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## RESEARCH ARTICLE

# COMPARATIVE ASSESSMENT AND CORRELATION OF DENTAL PATHOLOGIES BETWEEN CLINICAL AND RADIOGRAPHIC EXAMINATION–AN OBSERVATIONAL STUDY

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**ABSTRACT**

**Statement of the Problem:** Panoramic radiography is a widely used two dimensional extra oral radiographic technique for detection of dental diseases, jaw pathologies and other systemic diseases.
**Purpose:** This study investigates the use of this technique as a routine screening procedure to detect hidden pathologies that may go undiagnosed clinically.
**Materials and Method:** One hundred patients who visited dental OPD were selected for the study. SPSS Version 19.0 was used for statistical Analysis. Data was analyzed using Chi-Square Test and correlation between clinical and radiological findings was assessed by and co relational regression analysis.
**Results:** Statistically significant amount of additional pathologies were detected on panoramic radiograph
**Conclusion:** Panoramic radiograph can be used as a screening tool to detect additional or hidden pathologies supplementary to visual clinical examination.



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## INTRODUCTION

Appropriate Diagnosis is important to plan and execute the treatment. Usually clinical examination of an oral cavity helps the dental practioner to diagnose the dental pathology, however to understand severity of the disease radiographs are advocated. In dentistry intraoral radiograph is most important in dental diagnosis; however an intraoral radiograph is somewhat limited in its overall coverage of the maxillo-mandibular structures. Conventional extra oral radiographs achieve better coverage, but are frequently plagued by distorted images, lack of definition and superimposition of anatomic structures. Panoramic radiography overcomes most of these limitations. Panoramic radiography is a simplified extra oral procedure which allows examination of entire dentition, jaw bone, temporomandibular joints and adjacent structures on a single film. (White and Pharoah, 2014) since its introduction into the general practice of dentistry in the early 1960s, panoramic radiography has gained considerable popularity as a diagnostic tool. (Langland and Langlais, 1989)

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Early diagnosis of hidden or facial pathologies using panoramic radiography plays a very important role in clinical dentistry include not only correlation with the clinical findings but also helps patients to seek prompt treatment for incidental findings that are not seen clinically. Considering this the radiation dose involved in the panoramic radiograph (9-26 μSv which is very low as compared to 171 μSv and 35 μSv using rectangular and round collimator for complete intraoral film mouth survey of using F speed film) (White and Pharoah, 2014) and its diagnostic yield, routine examination by panoramic radiograph on the initial clinical visit may be useful screening tool in early detection of various pathologic and incidental findings. Very few studies have been conducted to show importance of OPG for routine screening, this provided us an impetus to carry out this study.

### Aim

To assess the prevalence of dental disease using panoramic radiograph.

### Objectives

- To correlate the radiographic findings with clinical diagnosis.

- To evaluate the hidden dental pathology with panoramic radiography.

## MATERIALS AND METHOD

### Data Collection

### Study setting

Patients who reported to the department of Oral Medicine and Radiology were screened randomly by panoramic radiograph between Jan 2015-March2015 by the principal investigator (TK).

### Eligibility criteria

**Inclusion:** patients visited dental OPD for dental diseases

**Exclusion:** Pregnant women (1st and 3rd trimester). Patients not willing to give consent were excluded.

### Calibration

Standardization and calibration of the principal investigator for clinical examination and radiographic interpretation was done at Dept of Oral Medicine and Radiology under the supervised guidance of head of the department. After obtaining the written informed consent, randomly patients were subjected to OPG examination in digital Orthopantomograph machine, CS 8000 keeping standard parameters at 73 kVp, 12mA, 13.9 sec for adult and 71kVp, 10mA, 13.2 sec for child.

Panoramic radiography was performed with the patient in a standing position and the mandible placed on the chin rest of the machine. Frankfort's horizontal plane, sagital plane and canine line adjusted by laser guidance. The radiographs obtained on computer screen were carefully evaluated for the presence of any hidden dental pathologies.

### Sample size

Based on the pilot study, 30% of patients were advised intraoral radiography to confirm clinical diagnosis, with level of significance at 95%, Power of study 80%, we calculated the sample size using formula $4PQ/L^2$, the sample size was estimated to be 100. Data was collected, compiled, tabulated and subjected for statistical analysis .SPSS Version 19.0 was used for statistical Analysis, quantitative data was analyzed using Chi-Square Test and correlational regression analysis was employed for assessing correlation between clinical and radiological findings

## RESULTS

The overall findings or pathologies that were seen on panoramic radiographs included dental caries, impaction, elongated styloid process, congenitally missing teeth, root piece, periapical pathology, retained deciduous teeth, pulp stones, root canal treated teeth, fixed partial denture, periodontal bone loss, altered tooth/root morphology, sinus pathology, idiopathic sclerosis, rotation/transposition, altered condylar morphology and benign tumor. 79 patients out of 100 on OPG had one or more finding/ pathology.

**Table 1. Prevalence of overall findings/pathologies on OPG examination**

| Overall finding/pathologies | Number | Prevalence (%) |
|---|---|---|
| Dental caries | 26 | 26 |
| Impaction | 28 | 28 |
| Elongated styloid process | 14 | 14 |
| Missing teeth | 31 | 31 |
| Root piece | 10 | 10 |
| Periapical pathology | 12 | 12 |
| Over retained teeth | 5 | 5 |
| Pulp stone | 19 | 19 |
| Rc treated teeth | 11 | 11 |
| Fixed partial denture | 5 | 5 |
| Periodontal bone loss | 17 | 17 |
| Altered morphology(tooth/root) | 4 | 4 |
| Sinus pathology | 2 | 2 |
| Idiopathic sclerosis | 5 | 5 |
| Rotation/transposition | 3 | 3 |
| Altered condylar morphology | 9 | 9 |
| Benign tumor | 1 | 1 |

NOTE: 79 patients out of 100 on OPG had one or more finding/ pathology.

**Table 2. Incidental findings seen on OPG examination**

| Finding/pathologies | Number of Patients | On OPG (incidental findings) | Percentage (%) |
|---|---|---|---|
| Caries | 26 | 9 | 34.61 |
| Impaction | 28 | 12 | 42.85 |
| Elongated styloid Process | 14 | 14 | 100% |
| Periapical pathology | 12 | 12 | 100% |
| Pulp stone | 19 | 19 | 100% |
| Sinus pathology | 2 | 2 | 100% |
| Idiopathic sclerosis | 5 | 5 | 100% |
| Altered condylar Morphology | 12 | 12 | 100% |
| Benign tumor | 1 | 1 | 100% |

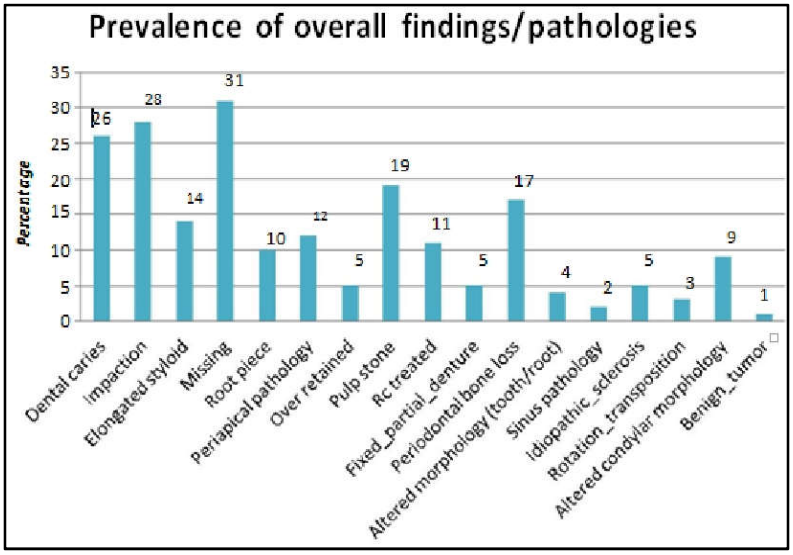
Prevalence of congenitally missing tooth was highest (Table 1, graph 1). Prevalence of pulp stone was highest amongst incidental or additional findings followed by elongated styloid process that were seen on OPG (Table 2, graph 2). 12 patients had impaction and periapical pathologies that were missed on clinical examination due to asymptomatic nature. 9 additional caries findings also recorded on opg that were unable to detect only on clinical examination. 12 altered condylar morphologies, 5 idiopathic sclerosis, 2 sinus pathologies and 1 benign tumor recorded on OPG though all these were asymptomatic (Table 3, graph 3).

## DISCUSSION

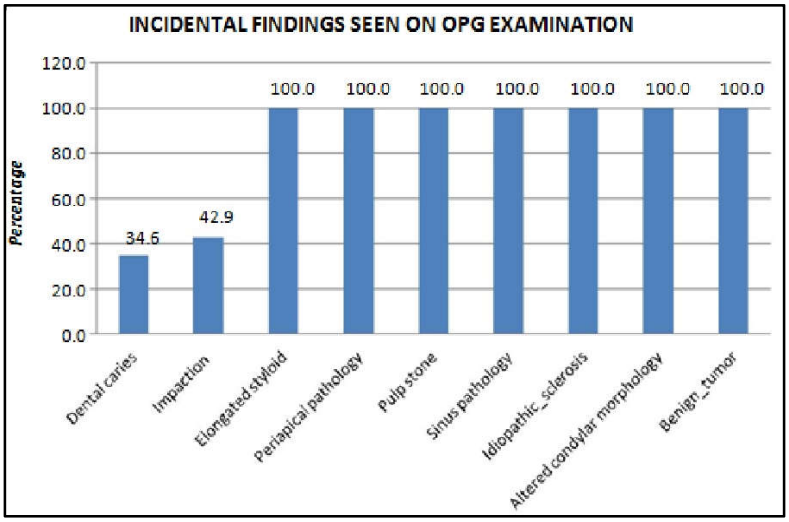
The present study was carried out to asses any missing dental pathologies during routine dental examination using panoramic radiograph. We used OPG for identifying hidden pathologies over full mouth intraoral periapical radiographs as OPG had advantages of wide coverage of arches, less radiation exposure, simplicity in operation and patient convenient. Congenitally missing teeth (31%) was the most common radiographical finding observed in the present study, probably disturbance during amelogenesis, missing permenant counterpart might be the reason.

**Table 3. Comparison between findings/pathologies based on clinical examination and incidental/ additional findings on OPG examination**

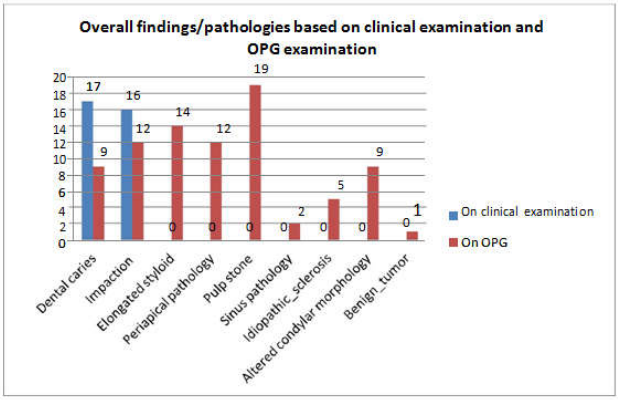
| Overall finding/pathologies | Number of patients | On clinical examination | On OPG(incidental/additional findings) | p-value | Remarks |
|---|---|---|---|---|---|
| Caries | 26 | 17 | 9 | P=0.02 | Significant |
| Impaction | 28 | 16 | 12 | P=0.26 | Not Significant |
| Elongated styloid | 14 | 0 | 14 | P<0.0001 | Significant |
| Periapical pathology | 12 | 0 | 12 | P<0.0001 | Significant |
| Pulp stone | 19 | 0 | 19 | P<0.0001 | Significant |
| Sinus pathology | 2 | 0 | 2 | P=0.49 | Not Significant |
| Idiopathic sclerosis | 5 | 0 | 5 | P=0.05 | Significant |
| Altered condylar Morphology | 12 | 0 | 12 | P<0.0001 | Significant |
| Benign tumor | 1 | 0 | 1 | 1.0 | Not Significant |




**Graph 1. Prevalence of Overall findings/Pathologies seen on OPG**




**Graph 2. Incidental findings seen on OPG examination**




**Graph 3. Prevalence of findings/pathologies based on clinical examination and incidental/additional findings on OPG examination**

Moreover polygenic mode of inheritance with epistatic gene and environmental factors might influence teeth missing congenitally (Badrov *et al*., 2017; Abdalla *et al*., 2014; Pawlowska *et al*., 2010; Dreesen *et al*., 2014. These findings are similar to the study conducted by santosh patil (Patil, 2013). When patients were subjected for routine radiographic examination it was observed that 12% of patients had impacted teeth, this clearly suggest the importance of advising OPG for detecting impacted tooth. Apart from detecting the impaction, OPG helps to diagnosis any periapical, pericoronal pathologies, cyst, angulation of impacted teeth, etc that will help to accurately plan the for disimpaction. This is in agreement with the study conducted by Shah RM, Grover PS and Thilander (Shah *et al*., 1978; Grover, 1985; Thilander, 1973). Clinically it is difficult to detect the pulp stones and it was observed in our study 19% of patients had pulp stones. These findings help to overcome the difficulties during endodontic treatment. This accidental pulp stone detection also helps to assess patient's systemic health condition like Hypertension and coronary artery condition and thus underlines the importance of OPG in dental health care (Nayak, 2010).

Elongated Styloid process was seen in 14% of patients and may be associated with series of symptoms such as foreign body sensation in throat, pain in rotating head, vertigo, facial pain, headache, trismus and tinnitus. OPG could be advised in suspected origin of pain in tonsillar or pharyngeal region, as many earlier studies have reported the significance of detecting elongated styloid process in overcoming dilemma between pain of dental or muscular origin .This finding is similar to the studies conducted by chandramani *et al*. (2010) advocating OPG in patients with pain in tonsilar region, neck region, and difficulty in swallowing is justified to rule out the elongated styloid process. Choi, (2011) in his study reported caries detectability of clinical examination in occlusal and buccolingual surface was higher than that of panoramic examination, however it was statistically insignificant. In proximal surface, caries detectability of panoramic examination was higher than that of clinical examination, and it was statistically significant. When the two examination methods were combined, additional detection of caries was possible33 (48.2% in proximal). This was favoring our study where 9 % of the detected caries were incidental findings and all were proximal/ root caries

## Conclusion

To conclude, although panoramic radiograph should not be used to replace visual clinical examination, this study showed that many dental findings like caries, impaction, periodontal bone loss, altered tooth and root morphology etc and jaw bone pathologies/findings like sinus pathology, presence of benign tumor, elongated styloid process, sclerosis etc could be detected on panoramic radiograph. Early detection of these pathologies or findings could result in good treatment outcome and will improve overall oral health status of the patient and will Thus it can be a valuable tool in screening of a mass population. Within the limitation of our study, it was observed it's wise to advice OPG routinely in dentistry as many undetected dental pathologies could be diagnosed .this helps not only in diagnosing dental diseases but many associated systemic conditions. OPG could be an alternative diagnostic tool for differentiating pain between dental and systemic origin.

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