



Research Article

KNOWLEDGE AND ATTITUDE OF POST GRADUATE STUDENTS OF DEPARTMENT OF CONSERVATIVE DENTISTRY & ENDODONTICS TOWARDS STERILISATION OF ENDODONTICS INSTRUMENTS IN DAKSHINAKANNADA DISTRICT KARNATAKA DENTAL COLLEGES – A CROSS SECTIONAL STUDY

Krishna Prasada L., Bhagat S. Tanwar* and Naveen Kumar K

Department of Conservative Dentistry & Endodontics, KVG Dental College & Hospital,
Sullia Karnataka, India

ARTICLE INFO

Article History:

Received 7th November, 2017

Received in revised form 19th

December, 2017

Accepted 2nd January, 2018

Published online 28th February, 2018

Key words:

Files, Dental Burs, Handpiece, Gutta-percha, Cross-infection, Sterilisation, Asepsis, Disinfection.

ABSTRACT

Introduction: Infection control procedures are essential to modern dentistry and have an impact on all clinical practices. There is a lack of evidence linking endodontic treatment with the transmission of disease.

With the whole world looking at the eradication of existing infectious diseases and preventing any new infections, sterilization of instruments is significant to ensure optimal patient care. Infection preventions and controls are the most important components for providing a safe environment for patients and staff within a dental practice. The goal of sterilization is to protect patients and health care workers by preventing cross contamination from instruments. The process involves a series of sequential steps aimed at Removing and Killing Microbes on Contaminated instruments and Maintaining those instruments in an aseptic state until they are reused.

Aim and objective: The aim of study was to assess the knowledge and attitude of post graduate students of department of conservative dentistry and endodontics towards sterilisation of endodontics instruments in dakshinakannada district colleges of Karnataka which include 5 dental colleges.

Materials and Methods: A cross-sectional study was performed in the geographic area of dakshinakannada. Study was conducted among 5 dental colleges (present on the day of survey) 62 Post graduate students (I, II, and III year) from Department of Conservative Dentistry and Endodontics in dakshinakannada district dental colleges were included in the study.

Conclusion: The knowledge among the post graduate Endodontist regarding sterilisation of endodontic instrument was found fair and adequate. Also in current available resources of sterilisation cleaning and sterilisation its time consuming process.

Copyright©2018 Krishna Prasada L., Bhagat S. Tanwar and Naveen Kumar K. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Infection control procedures are essential to modern dentistry and have an impact on all clinical practices. There is a lack of evidence linking endodontic treatment with the transmission of disease.

With the whole world looking at the eradication of existing infectious diseases and preventing any new infections, sterilization of instruments is significant to ensure optimal patient care. Infection preventions and controls are the most important components for providing a safe environment for patients and staff within a dental practice. Instruments that contact vital areas of the body, enter the vascular system or

penetrate the oral mucosa are classified as ‘critical items’ and must be sterile before use¹.

During cleaning & shaping of root canal, residual organic & inorganic debris accumulates on the working sections of the file from one section to another is substantial because they can act as antigen, infectious agent, microbes.

Hence, the objective was to assess the level of knowledge, attitudes, and practices regarding the sterilization of endodontic instruments by the postgraduate (PG) students from the Department of Conservative Dentistry and Endodontics at dental colleges.

Sterilization of instruments is the main concern for infection control in all health care procedures. According to CDC (Centres for Disease Control and Prevention) guidelines endodontic instruments (files) are classified as critical instruments.¹

*Corresponding author: **Bhagat S. Tanwar**

Department of Conservative Dentistry & Endodontics, KVG Dental College & Hospital, Sullia Karnataka, India

Three species of bacteria were inoculated into the root canals of the teeth to simulate an intra-canal infection. Two obligate anaerobic bacteria, *Fusobacterium nucleatum* (ATCC 10953) and *Porphyromonas gingivalis* (W50), and a facultative anaerobe, *Streptococcus mutans*, were used to represent the relative proportions of anaerobes and facultative anaerobes found in *endodontic infections*. Such anaerobes acts as a source of infections and they trapped inside the instruments.²

According to Gardner, It is an accepted principle that biological debris on instruments may prevent effective sterilization.

However, there is no scientific evidence to support this principle in relation to medical or dental instruments that are subjected to steam sterilization. The results of the present study demonstrated no growth of bacteria after the files had been processed by steam sterilization, irrespective of the prior cleaning procedure.

Johnson *et al.* examined the elimination of *Bacillus stearothermophilus*, a spore-forming bacterium that is extremely resistant to heat. Bacteria are more susceptible to cell death when exposed to air and the steam sterilization process. Johnson *et al.*, it can be proposed that biological debris on endodontic files does not reduce the efficacy of the steam sterilization procedures to eliminate microorganisms.³

It is also reported that *E. faecalis* can remain viable on inanimate surfaces for up to 4 months (Kramer *et al.* 2006). *E. faecalis* is a Gram-positive facultative anaerobic bacterium frequently found in the gastrointestinal tract and root filled teeth (Molander *et al.* 1998, Rocas *et al.* 2004, Stuart *et al.* 2006). It can survive and grow in a wide range of temperatures (10 °C-45 °C) and can withstand temperatures up to 60 °C for 30 min (Tendolkar *et al.* 2003).⁹

The goal of sterilization is to protect patients and health care workers by preventing cross contamination from instruments. The process involves a series of sequential steps aimed at Removing and killing microbes on contaminated instruments and maintaining those instruments in an aseptic state until they are reused.

Aim and objective

The aim of study was to assess the knowledge and attitude of post graduate students of department of conservative dentistry and endodontics towards sterilisation of endodontics instruments in dakshinakannada district colleges of Karnataka which include 5 dental colleges.

MATERIALS AND METHODS

A cross-sectional study was approved by Ethical community of KVG Dental college & Medical college, performed in the geographic area of dakshinkannada. Study was conducted among 5 dental colleges (present on the day of survey) 62 Post graduate students (I, II, and III year) from Department of Conservative Dentistry and Endodontics in dakshinkannada district dental colleges were included in the study.

A validated, interviewing questionnaire was used and distributed among all participants, and Confidentiality was maintained.

Questionnaire

1. On an average how many root canal therapy do you performed per day?
 - a. 2
 - b. 3
 - c. 3-5
 - d. 5-10
2. Do you sterilize instruments in your clinic after every use in patient?
 - a. Yes.
 - b. No.
3. How do you clear off the debris after use of files in patient?
 - a. Wipe with spirit.
 - b. Ultrasonic cleaner.
4. Do you sterilize new endodontic files before use in patient?
 - a. Yes.
 - b. No.
5. If you sterilize endodontic instruments like root canal files. How do you sterilize it?
 - a. Using glass bead sterilizer or
 - b. Using chemical.
 - c. Using spirit.
 - d. autoclave
6. Do you use ultra sonic cleaner to clean used endodontic files?
 - a. Yes
 - b. No
 - c. Some times
7. How do you sterilize your hand piece?
 - a. Chemical sterilization
 - b. Hand piece sterilizer
 - c. others
8. Do you sterilize gutta-percha before obturation?
 - a. Yes
 - b. No
 - c. Some times
9. Do you sterilize your burs after use?
 - a. Yes
 - b. no
 - c. Some times
10. If yes how do your sterilize your burs?
 - a. Glass bead sterilizer
 - b. Chemical sterilization
 - c. Auto clave
11. Do you use colour bag for waste disposal for instruments?
 - a. Yes
 - b. No

Statistical analysis: done with using SPSS software version 10.0 and evaluated the data.

RESULTS

In knowledge section, 80.2 % participants performed 3-5 root canal per day, while 15 % participants performed 5-10 root canal therapy per day, 2.8 % participants performed 3 root canal per day. While participants accepted endodontic instruments need to be sterilized and 85 % reported that new endodontic instruments can be sterilised before used in patients.

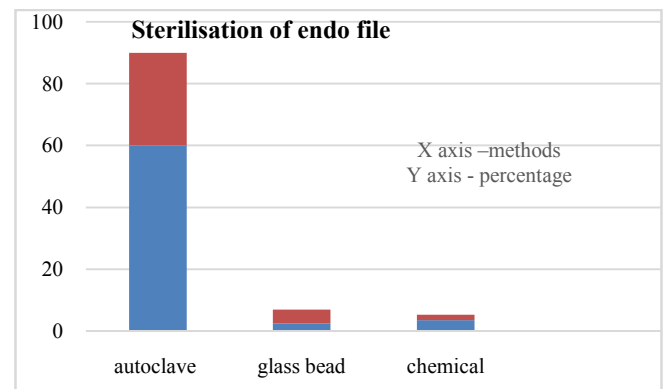


Figure 1 Showing sterilisation of Endodontic file and their perception about different methods of sterilisation.

For sterilization, 60% said autoclave and 30% glass bead sterilization. All of the PG students (85%) perceived that cross infection can occur with the use of unsterilized endodontic rotary files and all of them considered importance of sterilization to prevent it. In practice, the method of cleaning of file was brushing with soap & wiping with spirit (50%), ultrasonic bath (30%), and chemical solution (20%). The present study showed that the brushing with soap & wiping with spirit was the most common known method of choice to clean the endodontic files.

while 40 percent use hand-piece sterilisers to sterilise. And 10 percent sterilise with others mode like wiping it with spirit.

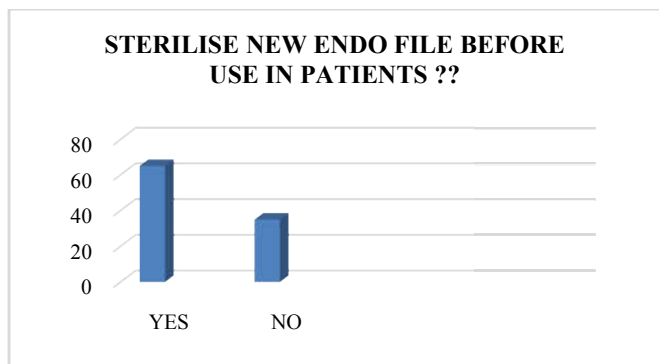


Figure 2 Showing Sterilisation of New Endodontics file.

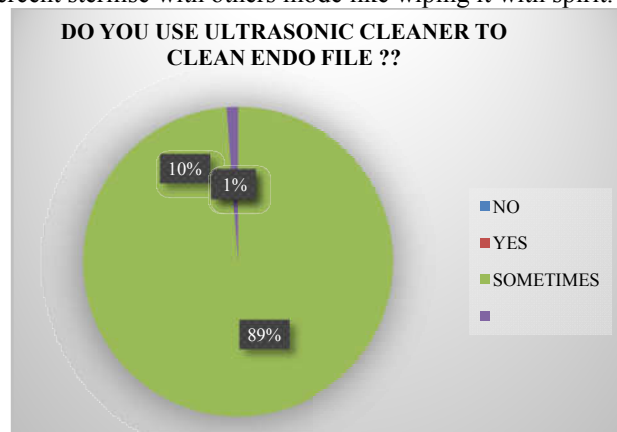


Figure 5 Showing perceptions regarding ultrasonic cleaner to clean endo file.

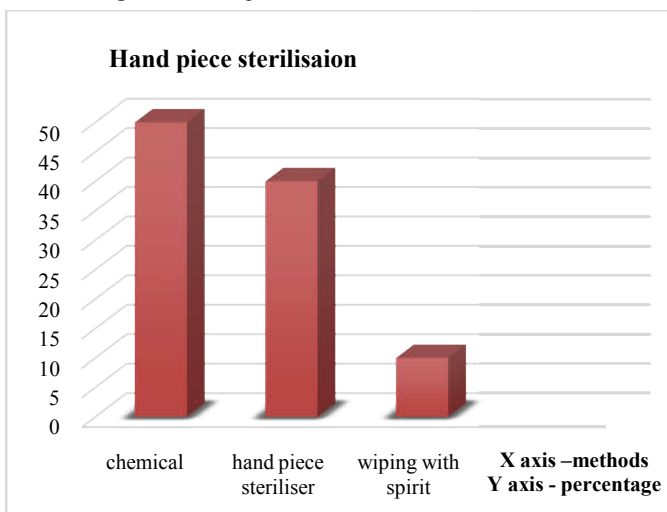


Figure 3 Showing percentage and distribution regarding hand-piece sterilisation

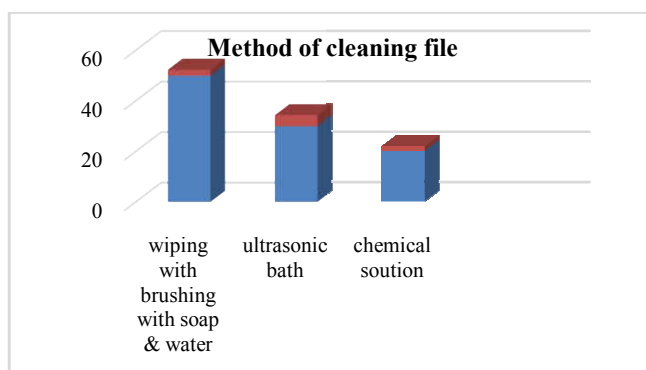


Figure 6 showing different methods used for "Cleaning" of hand file during routine endodontic treatment.

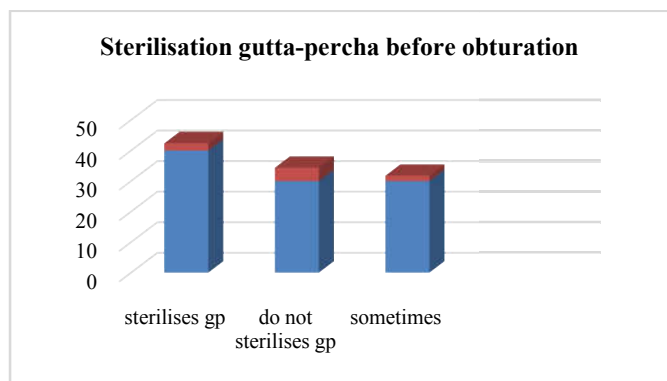


Figure 4 Showing perceptions regarding Sterilisation of gutta-percha.



Figure 7 Showing participants distribution regarding sterilisation of "Dental Burs"

Similarly, ultrasonic bath method was observed as best method to clean endodontic files in a study after evaluating biological debris and microbial counts. While 90% use ultrasonic bath to clean the endo file. It was reported that 50 percent students used chemical mode of sterilisation to clean the hand piece

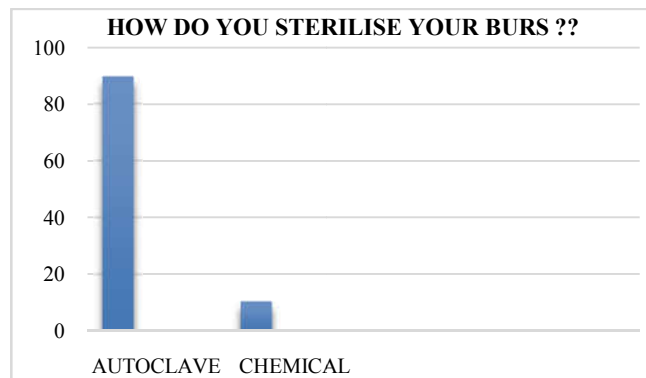


Figure 8 Showing methods of sterilisation of dental burs used during routine procedure.

While 40% sterilise gutta-percha before obturation with 2.5% Sodium hypochlorite. 30% do not sterilise gutta-percha, while 30 % participants sometimes they sterilises gutta-percha.

It was reported that 30 percent students sterilises the burs before use. While 43% they will sterilise sometime. While 90 % sterilises with autoclave & 10 % with chemical sterilisation, while 60% do not use colour coded bags for sterilisation

DISCUSSION

The emergence of the blood-borne pathogens and the infections are of increasing interest in dental healthcare which compel the dental professionals to have thorough knowledge about contagious diseases and its management. This survey yielded interesting findings regarding knowledge, attitudes, and practice among Post graduates of endodontics. Emerging agents as Ebola, Middle East Respiratory Syndrome-Corona Virus (MERS-CoV), H1N1 and H5N1 and others can be also transmitted during dental practice.¹¹

The data from this study indicated that the current state of student's knowledge related to sterilization of endodontic files was high. As cleaning and sterilizing endodontic instruments is a prerequisite for their reuse, knowledge regarding single use endodontic files was only known by 35%.

Furthermore, files which may carry significant material residues after washing might pose a threat of transmission risks if this residue were to carry variant Creutzfeldt-Jakob disease (vCJD) infectivity as it is an incurable, fatal disease and the causative agent, an abnormal prion protein is resistant to conventional sterilization procedures.²

Oliet demonstrated the inhibition of sterilization when the files were not cleaned prior to placement in a dry heat sterilizer. Several studies demonstrated that new files removed from the manufacturer's packet contained debris. Eldik *et al* showed that new files removed from manufacturer's packet were not sterilized. Thus, the new file should be sterilized before use.²

The CDC recommends that flash sterilization not be used routinely in the dental office to sterilize patient instruments- this process should only be used in unavoidable situations.

Instrument sterilization involves four distinct processes; presterilization, cleaning, sterilization, and aseptic storage. The methods for decontaminating endodontic instruments that are routinely applied are ineffective in removing biological debris. The importance of cleaning the instruments before, during, and after the use is mentioned in many studies.¹²

Ultrasonic cleaners have the advantage of being faster, easier in cleaning besides reduces the direct handling of contaminated instruments which decreases the chances of accidental skin punctures and cuts from pointed or sharp instruments. The optimum time for cleaning is between 5 and 10 min. According to Van eldik *et al*² Ultrasonic bath method was observed as best method to clean endodontic, files in a study after evaluating biological debris, and microbial counts.² Along with the knowledge regarding sterilization of endodontic files, 99% perceived its importance in inhibiting cross infection indicating high positive attitude. *Autoclave* is the first method of choice followed by dry heat, chemical vapour for critical and semi-critical instrument.

Glass bead sterilizer used as an aid for a chairside fast Sterilizer may be effective sterilizing the working ends, but

ineffective in completely sterilizing.¹³ DA Van Eldik, at all, 99.88 per cent reduction in bacterial numbers was achieved after cleaning with the ultrasonic cleaner.² The corrosion is most severe in steamsterilization group, followed by chemical sterilization, dry heat sterilization. Dry heat sterilization shows less corrosion.⁵

Even though gutta-percha cones are usually sterile during storage, they can be easily contaminated if incorrectly manipulated. This study found a 2.5% concentration of NaOCl to be an effective agent in disinfecting contaminated gutta-percha cones at no additional costs.⁶

Autoclaving was effective in the sterilization of sponges and endodontic instruments. Endodontic sponges should be autoclaved before clinical use. For clinical efficiency and cost-effectiveness, rotary NiTi instruments can be sterilized in endodontic sponges without removal of rubber stoppers.⁹

Repeated cycles of autoclave sterilization do not seem to influence the mechanical properties of NiTi endodontic instruments except for the K3XF prototypes of rotary instruments that demonstrated a significant increase of cyclic fatigue resistance.¹⁰

Similar study was done for orthodontic instruments, orthodontic plier disinfection using three different disinfectants was assessed. In most tests, Sanosil (disinfectant) was more efficient than Deconex (disinfectant) and both were more efficient than Micro10+. The studied disinfectants reduced mean colony counts of bacteria even after 5 min immersion significantly. Generally antimicrobial activity increased by increasing immersion time.¹⁴

Periodontal diseases will be one of the main applications for PDT within the oral cavity. Reasons for such a use are the multispecies infection and multifactorial genesis, the localization of the bacteria and, probably the fact that the method is easy to perform. By photosensitization, even the multi-resistant Gram-negative hospital strains are killed.

Besides killing, important virulence factors of Gram-negative bacteria are diminished by Photodynamic therapy, e.g., endotoxins and proteases. Exposure of LED with various of quantum yield can activate chlorophyll of to produce ROS that cause damage to the bacterial cell.¹⁵

Dewa *et al*, Detecting *E. faecalis* and *C. albicans* from clinical sample taken from the root canal can be done using culture or *real-time quantitative Polymerase Chain Reaction* (qPCR). The average number of *C. albicans* and *E. faecalis* in endodontic retreatment group almost doubled compared to the group of primary endodontic treatment. The persistence of the microorganisms in the root canal because it is not eliminated at the time of instrumentation, and resistant to disinfection materials. In addition, these microorganisms enter the dentin tubules that are not untouchable with disinfection materials and mechanical cleaning and shaping.¹⁶

CONCLUSION

The knowledge among the post graduate Endodontist regarding sterilisation of endodontic instrument was found fair and adequate. Also in current available resources of sterilisation cleaning and sterilisation its time consuming process. In dentistry there is vast variety of materials available and their effective sterilisation and disinfection should be

recommended before and after doing the endodontic therapy. Unfortunately, there is limited research available to recommend any guidelines or protocols on which to base sterilization procedures. In this era there is need of such chair side devices which can be less time consuming, less corroded the endodontic instrument, and prevents further cross-contamination.

References

1. William A. Rutala, David J. Weber and the Healthcare Infection Control Practices Advisory Committee. Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008
2. A Van Eldik, PS Zilm, AH Rogers, PD Marin. Microbiological evaluation of endodontic files after cleaning and steam sterilization procedures. *Aust Dent J* 2004;49(3):122-127.
3. Johnson MA, Primack PD, Loushine RJ, Craft DW. Cleaning of endodontic files, Part I: The effect of bioburden on the sterilization of endodontic files. *J Endod*. 1997 Jan;23(1):32-4
4. Effect of heat sterilization on surface characteristics and microstructure of Mani NRT rotary nickel-titanium instruments. *IntEndod J*.2006; 39:770-8.
5. Li RM, Wang CL, Xu GX, Ye L, Tan H. [Effects of different sterilization methods on the corrosion of dental fissure bur]. *Hua Xi Kou Qiang Yi XueZaZhi*. 2007 Dec;25(6):580-3.
6. Ozalp N, Okte Z, Ozcelik B. The rapid sterilization of gutta-percha cones with sodium hypochlorite and glutaraldehyde. *J Endod*. 2006 Dec; 32(12):1202-4.
7. Hamann CP. How to clean, disinfect, and sterilize a dental operatory. *Dent Assist*. 2004 Nov-Dec; 73(6):44, 46, 48-9.
8. Condryn AK. Disinfection and sterilization in dentistry. *Tex Dent J*. 2014 Aug; 131(8):604-8.
9. Chan HW, Tan KH, Dashper SG, Reynolds EC, Parashos P. Sterilization of rotary NiTi instruments within endodontic sponges. *IntEndod J*. 2015 Aug 17.
10. Plotino G, Costanzo A, Grande NM, Petrovic R, Testarelli L, Gambarini G. Experimental evaluation on the influence of autoclave sterilization on the cyclic fatigue of new nickel-titanium rotary instruments. *J Endod*. 2012 Feb;38(2):222-5.
11. Ibrahim NK, Alwafi HA, Sangoof SO, Turkistani AK, Alattas BM. Cross-infection and infection control in dentistry: Knowledge, attitude and practice of patients attended dental clinics in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. *J Infect Public Health*. 2017 Jul - Aug; 10(4):438-445.
12. Miller CH. Sterilization. Disciplined microbial control. *Dent Clin North Am*.1991 Apr; 35(2):339-55.
13. Engelhardt JP. Factors affecting sterilization in glass bead sterilizers. *J Endod* 1984; 10:465-70.
14. Majid Ghanbarzadeh, MahboobeDehghani, Kiarash Ghazvini, Taraneh Movahhed Disinfection of orthodontic pliers using three different disinfectants *j int dent med res* 2014; 7: (1), pp. 1-6
15. Ernie MaduratnaSetiawatie, SuryaniDyahAstuti, A. H. An in vitro Anti-microbial Photodynamic Therapy (aPDT) with Blue LEDs to Activate Chlorophylls of Alfalfa *Medicagosativa* L on *Aggregatibacteractinomycetemcomitans*. *J Int Dent Med Res* 2016: 9 -(2)P 118-125.
16. Dewa Ayu N.P.A., Boy M. Bachtiar, Siti M. Soerono Akbar., Quantitative Real-Time PCR of cps Type 1, 2 and 5 of *Enterococcus faecalis* and *Candida albican* Isolated from Infected Root Canal of Subject Requiring Endodontic Treatment ., *Journal of International Dental and Medical Research* 2016 Volume 9 - Number 3 Pages 157-163.

How to cite this article:

Krishna Prasada L *et al* (2018) 'Knowledge and Attitude of Post Graduate Students of Department of Conservative Dentistry & Endodontics Towards Sterilisation of Endodontics Instruments In Dakshinakannada District Karnataka Dental Colleges - A Cross Sectional Study', *International Journal of Current Advanced Research*, 07(2), pp. 10324-10328.
DOI: <http://dx.doi.org/10.24327/ijcar.2018.10328.1744>
