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Original Article

Dentistry Section

Misdiagnosis: How Uncommonly Common is it?

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ABSTRACT

Introduction: General dentists may be the first dental practitioners to see children with dental problems. 'Misdiagnosis' of certain commonly occurring dental conditions in children by general dentists may lead to failure of treatment in children. There are a few studies that have evaluated either knowledge or practices of general dentists regarding specific conditions in children. However, we found a lacunae in studies that evaluate diagnostic ability of the dentists.

Aim: To evaluate the diagnostic skills and treatment acumen of general dentists related to caries and its consequences, dental injuries, and certain common as well as rare conditions in children.

Materials and Methods: The present study was a cross-sectional survey based study that included 55 general dentists treating children in their practices. Selected general dentists were asked to fill a questionnaire which included 15 questions with photographs, and complete description of history and clinical and/or radiographic findings of most commonly seen conditions in children. Options were provided for the diagnosis or treatment of each condition. Collected data were subjected to descriptive statistics and percentages of correct answers were obtained. Pearson's correlation coefficient was calculated to evaluate correlation between two continuous variables.

Results: None of the participants could answer all 15 questions correctly. Number of correct answers given by general dentists ranged from 4 to 13, average score of correct answers being 9. Number of years in practice did not have significant association with diagnostic skills and treatment acumen of the general dentists (r=-0.0022).

Conclusion: General dentists did not demonstrate sufficient diagnostic skills or treatment acumen of commonly seen oral conditions in children.

Keywords: General dentists, Incorrect diagnosis, Treatment failure

INTRODUCTION

An accurate diagnosis of any orofacial condition is a culmination of conscious scrutiny of symptoms of the patient, signs observed during careful examination, and appropriate investigative reports. Sound knowledge of orofacial anatomy, physiology and pathology is a prerequisite to making accurate diagnosis. 'Misdiagnosis' is defined as "incorrect diagnosis" in Oxford Medical Dictionary [1].

There are number of reasons for misdiagnosis to occur. It can be because of the lack of sound knowledge or lack of clinical experience on the part of the doctor, language barrier between patient and the doctor, a situation where condition is rare or presentation is extremely unusual, or malfunctioning medical equipment. An accurate diagnosis in children may be complicated due to inability of children to describe the symptoms. Misdiagnosis of an oral condition in children may lead to failure of treatment, cause unnecessary anxiety to the child and the parents, and add to treatment charges.

Children are treated by general dentists in most of the countries [2,3]. Since; they are the first dental practitioners to see children, their diagnosing and treatment skills are extremely important for successful outcome of the condition presented. It is believed that undergraduate education in paediatric dentistry would prepare general dentists in successfully treating children [4]. In India, undergraduate syllabus contains comprehensive paediatric dentistry [5].

Prevalence of certain conditions like dental caries, traumatic dental injuries, molar-incisor hypomineralisation is high in children [6-12]. It is highly likely that children will present with problems related to these conditions to general dentists. Therefore, present study was conducted to evaluate the diagnostic skills and treatment acumen of general dentists related to caries and its consequences, dental injuries, and certain common as well as rare conditions in children.

MATERIALS AND METHODS

A total of 55 practicing general dentists with the clinical experience of more than six years were selected to participate in the present study. General dentists who were associated with academic institutions or not practicing general dentistry were excluded from the study. A questionnaire included socio-demographic data of the participating dentists including age, gender, qualification, year of graduation and number of years in practice. Second part included 15 questions with photographs, and complete description of history and clinical and/or radiographic findings of most commonly seen conditions in children. Options were provided for the diagnosis or in some cases treatment of each condition.

Prepared questionnaire was evaluated by five senior paediatric academicians with clinical experience of more than 10 years, who evaluated each question for its relevance to the study as yes or no. All questions were found relevant by all the evaluators; however, modifications were suggested in phrasing of certain questions. These suggestions were incorporated in the final version of the questionnaire.

The final questionnaire included six questions to evaluate diagnostic and treatment skills of conditions related to dental caries and its consequences, two questions on dental trauma, five questions on commonly occurring other conditions and two questions on important but not so common conditions seen in children [Table/Fig-1]. Questions regarding uncommon conditions like eruption cyst and natal tooth were included as there is extensive coverage of these conditions in the undergraduate syllabus.

The questionnaire was filled by the participating dentists in the presence of the principal author without referring to any information sources.

Conditions	Number (n=55)	Percent (%)
Caries and its consequences		
Need for radiograph in carious primary tooth	52	94.5%
Need for antibiotics in infected primary tooth with no systemic symptoms	14	25.45%
Treatment of infected primary molar	26	47.27%
Obturating material for pulpectomised primary tooth	47	85.45%
Treatment of infected young permanent molar	24	43.64%
Dental injury		
Treatment of extrusive subluxation	29	52.73%
Treatment of avulsion of mature tooth with extra-oral dry time of 2 hours	27	49.09%
Commonly occurring conditions		
Treatment of finger sucking in a three-year-old child	18	32.73%
Diagnosis of exfoliating tooth	40	72.73%
Diagnosis and treatment of ugly duckling phenomenon	42	76.36%
Diagnosis of molar-incisor hypomineralisation	18	32.73%
Diagnosis of mesiodens	53	96.36%
Rare but important		
Diagnosis of eruption cyst	42	76.36%
Diagnosis of natal tooth	53	96.36%

[Table/Fig-1]: Frequency and percent of general dentists with appropriate diagnostic skills and treatment acumen of commonly seen conditions in children.

STATISTICAL ANALYSIS

Collected data were entered in Excel spreadsheet (Excel 2013; Microsoft Corporation, Redmont, WA, USA). Descriptive statistics including percentages was obtained using Excel functions.

RESULTS

Out of 55 participating general dentists, 35 were males and 20 were females and had average clinical experience of 12.5 years (range 6 to 36 years).

None of the participants could answer all 15 questions correctly. Number of correct answers given by participants ranged from 4 to 13, average score of correct answers being 9. A total of 28 participants (51%) answered 10 or more questions correctly.

A total of six questions were included to evaluate diagnostic skills of the general dentists regarding dental caries and its consequences in children [Table/Fig-1]. Need for a radiograph in accurate diagnosis of a deep carious lesion was correctly acknowledged by 95% of the dentists. However, 53% of the dentists could not correctly diagnose and plan treatment of an infected primary molar on the basis of a radiograph. A total of 75% dentists advised need for systemic antibiotics in a child with an infected primary tooth in the absence of systemic symptoms. Antibioma was diagnosed correctly by 47% of the dentists. Appropriate obturating material for a pulpectomised primary tooth was correctly identified by 86% of the dentists. However, diagnosis and treatment of endodontically involved young permanent molar was correctly given by only 44% dentists.

Two questions were included to evaluate treatment acumen of general dentists regarding dental trauma in children. Correct alternative of the treatment was given by 53% dentists in case of extrusive subluxation and by 49% dentists in case of avulsion of mature tooth.

Among five questions included to evaluate diagnosis and treatment acumen of commonly seen other conditions in children, mesiodens was diagnosed by 96% of the dentists; whereas, ugly duckling phenomenon in mixed dentition and signs and symptoms related to exfoliating tooth were accurately diagnosed by 76% and 73% dentists respectively. Molar incisor hypomineralisation was diagnosed by only 33% of the dentists. Need for treatment of finger sucking in a 3-year-old child was incorrectly suggested by 77% of the dentists.

Two questions were included to evaluate diagnostic skills of the dentists regarding uncommon but important conditions. Natal tooth could be diagnosed by 96% and eruption cyst could be diagnosed by 76% of the participating dentists.

Correlation Between Years in Practice and Percent of Correct Answers

In order to evaluate if number of years in practice of participating dentists affected their diagnostic skills, collected data were subjected to Pearson's correlation analysis [Table/Fig-2]. Very weak correlation was found between the two variables (r=-0.0022) suggesting number of years in practice did not have significant association with diagnostic skills and treatment acumen of the participating dentists.

	Number of years in practice	p-value
Total correct answers	r=-0.0022	1

[Table/Fig-2]: Correlation between number of years in practice of general dentists and their ability of correctly diagnosing commonly occurring dental conditions in children.
Not significant at 0.05 level

DISCUSSION

Until date, very few studies have been published that evaluate diagnostic skills of general dentists related to commonly occurring oral conditions in paediatric patients. As incorrect diagnosis influences the treatment, some questions with options for treatment choices were included in the questionnaire. General dentists with fair experience in treating paediatric patients were selected for the present observational study.

Awareness of general dentists or paediatric dentists has been studied in the past, where main focus has been on their knowledge regarding certain conditions. However, application of this knowledge in a given situation to arrive at a specific diagnosis and plan treatment correctly is not easy.

In the present study although majority of the dentists acknowledged the need for a radiograph in the diagnosis of a tooth with deep carious lesion, many could not diagnose the infected primary molar on the basis of an accompanying radiograph. Patil DP et al., also reported from a survey conducted in India that only 26% general dentists could diagnose pulpally involved primary molar on the basis of a radiograph [13]. Such misdiagnosis would be detrimental to the treatment option selected in an affected primary tooth, considering many general dentists perform pulp therapies in children [14]. Similarly, in a survey conducted in the USA to compare treatment options selected by general dentists and paediatric dentists on the basis of radiographs, McKnight-Hanes C et al., reported that more general dentists than paediatric dentists selected inappropriate treatment for pulpally involved teeth [15].

Although, systemic antibiotics are not recommended in infected teeth in absence of symptoms like fever and large extra-oral swelling due to inability of the antibiotic to reach the bacteria in therapeutic concentration owing to vascular damage in an infected tooth [16,17]. A total of 25% of the participating dentists recommended the use of antibiotics in the present study. It is a widespread belief that antibiotics make recovery from an infection faster, less painful and more certain [18].

Undue prescription of antibiotics by dentists has been reported in dental literature in many countries [19-22]. Such a practice leads to antibioma and development of resistance to certain organisms [16,23]. Other problems that may arise due to overuse of antibiotics are hypersensitivity reactions, toxicity, superinfection, and nutritional deficiencies [24].

Most of the dentists (85.45%) in the present study selected iodised calcium hydroxide as an obturating material for pulpectomised primary tooth from options that also included resin-based material, root canal sealer and Mineral Trioxide Aggregate (MTA). This material has been universally accepted as obturating material for infected primary teeth [25,26].

About half of the dentists included in the present study failed to select appropriate treatment for the cases with traumatic dental injuries. Since, only two questions were included in the study, the results cannot be generalised. However, other studies have found inadequate knowledge and awareness among dentists regarding treatment of traumatic dental injuries in permanent and primary teeth [27-30]. This lack of knowledge is detrimental to the survival and successful outcome of an injured tooth, considering time is an important factor in the success of treatment and most of the injuries will be initially handled by general dentists.

In the present study, Molar-Incisor Hypomineralisation (MIH) could not be diagnosed by 67% of the dentists. Similar lack of diagnosis of MIH has been reported earlier by Weerheijm KL et al., [12]. Silva MJ et al., investigated the perception and knowledge of general dentists regarding MIH and concluded that more training was required among general dentists [31].

Management of teeth affected by MIH is complicated due to severe sensitivity, chronic pulpal inflammation, ineffective pain control during treatment, dental fear, behavioural management problems, postoperative breakdown of tooth requiring repeated treatment, and poor restorative longevity due to altered tooth structure [32-35]. Misdiagnosis of MIH by treating dentist may lead to inadequate treatment and increased frequency of retreatments.

Flaring of maxillary incisors along with midline diastema is a common self-corrected developmental phenomenon, termed as ugly duckling stage, in early mixed dentition in children [36,37]. Misdiagnosis of this normal developmental stage may lead to unnecessary treatment. Results from present study showed that most of the dentists were aware of the phenomenon.

More than 77% of the dentists included in this study incorrectly suggested treatment for finger sucking in a three-year-old child. However, interventions to cease the non-nutritive sucking habits are recommended to children only above three years [38].

Diagnosis of mesiodens and eruption cyst was given by most of the dentists. Even natal tooth was diagnosed correctly by almost all of the dentists. Although these conditions are not so common, they do have severe impact on the parents. Correct diagnosis of the condition will ensure correct steps in the treatment.

LIMITATION

Limitation of the present study was small sample size. Also, due to obvious constraint of the length of the questionnaire only 15 questions were included. Caution must therefore be exercised in generalising the results of the study. Information regarding participation of these dentists in continuing dental education programs related to paediatric dentistry was not collected in the present study. It would be interesting to study effect of such participation on diagnostic skills of dentists.

CONCLUSION

Alarmingly low percentage of dentists included in the present study could correctly diagnose or plan treatment for commonly seen conditions in children like infected primary molar (53%), endodontically involved young permanent molar (44%), molar incisor hypomineralisation (33%), and finger sucking in a three-year-old child (33%). Injudicious use of antibiotics was advised by 75% dentists. Almost half of the dentists could not plan correct treatment for dental injuries. Diagnostic skills were not found to be correlated with the clinical experience of the dentists. General dentists who treat pediatric patients should update their knowledge and skills through continuing education programs.

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