

## **DSLR vs Iphone**

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## **Abstract**

Digital photography has become one of the most important sectors in the field of Dentistry. As it plays a major role in diagnosis, treatment planning, case follow ups, communication and patient education. In this fast moving world everything is becoming digitised, digital photography has completely replaced the contemporary film based photographs. As the technology is growing faster, everything is constantly changing and becoming more faster and handier. Likewise in the field of smartphone industries are also growing bigger, better and faster, they have also started to produce smartphone cameras with high grade to produce images of high quality as equally as a DSLR or any other professional cameras. As it is more handy and fast moving it has also started to capture its own place in the field of photography.

This article aims to review the features of iPhone and DSLR as a comparative study.

**Keywords:** DSLR, iPhone, Digital photography, lens, image quality

## **Introduction**

The society is eventually undergoing a transition that includes big reforms provided by digitalisation. Digitalisation, as we call it today is swapping across every aspect of our daily lives in all possible ways. Right from gathering the news in the morning till the messages been sent before sleep has become digital, which makes the task faster and more accurate. The role of digitalisation has been involving various fields right from art, to science, to medicine and also dental (1).

Although it isn't mandatory to record the dental photographs of the clinical cases, as the technology advancements in the field of digital photography have

revolutionised the concept of photography as a powerful medium of expression and communication which offers a spectrum of perception, interpretations and execution.

Digital photography has multiple significance and represents a contemporary dentistry. Its application in dental practice has become simple, quick and extremely useful in documentation of cases, effectuating the education of patients and clinical investigations.

In recent years as the technology is emerging, some of the smart phone camera technology has come on leaps and bounds in recent years, which are indeed capable of producing images comparable to those from today's high end cameras with an image quality which a full frame DDLR can deliver (2).

On the other hand the technical aspect of DSLR and Mirror less cameras have also been increasing as to significantly provide better image quality than even as the best smartphones, as well as offering high quality interchangeable lenses that makes it multi-dextran.

### **History**

The history of dental photography has its traces from 1840s when the first photographic gallery was operated by a dentist turned photographer, since then dentistry and photography has become an integral part of patient's record and treatment plan (3).

In 1848, Dr.R.Thompson and W.Elde of Columbus, Ohio, marked the first time use of before and after photographs of dental procedures to create a new frontier in diagnosis and treatment plan.

In mid 1990s the evolution of digital photography came into existence within 10 years of its emergence it completely replaced film based photography (4).

In the past two decades the dental photography have become an integral part of dentistry.

In the recent years the smartphone photography has revolutionised the platform of digital photography.

**Why Digital Photography:** In digital photography the images are stored in computerised file format referred as digital image file. This format is composed of graphical image instead of text or programmed data. It is recorded in the form of bit mapped image (JPEG, PNG, GIF, TIFF and BMP) and vector based images. DICOM - Digital Imaging and Communication in Medicine is a standardisation worldwide programme that provides common language for formatting and exchanging medical and dental data (3).

In digital photography there is no need to wait for the film to be developed. Any problem in the image can be easily rectified. It converts the images directly into digital file which can be viewed in various formats. It has the ease of use along with the ability to repeat or delete unsuitable images on spot. Single media can hold many images. It can be easily stored and transmitted for various sectors like patient education, laboratory, insurance and academics.

Initial investment might be expensive but cost effective when compared with film based images which includes developing. It can be used to enhance the image characteristics (5).

### **Role of Digital Photography In Dentistry**

Digital photography plays a major role in Dentistry such as:

- Diagnosis and treatment plan
- Education
- Legal documentation and Insurance
- Communication
- Self-improvement
- Professional marketing (4).

**Diagnosis and treatment plan :**It is used as a tool for diagnosis and treatment planning. As it captures the clinical picture is used for the planning of the cases, steps and also to predict the treatment outcome.

**Education :** Aides such as audio, audio-visual, models and brochures are used for patient education. Digital pictures of cases, surgical steps, materials used for the procedure helps in educating the patient on diagnosis and the purpose of treatment and treatment plan in order to improve the understanding of the patient and make the patient more comfortable and satisfied with the treatment plan in order to achieve better cooperation during the treatment.

**Legal Documentation and Insurance :** Raw format (non-edited) digital photographs can be used as a legal document proof which can be used for various purposes including forensics.

As of any diagnostic proofs like radiographs dental photographs can also be used to support a narrative during insurance verification.

**Communication:** Case history with high resolution photographs can be used for ease of communication with other specialists for consultation or for opinions. As digital photographs can be transferred and received easily they can be used for communication with the other dentists and patients.

It also helps in communication with the laboratories regarding the laboratory works and also for shade guidance and matching with the patient's colour-corrected photograph to provide information to create a final restoration with more accurate hue, value, and chroma.

**Self-Improvement:** As we are in the phase of learning continuously throughout our careers digital photographs of the previous cases and the present photograph comparison will help us to understand the level of improvement during the course of learning.

**Professional Marketing:** Digital photographs of the cases, before and after picture of the treatment can be used for advertisement and marketing.

**Role of Digital Photography In Orthodontics:** Digital photography in dentistry has certainly raised the bars of treatment standards of diagnosis and treatment planning. Soft tissue pattern analysis, lip morphology, tonicity, smile arch, smile aesthetics, function, various angles and degree of incisal show upon smiling can be analysed using digital photographs (3).

**Smile line width and buccal corridor** can be determined using frontal view of the patient while smiling. Midline drawn from the centre of the forehead through the tip of the nose and chin helps us to determine any asymmetries if present in the frontal view.

**Inter pupillary line** through the centre of the pupil and facial midline is used to assess the horizontal facial geometry. Incisal plane used to assess the curvature and horizontal symmetry of the anterior teeth. E line connecting the tip of the nose to tip of the chin is used to determine lip support, anterior malocclusion and overjet (6).

**Facial profile** vertical line through glabella to tip of the chin determine the facial profile as concave, convex and straight.

**Frankfort plane** can be assessed when the patient tilts the head slightly forward which forms an angle of about 8° with the arbitrary horizontal plane commonly referred to as the esthetic plane.

**Gonial angle** the lateral profile is used to determine the skeletal classification.

**Golden proportion** is referred to as esthetic smile, the ratio is assessed by intra oral anterior view photographs (7).

#### **Features of DSLR And Its**

DSLR used digital data storage like other compact digital cameras. It has highly sophisticated features which is not found on most point and shoot cameras. Some of its features are (8);

**Control panel :** It consist of top or rear monochrome control panel display the camera settings.

**Battery grip:** It is used to increase battery power and to create a convenient hand grip to shoot portrait.

**Aperture Ring:** Most DSLR sport an aperture ring which can be used in manual and auto to select the desired aperture.

**Focus area:** It has more than one focus area, Between 3 to 11, it can be manual or automatically select the focus area of the image to be captured

**Focus ring:** In manual focus mode the ring can be rotated by the user to achieve focus.

**Zoom ring:** Easy fine tuning of zoom position by rotating the ring around the lens barrel helps to zoom into focus area.

**View finder:** It displays various focus area superimposed over the image.

**Hoe shoe for external flash:** It can be equipped with external flash. Which can be tilted, swirled and zoomed to accommodate the focal length of the cameras lens. It communicates with camera through connectors in hoe shoe and can be controlled manually and automatically.

**Sensor:** CCD and CMOS are the sensors used in digital cameras, point and shoot camera uses CCD. DSLR sensors are much larger as much as 14 times than a point and shoot camera. It is more accurate, larger the sensor lesser the electronic noise and display a larger dynamic range and performs better in low light.

**Mirror:** DSLRs have a tilted mirror in front of the sensor, after the lens. This mirror is used to display the preview image in the viewfinder. When the user presses the shutter, the mirror flips up for a brief instant, allowing light to hit the sensor. This is why DSLRs make a characteristic sound when a picture is being taken. This is also why DSLRs are typically thicker than point-and-shoot cameras, even without a lens mounted.

**Prime lens:** It has fixed focal length which cannot zoom. It is often easier to find prime lens with larger aperture and zoom lens equivalent which is more compact for casual use.

**Zoom lens:** It covers a range of focal lengths. Larger the focal length range of a zoom lens, the more compromises have to be made in the conception, yielding lenses with less than ideal image. Having one lens to cover a broad range is an advantage with less lens swapping.

There are various modes or settings available in a DSLR.

**Aperture Priority Mode:** To control and adjust the aperture in order to adjust the overall image brightness and darkness. Wider the aperture brighter the image, narrow the aperture darker the image.

**Shutter Priority Mode:** To control and adjust speed of the shutter. Adjusting the speed will let you freeze the motion. Slow shutter speed increases motion blur image and also brightens the image. Faster shutter speed decreases the blur image and darkens the image.

**ISO:** EYE so – to control cameras light sensitivity. Less ISO (100, 125, and 400) less sensitive, dark image is produced. More ISO (800, 1600, 2000) more sensitive, lighter image is produced.

**Focusing mode:** It has both single point focus and a spectrum of focusing points which can be adjusted manually and automatically.

**Exposure compensation:** Helps to improve the overall quality of the image from 0 to - / + values to adjust the contrast of the image brightness.

**Custom white balance:** When indoor light interferes the white of the ice rink a different colour is projected than to what it is actually seen. AWB or custom white balance is used to adjust the white so as to adjust the other colours (9).

**Features of Iphone:** The iphone 11 comes with triple camera. Ultra wide, Wide, Telephoto.

**Ultra wide camera:** It comes with 13mm focal length, f/2.4 aperture, 5- element lens, 120 degree field view.

4x more scene and 12MP sensor.

The ultra-wide camera captures up to four times more scene.

**Wide camera:** It comes with 26mm focal length, f/1.8 aperture, and 6- element lens. Optical image stabilisation, 100% focus pixels and 12MP sensor.

**Telephoto :** It comes with 52mm focal length, larger f/2.0 aperture and 6- element lens. Optical image stabilisation, 2xoptical zoom and 12MP sensor. 40% more light capture.

**Shutter speed:** It has zero shutter speed lag.

There are various modes and settings available in iphone

**Night mode:** Night mode uses intelligent software and A13 Bionic to deliver low- light shots. It can be controlled both automatically and manually to dial in even more detail and less noise.

**Portrait mode:** With three cameras working together, can fit more in the portrait. ios 13 adds the high-key light mono effect for studio-style monochromes. Portrait lighting helps to control the intensity of light.

**Smart HDR:** Next-generation smart HDR uses advanced algorithms to finesse highlight and shadow detail in your image. It leverages machine learning to recognise faces in the image and intelligently relight the image. It can automatically fine-tune detail in both the subject and background. Even some DSLR cameras cannot do that.

**Super retina XDR:** Super retina XDR display boats not one but two levels of brightness. It automatically hits 800 nits in sunlight and up to 1200 nits in viewing extreme dynamic range content.

**Pixel :** It has 458 pixels per inch.

**Custom OLED:** It consist of consistent colour and brightness in the image.

**Wide colour gamut:** It comes with system-wide colour management for colour accuracy.

**True tone:** It matches the white balance of the room to balance the white and the colour contrasts in the photo.

**Hepatic touch:** It helps to take picture even faster without launching the camera app.

### **Comparitive Analysis**

**Accessibility:** A smartphone is a handy instrument to have when compared with DSLR which are not that handy. DSLR are still prerogative of professional photographers but not that prevalent as smart phones.

**Portability:** Smart phones are easily portable to any places when compares to DSLR which are heavy and also comes with substantial accessories like additional battery, flash light, lens etc. which occupies a lot of space where in a couple of smart phones can be easily carried in pocket.

**Sharing information:** It is easy to share the data from a smart phone to another or any other devices. It can also be directly connected with social media to upload the picture. Where as in DSLR with modern day has excellent connectivity to with WIFI, NFC and Bluetooth but you will require an alternative device to connect, share and upload. Older DSLR does not have connectivity and can be connected only by cables.

**Image editing:** Smart phone consist of inbuilt editing software and supported apps for editing, whereas DSLR does not have inbuilt professional editing software.

**Cost:**Top quality iphone are costly but top end model DSLR are even more costly.

**Picture Quality:** Comparing the picture quality of an image taken from a smartphone with that of a DSLR camera. DSLR cameras deliver a higher range in comparison to smartphones. Today, you have smartphones that are capable of providing images of excellent quality such as iPhone X and iPhone 11.

**Versatility and Functionality:** DSLR cameras come with options like interchangeable lenses. Thus, users have the facility to change lenses according to their requirements.

It is not possible with smartphones because they come with built-in lenses thereby limiting their functionality. The versatility of DSLR cameras is incomparable to that of smartphone cameras.

**Shutter speed:** Smartphone cameras have autofocus lenses. They can be slow at times and experience shutter lag. Unveiling Shutter Speed in DSLR Camera! Image Processor

Smartphones are versatile appliances. DSLR cameras come with the DIGIC 4+Processors, Expeed 3 or Expeed 4 processors. These image processors deliver quality images when compared to smartphone processors.

**Flash:** Lighting is a critical aspect of photography. Smartphones come with LED flash whereas DSLR cameras come equipped with Xenon flash. The LED flashlight is not as bright as the Xenon flashlights. They cannot cover large areas thereby making smartphone cameras useless for specific photography such as wildlife photography.

**Viewing angle:** DSLR cameras comes with a 360-degree viewing angle. Smartphone cameras have a limited viewing angle because of the fixed focal length. This feature restricts the quality of photography. On the other hand, a DSLR camera lens has a versatile viewing angle.

**Battery Life:** DSLR cameras come with powerful batteries, some of them lasting for several days at a stretch. The smartphone batteries are not as powerful in comparison.

**Storage:** Smartphones come with several applications of which the smartphone camera is one. Hence, the smartphone memory has to cater to all the applications. Therefore, it can run out of memory soon. DSLR cameras

use SD cards for storage. These SD cards can store vast quantities of data (10).

### Discussion

As a coin as two sides there various feature which are present in iphone and DSLR which plays major role in digital photography, when compared together smartphones have some advantages like

- a. Accessibility
- b. Portability
- c. Sharing information
- d. Image Editing
- e. The Cost factor

On the other hand DSLR have various advantages like

- a. Picture Quality
- b. Versatility and Functionality
- c. Shutter
- d. Image Processor
- e. Flash
- f. Viewing angle
- g. Battery Life
- h. Storage

As digital photography is taking its upper hand in dentistry, so as to catch up with the emerging trends in dentistry one should have the knowledge of technology and its fast moving application. The basic knowledge in dental photography is essential and will also help to choose the right equipment for the right purpose, whether it's an iPhone or a DSLR as both as its own advantages and disadvantages

### Conclusion

2 to 3 decades ago who would have even thought that today we would be walking around with touchscreen devices, which is massively powerful and handy which has replaced many conventional devices. So, are the days of the cameras numbered? Certainly not.

The arguments bring us to the end of the discussion as to which of the two cameras is the better one, as it feels like anything is possible, the future of camera technology looks promising for both conventional cameras DSLR as well as smartphone cameras. As the innovations and inventions are becoming bigger and better every moment

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