, while most of the dental technicians belonged to the male (figure 2).

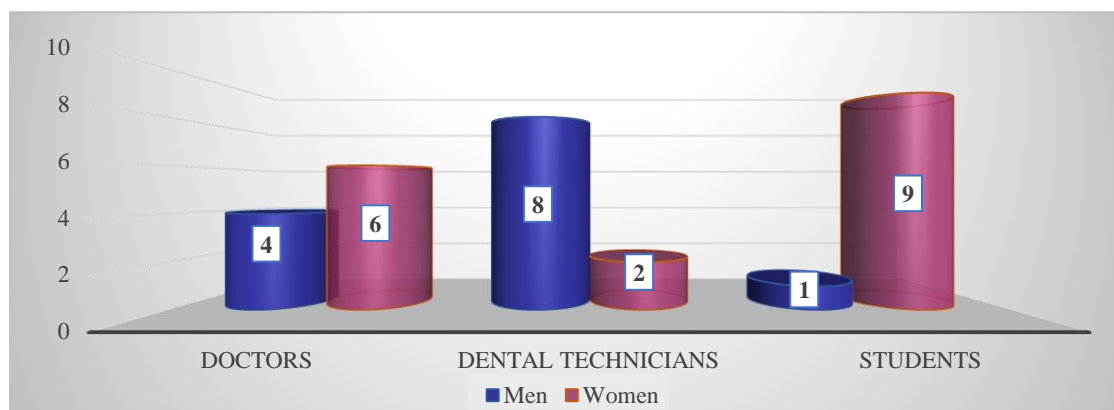


Figure 2. Distribution of subjects by profession

Regarding the time factor, most doctors and technicians analyzed the photos during the morning, with a restful look. Comparatively, most students analyzed the photos after 6pm.

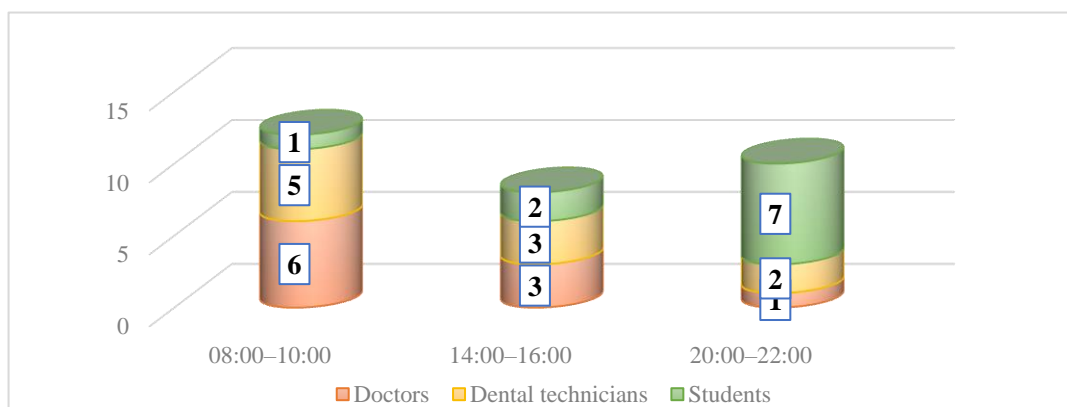


Figure 3. Distribution of subjects according to the time interval in which the image analysis was performed

Regarding the work environment, all subjects analyzed the images on a computer monitor in a naturally lit room, with a neutral light spectrum, with the monitor brightness set to 100% and the correction γ set to level 1 (unchanged), in order not to distort the perceived color hue. Due to the greater flexibility of the students program, they were available for photo analysis and other means of displaying images - a mobile phone of a smartphone type, respectively the display of the DSLR camera. There were discrepancies in the mean of the color analysis scores between the 3 display devices, especially in the sense of color distortion on the smartphone screen compared to the other two display devices.

However, these findings raised the question of the validity of the working method principle. In order for the results to

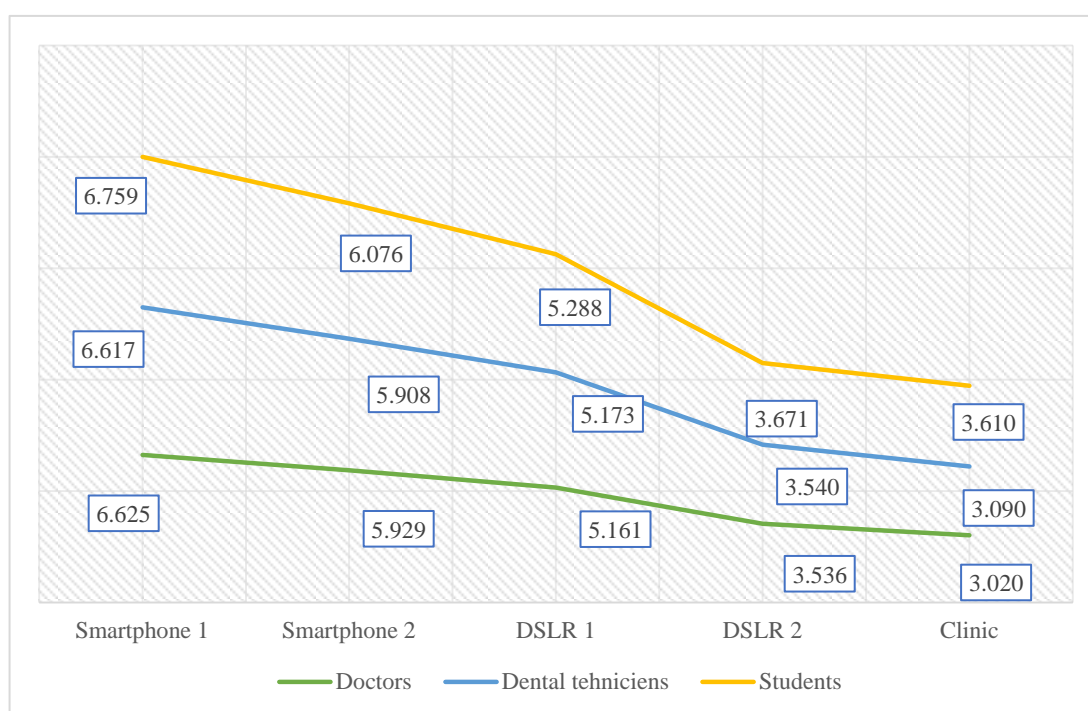
be considered credible, the working method had to be passed through the filter of an analysis to prove its objective character [10-13]. Thus, a set of criteria

was developed to allow an objective evaluation of the results, namely:

- The subject should have resting eyes;
- The dental color analysis on the photograph should be performed in an environment with a neutral light spectrum, which will not stress or exhaust the subject's gaze.

- The analysis should be performed on the same display medium [12,13].

Based on the three principles listed above, a null hypothesis was formulated which was tested using the Means Oneway ANOVA analysis of the IBM SPSS Statistics™ program.



Despite the differences in the average between the three teams of subjects, the results were statistically significant in terms of the disparities between the means of image capture, both with respect to each other and with the standard of clinical appreciation of the dental color [3,13]. Thus, the results closest to choosing the dental color in the cabinet with the help of a standardized color key were obtained with the DSLR high cost device and the macro lenses, and the most incorrect assessments were made based on the images captured with a smartphone at a low cost.

Based on the participation of the subjects in the study, the female sex seemed to be more interested in discussing the problems of dental aesthetics.

Regarding the distribution by age, the subjects who have already passed in the third decade of life seemed to be more interested in participating in the study, which may be due to a slightly more advanced level of preparation in the field of dentistry.

According to the distribution according to the analysis time, it was appreciated that the subjects were more receptive to participating in a study that

requires the visual analyzer at a time of the day when the gaze is relatively rested, which increased the accuracy of the assessment. .

Based on the averages obtained in the color analysis within the three teams of subjects, it was found a significantly higher accuracy in the case of dental doctors and dental technicians compared to students, which could be directly proportional to the level of preparation. in the field.

Conclusions

Regarding the means of displaying the photos, a similar accuracy was found between the monitor of a computer and the screen of the DSLR camera, but a reduced accuracy in the case of the smartphone screen.

The perception of color can be altered by the factors of time, environment and display medium. For a correct assessment, it is necessary to neutralize the variations of these parameters.

The closest assessment of the actual clinical score of the dental color was made based on the photographs taken with a high cost DSLR camera and the macro lenses, the quality of the assessment following an inverse trajectory to the cost price of the device.

The use of the camera of a high-cost mobile phone can be justified by the time saving, since the discrepancies are not great compared to a low cost DSLR camera.

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